SRI LANKA ECONOMICS RESEARCH CONFERENCE (SLERC) 2015

PROCEEDINGS

of

4th International Conference of Sri Lanka Forum of University Economists

Volume IV

Editorial Board

Chief Editor
Dr. Sumudu Perera

Co-Editors
Dr. W.S. Handapangoda
Mrs. P.P.Lalanie
Dr. M.A.K. Sriyalatha
Mr. P.J.S. Fernando

Department of Business Economics
Faculty of Management Studies and Commerce
University of Sri Jayewardenepura, Sri Lanka

20th and 21st November 2012

This publication is sponsored by

National Center for Advanced Studies in
Humanities and Social Sciences
Colombo 7
Sri Lanka

National Science Foundation
Colombo 7
Sri Lanka

MESSAGE FROM THE VICE CHANCELLOR
University of Sri Jayewardenepura

It is with extreme pleasure that I write this message as an economist to the Proceedings Book of 04th International Conference of Sri Lanka Forum of University Economists, Sri Lanka Economic Research Conference 2015 hosted by the University of Sri Jayewardenepura.

Since inception the University of Sri Jayewardenepura has been promoting prompt academic dialogue within its national role as a center for excellence in research and innovation. Faculty of Management Studies and Commerce in particular has been a dynamic and an appealing Faculty in its way to become the center for excellence in management education.

Apart from the regular scientific forum and the annual international conferences that are organized frequently by the Faculty, the tenure to host the Sri Lanka Forum of University Economists have allowed room for our academics grow their network whilst engaging in high quality research work. The carefully picked theme for this year, "Inclusive Growth towards Economic Transformation" is undoubtedly an issue of high interest for me personally. Though it is a national issue which is relatively new to local researchers it has been there within the economic vocabulary of the contemporary world for quite a while. It is high time that academia engages in studying how the less privileged parties could be involved in ongoing economic activities to bring out the expected efficiency levels of the national output. It is very important that nations include all parties in to their economic processes while securing the competitiveness the global market place while competing with economic giants for our share of consumption.

I have learned that the organizing committee has arranged for a multitude of well respected and renowned speakers including representatives of World Bank, International Monetary Fund, Central Bank of Sri Lanka, Chamber of Commerce, Center for Poverty Analysis and Deputy Minister of Foreign Affairs as panelists to participate in the panel discussion followed by the inaugural session of the conference. This provides ample evidence of the quality of the papers presented on the following day during the technical sessions.

The University of Sri Jayewardenepura has always encouraged Research by way of providing adequate grants and other resources to all academics. It is indeed a pleasure to cater and spearhead a University which comprises of academics with diverse and flamboyant research interests.

Concluding my message I wish to extend my best wishes to the Dean of the Faculty of Management Studies & Commerce and the Staff of the Department of Business Economics for their throbbing efforts and plenteous contribution to make this academic event a great success. I heartily commend the Chairperson and the Conference Committee for their dedication and commitment in organizing this event.

I wish the sessions every success.

Professor Sampath Amaratunge
Vice Chancellor
University of Sri Jayewardenepura

MESSAGE FROM THE DEAN
Faculty of Management Studies and Commerce
University of Sri Jayewardenepura

As the Centre of Excellence in Management Education in Sri Lanka and beyond, the Faculty of Management Studies and Commerce (FMSC) is delighted to host the 4th International Conference of the Sri Lanka Forum of University Economists to further encourage the process of creation and dissemination of knowledge.

The FMSC is the largest and pioneering Management Faculty in the Sri Lankan University System with nearly 6,000 internal undergraduates and 200 academics. Among the academic staff, there are 16 professors and more than 50 PhD holders. There is no other management institution having this kind of concentration of knowledge and expertise in a Sri Lankan educational establishment. We have produced high profile graduates, researchers and professors who have gained recognition around the world in their respective fields and in global organizations.

I am certainly overwhelmed with the role played by the Department of Business Economics of the Faculty of Management Studies and Commerce in the Sri Lanka Forum of University Economists during its tenure to lead and host this conference. Being the apex event in the annual calendar of the Forum, the Sri Lanka Economics Research Conference (SLERC) - 2015 was organized under the theme of "Inclusive Growth towards Economic Transformation". Inclusivity being a concern for decades has not been adequately discussed in academic forums of this nature within the country thus far. Therefore, the SLERC 2015 has provided the timeliest platform to bring about the reality of inclusivity in terms of concept and application through high quality research work.

Being a developing country for many decades, Sri Lanka has not been successful in integrating inclusivity in its production function. This has created social and community unrest that caused undesired circumstances unless otherwise could have been prevented. Furthermore, the true national policy issues have not been sufficiently skimmed to be addressed. Those concerns are rather being used as political dramas where the true interest to solve the real issues are missing out in contemporary policy making. The structural transformation of an economy should be inevitably supported by labour efficiency and overall productivity. Programmes aimed at improving labour productivity especially in agricultural sector should be streamlined. The lethargic performance of local industry contributes unsatisfactorily to overall economic activity. Though the services sector is booming, it is not a balanced growth, as the growth in other sectors is not properly linked to the growth in the services sector. The consumer protection is most neglected due these unbalanced transformational patterns. Accordingly, it should be

seriously taken to consideration that the economic transformation of a country should be balanced and inclusivity is highly endorsed thereof.

Furthermore, it should not be taken lightly that there is a huge discipline of indigenous knowledge in Sri Lanka that explicitly includes nature, culture, sustainability and healthiness in all human socio-economic behaviour. The religions or either its evolutions provide solid basis for human development which is not material rather spiritual.

It is high time for us to seriously consider inclusivity in economic activities in to the policy-making exercises of the country.

It is my pleasure to thank and wish the conference organizing committee for all their efforts throughout this whole year and times to come.

Dr. U Anura Kumara
Dean, Faculty of Management Studies and Commerce
University of Sri Jayewardenepura

MESSAGE FROM THE COORDINATOR
Sri Lanka Economics Research Conference (SLERC) 2015

It gives me a great privilege and pleasure as the Coordinator to write this message for the Conference Proceedings of the 4[th]International Conference of Sri Lanka Forum of University Economists – SLERC 2015 hosted by the Department of Business Economics, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura.

The SLERC has always been the chosen platform for the Economists in Sri Lanka, in particular, as well as for the experts around the world, to present the very best research results, solutions to contemporary problems and insight to the emergent new challenges. In keeping with this practice, SLERC 2015 is also structured under an apt theme- "Inclusive Growth towards Economic Transformation". Thus, we believe that the conference has pioneered in its attempt to create a fusion between inclusitivity and production in the Sri Lankan economy, a topic with much implication, especially in the present economy, but ignored by the academia and the practitioners of the industry. The conference, therefore, is enriched with insightful and significant research in the area carried out by nationally and internationally renowned researchers, academics and practitioners bringing to fore findings and recommendations that could be imperative for the economic survival of a third world country like Sri Lanka.

The SLERC 2015 would have not been possible without the generous support and dedication made by many individuals. First and foremost, we wish to extend our sincere gratitude to Prof. Sampath Amaratunga, Vice Chancellor of the University of Sri Jayewardenepura for his invaluable support throughout. We gratefully appreciate the continuous encouragement and guidance of Dr. Anura Kumara, Dean, Faculty of Management Studies and Commerce. I also wish to convey our gratitude to Dr. Sumudu Perera Conference Chair and the organizing committee for their hard work to make this event a success. A special word of appreciation goes to the administrative and the non-academic staff of the Department of Business Economics and Faculty of Management Studies and Commerce.

I wish all the presenters and participants a successful, productive, and memorable session at the SLERC 2015.

Mrs. Harini Amarasinghe
Coordinator – SLERC 2015
Lecturer, Department of Business Economics
University of Sri Jayewardenepura

EDITORIAL PREFACE

It is with great pleasure and pride that I write this message to the proceedings book of the 4th International Conference of Sri Lanka Forum of University Economists (SLFUE): Sri Lanka Economic Research Conference 2015. The journey that began in the year 2012 from the University of Colombo has come a long way and the SLFUE membership has grown over time. We, at the Department of Business Economics, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura took up the challenge of organizing the conference in a much broader scope by a panel discussion and a plenary session consisting of eminent government and non-government representatives engaged in the country's development sector. Furthermore the panel discussion has been enlightened with the representation of International Organizations and the viewpoints of their representatives. It is within our common understanding that this research conference would bring together academics from the Economics discipline from the entire University system.

Research in the discipline of Economics has global significance, especially when considering the current challenges which are faced by the developing countries. In this context, the conference theme has been set out as "Inclusive Growth towards Economic Transformation". Inclusive Growth refers both to the pace and pattern of long-term change in dominant economic activity in terms of growth which is interlinked and should be addressed together.

SLFUE conference provides an opportunity for generation, transmission and dissemination of knowledge which is based on latest research. The conference proved this fact through the receipt of 85 extended abstracts for initial reviewing, and the independent double blind review process retained 70 extended abstracts. Subsequent to a further screening and refinement, 36 extended abstracts were selected for the Proceedings book. The reviewing of the extended abstracts was done by a panel of eminent Professors and experts in the field of Economics and I am grateful to all of them who gave their contribution in the review process. Having gone through all the selected extended abstracts, I personally feel that the authors have gone through a rigorous process and have tremendously contributed to the field of Economics. Extended abstracts were received from a wide variety of subject areas, including Agricultural Economics, Industrial Economics, and Transportation Economics etc. It should be highlighted that papers were received from both local as well as International authors.

As the chief editor as well as the conference chair, I feel privileged to witness the fruits of hard work and commitment of our dedicated organizing committee. Although the journey was painstaking I believe that we can all

look back and rejoice on the outcomes and the contribution that this research conference has made to the discipline of Economics.

I have no doubt that this forum and our efforts in the conference, would immensely contribute to enrich the discipline of Economics. On the same note I wish that this good work will be carried forward by other members of SLFUE and I wish that the membership of SLFUE will be strengthened in time to come.

Dr. Sumudu Perera
Chief Editor and Conference Chair
Head, Department of Business Economics
Faculty of Management Studies and Commerce
University of Sri Jayewardenepura

SRI LANKA ECONOMIC RESEARCH CONFERENCE 2015

4th International Conference of Sri Lanka Forum of University Economists

Organized by

Department of Business Economics
Faculty of Management Studies of Commerce
University of Sri Jayewardenepura

ORGANIZING COMMITTEE

Dr. (Mrs.) Sumudu Perera (Conference Chair)

Mrs. Harini Amarasinghe (Conference Coordinator)

Ms. Pubudini Liyanage (Conference Secretary)

Mr. Ananda Rathnayake

Mr. M.P.K. Withanawasam

Ms. Ishari Madukala

Ms. Thilini Navaratne

Mr. Dilan Rajapakshe

PANEL OF REVIEWERS

Dr. K. Amirthalingam
Department of Economics, University of Colombo, Sri Lanka

Dr. A. Aruna Shantha
Department of Economics and Statistics, Sabaragamuwa University of Sri Lanka, Sri Lanka

Dr. P.J. Kumarasinghe
Department of Business Economics, University of Sri Jayewardenepura, Sri Lanka

Dr. (Ms.) W.S. Handapangoda
Department of Business Economics, University of Sri Jayewardenepura, Sri Lanka

Dr. M.H.A. Sisira Kumara
Department of Public Administration, University of Sri Jayewardenepura, Sri Lanka

Dr. (Ms.) M.A.K. Sriyalatha
Department of Business Economics, University of Sri Jayewardenepura, Sri Lanka

Dr. B.M. Sumanaratne
Department of Economics, University of Ruhuna, Sri Lanka

Dr. J.M.A Jayawickreme
Department of Economics and Statistics, University of Peradeniya, Sri Lanka

Ms. D.W.K. Hemachandra
Department of Business Economics, University of Sri Jayewardenepura, Sri Lanka

Dr. Duminda Kuruppuarachchi
Department of Decision Science, University of Sri Jayewardenepura, Sri Lanka

Dr. (Ms.) Padmini Jayasekara
Department of Human Resource Management, University of Sri
Jayewardenepura, Sri Lanka

Dr. (Ms.) G.D.N. Perera
Department of Human Resource Management, University of Sri
Jayewardenepura, Sri Lanka

Dr. Lalith Chandralal
Department of Marketing Management, University of Sri
Jayewardenepura, Sri Lanka

Dr. (Ms.) P.G.S. Amila Jayarathne
Department of Marketing Management, University of Sri
Jayewardenepura, Sri Lanka

Dr. (Ms.) M.S.S. Perera
Department of Business Economics, University of Sri
Jayewardenepura, Sri Lanka

Dr. (Ms.) B.J.H. Arachchige
Department of Human Resource Management, University of Sri
Jayewardenepura, Sri Lanka

Dr. G.G. Aruna Shantha
Department of Human Resource Management, University of Sri
Jayewardenepura, Sri Lanka

Dr. (Mrs.) M.A.A. Malkanthi
Department of Marketing Management, University of Sri
Jayewardenepura, Sri Lanka

Dr. (Ms.) B.W.R. Dhamayanthi
Department of Economics, University of Sri Jayewardenepura, Sri
Lanka

Dr. M. Ganeshamoorthy
Department of Economics, University of Colombo, Sri Lanka

Dr. Gamika Prathapasinghe
Department of Livestock and Avian Science, Wayamba University of
Sri Lanka

Dr. P.H.T. Kumara
Department of Public Administration, Uwa Wellassa University,
Sri Lanka

Dr. J.G. Sri Ranjith
Department of Economics and Statistics, University of Peradeniya,
Sri Lanka

Ms. P.P. Lalanie
Department of Business Economics, University of Sri
Jayewardenepura, Sri Lanka

Mr. M.V.S.S Udayanga
Department of Entrepreneurship, University of Sri
Jayewardenepura, Sri Lanka

Mr. Rukmal Weerasinghe
Department of Entrepreneurship, University of Sri
Jayewardenepura, Sri Lanka

Dr. A.J.M. Chandradasa
Department of Economics, University of Ruhuna, Sri Lanka

Dr. (Ms.) Prashanthi Gunawardena
Department of Forestry and Environment Sciences, University of Sri
Jayewardenepura, Sri Lanka

Dr. Aminda Methsila
Department of Banking and Finance
Wayamba University of Sri Lanka

Dr. A.M.M. Mustafa
Department of Management, South Eastern University of Sri Lanka,
Sri Lanka

Dr. Dushyantha Kulatunga
Department of Decision Science, University of Sri Jayewardenepura,
Sri Lanka

Ms. D.R.J. Siriwardene
Department of Business Economics, University of Sri
Jayewardenepura, Sri Lanka

Mr. P.J.S. Fernando
Department of Business Economics, University of Sri
Jayewardenepura, Sri Lanka

Ms. Aruna Muuthulingam
Department of Public Administration, University of Sri
Jayewardenepura, Sri Lanka

TABLE OF CONTENTS

Contemporary Studies

Labour Mobility

Entrepreneurship and Knowledge Economy

Development and Sustainability Studies

International Trade and Finance

Monetary Policy Analysis

Contemporary Studies

The Mediator Effect of Project Management Tools and Techniques on Project Success

Chinthaka Jayasundara [a] and **Vishuddhi Jayawickrema** [b]

[a] *University of Colombo, Colombo, Sri Lanka*
chinthaka@econ.cmb.ac.lk

[b] *Central Bank of Sri Lanka,Colombo, Sri Lanka*
vishuddhi@cbsl.lk

INTRODUCTION AND RESEARCH PROBLEM

Project management helps an organization to accelerate product development and time-to-market, to utilize limited resources, handle technological complexity, respond to stakeholder satisfaction and increase global market competition (Cleland, 1998). Moreover, several empirical studies support that the correct use of project management tools and techniques (PMTT) lead to project success. Conversely, inappropriate use of PMTT can lead to project delays, budget overruns and unsatisfied customers. In less developed countries the implementation of project management tools and techniques is still in the early phases of development. PMTT is itself a relatively modern practice that attempts to achieve planned objectives within specific time and cost limits through the optimum use of resources and using an integrated planning and control system (Abbasi and Al-Mharmah, 2000). Project management has led a number of organisations to be more effective and efficient in the delivery of their products and services, to have more accurate budgeting, scheduling and improved productivity. Therefore, the growth and acceptance of project management is continuing to increase as resources become scarce in less developed countries.

In less developed countries the implementation of project management tools and techniques is still in its early phases of

development. Abbasi and Al-Mharmah (2000) found out that the use of project management tools and techniques among the public sector companies was considerably low, but when practiced efficiently would result in tangible benefit in all aspects of planning, scheduling and monitoring the time, cost and specification of projects.

Post-conflict economic growth has resulted in a boom in the implementation of development activities across Sri Lanka. However, the Sri Lankan public sector also faces various issues and challenges that are common to developing countries which could ultimately affect its performance. In the above context, the purpose of this research is to investigate the usage of project management tools/techniques in the Sri Lankan public sector and to see whether they contribute to project success. Moreover, it attempts to investigate the mediator effect of project management tools and techniques in achieving project success. In addition, the study intends to understand the factors which influence the project success in the public sector of Sri Lanka.

METHODOLOGY

Considering experts' ideas the researchers planned a mixed approach in conducting the survey to achieve its objectives. Accordingly, the study was carried out with 251 survey responses followed by 8 structured interviews. The research followed a broad-based approach covering various public sector institutions. Accordingly, the analysis includes the government ministries, departments, provincial councils as well as statutory boards and public corporations.

The following hypotheses were formulated based on the previous studies done on the topic.

H1 - Project manager's competency is positively related to the extent of PMTT usage

H2 - Perceived top management support is positively related to the extent of PMTT usage

H3 - Affective organizational commitment is positively related to the extent of PMTT usage

H4 - Project complexity is negatively related to the extent of PMTT usage

H5 - The extent of PMTT usage is positively related to project success

H6 - The extent of PMTT usage mediates the effect of project manager's competency, perceived top management support and affective organizational commitment and project complexity on project success

The analysis was carried out as a predominantly quantitative study where confirmatory factor analysis coupled with structural equation modelling (SEM) was employed as the primary statistical analysis technique.

RESULTS AND FINDINGS

In terms of participants' educational qualifications, a majority of project workers in the public sector possessed at least a bachelor's degree. However, they lack reputed project management qualifications. Among the various types of project management tools and techniques, only the basic tools/techniques are found to be widely used in the public sector.

Hypothesis testing using structural equation modelling revealed that there is a significant association between project manager's competency and PMTT usage. Therefore, hypothesis 1, which states that the project manager's competency is positively related to the extent of PMTT usage, can be accepted. In addition, a significant association can also be noted between top management support and PMTT usage supporting hypothesis 2. Even though the level of significance in the relationship between organisational commitment and PMTT usage is not as large as the previous two relationships, there is a reasonable association between the variables, accepting the third hypothesis. However, no significant association was witnessed between project complexity and PMTT usage, failing to accept the forth hypothesis. Meanwhile, PMTT usage and project success exhibited a considerable association supporting the fifth hypothesis. Finally, a mediator analysis in terms of a Chi-Square difference test comparing the full model (with mediator) and the direct path model revealed that the extent of PMTT usage mediates the effect of project manager's competency, top management support and organisational commitment on project success. With the empirical evidence attained from the public sector projects it was modified the suggested framework of derived the model in the following figure.
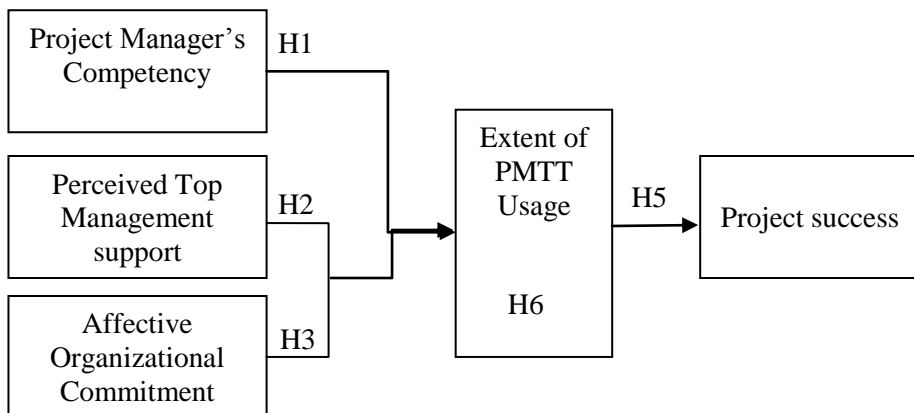
CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

This study empirically confirmed the significant association between project manager's competency and project success discovered by previous researchers. In addition, testing for the previously unproven mediator effect of extent of PMTT usage for project success is one of the key contributions to empirical literature. Accordingly, a mediating effect on the relationship between independent variables and project success was evident in the usage of project management tools/techniques once project complexity was exempted.

In addition, several findings were made through the descriptive data analysis. Even though the majority of project managers in the public sector possess a master's degree, they lack reputed project management qualifications such as PMP, CAPM, PRINCE 2 etc. In line with this, it was also revealed that project management tools employed by the public sector are still at a very basic level, where only a few participants indicated that they are making use of some of the advanced project management techniques.

The research findings reveal that the Sri Lankan public sector needs to focus more on enhancing the competency levels of project management staff, improving the level of support and cooperation extended by the higher level authorities, as well as to take measures to improve project workers' emotional attachment to the organisation.

REFERENCES

Abbasi, G. Y. & Al-Mharmah, H. (2000). Project management practice by the public sector in a developing country. International Journal of Project Management, 18, 105-109.

Baccarini, D. (1999). The Logical Framework Method for Defining Project Success. Project Management Journal, 30(4), 25–32.

Belassi, W. &Tukel, O.I. (1996). A new framework for determining critical success failure factors in projects. International Journal of Project Management, 14(3), 141-151.

Cleland, D. (1998), 'Strategic project management', In: Pinto, J. K., Project ManagementHandbook, San Francisco, CA: Jossey-Bass Publishers, pp. 27–54.

Patanakul, P., Iewwongcharoen, B. & Milosevic, D. (2010).An empirical study on the use of project management tools and techniques and their impact on project success. Journal of General Management, 35(3).

Westerveld, E. (2003), The Project Excellence Model: linking success criteriaand critical success factors. International Journal of Project Management, 21, 411–418.

Growing up with Television: the Impact of Television Cartoons on Children's Behavior in Anuradhapura District

R.G.S.K. Udayangani [a], D.A.M. Perera [b] and
H.A.B.W. Hettiarachchi [c]

[a] *Rajarata University of Sri Lanka, Mihinthale, Sri Lanka*
udayanganisanj@gmail.com

[b] *Wayamba University of Sri Lanka, Kuliyapitiya, Sri Lanka*
methsila240@yahoo.com

[c] *Rajarata University of Sri Lanka, Mihinthale, Sri Lanka*
buddhikarjt@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

Children spend most of their leisure time in front of televisions, watching cartoon programs. The meaning of the "cartoon" is strong, heavy paper or pasteboard, from the Italian word "cartone" and Dutch word "karton". A cartoonist is a visual artist who specializes in drawing cartoons. This work is often created for entertainment, political commentary or advertising. Felix the Cat was the first ever cartoon icon, which started its journey in 1920s. In the next 10 years, Donald Duck, Mickey Mouse and Pluto were introduced by Disney Cartoon Studios (Ali Hassan, 2013). Since it is the most frequent and easily accessible source of entertainment, some parents use cartoons to keep children occupied while they are busy with their work. Therefore, time which was previously spent by children on outdoor activities is now replaced with watching cartoons. Many children in Sri Lanka begin watching cartoons at an early age and by the age three or four, become enthusiastic viewers. This has become a

problem in Sri Lanka, because many children who are becoming addicted to aggressive cartoons on television have grown violent.

Many children are attracted to the content of cartoons which inculcate both positive and negative habits (Ali and Muhammad, 2013). Among others, violence features heavily in most cartoons, and children may be induced and attracted by such violent content. Hence, scholars argue that cartoons have only negative impacts on children (Kellogg, 1992; Anderson, 2003; Saturnine, 2004). Many parents are also of the view that some cartoon movies persuade children to behave antagonistically and disreputably. Alternatively, some scholars argue that cartoons have a tremendous impact in improving the cognitive aspects among school children (Alia and Roshan, 2012; Ginmann, 2003). They validate that children become more creative by watching cartoons. These contradictory versions show a research gap in this field.

Therefore, considering the importance of exploring the effects of cartoons on children's psychological development and behaviour patterns, the main objective of this study was to trace the impact of televised cartoons on the behaviour of school children in Anuradhapura district. Accordingly this research addresses the problem, "how and to what extent do cartoon films influence the behavioural pattern of school children in Anuradhapura district?"

METHODOLOGY

300 school going children of the age group 6-12 years were randomly selected from five government schools in Anuradhapura, Sri Lanka as the sample of this study. Considering the sensitivity of the respondents, this study was designed as a survey, and most of the data obtained through observations. Few focus group discussions also conducted with the parents and the teachers to gather necessary information. Before starting data collection, researchers visited these schools several times and had few focus group discussions with

teachers in the primary section and with some parents. The necessary measures were also taken to minimize the influence on children's behaviour during data collection.

Different dimensions were used to measure student behaviour; students' behaviour and interactions with peers, stationary used, and the music they like. The selected children were given a few blank papers and crayons, and they were requested to draw their heroes. Further, they were given a chance to sign a song in front of other students. No instructions or guidance was provided for students; they were given maximum freedom to paint their heroes as they like. While they were painting, researchers also checked the children's possessions, such as school bags, pencil cases, lunch boxes, water bottles, cover pages of books. The main purpose of this exercise was to explore the images (i.e., of the different cartoon characters) printed on them.

The data gathered was analyzed using a non-parametric test in Statistical Package for Social Sciences (SPSS) software version 17.

RESULTS AND FINDINGS

Of the 300 students, most (37%) represented the age group 08 - 09 years, followed by those in the 10 - 11 age group (36%). A majority of their parents were in employed in public sector (40%) compared to private sector (21%). 29 percent were farmers.

99 %of the children accepted that they watch cartoons and 70% do so after school. The correlation coefficient (0.831, p<.001) reveals that most school children are imitating their favourite cartoon characters when they interact with other children. When these children were requested to entertain the peers and the audience, the majority carolled songs in cartoon films, and most of these were comparatively aggressive (.0.746, p<.001). They imitate the movements of different cartoon characters. A majority painted

pictures of *'Ben 10''*. It was also revealed that *'Ben 10'* is the most popular cartoon among school children with an average following of 28%, followed by *'Krishna'* (27%), *'Weera'* (25%) and Scooby doo (8%). Students prefer to watch cartoons with violence (56%), over those with educational, didactic and emotional messages (31%). Moreover, it was revealed that they force their parents to buy merchandise depicting different cartoon characters. It was observed that 86% of their possessions contained images of different cartoon characters printed on them.

Interestingly, most of these findings are consistent with the outcomes of two studies carried out by Ali and Muhammad (2013), and Alia and Roshan (2012).

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

In the current era of powerful media, cartoon movies are the favourite television programs among school going children aged 6-12 years. Cartoons have changed drastically over the years but have lasting effects on children. This study reveals that the behaviour patterns of school children are influenced by different cartoon programs and the characters they watch. Since they have been affected by cartoons they usually watch, they like the clothes and accessories of their favourite cartoon characters. Due to their tender minds, many children try to imitate the actions performed by different characters.

Confirming the findings of Hapkiewicz and Aubrey (1971), this study produces two significant findings: (i) watching cartoons has become one of the favorite pastimes for children in Anuradhapura and cartoon watching strongly affects their attitudes and behaviour, including language and the manners of their dress and eating, (ii) cartoons and characters that contain violent behaviour have a strong impact on the behaviour of these school children. Yet, most parents are completely

unaware of the effects of cartoons on their children's psychological development, and behaviour patterns.

These findings highlight the necessity for appropriate policy measures to screen cartoon films telecast in Sri Lanka, and the way they are dubbed.

REFERENCES

Ali Hassan, and Muhammad Daniyal, (2013), Cartoon Network and its Impact on Behavior of School Going Children: A Case Study of Bahawalpur, Pakistan, *International Journal of* Management, Economics and Social Sciences, Vol. 2(1), pp.6-11

Alia Bibi, and Roshan Zehra, (2012), Effects of cartoons on children's psychology and behaviour patterns

Anderson, C, A., (2003), The influence of media violence on youth, *Psychological Science in the Public Interest*, December, 4 , 110

Ginmann, M., (2003), Cartoons as information, *Journal of Information Science,* (29)1: 69-77

Kellogg, M.A., (1992), The Toon Boom, *TV guide*, 6-8

Saturnine, R., (2004), *The Adverse Effects of Cartoons on the Minds of our Children,* Paper presented at a Toon-agedy Conference in Estonia

Walter G. Hapkiewicz and Aubrey H. Roden, (1971), The effect of aggressive cartons on children's interpersonal play, Child Development

Consumer's Quality Preferences for Different Types of Meat Purchased in Ampara District

S. Kaarthiga and **P. Sivarajah**

Department of Agricultural Economics, Eastern University
Chenkalady-30350 (EP)
sivaponniah@yahoo.com

INTRODUCTION

The changes in taste and lifestyle engendered by urban living are likely to have significant influence on food consumption patterns, especially livestock products. In Sri Lanka, per capita availability of beef, mutton, pork and chicken is respectively 1.12, 0.07, 0.08 and 4.86 kilograms per year (Department of Animal Production and Health, 2010). Ampara District is one of the coastal districts in Sri Lanka, where livestock production is a major occupation next to paddy farming and where large quantities of livestock products are consumed. Consumer needs are very few, but their preferences are more, so the commercial meat producing organization should cater to the needs and preferences of consumers (Chamburi and Bhatt, 2007). Various external factors, such as marketing to mixed social, cultural, personal and psychological characteristics, economic factors, consumer preference, and certain situational determinants also influence the consumer's purchasing decisions (Raghavendra, 2007).

METHODOLOGY

A study was conducted during January and February, 2011 to determine the meat marketing and consumption in coastal areas of Ampara district. The survey covered 100 meat consumers from four Divisional Secretariat Divisions (Kalmunai, Karaitivu,

Addalaichenai, and Akkaraipattu) of coastal areas of the Ampara District. Random sampling method was used in the consumer survey. The data which was collected at the rural markets were analyzed by using SPSS package. Descriptive statistics, frequencies, use of a five point Likert Scale and a multiple regression analysis were done.

RESULTS AND DISCUSSION

The amount of different types of meat by households per month differed significantly for beef and mutton, while it was insignificant for chicken meat. See Table 1 for LSD (Least Significance Difference) results.

Table 1: Amount of Different Types of Meat Purchased Monthly (Kgms/mth)

Divisional Secretariat Division	Beef	Mutton	Chicken
Kalmunai	4.6[a]	1.1[a]	4.5[a]
Karativu	6.2[b]	1.3[ab]	4.7[a]
Addalaichenai	6.4[b]	0.8[a]	3.8[a]
Akkaraipattu	5.7[ab]	1.8[b]	4.5[a]

Source: Survey data (2011), P is at level of 5% (P ≤ 0.05).
LSD: Same letter indicates no significant difference between the values.

The LSD analysis shows that the amount of beef purchased by each household per month was significantly different (P≤0.05) between Kalmunai and Karativu, Addalachenai Akkaraipattu Divisional Secretariat Divisions while the amount of mutton purchased was significantly different (P≤0.05) between Addalaichenai and Akkaraipattu, Karaitivu, Kalmunai Divisional Secretariat Divisions. The survey results revealed that all the consumers considered quality of meat in their decision to purchase meat. Most of the consumers

(92%) considered meat quality for their good health and to prevent diseases. Few of them (13%) considered meat quality for ease of cooking. About 34% of consumers considered quality for taste of meat. Consumers were willing to pay more to purchase the better quality meat and currently, they have shifted their focus towards quality (Chamhuri et al., 2007).

Table 2: Consumers Perception of Meat Quality Characters* (%)

Carcasses	Beef (N=81)	Mutton (N=83)	Chicken (N=100)	Pork (N=5)
Colour	92.6	75.9	50	60
Smell	35.8	45.8	0	40
Appearance	95.1	95.2	100	100
Tenderness	30.9	36.1	29	40

Source: Survey data (2013), * - multiple responses.

The consumer survey revealed that most of the beef consumers considered appearance and colour as a perceived quality characteristic during purchasing of beef. Some of the beef consumers (31%) considered beef tenderness. Some of them (36%) considered smell because some of the sellers adulterate with buffalo meat. The survey revealed that with mutton, consumers considered appearance (95%) of mutton as a perceived quality characteristic during purchasing of mutton. More than 75% of the mutton consumers considered the colour red in mutto to be a characteristic of as fresh mutton.

Appearance was considered by all consumers during purchasing of chicken. Nobody considered chicken smell as a perceived quality characteristic during the purchasing of chicken meat. Data revealed that appearance was considered by all pork consumers during buying pork. Some of the pork consumers (40%) considered tenderness of pork. Seneviratne, (2004) too observed a similar consumer behavior in his study on chicken meat purchases in Sri Lanka.

Table 3: Impact of Buyer Characteristics on Purchase Decision

Trait	Characteristics of buyer	Mean scale value
1. Cultural factor	Religion	4.44
2. Social factors	Family size	3.06
	Quantity of purchasing	3.23
3. Psychological factors	Preference	4.53
	Health	3.38
4. Economic Factors	Family income	3.19
	Price	3.48

Source: Survey data (2013)

The analysis showed that the mean Likert Scale value of buyer characteristics, cultural factors (religion) had high levels of impact on purchase decisions. Social factors such as family size and quantity of purchasing had moderate impact on purchasing decision of fresh meat. Psychological factors (preference and health) had a higher impact, but health concerns had a moderate impact on purchase decision. Economic factors such as family income and price of meat had moderate impact on purchase decision of fresh meat. De Silva et al. (2010) also obtained similar results in a study on meat consumption in the Southern Province of Sri Lanka.

CONCLUSIONS AND POLICY IMPLICATIONS

The quantity of beef and mutton purchased by consumer's differed significantly, but chicken purchases were not significantly different among the Divisional Secretariat area studied. It was evident from the study that consumers mostly looked into meat quality characteristics such as colour and appearance during purchases. Buyer's socio-economic characteristics such as cultural background- religion and psychological factors namely preferences for a meat type and health

consciousness had impacts on the decision making process to buy meat for consumption. Hence, marketing strategies should be geared to supply meat products to satisfy consumer preferences in meat colour and health aspects, i.e., high fat content.

REFERENCES

Chamhuri, N., and Batt, P. J. (2007). Factors influencing consumers' choice of retail stores for fresh meat in Malaysia. Curtin University of Technology, Perth, Western Australia.

Cole, G. A. (1993). Management: Theory and Practice, 14th edition. Germany Press Co. Ltd, Valo, Germany. pp 224-247.

De Silva, P. H. G. J., Atapattu, N. S. B. M., and Sandika, A. L. (2010). A study of the socio-cultural parameters association with meat purchasing and consumption pattern: A case of southern province, Sri Lanka. *The Journal of Agricultural Sciences*. 5 (2).

Department of Animal Production and Health. (2010). Annual Report, Colombo: Sri Lanka.

Raghavendra, H.N. (2007). An analysis of meat consumption pattern and its retailing: A case of Dharwad District. University of Agricultural Science, Dharwad.

Seneviratne, R.W.(2004). Factors determing the consumer preference and purchase decision on chicken meat in Sri Lanka and Japan. University of Peradeniya, Sri Lanka. pp 15-30.

Disaster Management in the Eyes of Victims - A Perception Study on Flood Disaster Management

G.S. Jayarathna [a], H.K. Amarasinghe [b] and
W.D.N. Prasad [c]

[a] *Information Technology Resource Centre, University of Sri Jayewardenepura, Sri Lanka*
gothami.usjp@gmail.com

[b] *Department of Business Economics, University of Sri Jayewardenepura, Sri Lanka*
harinik@sjp.ac.lk

[c] *Department of Information Technology, University of Jayewardenepura, Sri Lanka*
nilanthapra@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

Among the natural disasters which human life and its territorial integrity are adversely affected, flood is a common form of disaster that many countries are confronted with worldwide. It causes havoc in affected areas. The costs of floods include both thousands of lives and millions of dollars of physical resources and belongings every year to the global economy. Sri Lanka is also among those countries that are severely and frequently affected by devastating flood conditions. The damages had reportedly increased during recent years. Massive funds are allocated annually for disaster management by the government (Ministry of Disaster Management, 2014). Yet, aggravation of the repercussions of flood disaster is a major issue which hinders the progression of major economic activities of the affected areas. There is little literature support to analyse the failures of disaster management in Sri Lanka (Gamage, 2010).

This research is aimed at determining whether the flood disasters management was a success during the period of 2010 to 2014 as perceived by the victims. In case of a failure, whether such failure can be attributed to the shortcomings of disaster management system or shortcoming of stakeholders of disaster management.

Lives are affected detrimentally by the floods and Disaster Management Centre (DMC) has provided various solutions to mitigate those. Massive funds are allocated annually in this regard by the government. Yet mismanagement of the repercussions of flood is a major issue which hinders the progress of Disaster Management function within the country.

Hence this research, is aimed at determining whether the solutions provided to control flood disaster were successful and in case of a failure, whether such failure can be attributed to the shortcomings of disaster management system or shortcoming of internal stakeholders of disaster management. Identifying the reasons for the failures of disaster management can be of vital importance in formulating infallible policies in the realm of disaster management.

The research objectives were to identify the perception of the victims regarding the disaster management process in the cycle inclusive of Disaster Prevention, Situational Management and Post Disaster Phase. Further it was intended to identify the attributes of disaster management system and disaster management stakeholder of flood disaster management.

LITERATURE

According to Hewitt, (1997, cited in Mark Pelling et al, 2002) disaster can disrupt or destroy many different sorts of functions and institutions all at once. It may bring society-wide or systemic crisis. Annual flooding is a familiar experience to the people in the Kalu river basin. These floods are stimulated with rain from South West

and second inter monsoons. The river drops its slope at 2250 meters within 36 Kilometers at this stretch. Therefore, flood forecasting is difficult with limited lead time. Main reasons for floods in the river basin include: high rainfall intensity, deforestation in upper catchments, sand and gem mining activities, and unplanned development activities. Kalu river basin experienced huge floods in 2003 and 2008. The assessments were conducted to examine the existing flood preparedness, response capacity and mitigation options (Gamage, 2010). The study highlights the importance of needs assessments. Regular comprehensive, multi stakeholder needs assessments, linked to a coordination framework, can help to ensure that the appropriate assets are provided to military and civilian when they are needed. Further it facilitates the withdrawal of assets that are no longer required or appropriate (Wiharta et al, 2008).

According to United Nations Disaster Relief Coordinator (UNDRCO, 1991 cited in Pelling et al, 2002) different disaster types can occur in quick succession or as secondary or tertiary damages to a primary event. A resent research indicated that knowledge is a powerful resource to help governments, organizations and communities prevent, mitigate, plan for and recover from disasters and crises. Destinations need knowledge in the three stages of disaster management pre disaster prevention and planning, disaster situation management and post disaster phases of resolution and return to normality. (Mistilis & Sheldon, 2005).

A recent Kenyan report revealed that weaknesses of the current disaster management system are inadequate policy, legal and institutional frameworks, inadequate finances, human resources and equipment, inadequate information and data, weak disaster management capabilities within communities and institutions' inadequate integration and coordination and inadequate regional and international linkages (Draft National Policy for Disaster Management in Kenya, 2009).

The accomplishments in flood risk reduction seem at less-fulfilled level with limited capacity and human and physical resources. Weaker coordination with local governments inhibits the sustainability of flood management programmes. Further, disaster risk management should be included in regular planning. Inadequate flood preparedness may lead to loss of life, assets and infrastructure facilities. Lack of communication and coordination among the government and non-governmental partners have worsen the situation. Holistic flood risk management systems should be introduced. Ultimately, comprehensive flood management strategies should be activated with development disciplines and linked with all direct and indirect stakeholders. For this purpose, further research needs to be carried out to identify the real failure points of the disaster management system (Gamage, 2010).

Authorities of DMC - Kurunegala mentioned that, in an emergency situation, decisions are taken by district assistant directors. All the decisions are made in several phases (Disaster prevention, situational management and post disaster phase). Under these phases, response, relief, recovery, reconstruction, prevention, mitigation, preparedness and early warning are usually considered. They further stated that, general practice has been to over emphasise the response and relief processes but not the others. Officials of Maspotha divisional secretary stated that different types of relief are offered for affected people during and after the disaster period. Ready-made food to maintain substance levels is main relief during disaster while housing and material equipment are the most prominent category during post-disaster period. Housing damage claim is given only to the legal residential people. There is no such claim for illegal residential units though.

The Regional Irrigation Office of the district mentioned that one of the major objectives of the department is to control flood. It was further explained that the main cause of floods is illegal building construction. In this discussion they further noted that they did not take the bridge, tap line system, and damp of Thummodara water

management program into consideration. Lack of coordination among the related institutions is the main reason for flood disaster failure of the Kurunegala area. In addition they brought to light the fact that the communication channels are not so well established to work effectively in a disaster condition.

Officers in Disaster Management Coordination Unit in Kurunegala stated though there are sub systems of the disaster management system, the effectiveness of those systems are questionable. Neither the decisions are taken properly nor they are channelled to the affected groups, he further added. This was due to two major causes; 1. Flooded areas being unable to contact for circulation of required material support and; 2. The most affected areas get the priority in support systems as well.

Hence this study attempts to fill the research gap to identify perception held by victims regarding the support system delivered by the Disaster Management Center.

METHODOLOGY

This empirical study is focused to discuss the perception held by victims of floods regarding the disaster management system. The study was designed as an exploratory research with quantitative data. Population refers to people who are affected by flood management wing activities of Disaster Management Centre and the internal stakeholders of Disaster Management process. This research collected data using a structured questionnaire. The questionnaire was used to collected data related to the perception held by flood victims on disaster management system. Using convenience sampling method a sample of 400 villagers of *Galagedara, Rekkawa and Wilgamdematawa* Grama Niladhari divisions who are frequently affected by floods in *Maspotha* divisional secretariat was selected to gather information regarding internal stakeholders failures. The measurement scale for the questionnaire was the 5-point Likert Scale

from strong positive to strong negative perception. Perception on the disaster management system were measured using six independent factors measured using stakeholders' knowledge, availability of information and availability of required resources, the level of comprehension of the system, effectiveness of the system and the coordination of the system.

ANALYSIS AND DISCUSSION

Majority of the respondents were dissatisfied with the provided solutions provided by the DMC. They describe that the decisions taken by disaster management system poorly suit and work for the affected people. This decision can be categorized as short term decisions and long term decisions. 60% people who are affected by floods are not satisfied by the short term solution taken by the disaster management system while 90% people who are affected by floods are not satisfied by the long term solution taken by the disaster management system. There is a strong positive perception regarding the stakeholders' knowledge and availability of information. But the perception held by victims on all the other factors are not strong positive ones.

Further the analysis brought out the fact that the perception held by victims regarding availability of required resources, comprehensiveness of the disaster management system, the effectiveness of the disaster management system and the level of coordination of the disaster management system are at the neutral level. The overall disaster management system is perceived at neutral level.

CONCLUSIONS AND RECOMMENDATIONS

There is strong positive perception regarding the stakeholders 'knowledge and availability of information on disaster management

system. The main consideration need to be aimed at disaster management system comprehensiveness, effectiveness and coordination. The perception on knowledge and information availability should be given priority in future projects in to improve disaster management processes. The stakeholders' facilities need to be rationalized. The facilities should precisely include new technological methods along with the required supplies, proper coordination system, organizational cohesiveness and strong leadership.

Flood disaster cannot be eliminated. Hence the most essential element of it is to confront it with knowledge, information, facilities and good disaster management system by coordinating the relevant parties. It is a must to have preventive actions specially attributed to recent developmental projects. The risk gradually changes therefore risk information should be updated regularly and timely. Alternative economic activities should be introduced to people who rely upon flood-risk livelihoods.

REFERENCES

Draft National Policy for Disaster Management in Kenya 2009, Ministry of state for Special Programmes office of the president, Kenya.

Kurita, T, Nakamura, A, Kodama, M & Colombage, S R N 2006 Tsunami public awareness and the disaster management system of Sri Lanka, *Disaster Prevention and Management: An International Journal,* vol:15, no:01, pp: 92-110.

Ministry of Disaster Management 2015, http://www.disastermin.gov.lk/, http://www.disastermin.gov.lk/web/images/pdf/Performance_Report/ministry%20english.pdf; retrieved on 15.09.2015

Mistilis, N & Sheldon, P J 2005, *Knowledge Management for Tourism Crises and Disaster,* University of West Indies Kingston, Jamaica.

Pelling, M, Ozerdem, A & Barakt, S 2002, The macro-economic impact of disaster, *Progress in Development Studies*, vol:2, no: 4, pp:283-305.

Wiharta, S, Ahmad, H, Haine, J Y, Lofgren & Randall, T 2008, *The Effectiveness of Foreign Military Assets in Natural Disaster Response,* Thailand.

APPENDICES

Table 1: Coefficient of Correlation between Knowledge and Stakeholders' Failure

			Knowledge	Stakeholders' failure
Spearman's rho	Knowledge	Correlation Coefficient	1.000	.915[**]
		Sig. (2-tailed)	.	.000
		N	400	400
	Stakeholders' failure	Correlation Coefficient	.915[**]	1.000
		Sig. (2-tailed)	.000	.
		N	400	400

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2: Coefficient of Correlation between Information and Stakeholders' Failure

			Information	Stakeholders' failure
Spearman's rho	Information	Correlation Coefficient	1.000	.459[**]
		Sig. (2-tailed)	.	.000
		N	400	400
	Stakeholders' failure	Correlation Coefficient	.459[**]	1.000
		Sig. (2-tailed)	.000	.
		N	400	400

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Coefficient of Correlation between Facilities and Stakeholders' Failure

			Facilities	Stakeholders' failure.
Spearman's rho	Facilities	Correlation Coefficient	1.000	.209[*]
		Sig. (2-tailed)	.	.037
		N	400	400
	Stakeholders' failure.	Correlation Coefficient	.209[*]	1.000
		Sig. (2-tailed)	.037	.
		N	400	400

*. Correlation is significant at the 0.05 level (2tailed).

Table 4: Coefficient of Correlation between Disaster Management Failure and Stakeholders' Failure

			Stakeholders	Disaster management failure
Spearman's rho	Stakeholders	Correlation Coefficient	1.000	.160
		Sig. (2-tailed)	.	.111
		N	400	400
	Disaster management failure	Correlation Coefficient	.160	1.000
		Sig. (2-tailed)	.111	.
		N	400	400

Table 5: Coefficient of Correlation between Disaster Management Failure and Stakeholders' Failure

			Disaster management system	Disaster management failure
Spearman's rho	Disaster management system	Correlation Coefficient	1.000	.744[**]
		Sig. (2-tailed)	.	.000
		N	400	400
	Disaster management failure	Correlation Coefficient	.744[**]	1.000
		Sig. (2-tailed)	.000	.
		N	400	400

**. Correlation is significant at the 0.01 level (2-tailed).*

Labour Mobility

Trend Analysis of Direct Employment in Tourism Industry of Sri Lanka

K.M.U.B. Konarasinghe

Institute of Mathematics and Management (Pvt) Ltd, Nugegoda, Sri Lanka
udaya35@yahoo.co.uk

INTRODUCTION AND RESEARCH PROBLEM

Tourism had begun at the beginning of time. Food, water, safety or acquisition of resources (trade) was the early travel motivations. But the idea of travel for pleasure or exploration soon emerged. The earliest travelers walked or rode domesticated animals. The invention of the wheel and the sail provided new modes of transportation. Each improvement in technology increased individuals' opportunities to travel.

Tourism is a collection of various activities, services and industries that delivers a travel experience, including transportation, accommodations, food, retail shops, entertainment businesses, activity facilities and other hospitality services provided for individuals or groups travelling away from home (Parks and Recreation Management 300, 2003). Tourism is one of the fastest growing industries in the world which provides many economic benefits. Tourism creates millions of jobs, accounting for 1 in 12 worldwide. But in 2014 it was increased from 1 in 11 worldwide. Creating jobs diverse in their level of skill requirement and regional distribution; tourism provides a fast entry point into the workforce for many, particularly for young people and women predominantly in small and medium sized companies (World Tourism Organization, 2011) and (World Travel and Tourism Council,2014).

Direct and indirect employment opportunities are the major aspects of tourism. Travel and tourism generated 100,894,000 jobs in 2013 as direct employment (3.4% of total employment) (WTTC, 2014). Direct employment includes, employed by hotels, travel agents, airlines and other passenger transportation services, agencies providing recreational facilities, tourist guides, tourist shops and other organizations in the state sector.

Sri Lanka entered international tourism in the year 1960. There were fluctuations of growth in many ways up to 2009. The year 2009 is a significant landmark for the Sri Lankan economy. After 2009, there is a growth in the Sri Lankan tourism industry in many ways (SLTDA, 2013). As a result, direct employment within the industry also shows a remarkable improvement. Figure 1 is the time series plot of direct employment in the tourism industry in Sri Lanka. It clearly shows the improvement of direct employment in over the years. The rapid growth can be seen after the year 2009.

Figure 1: Time Series Plot of Direct Employment
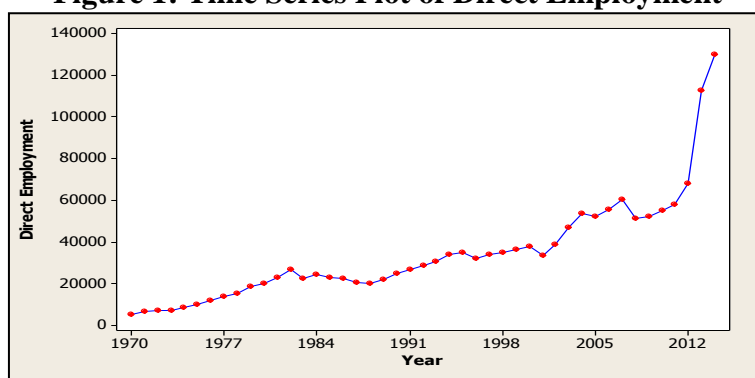
With the increase of direct employment in the Sri Lankan tourism industry, it is essential to have a sound plan for the workforce. Armstrong (2003), defines, employment forecasting as a process of estimating the future numbers of employees required and the likely skills and competencies they will need. Forecasting of direct employment is useful to achieve business objectives, identifying the types and quantities of skills and developing strategies and for many

estimation of current and existing skills (Ward, 1996) and (Pam, 2013). This can be achieved, identifying suitable forecasting techniques. It was hard to find, out the literature based on forecasting direct employment in the tourism industry in Sri Lanka. Therefore, the objective of the present study was focused on identifying suitable forecasting techniques for direct employment trend of tourism industry in Sri Lanka.

METHODOLOGY

Annual direct employment data from 1970 to 2014 were obtained from annual reports of Sri Lanka Tourism Development Authority (SLTDA). Model fitting was done by utilizing data from 1970 to 2002 and data from 2003 to 2012 utilized for model verification. Box and whisker plot was used for outlier detection in the data set. Box and whisker plot assesses and compares distribution characteristics such as median, range, and symmetry, and detects outliers. Four trend models were tested with log transformation. They are;

Linear trend model: $\log Y_t = \alpha + \beta_1 t + \varepsilon$ ----------------------------(1)

Quadratic trend model: $\log Y_t = \alpha + \beta_1 t + \beta_2 t^2 + \varepsilon$ -----------------(2)

Growth curve model: $\log Y_t = \alpha(\beta^t) + \varepsilon$ ----------------------------(3)

Pearl – Reed Logistic model: $\log Y_t = \dfrac{A}{\alpha + \beta(\gamma^t)} + \varepsilon$ ---------------(4)

Residual plots and Anderson-Darling tests for residuals were used as a model validation criterion. Forecasting ability of the models was assessed by considering Mean Absolute Percentage Error (MAPE), Mean Square Error (MSE) and Mean Absolute Deviation (MAD). Three measurements of errors used are as follows:

$$MAPE = \frac{1}{n} \sum \mid \left(\frac{Y_t - F_t}{Y_t} \right).100 \mid \text{----------------------}(5)$$

$$MAD = \frac{1}{n} \sum \mid (Y_t - F_t) \mid \text{--}(6)$$

$$MSE = \frac{1}{n} \sum (Y_t - F_t)^2 \text{---}(7)$$

Where; Y_t = Observed value of time t, F_t = Forecasted value of time t

RESULTS AND FINDINGS

Analysis begins with the checking of outliers. They are the extremely large or small values in a data set. Box and whisker plot, given in Figure 2 has obtained to check the outliers of the data set. It can be clearly seen that the data set contains 2 outliers. The year 2013 and 2014 are the outliers of direct employment and those are extreme values. Mean and standard deviation of a data set is badly affected by the outliers. Therefore, when following parametric statistical methods in a data analysis, it is a must to make the data set outlier free. Hence, outliers were removed before further analysis.

Figure 2: Box Plot of Direct Employment
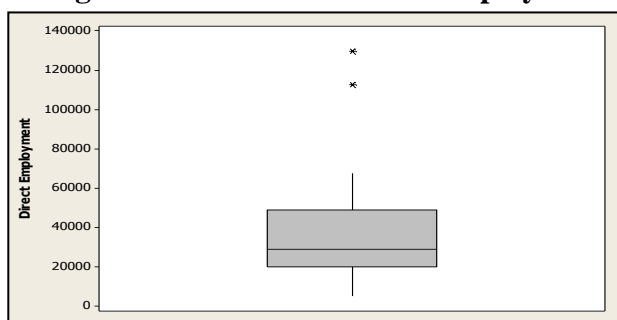
Then models (1), (2), (3) and (4) were tested on the data set and summary of model fitting and verification is given in Table 01.

<div align="center">**Table 1: Model Summary**</div>

Model	Model Fitting		Model Verification	
$\log Y_t = 3.90106 + 0.0236193t$	MAPE	1.83879	MAPE	1.97196
	MAD	0.07738	MAD	0.0935094
	MSE	0.00955	MSE	0.0112468
	Normality	P = 0.825		
$\log Y_t = 3.71714 + 0.0551484t - 0.000927325t^2$	MAPE	1.14898	MAPE	6.30431
	MAD	0.04924	MAD	0.299522
	MSE	0.00391	MSE	0.0972585
	Normality	P = 0.988		
$\log Y_t = 3.90479\,(1.00562^t)$	MAPE	1.93115	MAPE	2.80418
	MAD	0.08150	MAD	0.133022
	MSE	0.01041	MSE	0.0211438
	Normality	P = 0.894		
$\log Y_t = \dfrac{10^2}{12.3209 + 1.43726(0.962806^t)}$	MAPE	1.14131	MAPE	2.89155
	MAD	0.04906	MAD	0.137362
	MSE	0.00442	MSE	0.0200962
	Normality	P = 0.272		

P-values of the Anderson-Darling test of all the fitted models were greater than the significance level (0.05). They confirmed the normality of residuals. The residual plots confirmed the independence of residuals of all models. According to the results in Table 01, except the quadratic trend model, all the other models have MAPE's smaller than 5% in both models fitting and forecasting. However, linear trend model has least MAPE's among them. The values were 1.83% and 1.97 % respectively. MAD and MSE also confirmed the smallest deviation in linear trend model compared with other trend models.

Actual Vs fits of the Liner trend model, Quadratic trend model, Growth curve model and Pearl – Reed Logistic (S-Curve) model are shown in Figure 3, Figure 4, Figure 5 and Figure 6 respectively. The plots obtain for the period: 1970 to 2002.

Figure 3: Actual Vs Fits of Linear Trend Model
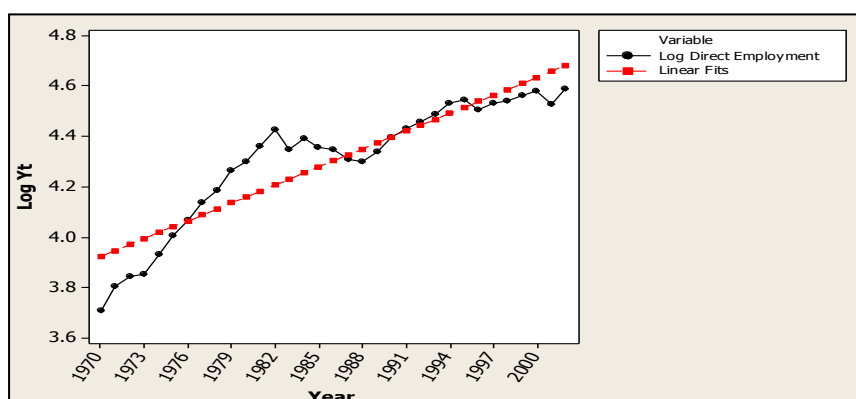
Figure 4: Actual Vs Fits of Quadratic Model
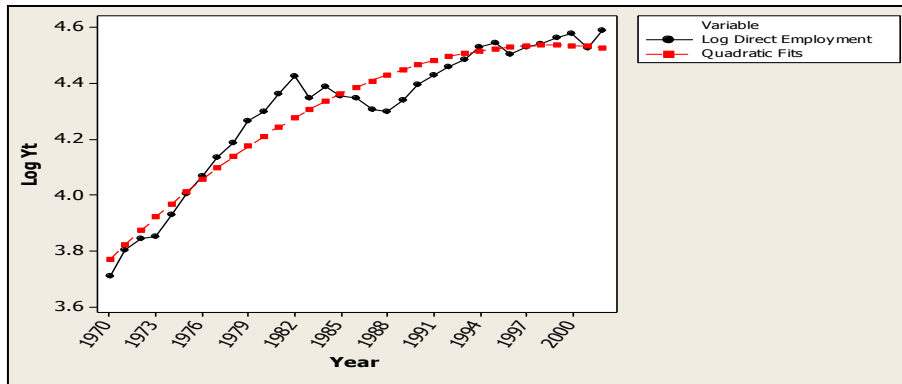
Figure 5: Actual Vs Fits of Growth Curve Model
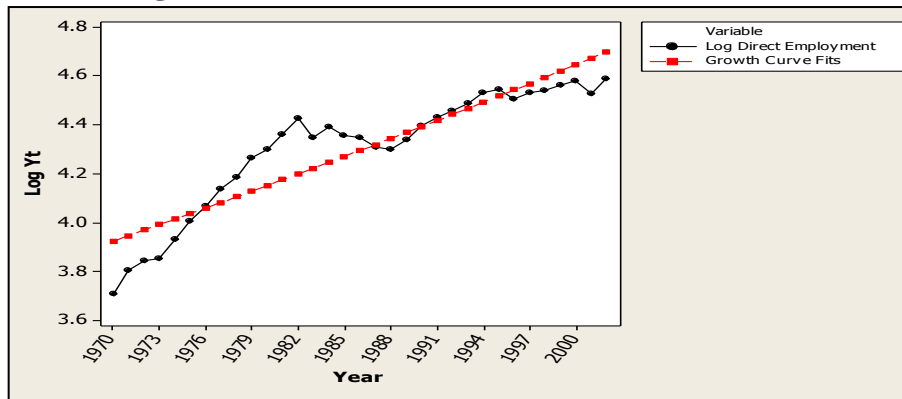
Figure 6: Actual Vs Fits of Pearl Reed Logistic Model
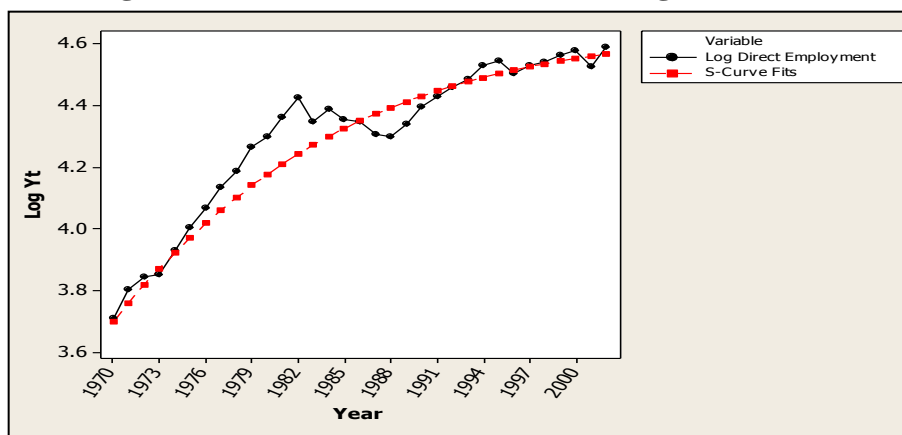
Forecasting direct employment for the period: 2003 to 2012 was done by all four models and were plotted with actual direct employment for the aforesaid period (Figure 7). According to Figure 7, Growth curve model overestimates the direct employment, Quadratic trend model and S-curve (Pearl- Reed logistic) models underestimate direct employment. Also, it is clear that the forecasts of linear model are very close to actual direct employment.

Figure 7: Comparison of Forecasted Values
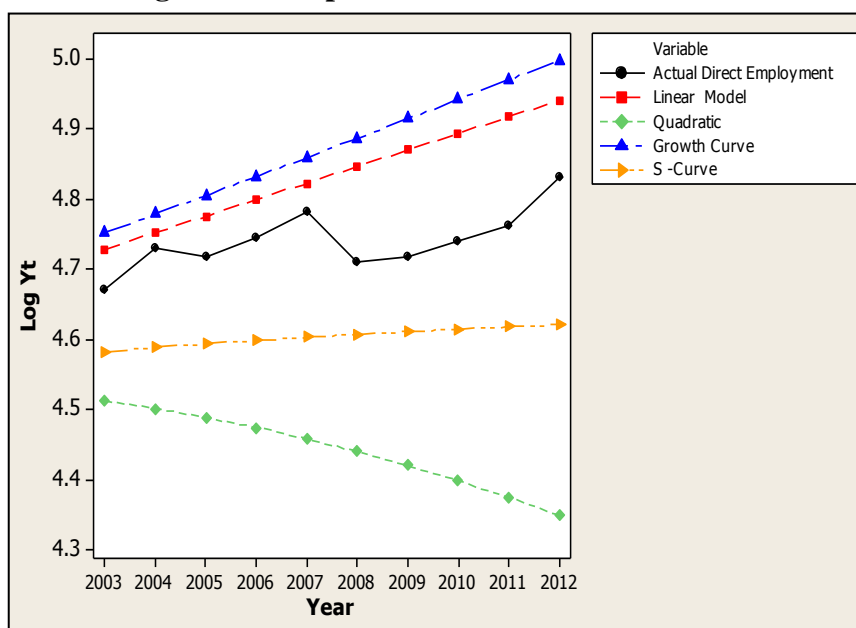
CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

Linear trend model fulfilled all model validation criterions in both model fitting and forecasting. In general, if MAPE of a model is less than 5%, that model is considered as a suitable model for forecasting. A Linear trend model of this study has 1.97 % of MAPE. Therefore, Linear Trend Model with log transformation is highly suitable for forecasting direct employment of tourism industry in Sri Lanka.

The results of this study can be used to forecast direct employment in the tourism industry of Sri Lanka to reduce the surplus of employees who are not being fully and effectively deployed. It will reduce the performance incapability and improve profitability within the industry. Also findings of the study are useful for sustainability of the tourism industry in Sri Lanka and can be used as a lighthouse for various decisions such as recruitments, training and developments and other expansions of a business.

Future research is recommended in the forecasting indirect and total employment opportunities of the tourism industry in Sri Lanka.

REFERENCES

Armstrong, M. (2003). A Handbook of Human Resource Management Practice, Sterling: Kogan Page.

Pam, W.B. (2013.) Demand Forecasting and the Determination of Employee Requirements in Nigerian Public Organizations Public Policy and Administration Review, 1(1), 01-15.

Parks and Recreation Management 300. (2003). Eco-tourism. [Online]. [Accessed on 23.06.2015]. Available at http://www.prm.nau.edu/prm300/what-is-tourism lesson.htm.

Sri Lanka Tourism Development Authority. (2012). Tourism Research and Statistics. [Online]. [Accessed on 23.06.2015]. Available at http://www.sltda.lk/sites/default/files/Annual_Statistical_Report_2010.pdf.

Ward, D. (1996). Human Resource Planning, All Business – D & B Company. [Online]. [Accessed on 23.06.2015]. Available at http:/www:allbusiness.com/humanresoruces/568478-1.htm.

World Travel and Tourism Council (2014). Travel & Tourism Economic Impact 2015 World [Online]. [Accessed on 30.06.2015]. Available at http://www.wttc.org/media/files/reports/economic%20impact%20research/regional%20reports/world2014.pdf.

World Tourism Organization. (2011). UNWTO Annual Report A year of recovery 2010.

Social Capital, Health, and Well-Being: The Case of Foreign-born Laborers in Japan

Kunio Urakawa [a] and **Carl Page** [b]

[a] *Department of Economic Engineering, Kyushu University, Fukuoka, Japan*
urakawa@econ.kyushu-u.ac.jp

[b] *Graduate School of Economics, Kyushu University, Fukuoka, Japan*
carlmacpage@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

According to the UN/MOJ the Japanese population is predicted to fall to less than 100 million by the year 2050 and, furthermore, to less than 80 million by 2100 (MOJ 2010). At the same time, the country has the highest elderly population in the world as a percentage of the total population.

Since 1990, the number of registered foreigners in Japan has nearly doubled from 1,075,317 to 2,078,480 people. In 1990, foreigners accounted for 0.87% of the overall population and accordingly this number too doubled to 1.67% by 2011. Both of these figures (total and overall percentage) are by far the lowest amongst all industrialized countries of the world (OECD 2014).

In their case study on the Hamamatsu Nikkejin, Tsuda and Cornelius used multivariate models to examine wage determination on immigrant Brazilian workers in Japan. Their results showed that every social capital variable except for marriage status had a positive effect on wages. Immigrants with access to social capital in the form of immigrant networks, gender, and ethnicity are able to obtain jobs with higher wages in Japan (Tsuda and Cornelius, 2002). To sum up,

their results showed that for immigrant workers in Japan, social capital leads to higher wages and easier access to employment.

Social capital has been shown to have numerous positive effects on an individual's life. Empirical research has proven that those with higher social capital enjoy such benefits as: longer life expectancy, better health, higher self-rated happiness. Lastly, Nakamura (2009) uses elements of Borjas' influential work, *The Economics of Immigration* (1994), to argue that, as opposed to decreasing native wages, an increase in the number of foreigners can actually have a positive effect on native wages.

Through the accumulation of data from an original survey conducted by the authors, it is our intention to shed some light on the current status of foreigners living in Japan while offering insights and ideas on future immigration policy.

METHODOLOGY

An original survey of the foreign labour population in Japan (Foreign Labourers N = 500), along with a comparative survey of native labourers (Japanese Labourers N = 300). The survey was an anonymous multiple choice survey consisting of 20 questions pertaining to occupation, income, labour status, health status, educational background, Japanese language ability, social class status, etc.; and 22 questions regarding social capital. The social capital section consisted of a series of questions that asked respondents to list whether or not they can gain access to particular resources or services within a week's time. This is based on a form of social capital measurement known as the 'Resource Generator' and is standard in terms of measuring social capital (Van der Gaag, 2005).

Using multivariate regression, discrete choice and multilevel analysis, we compared the levels of several types of social capital by several regions in Japan (Tokyo, Osaka, Shizuoka, Fukuoka). In addition, we categorized social capital into four types (bridging or bonding, individual level or area level) and investigated the impact of each type of social capital on health, well-being and labour productivity.

RESULTS AND FINDINGS

Estimation results from multilevel analysis and discrete choice models showed the significant positive association between social capital, self-rated health and subjective well-being of foreign workers. In addition, stronger Japanese language ability is highly correlated to high levels of bonding and bridging social capital and the participation in the labour market. Therefore, language ability can be deemed to be a very important variable affect social capital amongst foreigners living in Japan.

In addition, bridging social capital and individual level social capital are also associated with their wage levels in some regions in Japan. However bonding social capital and area level social capital are not correlated to them very much.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

According to the estimation results, some types of social capital of foreign workers in Japan lead to high levels of well-being and improve their labour productivity and health statuses among broad generations and regions. Therefore, we need to reconsider what sort of policies improve foreign workers' quality of lives from the viewpoint of the improvement of social capital. It is important to focus on the process of generating bridging social capital and

individual social capital, including the concept of the position generator.

Considering these results, if the Japanese government is serious about increasing the number of foreign labourers, it would be prudent for the government to consider Japanese language promotion, not only domestically for current foreign residents, but also abroad for future sojourners who will set foot in Japan.

Additionally, as Japan is considered to be quite homogenous and insular, cultivating social capital between native citizens and foreign labourers can be considered to be a central point toward helping increase labour productivity in the future. Possible methods include common forms of community trust building such as cultural exchanges, education/informative meetings, and mutually beneficial projects.

REFERENCES

Adler, Paul S, and Seok-Woo Kwon. (2002) "Social Capital: Prospects For a New Concept," *The Academy of Management Review*, 27, pp.17-40.

Borjas, George J. (1994) "The Economics of Immigration," *Journal of Economic Literature*, Vol. 32, No.4, pp.1667-1717.

Borjas, George J. (1995) "The Economics Benefits from Immigration," *Journal of Economic Perspectives*, Vol.9, No.2, pp.3-22.

Bjornskov, Christian. (2003) "The Happy Few: Cross-Country Evidence on Social Capital and Life Satisfaction," *KYKLOS*, Vol.56, pp. 3-16. http://www.fissc.net/ja/support/job.html (accessed February 12, 2011).

Glaeser, Edward L., Laibson, David, Sacerdote, Bruce. (2002) "An Economic Approach to Social Capital," *The Economic Journal*, Vol.112, pp. 437-458.

Helliwell, John F. (2006) "Well-Being, Social Capital and Public Policy: What's New?" *The Economic Journal*, Vol.116, pp.34-45.

Jiro, Nakamura, et al. (2009) *Japan's foreign workforce: investigating through economics*). Nikkei. Tokyo, Japan (in Japanese)

Kawaichi, I., Subramanian, S. V., Kim, D. (2008) *Social Capital and Health*, Springer. NY, USA

Kojima, Hiroshi. (2006) "Foreign Workers and Health Insurance in Japan: The Case of Japanese Brazilians," *The Japanese Journal of Population*, Vol. 4, No.1, pp. 79-92.

Putnam, R. (1993) *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press.

Sakanaka, Hidenori. (2005) *Immigration Bureau Battle Diary*. Kodansha. Tokyo, Japan (in Japanese)

Tezuka, Kazuaki. (2005) 'Foreign Workers in Japan: Reality and Challenges' *Japan Labor Review*, Vol. 2, No. 4, pp. 48-71.

Tsuda, Takeyuki. (2011) "When human capital does not matter: local contexts of reception and immigrant wages in Japan," *Geo Journal*, Vol. 76, pp. 641-659.

Van Der Gaag, Martin. (2005) "The Resource Generator: social capital quantification with concrete items", *Social Networks*, Vol.27, pp. 1-27.

Van der Gaag, M. P. J. and Snijders T. A. B. (2005) "The Resource Generator: measurement of individual social capital with concrete items," *Social Networks*, Vol.27, pp. 1-27.

Van der Gaag, M. P. J., Webber, M., (2008) "Measurement of
        Individual Social Capital: Questions, Instruments, and
        Measures," Kawaichi, I., Subramanian, S. V., Kim, D. eds.
        (2008) *Social Capital and Health*, Springer. NY, USA,
        ch.2, pp. 29-49.

Socio-Economic Impact of Unskilled Women Migration for Contract Work in Sri Lanka

P.T.D. Liyanage [a] and **U. Anura Kumara** [b]

[a] *Department of Business Economics,University of Sri Jayewardenepura, Colombo, Sri Lanka*
pubudiniusjp@gmail.com

[b] *Department of Business Economics,University of Sri Jayewardenepura, Colombo, Sri Lanka*
uthumange@gmail.com

INTRODUCTION

International migration of Sri Lankans for the purpose of employment, especially as contract workers has been a very recent phenomenon, where, this trend was initiated by professionals. Accordingly, it is noted that the migration for the purpose of employment has been demonstrating an increasing trend, specifically of the women migration for employment purpose which is depicted by Figure 1 below.

Figure 1: Number of Departures (Year 1994-2012)
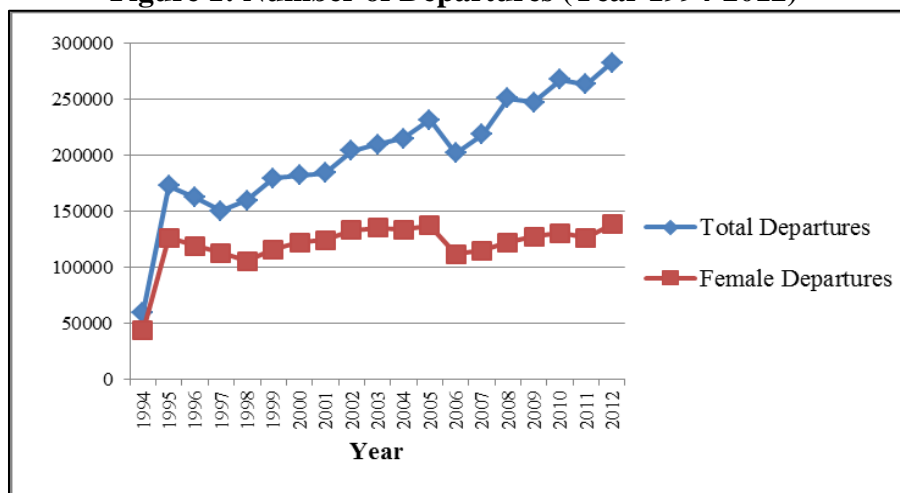
Source : Author constructed

Further, the trend of migration of professionals has been overtaken by the unskilled migrants specifically migrating as housemaids, which accounts for 42% of the total migrants in year 2012, which is a 15% increase out of the total migrants in year 1994 (Figure 2).

Figure 2: Total Departures by Manpower level
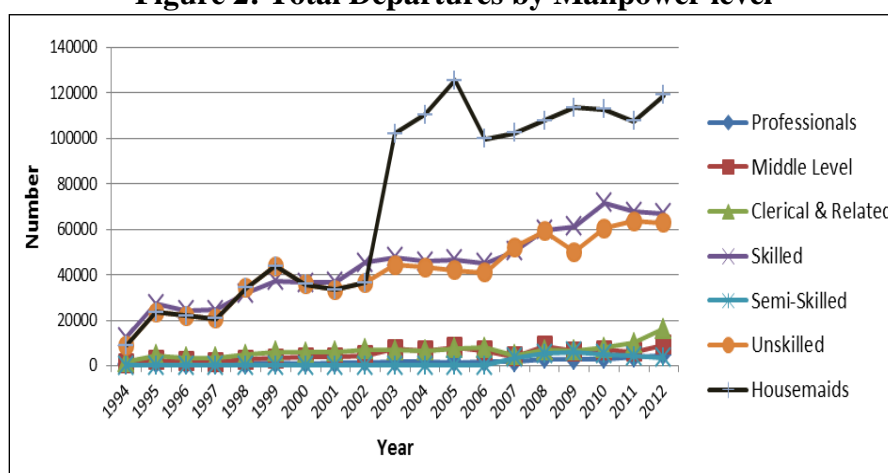
Source : Author constructed

According to the Sri Lanka Bureau of Foreign Employment (SLBFE) (2011), migration is caused by low per-capita income, unemployment/ underemployment, high inflation, etc., and the highest percentage has migrated to Middle East countries of which it is noted that female migration is out-numbering that of males.

Research Problem

Women migration can be considered a two-fold weapon, where, on one hand it generates foreign exchange for the economy, while many negative consequences such as physical and sexual harassment, non-payment of agreed wages, etc., were reported of which the climax was the assassination of one of the Sri Lankan women migrants.

Further, Lasagabaster et al. (2005) records that about 10% of total households in Sri Lanka were recipients of remittances, whereas Rodrigo (1999) records that these remittances have served as a way

of poverty alleviation for around one fifth of the population living in poverty. In a background of increasing women migrants and records of increasing remittances, the annual report of the Sri Lanka Bureau of Foreign Employment (SLBFE) (2011), records an increasing trend in the number of complaints received; particularly from those who migrated as housemaids. On the other hand many problems faced by the children left-behind by migrant workers were recorded by the media.(Daily News 15 March 2007; Human Rights Watch 2007). Thereby the research problem of this study was, "Whether women migration as contract workers has caused any socio-economic impact to the Sri Lankan economy".

Aims and Objectives

The aim of the study was to find out the social and economic impact of unskilled women migration towards the Sri Lankan economy. The study addressed the following two objectives:

a. To identify the economic impact of women migrants in Sri Lankan economy

b. To identify the social impact of women migrants in Sri Lankan economy

METHODOLOGY

The research design of the study is descriptive where economic impact and social impact of women migration was assessed through a historical analysis and a primary data analysis respectively.

The variables used by the researchers for analyzing the economic impact are net personal remittances from abroad, foreign private remittances as a percentage of GDP and foreign direct investment from abroad (for comparative purposes) and material benefits,

education and health of the children, and family dissolution as the variables to analyse the social impact.

Based on the literature, primary data was collected through a sample survey carried out in the Hanwella District Secretarial Division using stratified random sampling in selecting respondents from the two categories of families of which the female migrant is currently abroad and of which the female migrant is currently back in Sri Lanka after one contract period and snow-ball method of sampling in selecting the respondents from each category, focused group discussions, in-depth and structured interviews and observations whereas secondary data was gathered on the selected variables from various sources such as the world bank database, Annual Reports of Central Bank of Sri Lanka, SLBFE, Parliamentary Acts on labour migration of Sri Lanka and databases such as the World Bank database.

The analysis of the study was mainly descriptive in nature where secondary data on the variables chosen to analyse the economic impact was analyzed through graphs generated using Microsoft Excel while extensive use of the SPSS package was taken in analyzing the primary data gathered through the questionnaire.

RESULTS AND FINDINGS

Economic Impact

Secondary data of foreign remittances of Sri Lanka for the period during the years 1975 - 2012 reveal that the inflows are witnessing a steady growth from US $ 8.56 million to US $ 5,985 million during the years 1975 to 2012 (Figure 3). Further it is noted that the years 2004, 2010 and 2011 recorded a sharp increase compared to that of the respective previous years.

Figure 3: Private Remittances (Rs. Million)
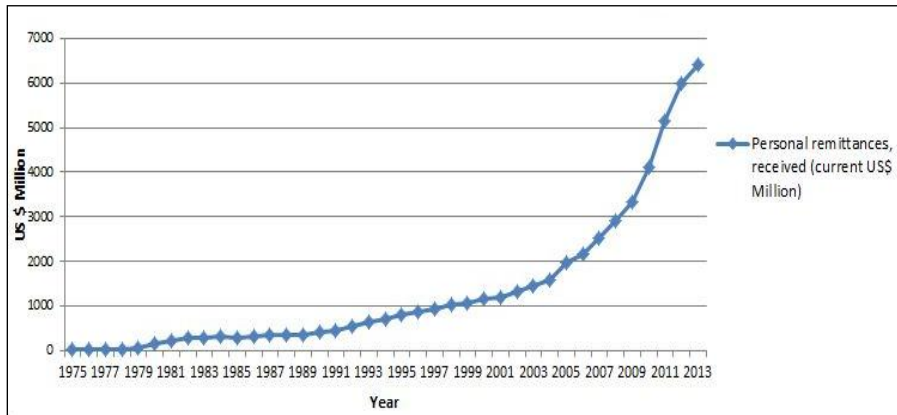
Source : Author constructed

Figure 3 reveals that out of the total foreign private remittances, remittances from the Middle East countries holds a major proportion which may have been caused by the fact that around 84% of the total labour migrants of Sri Lanka had being attracted by Middle Eastern countries such as Saudi Arabia, Kuwait, Jordan etc.

Figure 4: Foreign Private Remittances as a Percentage of GDP
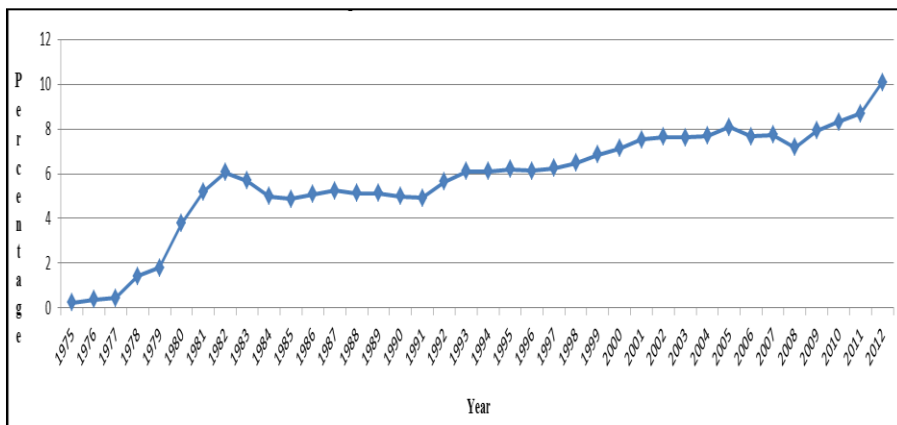
Source : Author constructed

When considering the percentage contribution of foreign private remittances to the GDP of Sri Lanka, the Figure 4 reveals that the contribution has increased more than 100% during the past three decades where the contribution has risen from a level of 0.22% of the GDP in 1975 to 10% of the GDP by the end of year 2012.

With the purpose of undertaking a comparative analysis of Foreign Private Remittances (FPR) as a source of foreign currency inflow to the country, it was compared with the Foreign Direct Investment (FDI) inflows to Sri Lanka within the period of 1975 – 2012, which is elaborated in Figure 4.

Figure 5: Comparative Analysis of Personal Foreign Remittances and FDI Inflows
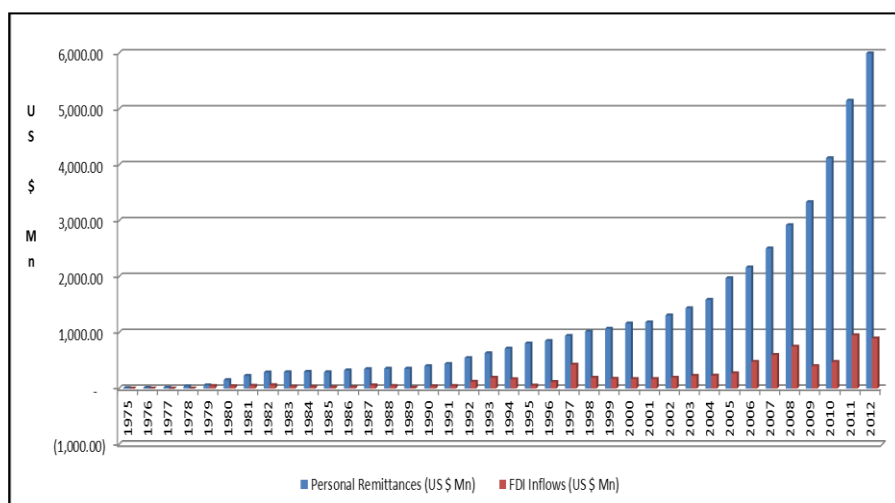
Source : Author constructed

Accordingly, it is noted that contribution of FPR is more than two fold than the FDI inflows, which depicts the significance of the FPR inflows. Moreover, during the period of 2008-2009 which records a high political and security unrest in the country, FDI inflows were paused and some significant foreign investors withdrew from the country. Vis-à-vis, even during this period, FPR inflows were increasing, depicting the counter-cyclical nature of FPR pointed out by the World Bank in 2006.

Further exploration of the effect of FPR on the Balance of Payment (BOP), it is revealed that it has been working as a cushion against the negative impact of trade balance of Sri Lanka. For instance, during the period from 2004 – 2008, during which an external supply-side shock due to a rapid rise in international oil prices hit the world, the

sharp deterioration of the trade account was negated by higher flows of FPR.

At a very micro-level, primary data revealed that in 82% of the cases, the family income has increased due to the female migration, which may, in turn, increase the domestic consumption level as well as the savings, which will be discussed in the succeeding section.

Social Impact

Study of primary data revealed that low family income (78%), limited employment in the country (8%), husband being unemployed (4%) number of family members being higher than four (extended families), extended family patterns, etc., was the main reason behind the women migration and the main objectives of women migrating (as depicted by Figure 6) was to build a house, purchase a vehicle, earn for children's education and earn for medical expenses, raising the issue of effectiveness of the free-education and free-health system of the country.

Figure 6: Objectives of Migration

Source: Survey data, 2013
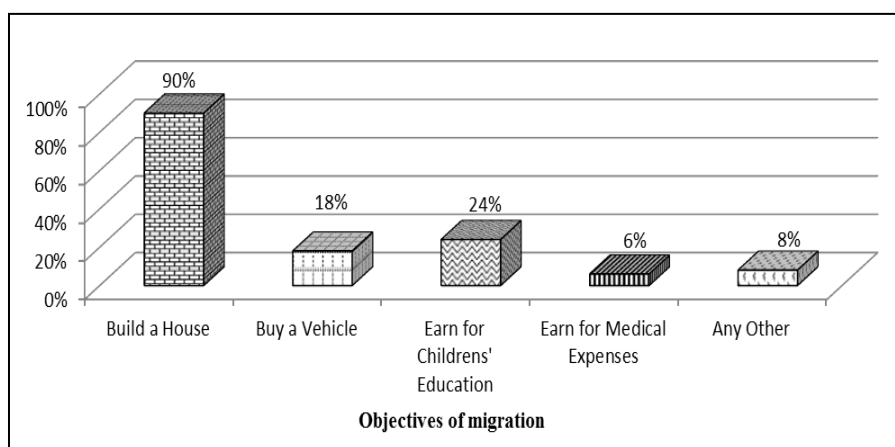
It was also observed that the majority (80% of the sample) of the migrants left as housemaids and 82% were earning Rs. 10,000-25,000

where 84% of the sample have been attracted by Middle Eastern countries such as Saudi Arabia, Kuwait, etc.

The study revealed, that although these women migrants have been earning Rs. 10,000.00 on average for a period of minimum 2 years, 60% of the migrants were not able to achieve its objective of migration mainly due to remittances not utilized for the intended purpose, high current consumption and gap between expected and actual salaries received. This clearly demonstrate the issue of mismanagement of the foreign remittances at the micro level, which will in turn lead to repeated migration, until such time the objectives are achieved upon. It was also observed that, none of the respondents who could not achieve their objectives in migration, could save an amount of the remittances; which could be a threatening situation, since domestic savings is vital in the development process.

It was also revealed that, 76% of the respondents who were back in Sri Lanka after one contract period (in general a contract period is 02 years) were planning on migrating to another country on a contract,. An in-depth analysis revealed that the reason for this repeated-migration decision was mainly due to income earned in the initial migration not being sufficient to achieve the objectives of migrating (53%) and due to remittances of the initial employment not being utilized for the intended purpose (32%).

Further, one of the key findings of the study were that 92% were able to make a positive impact on the condition of their houses while 50% have been able to achieve material benefits such as acquiring televisions, refrigerators etc. it is also observed that only 14% of the sample migrants have been able to positively impact the education of their children but none of them were able to positively impact the health condition of the children (Figure 7), which are key aspects denoting the social impact of the women migration to the migrants' families.

Figure 7: Positive Impact of Migration
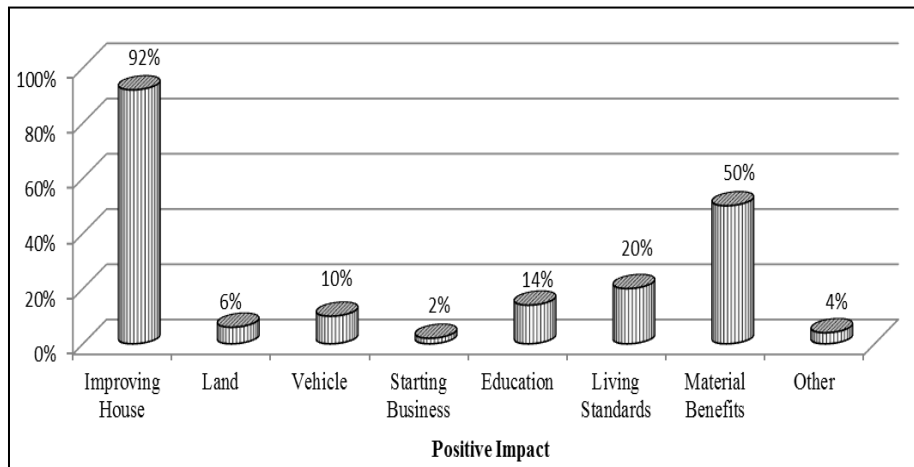
Source: Survey data, 2013

Further analysis on the impact of women migration on the education of the children left-behind out of the families which has children, revealed that 80% have not been able to positively impact on the education and 75% of the migrants who migrated with the objective of spending for the education of the children, have not been able to make a positive impact on their education.

Figure 8 demonstrates that migration of the mother has made various negative implications on the health condition of the children left-behind, especially on the mental status of the children, where various negative behavior of the children, such as earning low grades at school, dropping out from school, temper tantrums, joining socially undesirable gangs, disobedience etc. were noted among the sample families.

Exploration of primary data also revealed the following various negative social implications such as spouse being addicted to alcohol (76% of the cases) , spouse having external affairs and leaving the family behind although legally married to the women migrant (53% of the married migrants), increased divorce cases (10% of the pre-migration married women migrants) , increased family dissolution cases, misbehavior and disobedience of the children, increased drop-

outs from schools, children earning low-grades at school, temper tantrums and bad moods, joining socially undesirable gangs due to the fact that no other family member is paying attention to the children after the mother's migration.

Figure 8: Changes of Behavior of the Children
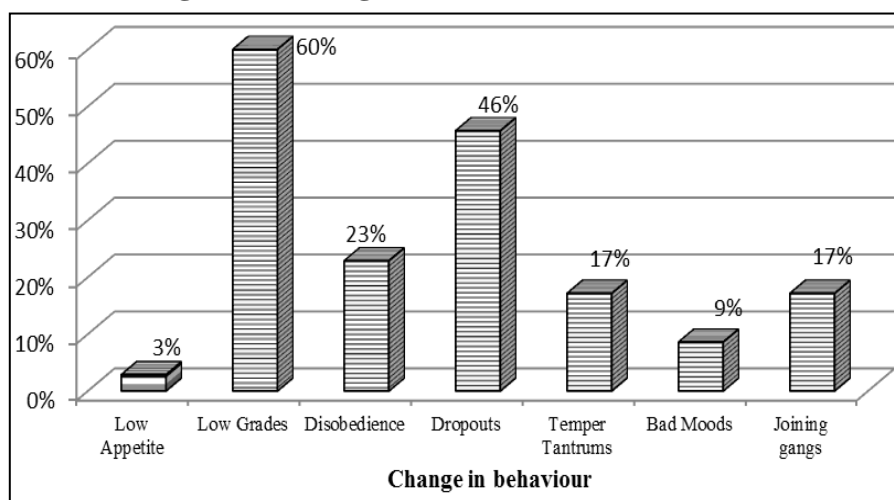
Source: Survey data, 2013

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

The study was carried out with the aim of finding out the social and economic impact of women migration as housemaids, where the economic impact was analyzed using a historical analysis using secondary data obtained through various sources such as the world bank database, annual reports of SLBFE, etc., while the social impact was analyzed using primary data obtained through a sample survey in the Hanwella Divisional Secretariat Division.

Accordingly, the study revealed that although foreign private remittances has increased by more than 100% during the past few decades which is an increase from 0.22% of the GDP in 1975 to 10% of the GDP in 2012 at the macro level and it has also increased the family income of 80% of the female migrants, which denotes that

women migration has a very high positive impact on the economic well-being of the migrant families as well the country as a whole, various aspects of women migration could have adverse social effects on the migrant families and Sri Lankan economy at large in the long run. Accordingly, it was found-out, that objectives of women migration were construction of a house, purchasing a vehicle, expending for children's education, etc., raising the issue of effectiveness of the free education and health system of the country which can be considered for an in-depth research study in the future. Further, majority of the women migrants could not achieve their objective of migration mainly due to the remittances not being used for the intended purpose. It was also found out that although migration has caused a positive impact on the material wellbeing of the migrant families through having a positive impact on the condition of their house, acquiring materials such as a vehicles , televisions, etc., migration of the female party has caused increased family dissolution cases such as spouse being addicted to alcohol, misbehavior of the children, negative effect for the education of the children, misuse of the remittances hindering the positive impact of remittances.

Thereby, based on the findings of the study, it is recommended to conduct awareness programmes especially for the family members of the migrants emphasizing the importance of management of remittances for the betterment of the family, opening of day-care centers which will support the psychological development of the children left-behind and adoption of supervision programmes on the educational progress of them in collaboration with the schools which will ensure that the economic impact of women migration will not over-ride the social development process of the country.

REFERENCES

Central Bank of Sri Lanka (CBSL) 2012-2005, Central Bank of Sri Lanka Annual Report, Author, Sri Lanka.

International Organization of Migration (IOM) 2013, *Key Migration Terms*, viewed 15 November 2013, http://www.iom.int/cms/en/sites/iom/home/about-migration/key-migration-terms-1.html#Migration

International Organization for Migration (IOM) 2013, *World Migration Report 2013*, viewed 13 November 2013, http://www.iom.int/cms/wmr2013

International Organization for Migration, *Rural Women and Migration – Fact Sheet 2012*, viewed 04 June 2013, http://www.iom.int/.../Rural-Women-and-Migration-Fact-Sheet-2012.pdf

International Organization for Migration 2005, *IOM and Remittances : Definition, Scale and Importance of Remittances*, viewed 04 February 2014, http://www.iom.int/jahia/webdav/site/myjahiasite/shared/shared/mainsite/published_docs/brochures_and_info_sheets/IOM_Remittance_eng_pdf.pdf

International Labour Organization 1999, International Convention on Migration for Employment No 97, 1949, viewed 04 June 2013, http://www.ilo.org/public/english/standards/relm/ilc/ilc87/r3-1b2.htm

Kelegama, S (ed.) 2011, '*Migration, Remittances and Development in South Asia*', SAGE Publications India Pvt. Ltd., New Delhi.

Lasagabaster, E., Maimbo, S. M., and Hulugalle, S. 2005, *Sri Lanka's Migrant Labour Remittances : Enhancing the Quality and Outreach of the Rural Remittances Infrastructure*, World Bank Policy Research World Bank Policy Research Working Paper No. 3789, World Bank, Washington D.C.

Rodrigo, C. 1999, 'Asian Females in Overseas Employment: Causes and Consequences: Insights from the Sri Lankan Experience', *Regional Development Studies*, Vol. 05, pp. 173-190

Sri Lanka Bureau of Foreign Employment (SLBFE) : Research Division 2011, *Statistical handbook on migration : 2011*, Author, Colombo.

Sri Lankan Government 1985, *Sri Lanka Bureau of Foreign Employment Act No. 21*, Amendments in 1994 and 2009, Author, Sri Lanka.

Ssengonzi, R., De Jong, G. F., and Stokes, C. S. 2002, 'The Effect of female migration on infant and child survival in Uganda', *Population Research and Policy Review*, vol. 21, no. 5, pp. 403 – 431.

United Nations Population Fund (UNFPA) 2009, *Global Migration Group (GMG) Fact-Sheet on the Impact of the Economic Crisis on Female Migration*, viewed 02 September 2013, http://www.globalmigrationgroup.org/gmg/sites/default/files/uploads/documents/UNFPA%20Fact%20Sheet_final.pdf

World Bank (n.d.) Gender, Poverty Reduction and Migration by Omelaniuk, I, World Bank, viewed 08 October 2013, http://siteresources.worldbank.org/EXTABOUTUS/Resources/Gender.pdf

International Remittances in Improving Household Economic Well-being: The Case of Sri Lanka

Dinesha Siriwardhane [a], Indralal De Silva [b] and
Sampath Amaratunge [c]

[a] *Senior Lecturer, Department of Business Economics, University of Sri Jayewardenepura, Sri Lanka*
d.siriwardhane@sjp.ac.lk

[b] *Senior Professor of Demography, Department of Demography, University of Colombo, Sri Lanka*
indralald37@gmail.com

[c] *Professor of Economics, University of Sri Jayewardenepura, Sri Lanka*
amaratunge@sjp.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

International labour migration and its socio-economic implications have become an important theme for discussion in Sri Lanka. International remittances, as the main visible benefit of labour migration, have become a vital source of foreign resources of the country. However, it is not clear whether the increase in international remittance flow is reflected at household level. Literature on remittances is mainly based on two phenomena: while many studies focus on motives behind remittances, relatively little attention has been paid to examining the impact of remittances on the economic well-being of households (see Koc and Onan, 2004; Cardona and Medina, 2006; Kibikyo and Ismail, 2012; Waheed and Adebayo, 2012; Adams and Page, 2005). Examining the impact of remittances, studies have found that remittances increase household income and decrease household poverty (see Bracking and Sachikonye, 2008; Kibikyo and Omar, 2012; Waheed and Shittu, 2012; Massey et al.,

1990, 1994; Semyonov, 2004; Stark, 1984; Adams and Page, 2005). Some studies have used household expenditure data to examine remittances and household well-being (see Koc and Onan, 2004; and Cardona and Medina,2006) , and found that the remittances make a significant impact on the economic well-being of households left behind. Studying both micro and macro level impacts of remittaces, Arunatilake et al. (2010) show that remittance-receiving households in Sri Lanka spend a comparatively larger amount of money on consumption than other households. Gamburd (1995) shows that remittances sent by many Sri Lankan women migrants help their husbands and fathers to enjoy new social status and improved economic conditions. The importance of remittances in supporting households to move out of poverty was shown by Munas (2008) and De and Ratha (2012). Studying the context of the Western Province in Sri Lanka, Sharma, (2011) found that remittance enhances food and non-food expenditure of the households left behind. Studies such as; Gamburd, 2004; Shaw, 2008; Tidball, 2011 relating to migration and remittances in the Sri Lankan context focus on women migrants and their families left behind. De Prabal and Ratha, 2012 and Arunatilake, 2010 have focused on remittance utilzation by households with either male or female labour migrants. Lack of studies on the impact of remittances at household level prevents policy makers from designing appropriate policies related to labour migration. Hence, present study aims to fill this literature gap by examining the impact of international remittances on the economic well-being of the households left behind. The research problem that the study focuses on is "what is the impact of international remittances on the economic well-being of the remittance receiving households in Sri Lanka?"

METHODOLOGY

There is no unique definition for the economic well-being. Different studies have used definitions and measurements. Among these, consumption level, asset accumulation, financial status of the

households is commonly used as measurements or proxy for economic well-being. Following previous works in the field, (namely Cutler and Katz, 1991; Jorgenson, 1998; and Meyer and Sullivan, 2003), economic well-being is defined as; *"enjoying better economic conditions by the households"* and it is measured by using the food and non-food consumption of households. Since education and health are freely available in the country, health and education expenditures are not taken into account as they generate misleading results. In order to adjust the size and composition variations in the households, the oxford scale of adult equivalence is applied. Accordingly, adult equivalence consumption of the households is used to measure economic well-being. The study applied experimental research design and the household is taken as the unit of analysis. Primary data is collected by the survey conducted in the Kalutara District, and the size of the sample is 751 households. This includes 629 with labour migrants and 122 households without. Clustered sampling method is applied to gain a sample with the representation of households from urban, rural and estate sectors. For each cluster households are randomly assigned using a list of labour migrants who migrated in 2012 and the list of electoral registration. The main hypothesis tested in the study is that the international remittances improve the economic well-being of the remittance receiving households.

Propensity score matching method is used to analyze data. Stratified matching technique is applied in the matching procedure since the consumption level of the household represented a significant inequality among the households. Propensity scores are developed by estimating a logit model for remittance receiving status. As Rosenbaum and Rubin (1985) show five blocks as the most suitable strata levels, five strata are used in the study. Replacement ratio of the unit is used as three since the size of the control group is relatively small. Average treatment effects are estimated for each income quintile of the households and compared between remittance receiving and non-receiving households using independent sample t tests. After matching sample size become, 564 remittance receiving and 181 non-remittance receiving households.

RESULTS AND FINDINGS

The description of variables and descriptive statistics are presented in Table 1, while the estimation results of logit model used to generate propensity scores in Table 2 and average treatment effect of the remittances on the economic well-being of the remittance receiving households in different income quintiles in Table 3 as follows.

Results show that remittances make a significant impact on the households in different income quintiles. Weighted average treatment effect shows the average impact of remittances on remittance receiving households. It shows that economic well-being is higher among remittance receiving households than their non-remittance receiving counterparts. The economic well-being is lower among low income earning households and higher among high income earning households. International remittances have improved economic well-being of low income households by a lower percentage. However, percentage of improvement is higher among high income earning households.

Figure 1 presents percentage change in the average treatment effect on treated, estimated for rural and urban sector households in different income quintiles. Estimations are done by the stratified matching method. Impact of remittances on economic well-being is estimated as the percentage change in the economic well-being of the households in different income quintiles.

In the rural sector it was found that there is a significant improvement in household economic well-being among the households in all income quintiles. However, the size of the improvement varies with the level of income. Improvement is rather lower among poor households and higher among high income earning households.

Table 1: Description of Variables and Descriptive Statistics

Variables	Variable Description	Remittance Receivers		Non-Receivers	
		Mean	SD	Mean	SD
WB	Economic well-being, measured by Adult Equivalence Consumption	32819	26815	28521	23805
AGE	Age of Head of the household	44.00	14.64	51.22	14.56
HHS	Size of the household	1.125	0.422	1.206	0.443
GEN	Gender of head of the household	0.592	0.491	0.227	0.421
EDU	Highest education level of head of the household (primary =1)	0.108	0.311	0.111	0.315
CHILD1	Number of children below 5 years	0.273	0.526	0.183	0.454
CHILD2	Number of children between 5 and 15 years	0.608	0.803	0.444	0.678
ADULT	Number of adults in the household	0.211	0.461	0.144	0.368
EMPLD	Number of people employed in the household	1.828	0.874	1.638	1.002
REGI	Availability of regular income	0.561	0.496	0.794	0.405
IREGI	Availability of irregular income	0.281	0.450	0.488	0.501
AST	Asset Index of the household	4.119	1.411	4.144	1.691
RURAL	Household is in rural sector (yes=1)	0.870	0.339	0.90	0.301

Table 2: Estimated Results of the Logit Model

Variable Name	Coefficient	Std. Error	Wald Test	Exp(B)
Characteristic/Head				
GEN	1.105**	0.223	24.522	3.02
AGE	-0.019**	0.007	6.330	0.98
EDU	0.555	0.356	2.439	1.74
Characteristics/Household				
HHS	-.908**	0.146	38.595	0.43
CHILD 1	1.04**	0.260	16.073	2.84
CHILD 2	1.00**	0.196	26.153	2.72
ADULT	0.885**	0.168	27.661	2.42
EMPLD	0.530**	0.142	13.970	1.69
REGI	-1.320**	0.262	25.272	0.26
IREGI	-1.122**	0.221	25.784	0.33
AST	0.114	0.071	2.552	1.12
RURAL	0.392*	0.211	3.448	2.13
Constant	0.481	0.654	0.541	
Dependent variable: Remittance receiving status (1=yes; 0=otherwise)				3.016
Percentage Correct 83.6				
N 751				

Source: Estimated by author using survey data in SPSS 21

Note: Confidence levels for significance; *** <0.01p, ** <0.05p, * <0.1p

Table 3: Remittance on Economic Well-being: Average Treatment Effect

Income Quintile	Weighted Average Treatment Effect (Rs.)	Improvement in the Economic Well-being (%)
Poorest 20%	2454.77*	8.19
2nd 20%	4808.71*	17.19
3rd 20%	4897.94*	17.77
4th 20%	5663.82*	20.61
Richest 20%	5411.31*	19.55

Source: Estimated by authors using survey data in SPSS 21
*Note: Confidence levels for significance; *** <0.01p, ** <0.05p, * <0.1p*

Figure 1: Improvement of Economic Well-being by Sector and Income Quintile of the Household
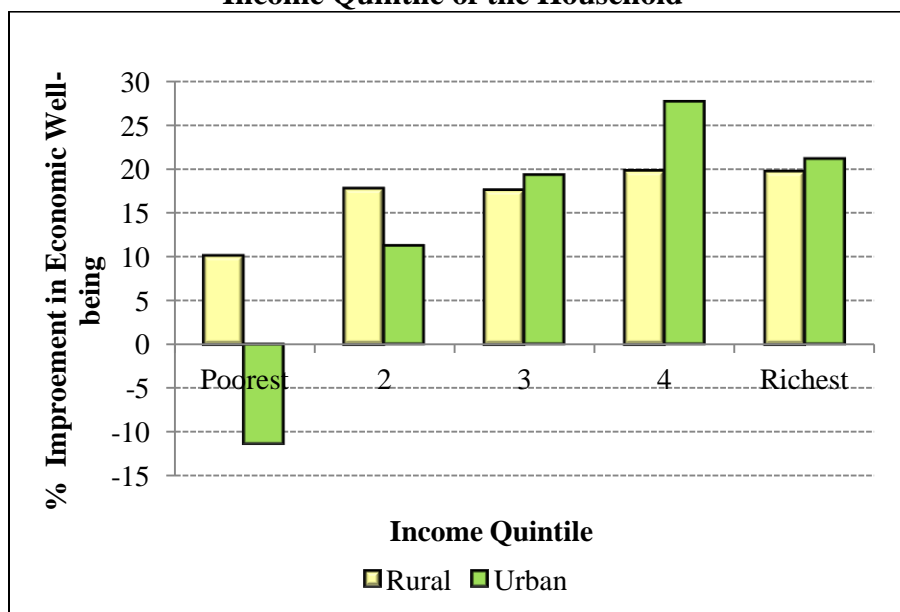
Source: Estimated by author using stratified matching analysis and survey data, 2013

On the other hand, remittances have made a negative impact on the economic well-being among the poorest group of households in the urban sector. Their economic well-being is significantly lower that of their non-remittance receiving counterparts, who are in the same level of household income. Improvement in well-being among lower middle income earners in the urban sector is low, compared to their counterparts in the rural sector. However, well-being improvement through remittances among both high middle income earners and high income earners is significantly higher compared to that in the rural sector.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

Objective of this study was to examine the impact of international remittances on economic well-being of remittance receiving households in Sri Lanka. Study used primary data collected through a sample survey. Propensity score matching method with stratified matching technique was used to analyze data. It was found that, international remittances make a significant impact on the economic well-being of the remittance receiving households. Improvement in well-being was estimated by weighted average treatment effect of treated, that estimates the impact of the independent variable in the stratified matching method. Results show that improvements in economic well-being vary with the income level of households. While the well-being improvement with remittances is lower among the low income earning households, it is higher among high income earning households. This situation is common to both urban and rural sectors. However, in the urban sector, economic well-being of low income earning remittance receivers is comparatively lower than their non-remittance receiving counterparts. Results are consistent with the findings of previous research done in various country contexts (e.g., Koc and Onan, 2004; Cuong, 2008; Tullao and Rivera, 2008, Taylor et al., 1996).

International labour migration is one of the main sources of employment in Sri Lanka. With a wide variety of socio-economic costs and benefits, remittances are considered the main return, though short term, to the sending country. In a developing country like Sri Lanka, remittances play a vital role at the macroeconomic level. However, relevant literature is rather scanty in the Sri Lankan context , where the role of remittances at household level has not been sufficiently examined. This is one of the first papers to examine the impact of remittances on household well-being in both the Sri Lankan and South Asian contexts. Hence, this study is timely and addresses the existing gap in literature, where previous research on remittance-well-being nexus has not paid sufficient attention to the selection bias generated. This study, taking into account the determinants of remittances and employing propensity score matching method, has controlled the selection bias and produced more accurate results. Stratified matching approach was also used to improve the accuracy of results, which is a step further from similar studies in the field.

REFERENCES

Adams, R. and Page, J., 2005. Do International Migration and Remittances Reduce Poverty in Developing Countries?. World Development, 33(10), pp. 1645-1669.

De Silva, I., and Siriwardhane, D. 2014. Labour Migration: Consequence of one-parent family on the Well-being of their Children in Sri Lanka, paper presented on International Conference on Growing up in one-parent family in Asia, at Asia Research Institute Singapore.

Bracking, S. and Sachikonye, L. 2008. Migrant Remittances and Household Well-being in Urban Zimbabwe, s.l.: International Organization for Migration (IOM).

Cardona, S. and Medina, C. 2006. Migration as a Safety net and Effects of Remittances on Household Consumption: The Case of Colombia. Borradore de Economia.

Cuong, N. V. 2008. Impacts of International and Internal Remittances on Household Welfare: Evidence form Vietnam. Asia Pacific Development Journal, 16(1), pp. 59-92.

Gamburd, M. R. 1995. Sri Lanka's Army of Housemaids"; Control of Remittances and Gender Transformations. Anthropologica , 49-88

Jorgenson, D., 1998. Did We Lose the War on Poverty?. Journal of Economic Perspectives, 12(1).

Kibikyo, D. and Ismail, O., 2012. Remittances Effects on Poverty and Social Development in Mogadishu, Somalia. Microeconomics and Macroeconomics, p. 10.

Koc, I. & Onan, I., 2001. The Impact of Remittance sof International Migrants on the Standard of Living of the Left-Behind Families in Turkey. Salvador, Brazil 18-24 Apil, s.n., pp. 78-112.

Massey, D. et al., 1993. Theories of International Migration: A Review and Appraisal. Population Council, 19(3), pp. 431-466.

Munas, M. (2008). MOving out of Poverty: The Role of Remittances. Center for Poverty Analysis (CEPA)

Meyer, B. and Sullivan, J., 2003. Measuring the Well-Being of the Poor Using Income and Consumption. Journal of Human Resources, Volume XXVIII.

Rosenbaum, P. R., and Rubin, D. B. 1984. Reducing Bias in Observational Studies Using Subclassfication on the Propensity Score. Journal of the American Statistical Association, 79(387), pp. 516-524.

Rosenbaum, P., and Rubin, D. 1983. The Central Role of Propensity Score in Observational Studies for Causal Effects. Biometrika, Volume 70, pp. 41-55.

Semyonov, M. A. G. 2005. Labour Migration, Remittances and Household Income: A Comparison between Filipino and Filipina Overseas Workers. IMR, 39(1), pp. 45-68.

Sharma, M. P. 2011. International Contract-Based Migration, Remittances and Household Well-Being in the Western Province of Sri Lanka. International Migration , 51, 216-248.

Shaw, J., 2008. Housemaid Remittances in Rural Sri Lanka: Development Policy Issues. Melbourne, Asian Studies Association of Australia.

Siriwardhane, D., De Silva, I., and Amaratunge, S. 2013. Female Dominance to Male Dominance: Changing Sex Structure of the Labour Migrants and the Remittance Flow to Sri Lanka. Paper Presented at the International Conference on Migration. National Science Foundation, Sri Lanka.

Siriwardhane, D., De Silva, I., and Amaratunge, S. 2014. Sri Lanka-Middle East Labour Migration Corridor: Trends, Patterns and Structural Changes, International Journal of Social, Behavioural, Educational, Economic and Management Engineering, Vol.8 No. 12 (2014), World Academy of Science, Engineering and Technology , pp.3713-3716.

Taylor, E., Arango, J., Hugo, G., Kouaouci, A., Massey, D., Pellegrino, A.1996. International Migration and Community Development. Population Index, 62(3), pp. 397-418.

Tidball, S., 2011. Migration of Sri Lankan Women as Housemaid to the Middle East. Lincolin, University of Nebraska.

Tullao, T., and Rivera, J. 2008. The Impact of Temporary Labour Migration on the Demand for Education: Implication on the Human Resource Development in the Philippines, s.l.: EADN Working Paper No.37.

Waheed, O., and Adebayo, S. 2012. Remittances and Income Inequality in Rural Nigeria. Business Management and Economics, 3(5), pp. 210-221.

Agro Business Management

Demand for Saving Turtles at Rekawa Sanctuary

R.M.W. Rathnayake

Department of Tourism Management, Sabaragamuwa University of Sri Lanka, Sri Lanka
warath1@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

Marine turtles have been roaming the oceans for about 190 million years although only seven species are known to be living today. Of these, Sri Lanka is host to five endangered species that regularly visit its sandy beaches. The Rekawa wildlife sanctuary is the prime habitat for turtle nesting. Turtles at Rekawa are under threat due to ongoing illegal activities such as killing turtles for meat, collection of eggs for sale, and the use of turtle shells to make products. There is a niche market for 'turtle watching' among both local and foreign tourists, and that potential has been underutilized by the policy makers as well as the local community as a revenue-generating initiative. At present some non-government organizations are involved in improper 'turtle watching initiatives' and only a few people get benefits by charging tourists for the service. These self-appointed "nest protectors" also steal turtle eggs to meet their daily consumption needs. This study employs a basic non-market valuation technique, viz., the Contingent Valuation Method (CVM), to estimate the benefits of a sea turtle conservation program taking into consideration the multidimensional nature of conservation benefits. Accordingly, the objective of this study is to estimate the WTP (willingness to pay) as an entrance fee for turtle watching at the sanctuary the revenues that could be used to compensate fishermen who depend on sales of turtle eggs and turtle products as their livelihood.

METHODOLOGY

We carried out a CVM study at the Rekawa sanctuary and two national parks in close proximity to Rekawa sanctuary, Bundala and Yala, which were treated as off-site study sites. In the present study, we have developed two alternative management scenarios: scenarios 1 and 2. The question of whether turtles should be fully protected, or whether they should be conserved while providing recreational facilities to the general public, is one that is currently garnering much attention among conservationists. We developed Scenario 1 focusing mainly on visitor services to be established at Rekawa, while Scenario 2 focused on both visitor services and conservation initiatives to be establishedat Rekawa. Both scenarios included economic incentives for the local community. The payment vehicle was the bid value in terms of proposed entrance fees.

To estimate the WTP, we follow the estimation approach given in Lopez-Feldman (2012). In this approach, WTP is modeled as a linear function

$$WTP_i(z_i, u_i) = z_i\beta + u_i$$

where z_i is a vector of explanatory variables, β is a vector of parameters and u_i is an error term. In our study, the following are explanatory variables:

educ: Education in number of years

age: Age of respondents in years

gender: Respondents' gender (1= male and 0= female)

hhinc: Household income (LKR/USD)

marital: Marital status (1= married, 0= others)

entow: Working in tourism or environment-related field (1=yes, 0= no)

turtseen: Seen turtles (1=yes, 0= no)

nestseen: Seen turtle nesting (1=yes, 0= no)

site_dum: Survey site (1=Rekawa, 0=Yala and Bundala)

rekawavi: Knowledge of Rekawa or visited Rekawa (1=yes, 0= no)

grsize: Group size

Each individual is offered a single bid value (t_i) and is expected to answer yes or no. Denote $y_i = 1$ if the answer is yes and $y_i = 0$ if the answer is no. The individual would answer yes when his/her WTP is greater than the offered bid amount ($WTP_i > t_i$). The probability of $y_i = 1$ is a function of the explanatory variables and can be written as:

$$\Pr(y_i = 1 \mid z_i) = \Pr(WTP_i > t_i)$$
(2)

$$\Pr(y_i = 1 \mid z_i) = \Pr(z_i \beta + u_i > t_i)$$

$$\Pr(y_i = 1 \mid z_i) = \Pr(u_i > t_i - z_i \beta)$$
(3)

Researchers commonly use probit and logit models when the dependent variable is binary (Capps and Cramer, 1985; Bishop and Heberlein, 1979; Seller, Stoll, and Chavas, 1985). In this study, the outcome is binary and we apply the probit model for data analysis. Hence, we assume that the error term u_i has a normal distribution $N(0, \sigma^2)$. In this case, Equation (3) can be written as

$$\Pr(y_i = 1 \mid z_i) = \Phi\left(\frac{z_i \beta}{\sigma} - \frac{t_i}{\sigma} \right)$$
(4)

where Φ (.) denotes the standard cumulative normal distribution function. Note that, in Equation (4), the probit model has t_i in addition to z_i as explanatory variables. There are two ways in which one could estimate this model. The first one is to use Equation (4) and apply maximum likelihood estimation to solve for β and σ. The other option, which we use in this study, is to directly estimate the probit model with z_i and t_i as explanatory variables, which can be estimated in STATA statistical package. In this case, we obtain estimates of β/σ and $-1/\sigma$ after estimating the probit model. For the results of probit model, denote $\hat{\alpha} = \hat{\beta}/\hat{\sigma}$ (the vector of coefficients associated to each one of the explanatory variables) and $\hat{\delta} = 1/\hat{\sigma}$ (the coefficient for the variable capturing the amount of bid).

The expected value of WTP can be estimated for individuals with certain characteristics or at the average of explanatory variables as

$$E(WTP \mid \tilde{z}) = \frac{\tilde{z}\hat{\alpha}}{\hat{\delta}}$$

(5)

where, $\tilde{z}$ is a vector with the values of interest for the explanatory variables.

The sample size was 894 and we surveyed both foreign and local visitors under the two scenarios at different bid values. In each scenario, we proposed six bid values for local visitors and four entrance fees (or bid values) for foreign visitors, interviewing them under each bid value and asking them about their willingness to accept it as the proposed entry fee for visiting Rekawa. In addition, we collected information on the socio-economic conditions of the local community, interviewing a selected crowd including the relevant Divisional Secretary and Grama Niladhari, and referring to secondary data.

RESULTS AND FINDINGS

We found that with an increase in the bid value in the form of the entrance fee, the number of visitors who were willing to visit Rekawa and pay for the scenarios went down gradually. The main reasons for WTP for both scenarios being "I can afford this amount", "This initiative helps to conserve turtles at Rekawa", "I will enjoy improved visitor facilities", "It will help the local community" and "I will be able to see turtles/turtle nests". Meanwhile, some of visitors mentioned "the entrance fee is high", "do not like to watch turtles" and "do not trust the government" as their three main reasons against WTP.

More than 90 percent of the respondents accepted that the proposed initiatives would lead to better protection and conservation of turtles, at the same time providing economic incentives for the local community. The estimated mean WTP values per visit of locals were LKR 93.08 and LKR 142.61 for scenarios 1 and 2 respectively, while the mean WTP values of foreign visitors were USD 15.33 and USD 19.16 for scenarios 1 and 2 respectively. These values are comparable to the WTP values for other species culled from studies in the Asian region. At present, only foreign visitors pay an entry fee, amounting to LKR 1000 (USD 8) and resulting in an annual revenue of LKR 2.44 million. These findings show that there will be annual revenue increase of 2043.82% and 2855.65% respectively, if we implement the scenarios are implemented.

A majority of people in the area do not have access to basic needs such as drinking water and electricity, with the percentage of poor, with a daily household income of less than LKR 100, at approximately 33 percent. This lack of livelihood opportunities is a major threat to the survival of marine turtles on the Rekawa beach. Our field studies showed that some local youth earn up to LKR 1000 per day working as nest protectors while the egg collectors earn up to LKR 300 per day from selling the stolen turtle eggs. Though the

majority of the local community can be classified as substing below the poverty line and as either unemployed or under-employed, they do not have access to work as nest protectors or as guides in the existing turtle watching trade because of the monopoly held by those currently working as nest protectors and guides. One of the major concerns expressed by the local community was their exclusion from turtle conservation initiatives, a concern shared by administrators, policy makers and community leaders of the area. Therefore, if we are able to attract more visitors to Rekawa and charge entrance fees, we would be able to employ local youth as nest protectors or interpreters, and allocate a percentage of those earnings for daily wages. We found that the local level hoteliers, restaurant operators and boutique owners too were ready to provide visitor facilities including accommodation and meal services if the government becomes directly involved in providing tourism-related operations at Rekawa. Then the local community will be able get involved in tourism related activities, and find new economic incentives through the proposed scenarios.

CONCLUSION AND IMPLICATIONS

The results indicate that the majority of visitors were willing to pay an entrance fee which would go towards protecting turtles and improving visitor facilities at Rekawa, and that a successful entrance fee program could thus be designed for Rekawa sanctuary. If we promote the above scenarios we will be able to attract more visitors to Rekawa and employ poachers and egg collectors as the nest protectors and interpreters. Further we will be able to allocate a certain amount of earnings from entrance fees as their salaries to compensate for their previous earnings from turtle poaching and egg collection. It also means that policy makers would be able to get the local community involved in turtle conservation through the 'turtle watching' initiatives.

The study recommends therefore that the following policy directions be adopted, in order to help both turtle conservation and the provision of economic incentives for the local community: (i) streamlining and promoting 'turtle watching' at Rekawa; (ii) introducing a new fee structure for turtle watching; (iii) proposing a proper incentive/compensation scheme for the local community to get involved in turtle conservation; and (iv) establishing a village-level welfare fund using a percentage of the gate collection to improve basic infrastructure facilities in Rekawa village that would benefit the entire community, thus providing an incentive for everyone in the community to support the initiative.

REFERENCES

Bishop, R. C., and Heberlein, T. A. 1979. Measuring Values of Extra market Goods: Are Indirect Measures Biased?. *American Journal of Agricultural Economics*, 61 (Dec.), 926-30.

Capps, O., and Kramer, R. A. 1985. Analysis of food stamp participation using qualitative choice models', *American Journal of Agricultural Economics,* 67 (1), 49-59.

Lopez-Feldman, A. 2012. Introduction to contingent valuation using STATA. *MPRA*

Paper No.41018 (Online at http://mpra.ub.uni-muenchen.de/41018/). (Accessed 4, September 2012)

Seller, C., Stoll, J. R., and Chavas, J. P. 1985. Validation of empirical measures of welfare change: a comparison of nonmarket techniques, *Land Economics*, 156-175.

Consumption Patterns and Preferences of Households for National and Local Brands of Yoghurt and Curd: A Study in Anuradhapura District

D.W.K.S. Diwuldeniya [a] and **P. Weligamage [b]**

[a] *Temporary Demonstrator, Faculty of Agriculture, Rajarata University of Sri Lanka*
kumududil.shanika@yahoo.com

[b] *Senior Lecturer, Faculty of Agriculture, University of Peradeniya*
parakw@pdn.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

According to household income and expenditure survey 2012 milk and milk products are a major component of the food basket of the Sri Lankan population. Average household expenditure on dairy products is Rs.1,444 per month. It is all round food stuff and helps give a balance diet as milk supplies high quality protein, mineral, and vitamins. Promoting local milk production is a strategy by the Government of Sri Lanka to reduce dependency of the nation on imports. Yoghurt and curd industries primarily depend on local production of milk and involve a diverse set of industry participants. Even though yoghurt and curd are popular among households, there is no data devoted to consumption of yoghurt and curd. There are small scale producers, farmers, and large scale companies which engage in the yoghurt and curd production. There is large number of pioneer and follower brands of yoghurt and curd available. At the same time Sri Lankan government encourage small scale producers of dairy products such as yoghurt and curd, also motivating consumers to purchase more local dairy products by reducing the price.

According to past studies consumption of yoghurt depends on the socio-economic and demographic characteristics of households. Therefore, this research attempts to find out what the effects of socio-economic and demographic factors are on consumption and preferences of yoghurt among households. The general objective of the study is to identify the consumption patterns of dairy products among households in the Anuradhapura District. The specific objectives of the study are to study the socio economic condition of the consumers towards yoghurt products, identify which brand of yoghurt and curd was consumed most, and to identify factors considered by yoghurt consumers when selecting brand.

METHODOLOGY

Primary data was collected using primary survey method. In this study the target population was defined as the residents of the Anuradhapura District. Because Anuradhapura is a second largest milk producing district in Sri Lanka. Households were selected as a sampling unit. Ninety households were interviewed to represent the target population. Stratified sampling method was used to select the sample among the target population. Stratification of the households was based on the rural, urban and semi-urban sector in the Anuradhapura District. On this basis 30 household sample from each rural, urban and semi-urban sector were selected. Sampling framework was the electorate registry. In that 30 urban households were randomly sampled from Yasasiripura Grama Niladari Division, 30 rural households from Kadiyangalla Grama Niladari Division. And 30 semi-urban households were randomly sampled from Kurundankulama Grama Niladari Division. Consumption data were based on seven-day recall of food purchase and consumption. Data on socio-demographics and availability of brands in the locality were also collected. Data were analysed using descriptive statistics to understand consumption patterns. Determinants of consumption quantity were identified using multiple regression analysis.

RESULTS AND FINDINGS

Results reveal that 96 percent and 93 percent of households consume yoghurt and curd respectively. Weather conditions affect the consumption of yoghurt and curd. 64 percent of households reduce consumption due to rainy conditions. The nearby grocery is the preferred place to buy yoghurt, and large groceries and distributors are the most preferred place or buying curd.

Linear regression model suggests that household size and per capita consumption of curd and ice-cream negatively affect the per-capita consumption of yoghurt, while presence of children less than ten years old and well being index positively affect it. The effect of mother's education on yoghurt consumption is positive and significant.

98 percent of the households prefer national brands to local brands in yoghurt buying while only 45 percent of households prefer national brands of curd over local brands. Also Most of the households like to buy branded yoghurt and curd due to availability, taste, texture, nutrient content and they do not consider the design of the packaging. Household's locations had impact of brand preferences. Because availability of the different brands.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

This study suggests that as household size decreases per capita consumption of yoghurt decreases as well. Relatively greater scarcity is faced by the individuals in large families. Also per capita consumption of curd and ice-cream decrease the per capita consumption of yoghurt. Therefore curd and ice-cream act as substitutes to yoghurt.

With the increase in the number of children less than ten years old per capita consumption of yoghurt of the households were increased. Households with children consume more yoghurt, as do households with educated mothers. The educational level of the mother influences the per capita consumption of yoghurt.

Wellbeing index of households indicates the wealth conditions of the household. This study suggests that with the improvement in the wellbeing index per capita consumption of yoghurt was increased.

This result suggests that yoghurt producers should target households having high well being index, an educated mother, and children less than ten years old. Interventions should target those households in their promotional campaigns to increase sales. Local producers would gain more by value addition of their milk through curd instead of competing with national brands for yoghurt.

REFERENCES

Aidoo, R., Nurah, G.K., Fialor S.C., and Ohene-Yankyera, K. 2009. Determinants of dairy consumption expenditure in urban communities of Southern Ghana. *Journal of Science and Technology,* 29(1)

Babalola, D.A., and Isitor S.U. 2014. Analysis of the determinants of food expenditure patterns among urban households in Nigeria: Evidence from Lagos State, *IOSR Journal of Agriculture and Veterinary Science*, 7(5) Ver. III (May. 2014), PP 71-75. Viewed 18 November, 2014, http://www.iosrjournals.org

Department of Census and Statistics, 2013. Household income and expenditure survey 2012/13. Department of Census and Statistics, Ministry of Finance and Planning, Sri Lanka

Dong, F. 2005. The Outlook for Asian Dairy Market: The Role of Demographics Income and Prices, CARD working paper 05-WP 399, Centre for Agricultural Development, Iowa State University, viewed 18 November, 2014, http://www.card.iastate.edu/publications/DBS/PDFFiles/05/wp399.pdf

Fuller, F., Beghin, J., and Rozelle, S. 2007. Consumption of dairy products in urban China: results from Beijing, Shangai and Guangzhou, *The Australian Journal of Agricultural and Resource Economics*, 51, pp. 459–474.

Kumar, A.A., Babu, S. 2014. Factors influencing consumer buying behavior with special reference to dairy products in Pondicherry State, International Monthly Refereed Journal of Research In Management & Technology, 3, Viewed 24 Octomber, 2014, http://www.abhinavjournal.com

Economic Factors behind the Conversion of Rubber Cultivations into Alternative Cash Crops with Special Reference to Kalutara District

J.K.S Madushani [a] and **Nandasiri Keembiyahetti** [b]

[a] *Department of Economics, University of Ruhuna, Matara, Sri Lanka*
go2shanijayasuriya@gmail.com

[b] *Department of Economics, University of Ruhuna, Matara, Sri Lanka*
nandasiri2007@gmail.com

INTRODUCTİON AND RESEARCH PROBLEM

This study focuses on economic and non-economic factors causing conversion of rubber cultivations into alternative crops. The main objective of this study is to identify the reasons and their relative importance for conversion of Rubber lands into alternative crops.

Rubber and tea both have been economically important crops for Sri Lanka for years. The observed recent trend is that rubber cultivation gradually being uprooted by the rapid expansion of tea and other alternative crops. Hence, this study attempts to answer the question, what factors cause transition of rubber cultivations into alternative crops?

Kulasekara (2007), in a case study on Baduraliya under the theme of 'Economics of Transition from Rubber to Other Alternatives' emphasized that about 28 per cent of the total area under rubber cultivation has already undergone conversion. The majority

consisting of 94 per cent of the total transition was for tea cultivation while a margin of 3 per cent for coconut and cinnamon. This study identified the reduction of rubber prices as the major reason for transition. In the presence of a higher Internal Rate of Return (IRR) and a relatively low payback period for tea cultivation compared to Rubber this study concluded that Tea is more economically viable than rubber for the Baduraliya Division in the Kalutara District.

Wijesuriya et al. (2004),examining the reasons for abandoning rubber cultivation in Pohorabava village in the Rathnapura District, disclosed that there was a 20 per cent risk of abandoning rubber cultivation as a combined effect of interactions between the environment, society and technology in the smallholder rubber sector. Using Participatory Rural Appraisal (PRA) techniques the said study discovered that factors directly influencing the decision of abandoning rubber are reduced income, shortage of labor, inefficiency of advisory services, insufficient subsidies, and long immature period. Further it revealed that the shortage of labor was due to other occupations which were indifference to tapping while the reduced income was due to low rubber prices and heavy rainfall. As remedial measures they recommended reducing the degree of price fluctuations through government policy marking, increasing subsidies, awareness building, and finally changing attitudes of people on rubber tapping as a livelihood.

Jayasuriya, and Carrad (1975) using a sample of 165 smallholdings conducted a survey in the Colombo, Kalutara and Rathanapura Districts with the objective of ascertaining how smallholders made their decision to replant rubber. The responses showed a wide range of influences at work: the main factors encouraging farmers to replant were the promise of a steady flow of output and a reasonable income, low risk, and a lack of viable alternative crops. Negative influences for replanting ranged from inability to lose current income (albeit very low) by removing old rubber trees, insufficiency of the

replanting subsidies, and the greater profitability of the other perennial crops.

METHODOLOGY

This study assumes the decision of an individual to changeover to alternatives depends on a set of explanatory variables such as income of rubber relative to other crops, shortage of skilled harvesters, expected leisure time, bad weather conditions, availability of subsidies, age structure, gender and the education level of smallholders. We estimated following binary logistic model to identify the influencing factors in terms of odd ratios:

$$L_i = \text{In}\left(\frac{P_i}{1 - P_i}\right) = Z_i = \beta_0 + \beta_1 EXIN_i + \beta_2 LAB_i + \beta_3 FREE_i + \beta_4 RPROFIT_i$$
$$+\beta_5 RDAYS_i + \beta_6 OWN_i + \beta_7 EDU_i + \beta_8 SEX_i + \beta_9 AGE_i + \beta_{10} SUBT_i + u_i$$

Where,

Z $\qquad$ = Dummy dependent variable $\begin{Bmatrix} 1 \; if \; converted \\ 0 \quad otherwise \end{Bmatrix}$

EXIN $\qquad$ = Ratio of expected income from new cultivation to the previous cultivation at the time of convention. Since expected income is unobservable, it was assumed equal to realized income

LAB $\qquad$ = labor shortage as a percent of total labor requirement in rubber at the time of convention

FREE $\qquad$ = Number of free days where owner not involved in cultivation per week after convention

RPROFIT $\qquad$ = Ratio of profit margins after convention to before convention

RDAYS   = Number of untapped (lost harvest) days during the year before convention

OWN   = Categorical variable showing ownership whether own, government, or combined

EDU   = level of education measured by year of schooling of the smallholder

SEX   = Dummy variable $\begin{Bmatrix} 1 & if\ male \\ 0 & otherwise \end{Bmatrix}$

AGE   = Age of smallholder at the time of convention, current age for others

SUBT   = Dummy variable
$\begin{Bmatrix} 1 & if\ new\ crop\ received\ subsidies \\ 0 & otherwise \end{Bmatrix}$

u_i = error term

Hypotheses

$\beta_1 > 0$ =   Higher the expected income from new cultivation is, higher the odds of tendency to transit to alternative crops

$\beta_2 > 0$ =   Higher the skilled labor shortage is, higher the odds of tendency to transit to alternative crops

$\beta_3 > 0$ =   The more free time available after conversion is, higher the odds of tendency to transit to alternative crops

$\beta_4 < 0$ =   Higher the rubber profit compared to that of alternatives is, lower the odds of tendency to transit to alternative crops

$\beta_5 > 0$ = Higher the rain interference is, higher the odds of tendency to transit to alternative crops

$\beta_6 < 0$ = The more ownership rights are vested with outside party; lower the odds of tendency to transit to alternative crops

$\beta_7 > 0$ = Higher the level of education is, higher the odds of tendency to transit to alternative crops

$\beta_8 > 0$ = When the small holder is male, higher the odds of tendency to transit to alternative crops

$\beta_9 > 0$ = Older the smallholder is, higher the odds of chance to transit to alternative crops

$\beta_{10} > 0$ = The more subsidies are available for tea, higher the odds of tendency to c transit

Sample and Data

Kalutara District has an extent of 29,299 ha of rubber and is ranked 2nd among rubber producing districts (Department of Census and Statistics, 2012). It belongs to the agro ecological zone, where 3,200 mm of annual rainfall can be expected with 75% probability (Wijesuriya et al., 2004). The study uses primary data collected from stratified random sampling techniques where the study population was divided into subgroups called strata. In the first step 5 GN divisions were selected considering two factors, namely:

(1) Density of rubber cultivation and
(2) Adequacy of conventional cases from rubber to alternatives crops.

Accordingly Baduraliya, Lathpandura, Hedigalla, Morapitiya, and Pelenda Grama Niladari (GN) Divisions in Palindanuwara Divisional

Secretariat Division were selected. Then, a sample of 100 respondents was selected randomly using a computer generated random number list and data were collected through a questionnaire survey. Total sample size was restricted to 100 considering limitations on expenses and time. A single smallholder who has converted a part of the Rubber cultivation while keeping the remaining part unchanged was considered as two individual smallholders for analytical convenience.

RESULTS AND DISCUSSION

The binary logit model was estimated in Maximum Likelihood (ML) method with the help of E-views-5. The variable SUBT was dropped as it was found highly correlated with other explanatory variables. Accordingly, the estimated equation is given by:

$$\hat{Z}_i = 61.939 + 4.183EXIN_i - 14.43LAB_i + 0.489FREE_i - 52.776RPROFIT_i - 0.0239RDAYS_i - 0.899OWN_i - 0.053EDU_i - 0.757SEX_i - 0.105AGE_i \dots\dots\dots\dots\dots (1)$$

Estimated coefficients in the Binary Logit Model together with z-statistics and probability values are reported in Table 1 below.

Table 1: Estimated Coefficients of Binary Logistic Model

Dependent Variable: Y

Method: ML - Binary Logit (Quadratic hill climbing)

Sample: 1 100

Included observations: 100

Variable	Coefficient		z-Statistic	Prob.
C	61.93914		2.000344	0.0455
EXIN	4.183419	***	2.966547	0.0030
LAB	-14.43008	***	-2.336991	0.0194

FREE	0.489577	**	1.775608	0.0758
RPROFIT	-52.77699	**	-1.778849	0.0753
RDAYS	-0.023920		-0.868976	0.3849
OWN	-0.899383		-1.080947	0.2797
EDU	-0.053076		-0.326661	0.7439
SEX	-0.757366		-0.538199	0.5904
AGE	-0.105147		-1.085399	0.2777

McFadden R-squared:		0.777450			
LR statistic	:	83.85212			
Prob(LR statistic)	:	0.000000			
Obs with Dep = 0	:	23	Total obs	:	100
Obs with Dep = 1	:	77			

*** *Significant at 1%, ** Significant at 10%*

In the *logit model* the slope coefficient of a variable gives the change in the log of the odds associated with a unit change in that variable, again holding all other variables constant. For the logit model the rate of change in the probability of an event happening is given by *βj Pi* (1 − *Pi*), where *βj* is the (partial regression) coefficient of the *j*th repressor. But in evaluating *Pi*, all the variables included in the analysis are involved. (Gujarati, 2003) Therefore, this study initially concerns the expected sign of the coefficients and their significance. Since estimation method used here is maximum likelihood, which is generally a large-sample method, the estimated standard errors are *asymptotic.* As a result, instead of using the *t* statistic to evaluate the statistical significance of a coefficient, the (standard normal) *Z* statistic can be used. So inferences are based on the normal table. It is theoretically accepted that, if the sample size is reasonably large, the *t* distribution converges to the normal distribution.

The hypothesis test revealed that the null hypotheses, $\beta_5 = 0$, $\beta_6 = 0$, $\beta_7 = 0$, $\beta_8 = 0$, $\beta_9 = 0$ cannot be rejected at any conventional significance level. Thus, it can be concluded that

number of rainy days (RDAYS), nature of land ownership (OWN), smallholder's education level (EDU), land owners' sex (SEX), and smallholder's age do not influence the decision of rubber cultivations being converted to other crops. The test results are reasonable because the preliminary data analysis also does not find any noteworthy difference in nature of land ownership, smallholder's education level, land owners' sex and age among those who converted or who continued to cultivate rubber. Even though one might reasonably assume rain interference must necessarily affect the decision of convention, it was not statistically significant in this study. This is because irrespective of whether converted or not-converted, all respondents experienced the same amount of rainfall as being living in the same geographical area.

Ho; $\beta_1 = 0$ is rejected at 1% significance level, correct in sign, favoring the alternative hypothesis $H1$; $\beta_1 > 0$ that higher the expected income from new cultivation, higher the odds of tendency to convert. Similarly, Ho; $\beta_2 = 0$ is rejected at 1% significant level favoring the alternative hypothesis $H1$; $\beta_{12} < 0$ which is against the expected sign. Thus findings suggest that higher the skilled labour shortage, lower the odds of tendency to convert. This could happen if similar labour shortage problem is experienced in tea cultivation as well. This needs further studies.

Ho; $\beta_3 = 0$ is rejected at 7% significance level, correct in sign, favouring the alternative hypothesis $H1$; $\beta_3 > 0$ suggesting that the more free time available after convention, higher the odds of tendency to convert from rubber to alternatives. This is plausible finding because rubber cultivation needs daily attendance whereas it is enough attend one or two days per week for tea for harvesting and maintenance. Therefore, leisure time has been a decisive factor in convention.

Finally, Ho; $\beta_4 = 0$ is rejected at 7% significance level, correct in sign, favouring the alternative hypothesis $H1$; $\beta_4 < 0$ suggesting that

higher the relative profit margin of Rubber, lower the odds of tendency to convert from rubber to alternatives.

A more meaningful interpretation in terms of odds can be obtained by taking the antilog of the various slope coefficients. Thus, the antilog of the EXIN coefficient of 4.183 is approximately 65.59 (=Exp 4.183). This suggests that those who expect more income than currently received from rubber are more than 65 times more likely to convert from Rubber to alternative crops than those who believe no change in income will result after conversion, other things remaining the same.

In terms of leisure time, the antilog of the FREE coefficient of 0.49 is approximately 1.63 (=Exp 0.49). This suggests that those who expect they will enjoy one more day free after convention, more than 1.6 times likely to convert from Rubber to alternative crops than those who expect no change in leisure time after convention, all else being equal.

The probability of somebody converting rubber to other crops is not directly given by logit model. Nevertheless, such probability values can be computed given values for other variables for any individual using the equation given below.

$$P_i = \frac{1}{1 + e^{-Z_i}}$$

When probability over 0.5 is considered as converter and probability below 0.5 as non-converter, it is interesting to note that the estimated model predicts 98 out of 100 observations correctly.

Usual R^2 is not applicable in logit model. Alternatively the McFadden R^2 value standing at 0.78 suggest that 78% of the variation in odd ratio can be explained by the repressors. Moreover, using actual, predicted and residual values for the sample the count R^2 value was calculated as 96/100= 0.96 suggesting that 96% of the

variation can be explained by the explanatory variables used in this model.

To test the null hypothesis that all the slope coefficients are simultaneously equal to zero, the equivalent of the F test in the linear regression model is the likelihood ratio (LR) statistic. Given the null hypothesis, the LR statistic follows the $\chi2$ distribution with df equal to the number of explanatory variables, (Gujarati, 2003) nine in the present model. (*Note:* Exclude the intercept term in computing the df). In the estimated model long-run statistic is 83.85 with probability 0.0000 which means the null hypothesis that all the slope coefficients are simultaneously equal to zero is rejected at any conventional level of significance.

In summary, above findings denote that convention from rubber to alternative crops is mostly governed by economic factors, rather than demographic factors or natural factors.

CONCLUSIONS

This study examined the question of why Rubber smallholders' transit to alternative crops. The logistic regression analysis concluded that the individual decision regarding conversion from rubber to alternative crops is positively influenced by expected net income and expected leisure time resulting from convention. Relative profit margin of the old crop (rubber) compared to the new crops and the shortage of skilled labour was found as factors negatively influencing the decision to convert. Smallholder's sex, age or education level was found irrelevant to the decision to convert or not to. Rain interference, though many respondent claimed as a severe disturbance to rubber tapping, was proved to be insignificant in econometrics model. This is because those who have not given up their rubber cultivation had also been subjected to the same rain interference and hence data does not reject the null hypothesis that

number of annual rainy days does not affect the decision to convert. Even though this study examined the factors influencing smallholders to convert their rubber lands into tea or alternative crops, by no means this research recommends such conventions must be prevented or discouraged. It is beyond the scope of this study. This study only concerned the influencing factors but not the implications of such conventions on national economy. Therefore, the platform is open for a potential future researcher to investigate what types of economic, climatic and geological and environmental implications would be resulted by such conventions and whether or not such conventions are favourable for national economy. It must be a combined study not only by economists but also by geologists, meteorologists and geographers and environmentalists.

REFERENCES

Department of Census and Statistics (2012) Annual Performance Report, Colombo, Sri Lanka

Gujarati, D. (2003) *Basic Econometrics*. 4th ed., United States Military Academy, west point. pp. 622-640

Gujarati, D. (2011) *Econometrics by Example*. 1st ed., Palgrave, Macmillan. pp.142-155

Jayasuriya, S.K.W & Carrad, B., 1975. Decision making in smallholding rubber: Attitudes to replanting in Sri Lanka*, Research bulletin*, Rubber Research Institute in SL. 54, 381-397.

Kulasekara, K.P., 2007. Economics of transition rubber to other alternatives,unpublished thesis, Department of Agriculture Economics & Extension, Faculty of Agriculture, University of Ruhuna.

Wijesuriya, W. Disanayake. D.M.P.A. Wijeratne, M. Herath. K and
Edirisinghe, J.C., 2004. Reasons for abandoning rubber
cultivation: a case study using Bayesian network (BN)
approach. *Bulletin of Rubber Research Institute of Sri
Lanka,* 45, 32-38.

The Dynamics of Production, Consumption and Prices:
A Study on Global Tea Industry

M.I. Mujahid Hilal

Senior Lecturer in Marketing Management
Faculty of Management & Commerce
South Eastern University of Sri Lanka
mujahidh@seu.ac.lk

INTRODUCTION

Tea is grown in about 36 tropical and semi-tropical countries. However, six among them account for 80 per cent of the world tea production. China and India are the two main global producers of tea and are also the two major consumers. Much of the world tea consumption is made up of black tea and green tea. Although produced from the same shrub, the leaves are processed differently. Black tea (which includes varieties such as Assam, Darjeeling, Sikkim, Ceylon, Lapsang, Souchong, Earl Grey, Yunnan and Keemun) makes up 65 per cent of the world output, 67 per cent of consumption and 80 per cent of international trade (The Technical Centre for Agricultural and Rural Corporation, 2011). Eighty-five per cent of the world tea output is sold by a handful of multinational companies, which own plantations and buy crops of small growers.

Tea production and tea trade have historically been dominated by large multinational companies. Tea plantations and world trade in tea were initially controlled by colonial multinationals ever since the days of the Dutch East India Company. The dominance of transnational companies in tea plantations and international trade in tea has continued to the present day. About 85 percent of world

production of tea is sold by multinationals. The entire supply chain in tea production and distribution, including production, auction, logistics, international trade and retailing is dominated by multinationals (CTA, 2011). Seven of these control about 90 percent of the Western tea trade. Included among these are Unilver, Associated British Foods, Van Rees, James Finlay and Tata Global Beverages Ltd.

At the global level, four companies dominate the tea trade: Unilever, Van Rees, James Finlay, and Tata Global Beverages (Der Wal, 2008). Unilever is a Europe-based international conglomerate with strong tea brands such as Brooke Bond and Lipton. Unilever is the world's largest tea company, vertically integrated in the value chain from production to commercialisation of tea. It buys 12 per cent of the world's tea production and holds a 10 per cent share of the world tea market (Unilever, 2011; Unilever, 2009). The world's most popular tea brand is Unilever's Lipton Yellow Label, followed by Tetley.

Van Rees, based in Netherlands is a tea trader and blender, supplying to many packers, and is part of the Deli Universal Corporation. James Finlay, based in UK is a tea producer, trader and packer. Tata Global Beverages, which acquired UK's 'Tetley' brand, is a tea producer, trader and packer.

Downstream integration starts with plantations. Tea plantations in many countries are owned by multinational companies. Several tea auction centers are also controlled by transnational corporations. For example, the Jakarta Tea Auction is dominated by Unilever which buys 70 per cent of all tea auctioned, and the Dutch exporter L. Elink Schuurman, which buys up to 20 per cent of the tea sold. Unilever buys around 12 per cent of the world's black tea supply, making it the world's largest purchaser of black tea (Der Wal, 2008).

The retail markets in several countries are also dominated by the multinationals. For example, the top three packers have a 60 per cent share of the tea market in the United Kingdom, 67 per cent in Germany and 66 per cent in Italy. In the Netherlands a single company, Sara Lee, controls 65 percent of the market (Oldenziel, 2006).

The Food and Agricultural Organization states that the decline in the price of tea is attributed to the excess production resulting from the production and supply gap. Thus, FAO insists that tea producing countries reduce their production. Therefore, this paper attempts to analyze factors affecting the global tea market.

The fortunes of the global tea industry have been influenced by several factors. While world production of tea has been increasing, there has been a decline in prices for several decades. The price decline has been attributed to a demand - supply gap. It is also assumed that the production of tea has always been more than demand and consumption. While the cost of production has been increasing, prices have been declining, leading to low wages in the industry and low motivation among farmers. Hence, the objective of this paper is to analyse issues related to global tea production, trends in global tea prices and changes in global tea consumption.

METHODOLOGY

This study is based on the secondary data collected from various sources such as Sri Lanka Tea Board. Data were also obtained from the statistical report of the International Tea Committee. Data were analysed using tables and percentage.

Review of Global Tea Production

Global tea production has been continuously increasing and it reached 3.8 million tons in 2008. Data on global tea production is given in Table 1. World tea production has increased significantly during the 10 year period surveyed, increasing from 2.95 million tons in 1999 to 3.8 million tons in 2008.The annual rate of growth of production was 3.05 per cent Compound Annual Growth Rate and the overall increase in production was 24 per cent. This production trend has continued in subsequent years as well. World tea production was 3.885 million tons in 2009 and 3.9 million tons in 2010.

Analysis of tea production data for four decades from 1961 to 2001 indicates that there was significant growth in global tea production during the period. The data is provided in Table 2. World production of tea increased from 851 million Kg in 1961 to 3091 million Kg in 2001. The compound annual growth rate in tea production was 5.2 per cent in the ten year period from 1961 to 1971. In the next two decades, the growth rate (CAGR) remained at 3.8 per cent. During the 1990s, however, there was a drastic reduction in the growth rate (1.8 per cent CAGR). The compound annual growth rate during the 40 years period was 3.36 per cent.

Table 1: World Tea Production (1961-2001)
(Production in million kg.)

Year	World tea production	Decadal Growth (CAGR)
1961	851	-
1971	1348	5.24%
1981	1884	3.79%
1991	2639	3.82%
2001	3091	1.77%
CAGR		3.36%

Source: Karmakar and Banergee (2005)

The growth in tea production during the first decade of the 21st century, as shown in Table 2, has been significant and the growth rate with CAGR 3.36 per cent is almost same as the growth rage achieved during the four decades between 1961 and 2001. Only during the 1990s was there a relative decline in growth in tea production.

Review of Global Tea Prices

The real price of tea has been in long-term decline. Tea prices, as measured by the FAO Tea Composite Price, have declined in real terms since the 1970s. Relevant data for selected years are presented in Table 3.

Table 2: Tea Prices (Real Price) for Selected Years

Year	Tea Prices in Real Term US Cents / Kg
1961–63	266
1971–73	159
1981–83	138
1991–93	95
2001–02	88
2000	96.1
2001	89.1
2002	86.0

Source: Food and Agricultural Organization, 2004

Tea price during 1961-63 was 266 US Cents per kg. This gradually declined over a span of four decades to approximately to 88 cents by 2002.However, exceptional peaks occurred in periods following the oil supply shocks of the 1970s and 1980s.

In nominal terms, however, prices have recorded modest growth during certain periods (Figure 1). However, there was dramatic

decline in real price after 1979 until 2006. Since 1980, the real price of tea has fallen by 15 per cent.

Figure 1: Real and Nominal Price of Tea
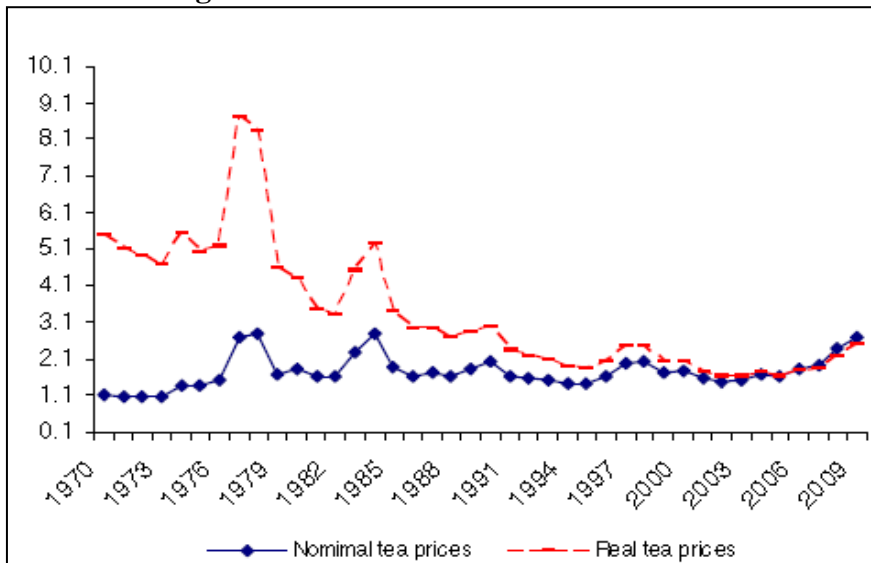
Source: Reproduced from Food and Agricultural Organization, 2010

Reasons for Decline in Real Prices

Several reasons have been attributed for the decline in real prices of tea during the past several decades. Intense competition among producing countries for a share of the world market is a major reason for price competition. When a large number of countries produces tea and many of them are big enough to prevent the establishment of a clear monopolistic leader, fierce competition is inevitable. It has been pointed out that growth in demand has been slow, which forces sellers to reduce the price. The general assumption is that tea supply has been greater than demand. Being a perishable commodity, tea expires fairly quickly which makes necessary to cut prices in order to clear stocks.

FAO (2010) holds the view that the growth in world production had been largely responsible for the damaging fall in prices. However, the response from producing countries has not been towards restricting supply. A vicious cycle has been created whereby many countries try to compensate for lost export earnings due to lower prices by extending the area devoted to tea and expanding the volumes of their tea exports (Oxfam, 2002).

Auction Prices

Tea auction prices in the last three decades have shown wide fluctuations (Figure 2). There was general increase in auction prices between 1980 and 1990.

Figure 2: Tea Prices at Auction Centers – 1980 -2010
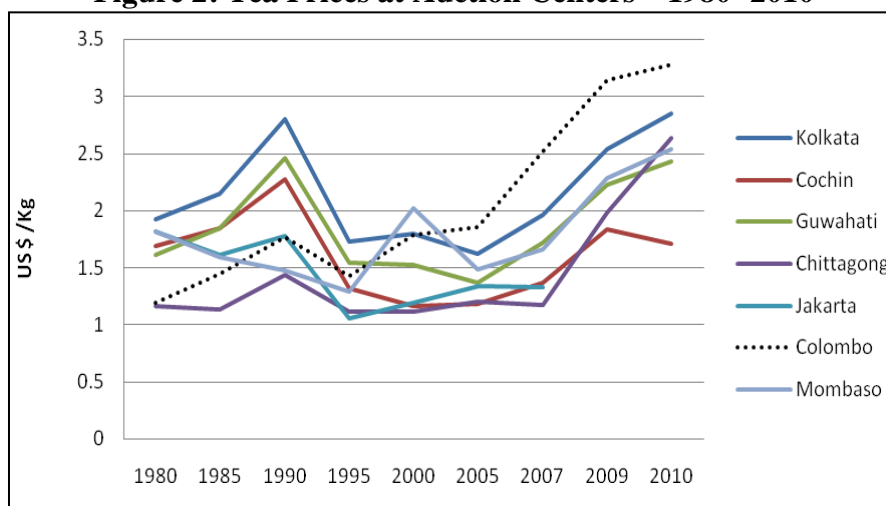
Source: Sri Lanka Tea Board, 2007; Forbes and Walker Tea Brokers, 2010

There was a sudden decline in prices in the next five years. In most auction centers prices remained without much fluctuation during the period 1995 to 2005, except Colombo and Mombasa where auction prices gradually increased. In almost all auction centers, there has been significant increase in auction prices after 2005 up to 2010. The Figure 4.4further shows that the auction tea price at Colombo auction have been the highest in the world market since 2005.

In recent years however, there has been increase in auction prices particularly after 2006 in all major auction centers.

Table 3: Average Auction Prices at Auction Centers – US $ / Kg

Auction Centers	2000	2004	2005	2006	2007	2009	2010
Kolkata	1.8	1.73	1.56	1.73	1.96	2.54	2.85
Cochin	1.16	1.17	1.18	1.22	1.36	1.83	1.71
Guwahati	1.53	1.56	1.37	1.50	1.72	2.23	2.43
Chittagong	1.11	1.09	1.20	1.39	1.37	1.98	2.63
Colombo	1.79	1.79	1.85	1.92	2.52	3.14	3.28
Mombasa	2.02	1.49	1.47	1.93	1.66	2.29	2.54

Source: Sri Lanka Tea Board, 2007; Forbes and Walker Tea Brokers, 2010

Auction prices at Kolkata increased significantly from 1.96 US$ in 2007 to 2.85 US$ in 2010. Similarly, in Guwahati price increased from 1.72 US$ in 2007 to 2.43 US$ in 2010. There has been a continuous increase in auction prices in almost all auction centers. The highest increase in prices was recorded in Colombo. The price at Colombo auction increased from 2.52 US$ in 2007 to 3.28 US$ in 2010.

Despite the recent increase in auction prices in the world market, even the 2010 auction prices are less than the auction prices of 1990, except in the case of Colombo auction (Figure2). Added to this is the fact that these prices are nominal prices and not real prices. Obviously, there could be substantial decline in tea auction prices in real terms since 1990.

Export Prices

Data on export prices of tea for the four major exporting countries for the past five decades are provided in Figure 3. The data reveal that there has not been significant price increase after 1980. Only the Sri Lankan export prices of tea have recorded substantial growth. The

prices given are nominal prices. Any increase in prices shown by the data will be offset if the real prices are considered.

Figure 3: Tea Export Prices for Selected Countries
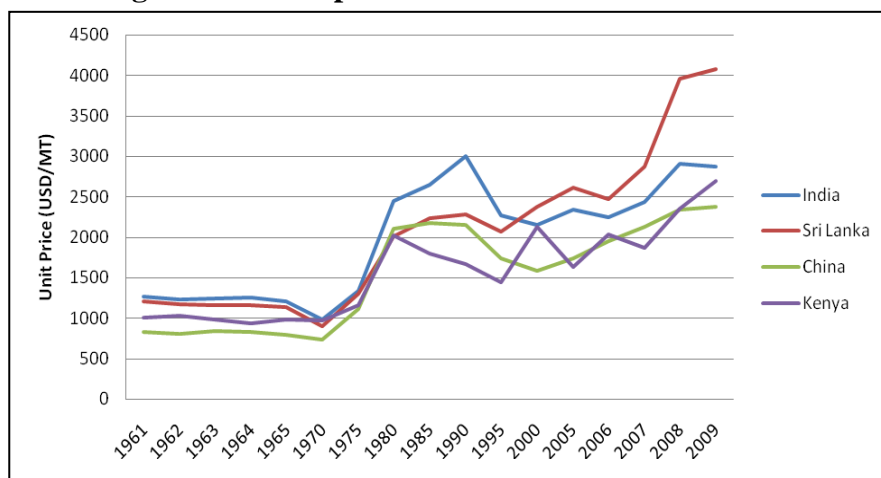
Source: Food and Agricultural Organization, 2009

Export prices of tea from leading exporting countries reveal that there has been a decline in price during the 1960s (Figure 3). During the 1970s there was modest increase in the nominal price. From 1980 to 2005 the export prices of tea remained without much increase, except in the case of Indian export price. However, there was increase in prices since 2006.

FAO Composite prices also (Table5) show the recent increase in international tea price. Between 2006 and 2009 tea prices recorded a slow but steady growth.

Table 4: FAO Composite Price for Tea

Year	FAO Composite price (US$)	Annual Growth Rate
2006	1.83	-
2007	1.95	6.6%
2008	2.39	22.6%
2009	3.18	33.1%

Sources:Tea Board Kenya, 2010,

As reported by Food and Agricultural Organisation, this is on account of strong demand for tea worldwide, particularly in emerging economy markets. The growth rate in tea prices accelerated in 2008 and 2009, first due to the civil disturbance in Kenya, and later due to prolonged droughts in Kenya, India, and Sri Lanka, which tightened supplies at the global level. Another factor is that after a long period of sustained growth, tea production actually declined by 0.64 percent from 2007 to 2009. At the same time, consumption increased by 0.21 percent at the global level during the same period. As a result, FAO composite price increased from US$ 1.95 per kg averaged in 2007 to US$ 2.39 in 2008 and reached a recorded level of US$ 3.90 in 2009. Further, labour disputes in Sri Lanka and appreciation of local currencies against the US Dollar controlled the supply of tea and it also led to an increase in price in the world market (FAO, 2010).

Review of Global Tea Consumption

Many sources (FAO, 2010; Oxfam, 2002; Der Wal, 2008) suggest that the reason for tea price decline in the international market has been the high growth in tea production and the stagnation or slow growth in tea consumption. For example the Oxfam (2002) study reported as follows: "The growth in world production has been largely responsible for the damaging fall in prices, but the response from producing countries has not been towards restricting supply…. The strong growth in production levels has not been matched by consumption." Sources such as FAO (2010) have been advocating that tea producing countries should reduce tea production in order to prevent decline in tea prices.

However, analysis of global tea consumption data for 20 years (Table 6) indicates that there was substantial growth in tea consumption.

Table 5: Global Tea Consumption – 1987 - 2006

Year	Consumption ('000 MT)	Growth rate for different periods (CAGR)
1987	2311	
1988	2472	
1989	2394	
1990	2505	2.72%
1991	2597	
1992	2464	
1993	2551	
1994	2543	
1995	2516	2.72%
1996	2678	
1997	2761	
1998	2968	
1999	2920	
2000	2886	2.78%
2001	3006	
2002	3020	
2003	3153	
2004	3200	
2005	3332	2.92%
2006	3437	
2007	3638	
2008	3707	
2009	3714	2.75%
Growth (CAGR)		2.18%

Source: International Tea Committee, 2007 and 2010

The rate of growth was rather consistent with a five year compound growth rate of around 2.7 percent throughout the 20 year period, except for the period 2000 to 2005 when it was little higher with 2.9

per cent. The overall growth rate for the 20 year period was 2.18 per cent.

Rate of Growth in Tea Production and Consumption – Comparative Analysis

Data on comparative growth rates in global tea production and tea consumption for the 20 year period 1987- 2006 are given in Table 7.

Table 6: Comparison of Growth in Global Tea Production and Consumption -1987- 2006

Year	Consumption ('000 MT)	Growth rate for different periods (CAGR)	Production ('000 MT)	Growth rate for different periods (CAGR)
1987	2311		2341	
1988	2472		2476	
1989	2394		2445	
1990	2505	2.72%	2538	2.73%
1991	2597		2581	
1992	2464		2438	
1993	2551		2572	
1994	2543		2523	
1995	2516	2.72%	2525	-0.10%
1996	2678		2679	
1997	2761		2763	
1998	2968		3026	
1999	2920		2945	
2000	2886	2.78%	2940	3.09%
2001	3006		3064	
2002	3020		3085	
2003	3153		3203	
2004	3200		3312	

2005	3332	2.92%	3429	3.13%
2006	3437		3533	
2007	3638		3795	
2008	3707		3864	
2009	3714	2.75%	3861	3.01%
Growth (CAGR)	-	2.18%	-	2.30%

Source: Author's comparison using data of the International Tea Committee Reports

The comparison reveals the following:

- The rate of growth in production and consumption were almost the same during the period 1987-1990, with 2.72 percent in consumption and 2.13 per cent in production.

- During the five year period from 1991 to 1995, growth in production was negative (-0.1 per cent) while growth in consumption was 2.72 percent. Obviously, rate of growth in consumption was more than in production during the period from 1987 to 1995.

- The stagnation in production during the period 1991-1995 is offset by a modest increase in production in subsequent years, compared to consumption. During 1995- 1999 while consumption grew at the rate of 2.8 per cent, production grew at 3.1 percent. From 2000 to 2004, consumption grew at the rate of 2.9 per cent and production increased at the rate of 3.1 percent. From 2005 to 2009, while consumption increased at the rate of 2.8 per cent, production increased at the rate of 3.0 percent.

- The overall growth in consumption during the 20 year period was 2.2 percent while the rate of growth in production was 2.3 per cent. The difference of 0.1 per cent is not significant.

Gap between Production and Consumption

The gap between tea production and consumption for the 20 year period is given in Table 10 and in Figure 4.

Data shows that gaps between production and consumption for the various years are rather modest, ranging from one to four percent. During certain years, production was less than consumption. A small difference between production and consumption is natural in any given year for various reasons, including the fact that all the output of a particular year cannot be consumed in that year.

It is pertinent to note that a 3-4 percent difference in production and consumption occurred only during the last few years of the period under consideration. It is during this period that the international tea prices increased significantly. In fact, if the 3-4 per cent 'over supply' is a serious issue, the prices should have declined, not increased. Evidently, decline in prices was not on account of the supposed excess production, which has not happened.

Table 7: Global Production and Consumption Gap
(Values are in 000' MT)

Year	Production	Consumption	Production minus consumption	Production minus consumption as % of production
1987	2341	2311	30	1.28
1988	2476	2472	4	0.16
1989	2445	2394	51	2.09
1990	2538	2505	33	1.30
1991	2581	2597	-16	-0.62
1992	2438	2464	-26	-1.07
1993	2572	2551	21	0.82
1994	2523	2543	-20	-0.79

1995	2525	2516	9	0.36
1996	2679	2678	1	0.04
1997	2763	2761	2	0.07
1998	3026	2968	58	1.92
1999	2945	2920	25	0.85
2000	2940	2886	54	1.84
2001	3064	3006	58	1.89
2002	3085	3020	65	2.11
2003	3203	3153	50	1.56
2004	3312	3200	112	3.38
2005	3429	3332	97	2.83
2006	3533	3437	96	2.72
2007	3795	3638	157	4.14
2008	3864	3707	157	4.06
2009	3861	3714	147	3.81
CAGR	2.30%	2.18%	-	

Source: International Tea Committee, 2007 and 2010

The data furnished in Table 9 and Table 10 do not support the widely held view that global tea production is not matched by global tea consumption. The analysis reveals that production has been matched by consumption and that there has been a steady increase in consumption without any fluctuation.

The marginal difference of 0.1 per cent growth in production over consumption during the 20 year span does not explain the fall in real prices of tea in the international market. The reason for the price decline has to be sought elsewhere.

Figure 4: Global Production and Global Consumption of Tea
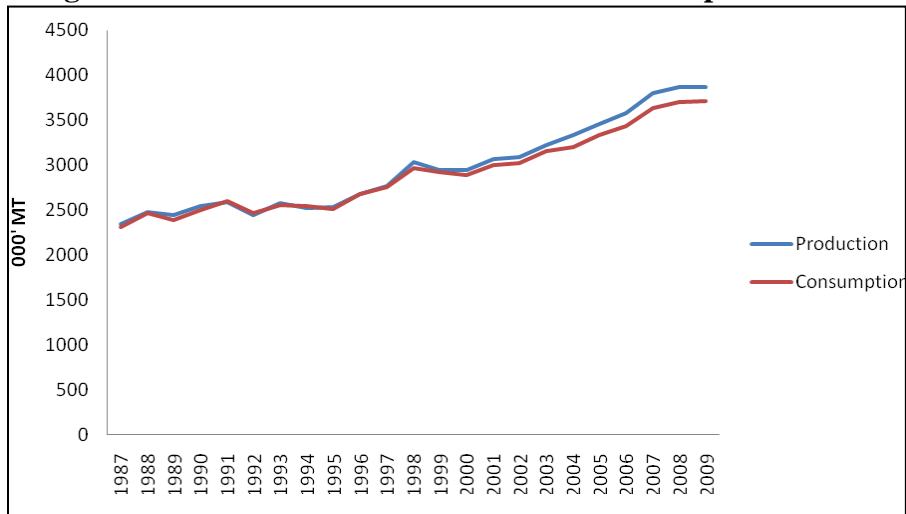
Source: International Tea Committee, 2010

CONCLUSION

Findings state that the world production of tea is growing at 3.36% compound annual growth rate. Analysis reveals that the largest tea producer in the world is China with 31% of share of production. This study has also generally found that Turkey and Vietnam are emerging potential competitors in the global tea industry.

The findings of this study suggest that real price of tea declined since 1970s. The reason for the decline in the real price of tea was competition on price for capturing world market share by producing countries. In the case of auction price of tea, study indicates that among tea auction centers in the world, Colombo recorded the highest price since 2005.

It was found that although many studies pointed out that reason for the decline in tea prices attributed to the growth in tea production and the stagnation or slow growth in tea consumption, analysis in this study reveals that there was substantial growth in tea consumption.

Comparative analysis between tea production and consumption in this study suggest that there was no significant difference between tea production and consumption of tea in the world market. Therefore, this study does not support the widely held view that global tea production is not matched by global tea consumption. Thus, this study also found that production of tea matched by tea consumption and that there was steady growth in consumption of tea.

These large companies have power to influence the demand for tea as well as price. Their operations are both horizontally and vertically integrated from plantations and processing factories to controlling the transport companies and shipping agencies. Obviously, these transnational companies have their presence at almost all stages in the journey of tea from tea bush to the consumer.

The few multinational corporations that dominate the tea industry play a critical role in determining the price of tea. International organization such as FAO insists that there is a gap between production and supply and that decline in price is on account of excess production. However, the data analysed here point to the conclusion that there is hardly any gap between production and consumption. The price decline is obviously not based on demand - supply gap.

This study also contributes to the future studies on the consumption of value added tea products. Findings show that consumption of tea in the world market steadily increasing. Hence, further researches have to be carried out on the value added tea products that mostly consumed in the world market. Accordingly, tea producing countries have to tap the country markets by studying the pattern of consumption of value added tea products.

Taken together, these findings provide strong recommendation to the industry that increasing production of tea in tea producing countries

is paramount and that will not attribute to the price decline in the world market due to the steady growth in the consumption.

REFERENCES

The Technical Centre for Agricultural and Rural Corporation – Agritrade, 2011, Tea: Trade Issues for the African, Caribbean and Pacific ACP.

FAO, 2004, The State of Agricultural Commodity Markets.

FAO, 2008, Committee on commodity problems - Intergovernmental group on tea- Current Situation and medium outlook- May 2008, ftp://ftp.fao.org/docrep/fao/meeting/013/k2054E.pdf.

FAO, 2010, Preliminary Analysis of the Impact of High Tea Prices on the World Tea Economy, Committee on Commodity Problems, Intergovernmental Group on Tea, New Delhi.

Forbes &Walker Tea Brokers (Pvt) Ltd., 2010, Tea Market Review

International Tea Committee, 2007, Annual Bulletin of Statistics

International Tea Committee, 2009, Annual Bulletin of Statistics.

Karmakar K.G, and Banergee G.D, 2005, The Tea Industry In India: A Survey, Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Mumbai.

Oldenziel J, 2006, Sustainabilitea: The Dutch Tea Market and Corporate Social Responsibility, Published by SOMO – Center for Research on Multinational Corporations.

Oxfam, 2002, The Tea Market – A Background Study

Der Wal,Sanne van, 2008, Sustainability Issues in the Tea Sector: A Comparative Analysis of Six Leading producing Countries, Published by SOMO.

Sri Lankan Tea Board, 2007, Annual Bulletin of Statistics Tea Board Kenya, 2010, Tea News, April – June.

Profitability of Rice Production: with Special Reference to North Central Province in Sri Lanka

B.M. Sumanaratne

Department of Economics
University of Ruhuna, Matara, Sri Lanka
bmsumana@econ.ruh.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

Rice production plays a crucial role in the domestic economy and food security of the country. Rice is the staple food of the 20 million people in Sri Lanka, and is the main source of calories in the Sri Lankan diet. The average per capita rice consumption is about 300 grams and, it provides around 1050 Kcal per day, with 45 percent of per capita protein requirements (Werahewa, 2004). Rice production provides livelihoods for about 1.8 million farmers,[1] while it absorbs directly and indirectly 30 % of the labour force. Note that 80 percent of Sri Lanka's people reside in rural areas and most of them are employed in agriculture, mainly, in paddy cultivation. It is worthwhile to note that a majority of paddy farmers, 82 percent, are small farmers with less than one hectare (Department of Census and Statistics, 2007). In reality, small holders are the backbone of Sri Lanka's economy, and they account for 85 percent of the production of the staple food of the country.

In the case of Sri Lanka, achieving self-sufficiency in rice for food security, through improving the income of paddy farmers, by increasing productivity, through technological development, and

---

[1] See Thiruchelvam, (2005).

ensuring availability and minimizing the cost of rice to the consumer were the major policy goals of the government policy reform. However, it seems that the matter of structural reforms in the agricultural sector, especially, rice production sector has been a controversial and much disputed subject over the past period. This study, more specifically, will focus on the impact of profitability and efficiency of rice production resulting from public policy reform through the available evidence from secondary sources.

This paper examines the private and social profitability of paddy farming in Sri Lanka using the two different tools: the policy analysis matrix (PAM) and domestic resource (DRC) ratio. The first systematic study of PAM was reported by Monke and Pearson (1989).The PAM has been widely used to estimate the impact of policy reforms on private and social profits of various farming systems (Masters and Winter-Nelson (1995); Reig-Martinez et al. (2008); Kanaka and Chinnadurai, 2013).

Despite the attempt to achieve self-sufficiency in rice production, currently Sri Lankan government imports rice and imposes tariff to protect paddy farmers. One of the most significant current discussion in rice production is high cost of production. The research question of this study is mainly related to the private and social profitability of rice production. In this context, the current study seeks to address the following research questions: (1) Is rice production in Sri Lanka profitable? (2) Does Sri Lanka have comparative advantage in rice production?

With the introduction of public policy reforms under the banner of liberalization policy , Sri Lanka abandoned price controls and began comprehensive price reforms to bring them more closely into line with what are seen as realistic market levels. In this context, it is worthy to explore how such reforms would affect profitability of rice sector. The current study mainly focuses on private and social profitability of irrigated paddy farming with special attention to cost

factors in the Anuradapura and Polonnaruwa Districts. Also, the study aims to assess impact of policy reforms on comparative advantage of rice production in Sri Lanka.

METHODOLOGY

To date various methods have been developed and introduced to measure profitability of rice production. The most popular method in this area is the Frontier Method which was developed by Coelli (1994).[2] This study employed PAM[3] to evaluate the profitability and efficiency of rice production. The PAM measures profitability of a particular good in two ways: private prices and social prices. Private prices represent the actual prices of all inputs and outputs used in production while social prices denote the value which would prevail without distortions of government policies (such as taxes/subsidies) and market failure. Prices of outputs and inputs can be decomposed into two categories, tradable and domestic (Reig-Martinez et al. (2008) and Kanaka and Chinnadurai (2013). The PAM estimates mainly two measures: the first measure identifies the profitability of rice production, estimating the difference between actual prices of income and cost; the second identity measures the impact of distortions resulted from policy changes and market failure on income and cost. The PAM can be simplified as follows:

---

[2] Thiruchelwam (2005) estimated stochastic frontier production of Cobb-Douglas for Mahaweli System H and and Aruna Shantha et al. (2012) employed stochastic frontier production of Cobb-Douglas for the Trincomalee District.

[3] Pioneers of this method are Monte and Pearson (1989).

Table 1: Policy Analysis Matrix

Items	Income	Cost		Profit
		Tradable inputs	Domestic inputs	
Private prices	A	B	C	D
Social Prices	E	F	G	H
Divergences	I	J	K	L

Source: Monke and Pearson (1989).

The rows of the matrix can be defined as follows: private profits = D = A-B-C;

Social profits = H = E-F-G; and divergences represent net transfers (L) = D-H or I-J-K.

In order to measure the comparative advantage of the rice production Domestic Cost Ratio (DRC) is estimated.[4] The DRC can be defined as the value of domestic resources to the net foreign exchange earned by the rice production. This ratio indicates whether production of rice is efficient or not. In general, if the DRC is higher than unity the country does not have comparative advantage in rice production. The DRC can be estimated as follows:

$$DRC = \frac{\sum_{i=k+1}^{n} a_{ij}p_j}{p_i^b - \sum_{i=1}^{k} a_{ij}p_j^d}$$

Where, a_{ij}, from k+ 1 to 'n' refers domestic inputs, a_{ij}, from 1 to 'k' represents tradable inputs, p_j refers shadow prices and p_i^b and p_i^b and p_i^d represent border prices of output and input respectively.

---

[4] The DRC has been widely used to measure the comparative advantage of efficiency of rice production

The study was carried out in the Anuradapura and Polonnaruwa Districts. The North Central Province, which is based on the irrigated regime, is the one of the main rice growing provinces in the country[5].

The present study completely depends on secondary data gathered from the Department of Agriculture, Central Bank and Department of Census and Statistics. Social values for tradable, outputs (E) and inputs (F), world prices[6] were used, and for domestic resources, which are not traded, shadow prices were used. Cost of land was estimated as 25% of gross income. The current study estimates social cost of irrigation since it has been identified as a most crucial factor in determining the productivity of rice (Kikuch et al., 2002). Social cost of irrigation was estimated based on both operation and maintenance cost. Capital covers the cost of use of both farm owned and hired machinery and equipment. For constructing PAM cost and income are calculated per acre.

The PAM estimated for both agricultural seasons Maha and Yala. The results of PAM show that paddy farming in central province was profitable given technology, prices for inputs and outputs and policy (see table 1 and 2). It is worth noting that profits are being made both at private and social prices. However, in terms of social prices, paddy farming was not profitable due to the low world prices of rice until 2011. The border price of rice increased from Rs., 53 per kg in 2010 to Rs. 73 in 2011 and Rs. 85 in 2012 respectively (Central Bank of Sri Lanka, 2013). Rafeek and Samaratunga (2000) argue that because of high cost of production and low productivity Sri Lanka's rice production is characterised by low competitiveness.

---

[5] This province covered 26% of total paddy cultivated area in the country in 2009/10 (Department of Census and Statistics, Sri Lanka, 2010).

[6] Cost Insurance and Freight (CIF) were used for world prices.

RESULTS AND FINDINGS

Table: 2 Policy Analysis Matrix for Maha Season (Average of 2008 – 2012)   (in Rupees)

| | Income | Tradable inputs | Domestic Resources | | | | | Profit |
			Labour	Seed	Capital	Land	Irrigation	
Private	69284	4070	16781	2262	10258	-	-	26913
Social	88675	12601	16781	2262	10258	15071	359	31344
Divergence	-28391	-8531	-	-	-	-15071	-359	-4430

Table: 3 Policy Analysis Matrix for Yala Season (Average of 2008 – 2012) (in Rupees)

| | Income | Tradable inputs | Domestic Resources | | | | | Profit |
			Labour	Seed	Capital	Land	Irrigation	
Private	62299	4310	17928	2535	10403	-	-	27123
Social	89095	12866	17928	2535	10403	15574	603	29186
Divergence	-26796	-8556	-	-	-	-15574	-603	-2063

As revealed by the results, social profits are less than the private profits. It can be seen from the results that the social cost of paddy farming is higher than the private cost with the elimination of subsidies (in particular fertilizer subsidy) and considering social cost of irrigation and land. Positive Private Profitability (Rs. 26913 and Rs. 27123 per acre for both seasons) indicates that farmers in central province have an incentive to paddy farming. Also, positive sign on social profit shows that paddy farming has a comparative advantage in this province (see Table 2 and Table 3).

The negative value of income transfers (the difference private and social income) indicates that the government protection policies negatively influenced to producer incentives. At the same time, negative value of input transfers shows that the input prices faced by farmers are less than world prices. Also, negative value for the difference between private and social profit indicates that farmers can earn higher profits without government interference.

The DRC ratio for both agricultural seasons are less than unity (DRC for Maha and Yala 0.59 and 0.62 respectively). It means that the value of domestic resource used for per acre in North Central province is less than cost of rice imports. Accordingly, this province has a comparative advantage in rice production.

CONCLUSIONS AND IMPLICATIONS

This study has shown that paddy farming in the North Central Province is profitable both at private and social prices. The second major finding to emerge from this study is that the province has a comparative advantage in rice production. This finding suggests that the government interference in the rice sector through increasing tariff to protect paddy farmers is unnecessary. The most obvious finding to emerge from this study is that subsidized policies of the government are unnecessary as farmers are achieving substantial positive social profits. An implication of this finding is that the

government can implement policies directly aimed at increasing productivity mainly through research and development.

REFERENCES

Aruna Shantha, A., Asan Ali, B.G.H., and Bandara, R.A.G. (2012). Efficiency and Managerial Ability of Paddy Farming under Minor Irrigation Conditions: A Frontior Production Function Approach, *The Journal of Agricultural Science*, &93):145-158.

Central Bank of Sri Lanka (2013), Annual Report. Colombo.

Coelli, T. (1994). A guide to Fron tier Verson 4.1: *A Computer Program for Stochastic Fron tier Production and Cost Function Estimation.* Australia: University of New England

DCS (2007). Census of Agriculture 2002: Small Holding Sector. Department of Census and Statistics, Colombo.

Masters, W.A. and Winter-Nelson, A. (1995). Measuring the Comparative Advantage of Agricultural Activities: Domestic Resource Cost and Social Benefit Ratio. *American Journal of Agricultural Economics* 77: 243-250.

Monke, E.A. and Pearson, S.R. (1989). *The Policy Analysis Matrix for Agricultural Development*. Cornel University Press, Ithaka.

Raffk, M.I.M. and Samaratunga, P.A. (2000). Trade Liberalization and its Impact on the Rice Sector of Sri Lanka. *Sri Lanka Journal of Agricultural Economics*, 3(1): 143-154.

Reig-MartineZ, E., Picazo-Tadeo, A.J., and Estruch, V. (2008). The policy Analysis MatriX with Profit-efficient Data: Evaluating Profitability in Rice Cultivation. *Spanish Journal of Agricultural Research*, 6(3): 309-319.

Thiruchelvam, S. (2005). Efficiency of Rice Production and Issues Related to Cost of Production in the Districts of Anuradapura and Polonnaruwa. *Journal of National Science Foundation* 2005 33 (4):247-256.

Weerahewa, J. (2004). *Impact of Trade Liberalisatin and Market Reforms on the Paddy/Rice Sector in Sri Lanka.* MTID Discussion paper 70. International Food Plicy Research Institute, Washington D.C.

Agriculture Efficiency

Farmer Participation in Paddy Crop Insurance: Evidence from Trincomalee District

Muneesa Begam and **Ponniah Sivarajah**

Department of Agricultural Economics, Eastern University, Chenkalady-30350 (EP)
sivaponniah@yahoo.com

BACKGROUND

Recent climatic changes in Sri Lanka had caused irregular rainy seasons that lead to floods, droughts, storms and uneven temperature variations, leading to risk and uncertainty in paddy production and incomes of farmers. Pest attacks and disease also cause significant losses in production and income. Various schemes have evolved over time in different countries to protect farmers from risks, among them guaranteed prices, subsidized credit and crop insurance. There are several crop insurance schemes that have been introduced by the Government in recent years, mainly by organizations such as Agricultural and Agrarian Insurance Board (AAIB) and Ceylinco Insurance Company Limited (CICL) which insure crops in Sri Lanka.

Crop insurance is recognized as a basic instrument for uncertainties in production, and stabilize farm incomes by promoting technology, encouraging investment and increasing credit flow in the agricultural sector. It contributes to self-reliance and self-respect among farmers, since in cases of crop loss they can claim as a matter of right (Chandrakanth, 1976). Thus, crop insurance cushions the shock of crop loss by assuring farmers protection against natural hazards beyond their control.

Trincomalee is located in the dry zone of Sri Lanka. Rain fed paddy cultivation is more common here than other irrigation methods. Due to heavy rain, floods cause crop damage. Inadequate rain causes

drought. Rain during the harvesting season also leads to losses in production. Extension services and awareness about crop insurance among farmers are very low. The office for crop insurance is far from farming villages and procedures in insuring crops are perceived to be difficult. So farmers are unwilling to participate in crop insurance scheme. Even if crops are insured, the compensation received each season is not satisfactory. The objective of this study was to analyze farmers' awareness of paddy crop insurance, the existing problems in adopting crop insurance, and the factors affecting adoption of crop insurance in Kinniya Divisional Secretariat Division, Trincomalee.

METHODOLOGY

The farmers were selected from nine (09) Farmer Organizations out of nineteen (19) according to the extent of paddy cultivation. The selected Farmer Organizations were Poovarasantheevu, Theenery, Pattiyanoor, Kandalkaadu Sinnavely, Panichchankulam, PanichchankulamWest, Naduoothu, Maniyarasankulam and Ayiliyadi. Simple random sampling method was used to select the samples. 50 paddy farmers were selected from each extent category i.e., less than 2acs, 2-5acs and more than 5acs. Thus the final sample comprised of 150 paddy farmers. The analysis was done using the SPSS 14V software and descriptive statistics; ANOVA and regression analysis was performed.

RESULTS AND DISCUSSION

Socio economic characteristics of the paddy farmers were analysed to understand managerial ability.

The average age of a paddy farmer was 46 years old. It was observed that 80.7% of respondents were involved in paddy cultivation as a part time occupation and had about 14 years' experience. The educational level of farmers was measured in the years of schooling.

According to the survey, the average paddy farmer received 10 years of schooling. Average monthly income was Rs.14, 778.

Table 1: Paddy Farmers' Socio Economic Characteristics (N=150)

Trait	Mean	Std. Deviation
1. Age of respondent (years)	45.70	11.48
2.Educational level (years of schooling)	9.88	3.10
3.Income of respondent (Rs/month)	14,788	6,942
4.Family size (No. of persons)	3.99	1.30
5.Experience in farming (years)	13.97	10.21

Source: Field Survey data, 2014

Adoption of Paddy Crop Insurance

About 80% of the farmers in the study area had adopted crop insurance. Only 16% of farmers were non- adopters. About 4% of the farmers had discontinued crop insurance. The extent of paddy land insured was analyzed and is shown in the table below.

Table 2: Extent of Land Insured by Type of Risk

Extent of paddy land insured	Mean	Std. Deviation
Extent of land insured for flood (acs)	2.78	1.91
Extent of land insured for drought (acs)	2.61	1.92
Extent of land insured for wild animals (acs)	2.14	1.52

Source: Field survey data, 2014

Most of the cultivated paddy lands (average of 3.76 acres) had been insured against flood damage. The lands insured against attacks by wild animals, especially elephants and pigs, were less than those insured for drought and flood. The number of times paddy lands had been affected by flood and drought in both Yala and Maha seasons during the past 10-15 years was analyzed. It was found that drought and floods were the major risks against which crop insurance cover

was obtained by farmers. Data revealed that only about 36% of the land cultivated is insured during both seasons.

About 34.1% of the paddy farmers were affected once, 37.7% of the farmers twice, by floods during Maha season. Hence more than 92% of the farmers had been affected at least once by floods in Maha. About 75.2% of the paddy farmers were affected once, 22.1% twice, and 2.7% of the paddy farmers affected 4 times by drought during Maha season. Drought affected about 50% of the farmers once, 40% twice, and 10% thrice during the Yala season.

Knowledge about Crop Insurance

About 88% of the paddy farmers had some knowledge of crop insurance and only 12% did not have any knowledge about crop insurance. Thus awareness and knowledge about crop insurance in the study area was high. About 68.7% of the paddy farmers had been exposed to awareness programs on crop insurance.

The results of the Chi-Square analysis of the association between knowledge about crop insurance and socio-economic traits of farmers indicated that educational level and obtaining loans from banks were the factors that had persuaded farmers to adopt crop insurance. The requirement that crops be insured was the major factor that persuaded farmers to adopt crop insurance, rather than the need to reduce risk (risk averse) encountered in paddy production due to droughts and floods. It was observed that 80% of the farmers who had adopted paddy insurance were from areas that had a high level of risk to natural disasters (floods or drought).

Regression results indicated that the extent of paddy land cultivated (P<0.01), type of farmer (P<0.1), crop insurance premium rate (P<0.1) and extent of land owned (P<0.01) had a significant impact on the extent of paddy land insured against risks during both Maha and Yala seasons. Thus it was evident that participation in crop insurance was significantly affected by the extent of land owned,

rates of insurance premium, extent of land cultivated and whether the farmer in question worked full-time or part-time.

Table 3: Association between Knowledge of Crop Insurance and Some Socio-Economic Traits

Traits	Pearson Chi-Square	Likelihood Ratio	Fisher's Exact Test
1. Age of farmer	4.372	4.318	1.450
2. Educational level	6.418**	5.191*	4.027**
3. Extent of paddy cultivated	1.216	1.147	0.511
4. Obtain credit/loan-Banks	9.780***	12.294***	9.715***

*Significant level= *** P<0.01, ** P<0.05, * P<0.10*

Table 4: Regression Analysis Results –Factors Affecting Adoption of Crop Insurance

Variables	Coefficients		T values
	B	Std. Error	
(Constant)	-0.428	1.189	-0.360
Extent of own land (acs)	0.375	0.047	7.898***
Age of farmer (years)	0.007	0.010	0.644
Educational level (years-schooling)	0.030	0.041	0.740
Exposed to awareness program	-0.287	0.248	-1.158
Type of farmer	0.540	0.315	1.714*
Premium rate(Rs/ac)	0.001	0.000	1.819*
Extent of paddy land cultivated acs)	0.266	0.067	3.966***
Crop insurance bound to Bank loan	0.315	0.379	0.832

a Dependent Variable: Total extent of paddy land insured

CONCLUSIONS AND POLICY IMPLICATIONS

It was evident from the study that only a small proportion of the paddy lands cultivated are protected by crop insurance against risks such as floods and drought which are very frequent in the area. Also only educated farmers who had awareness of crop insurance and had obtained loans from Banks adopted crop insurance to cover their crops against risks. Hence it is essential to create awareness about crop insurance among all farmers to increase participation and to enhance risk pooling of farmers to make crop insurance a viable scheme.

REFERENCES

Agricultural and Agrarian Insurance Board, (2009). Particulars of Paddy Insurance, Trincomalee.

Central Bank of Sri Lanka, (2013). Annual Report-2013, Central Bank of Sri Lanka, Colombo.

Chandrakanth, M.G., Rebello, N.S.P. (1980). "Crop Insurance for Potatoes: A Case Study", Financing Agriculture, Vol. 4.

Divisional Secretariat Office, (2014). Paddy Cultivation Statistical Data, Kinniya Divisional Secretariat Office.

Production Interrelationships in Inland Fishing in Anuradhapura, Sri Lanka: A Simultaneous Equation Approach

W.A.D. Vimukthi [a], P. Korale Gedara [b], D.P. Seneviratne [c], L.H.P. Gunaratne [d], P. Weligamage [e] and J. Weerahewa [f]

[a] *Department of Agricultural Economics and Business Management, Faculty of Agriculture, University of Peradeniya, Sri Lanka*
weeramanthri09@gmail.com

[b] *Department of Agricultural Economics and Business Management, Faculty of Agriculture, University of Peradeniya, Sri Lanka*
pradeepa.malkanthi@gmail.com

[c] *Department of Agricultural Economics and Business Management, Faculty of Agriculture, University of Peradeniya, Sri Lanka*
diluprasangi.seneviratne@gmail.com

[d] *Department of Agricultural Economics and Business Management, Faculty of Agriculture, University of Peradeniya, Sri Lanka*
lhpguna2010@gmail.com

[e] *Department of Agricultural Economics and Business Management, Faculty of Agriculture, University of Peradeniya, Sri Lanka*
parakw@gmail.com

[f] *Department of Agricultural Economics and Business Management, Faculty of Agriculture, University of Peradeniya, Sri Lanka*
jeevikaw@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

The inland fisheries sector plays an important role in the subsistence economy of Sri Lanka. However, no tradition of aquaculture or

organised freshwater fishery existed until the introduction of a high yielding exotic fish species cichlid, *Oreochromis mossambicus* in 1952 (De Silva, 1988). With the introduction of tilapia and other exotic fish species such as Catla *(Catla catla) ,* Java tilapia *(Oreochromis mossambicus)*, *Tilapia hornorum*, *Tilapia rendalli*, bighead carp *(Aristichthys nobilis)*, rohu *(Labeo rohita)* and mrigal *(Cirrhinu smrigala)*, inland fish production has rapidly increased by 2013, accounting for 10.4 per cent of total fish production by producing 66,910 Mt in 2013. Meanwhile, per capita consumption of inland fish was recorded as 2kg per year (Fisheries Statistics, NAQDA, 2014). Apart from its direct contribution to food security, the inland fishery sector plays a vital economic role by accounting for 1.7 per cent of Gross Domestic Product (GDP) and providing livelihoods to around 32,635 active fishermen in the country (Ministry of Fisheries and Aquatic Resources Development, 2014).

However, despite this importance, the sector has not reached full potential. Given a 260,000 ha extent of fresh water bodies and the large number of rivers, estuaries, lagoons, brackish water ponds, floodplain lakes, as well as major, minor and village tanks, there is great potential for improvement in the Sri Lankan inland fisheries sector .

During the past decade the government of Sri Lanka has taken a number of steps such as establishing breeding centres and stocking reservoirs with fingerlings to boost inland fish production. Even though stocking of tilapia significantly increased inland fish production in reservoirs (De Silva, 1991; De Silva, 1992), it was found to hamper the bio-diversity. It was evident that when tilapia is present, the availability of food for indigenous and non-indigenous fish species reduces. This can place some such species at risk of extinction (Canonico et al., 2005; Martin et al., 2010).

Therefore, recently the government has taken a policy decision not to continue stocking fresh water bodies with tilapia fingerlings due to the discussion on the invasiveness of tilapia species in local water

bodies. It has planned instead to direct inland fisheries towards carp based fisheries (NAQDA, 2009). Against this background, this study aims to explore the effect of stocking of tilapia and other exotic fish fingerlings on the harvest of tilapia, other exotic fish and indigenous fish species.

Objectives

To estimate the joint production function of multi-purpose tanks treating harvests of tilapia, other exotic fish and indigenous fish as exogenous variables and treating stockings of tilapia and other exotic fish, efforts and types of tanks as exogenous variables.

METHODOLOGY

Empirical Model

Species of fish captured in inland water bodies of Sri Lanka were categorised into three major groups as *a) tilapia, b) other exotic fish species and, c) indigenous fish species.* In a given reservoir the harvest of each category is determined by the input, usage, and tank specific characteristics. Therefore, production function of each of the three species was specified as follows.

$$Y_o = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \gamma_0 Y_e + \gamma_1 Y_l + \delta_i$$
$$Y_e = \alpha_1 + \beta_5 X_1 + \beta_6 X_2 + \beta_7 X_3 + \beta_8 X_4 + \gamma_2 Y_o + \gamma_3 Y_l + v_i$$
$$Y_l = \alpha_2 + \beta_9 X_1 + \beta_{10} X_2 + \beta_{11} X_3 + \beta_{12} X_4 + \gamma_4 Y_o + \gamma_5 Y_e + u_i$$

Where,

Y_o = Tilapia production (kg)

Y_e = Other exotic fish production (kg)

Y_l = Indigenous fish production (kg)

X_1 = Fishing effort (number of boats used)

X_2 = Type of tank (major=1, medium=0)

X_3 = Number of Tilapia fingerlings

X_4 = Number of other exotic fingerlings

Although three production equations can be specified as above, they cannot be estimated using OLS regression. Since the production of each species is interdependent on the harvest of others, there will be an endogeneity problem and the error term will correlate with the independent variables. Thus, OLS estimation will result in biased estimates (McLaughlin, 1987). Therefore, simultaneous equation system is estimated using Three-stage Least Square technique to obtain consistent and unbiased estimates.

Three-stage least square method of estimating a structural equation consists of three steps in which the first two steps are similar to the two-stage least square method of estimation. That is, in the first stage, the moment matrix of the reduced-form disturbances is estimated and in the second stage, coefficients of one single structural equation are estimated after its jointly dependent variables are "purified" by means of the moment matrix. Going one step further, in the three-stage least square method all coefficients of the entire system are simultaneously estimated using the two-stage least squares estimated moment matrix of the structural disturbances (Zellner and Theil, 1962).

Data

The study was based on secondary data on monthly fish harvests for 22 major and medium reservoirs in Anuradhapura district for the year 2014. Anuradhapura was selected because it has the highest contribution to inland fish production. Data were collected from the NAQDA (Table 1).

Table1: Fish Catch Statistics and Fingerling Stocking Rates of the Reservoirs in Anuradhapura District

Reservoir	Area (ha)	Fish catch (kg)			Stocking Rate (number of fingerlings)	
		Total Tilapia	Total Other Exotic Fish	Total Indigenous	Tilapia	Other Exotic
Padaviya	2,672	401,125	25,061	40,355	25,000	0
Nachchaduwa	1,781	115,127	142,511	18,799	7,800	179,960
Rajanganaya	1,619	390,760	60,284	33,667		0
Hurulu Wewa	1,619	147,429	154,607	0	0	75,000
Mahakanadarawa	1,457	404,914	139,619	30,296	0	0
Kala Wewa	1,440	432,860	101,574	59,879	0	0
Balalu Wewa	1,200	409,370	48,138	54,580	0	0
Nuwara Wewa	1,197	328,548	137,636	24,185	45,000	70,200
Wahalkada	1,166	152,398	107,188	0	0	0
Vilachchiya/ Maha Vilachchiya	971	416,186	157,147	25,454	0	154,960
Angamuwa	445	85,870	0	0	0	0
Galkulama/ Maha Galkulama	350	220,311	7,602	1,265	50,000	0

Nika Wewa	325	197,266	0	0	0	0
Turuwila	280	75,186	41,785	0	0	0
Manankattiya	276	97,878	122,869	0	25,000	25,000
Kalankuttiya	271	76,945	0	0	0	60,000
Sangilikanadarawa	263	88,183	0	0	0	0
Eru Wewa	261	96,733	0	0	0	0
Katiyawa	261	62,071	0	0	0	0
Horiwila	243	72,757	0	0	0	0
Tisa Wewa	243	70,243	0	0	0	0
Aluth Divul Wewa	239	135,683	361,88	0	0	0

Source: NAQDA 2014

Table 2: Results of the Estimation of Simultaneous Equation Model

Variables	Unit	Mean	Std. Dev.	Tilapia	Other Exotic	Indigenous
Effort	number of boats	57.76	32.46	2577.37** (0.008)	388.18 (0.371)	280.92* (0.089)
Type of tank	medium=0,major=1			116510.8* (0.051)	43378.95 (0.115)	16783.91 (0.105)
Tilapia fingerlings	number of fingerlings	6945.45	15078.48	2.66** (0.043)	0.36 (0.544)	0.16 (0.470)
Other exotic fingerlings	number of fingerlings	25687	51943.12	-0.844** (0.032)	0.44** (0.017)	-0.10 (0.142)
Constant				13905.19 (0.766)	7096.91 (0.745)	-8277.78 (0.315)
R-square				0.6733	0.5743	0.5042
Number of observations				17	17	17

Table 3: Input-Output Elasticities of the Selected Tanks in Anuradhapura District

	Tilapia fish	Other Exotic Fish Species	Indigenous Fish Species
Effort	0.38	0.38	1.24
Stockings of tilapia fingerlings	0.05	0.04	0.08
Stockings of exotic fingerlings	0.056	0.19	0.19

RESULTS AND FINDINGS

The results of the structural equation model are reported in Table 2 and the production elasticities calculated based on the estimates are reported in Table 3. The R-squares of the estimated models range between 0.5042 and 0.6733 indicating a reasonable model fit. The significance of the individual variables in each model is separately discussed below.

Factors Affecting Tilapia Fish Harvest

Increase in effort (number of boats) stocking tilapia fingerlings was found to lead to an increase in harvest of tilapia, while increase in stocking of other exotic fingerlings was estimated to decrease tilapia harvest. Precisely, as given by the elasticity figure, a one per cent increase in effort will increase harvests by 0.38 per cent (Table 3). An addition of one tilapia fingerling increases the harvest by 2.66 kg while the increase in stocking of other exotic fingerlings by one decreases tilapia harvest by 0.844 kg.

It was also found that tilapia harvest is higher in major reservoirs than in medium reservoirs. The difference is statistically significant for tilapia and is about 116,511 kg. This could be because of the difference in capacity in the two types of reservoirs.

Factors Affecting Exotic Fish Harvest

Increase in stocking of other exotic fingerlings led to an increase in the harvest of other exotic fish, while increase in stocking of tilapia fingerlings and the number of boats doing so did not significantly impact harvests of other exotic fish. According to the estimate of elasticity, a one per cent increase in stocking of tilapia will bring a 0.19 per cent increase in other exotic fish harvest.

Factors Affecting Indigenous Fish Harvest

It was found that fishing effort has a significant effect on the indigenous fish harvest and the increase of one boat would increase the indigenous fish catch by 280.92 kg. However other factors such as type of tank and stocking of tilapia and other exotic fish fingerlings had no significant influence on indigenous fish harvest. Even though statistically insignificant, the estimates derived for tilapia fingerlings and other exotic fish fingerlings indicate that stocking of tilapia fingerlings has a positive effect on indigenous fish harvest while the effect of stockings other exotic fish fingerlings has a negative effect.

All in all the study confirms that the stocking of fingerlings in tanks is one of the ways to increase the inland fish catch in Anuradhapura district. Especially stocking of exotic fingerlings would increase the inland fish production in the study area and hence reduce protein malnutrition in the area. However, since tilapia harvest is negatively affected by stocking of other exotic fish species, there is a need to be cautious about stocking these two types of fingerlings together in a reservoir.

CONCLUSION

The estimation of production interrelationships in inland fisheries revealed that stocking tilapia has an influence only on tilapia production and it indirectly increases the share of tilapia catch over total inland fish production.

Stocking of other exotic fish fingerlings has a negative influence on tilapia production and reduces the share of tilapia production over total fish production. Other than that, stocking other exotic fish fingerlings has a positive impact on exotic fish catch and increases the share of exotic fish production over total inland fish production.

REFERENCES

Canonico, G. C., Arthington, A., McCrary, J. K., and Thieme, M. L. (2005). The effects of introduced tilapias on native biodiversity. Aquatic Conservation: Marine and Freshwater Ecosystems, 15(5), 463-483

De Silva., K 1991. The predicament of the Freshwater fisheries and aquaculture of Sri Lanka. Naga, the Iclarm Quaterly.

De Silva, S.S. 1988. Reservoirs of Sri Lanka and their Fisheries. FAO Fisheries Technical Paper 298: 128 p.

Inland and aquaculture fish production, 2014. [Online] Available at: <http://www.naqda .gov.lk/brackish water.php> [Accessed 6 July 2014].

Inland and aquaculture fish production, 2014. [Online] Available at: <http://www. naqda.gov.lk/> [Accessed 6 July 2014].

McLaughlin, C. G. (1987). HMO growth and hospital expenses and use: a simultaneous-equation approach. *Health Services Research*, *22*(2), 183.

Ministry of Fisheries and Aquatic Resources Development, 2014. *Annual Report 2014*. [Online] Available at:<http://www.fisheries.gov.lk/elfinder-2.0 rc1/files/stat/Fisheries%20Statistices/Tables.pdf>[Accessed 6 July 2014].

Ministry of Fisheries and Aquatic Resources Development, 2014. *Fish Production Report 2014*. Available at: <http://www.fisheries.gov.lk/content.php?cnid=ststc> [Accessed 6 July 2014].

Zellner, A., and Theil, H. (1962). Three-stage least squares: simultaneous estimation of simultaneous equations. *Econometrica: Journal of the Econometric Society*, 54-78.

Economic Viability of Organic vs. Conventional Paddy Farming: With Special Reference to Kesbewa Divisional Secretariat Division

D.P. Rajapakshe [a] and **D.W.K. Hemachandra [b]**

[a] *Department of Business Economics,University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
dilan.r@sjp.ac.lk

[b] *Department of Business Economics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
kinkini2009@gmail.com

INTRODUCTION AND THE RESEARCH PROBLEM

Rice is the single most cropped staple food occupying 34% of the total cultivated areas in Sri Lanka. 1.8 million Farmers are, approximately, engaged in paddy cultivation. According to the Department of Agriculture (2014), 95% of the national rice requirement is fulfilled by the domestic production.

As a result of the Green Revolution a remarkable increase has been recorded since independence. There was no use of agrochemicals prior to this Green Revolution and the average yield of rice was low. However, with increasing population and hence increasing demand, a pressure on increasing domestic rice production has emerged. The Department of Agriculture's priority was given to find rice varieties and hence improve them in order to increase the harvest. With the shift from indigenous rice varieties to new improved varieties, new set of problems emerged specially the pest problem. As a result the use of agrochemicals was increased significantly.

Even though the crop level has increased, the problem associated with farming has also increased. Researchers have conducted studies to identify these unsustainable farming practices, their adverse consequences as well as finding alternative farming practices.

According to Yadav et al. (2013) organic agriculture (OF) is a production system which avoids or minimizes the use of synthetic fertilizers, pesticides and the environmental, social, and economic sustainability are the basics of organic farming. Pure OF is a broader system which has a set of technological characteristics such as crop rotation. However, in this study the farms where organic fertilizers are utilized at least for 3 years before the study duration were considered as organic farms due to the absence of pure OF in the study area.

Abdussamie et al. (2010) have defined conventional agriculture (CF) as a production system which employs synthetic fertilizers, and pesticides and accordingly conventional farms were recognized with the usage of agrochemicals.

In Sri Lanka, paddy farming has expanded over time both in terms of yield and sown area. But, a reduction of paddy sown area could be identified in the wet zone (Apasingha et al., 2009) (see Figure 1). The abandoned paddy lands have recorded to be 37,128 ha in the wet zone which is a 24.3% of the total paddy lands in the zone in 2008 (152,903 ha). The opposite trend could be identified with respect to the areas excluding the wet zone (the dry and intermediate zones together). Therefore, the paddy production in the wet zone was found to be facing some dilemmas.

Apasingha et al. (2009) have evaluated the reasons driven to the decreasing trend in cultivating paddy lands in the wet zone. Their study emphasized high power cost, high production cost, and rapid urbanization as the major barriers in paddy farming in the Colombo District.

About 43% of the sample of the Colombo District farmers has suffered from higher production cost. The limited time to be devoted for paddy cultivation has led to increase hired labor. Additionally, labor wages have found to be higher in the Colombo District with the deficit of labor supply. Moreover the power costs, agrichemical costs and seed costs have been identified as the other drivers to increase cost of paddy production (Apasingha et al., 2009).

Figure 1: Paddy Sown Area of Sri Lanka and Wet Zone (from 1979 – 2013) ('000 Hectare)
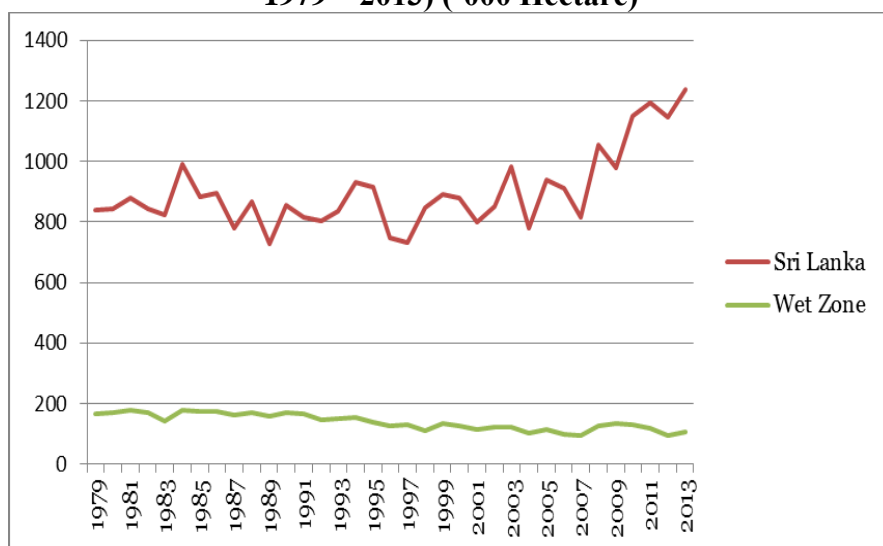
Source: Author Compilation based on data from the Department of Census and Statistics and the Department of Agriculture

Apart from those facts, the insufficient revenue to be spent on farming has also been identified as a problem by 37.5% of the farmers in the Colombo District. Moreover, insufficient yield (for 37.5% of the sample), higher labor wages (for 43.7% of the sample), the engagement of another occupation (for 46.8% of the sample) were recorded as problems in the Colombo District (Apasingha et al., 2009).

Most of the people are engaging in paddy cultivation as an additional source of income in the Colombo District. Their willingness has deteriorated due to various factors as mentioned above.

Hence, this study has been designed to assess the economic viability of two paddy farming practices (OF and CF) in Kesbewa Divisional Secretariat Division.

The research question of the study was,

"Is organic paddy farming economically more viable than conventional paddy farming in Kesbewa Divisional Secretariat Division?"

The primary objective of this study was to compare economic viability between conventional and organic paddy farming in Kesbewa Divisional Secretariat Division. The secondary objective was to compare farmer related characteristics between two farming practices. Whether there is any farmer related characteristic in terms of their education, experience, age etc. that determines the adoption of a specific farming practice was studied under that objective.

The study is unique for the study area and has dedicated to identify directions to promote paddy cultivation in such areas where rapid urbanization and other socio-economic changes occur.

METHODOLOGY

Study Area, Sampling and Data Collection

Colombo, Gampaha, Kalutara, Galle, Matara and Kegalle Districts belong to the wet zone in Sri Lanka.

The greatest abandoned paddy lands were found in the Colombo District (36.6% as a percentage of asweddumized paddy lands in the district in 2008). 53.6% of paddy lands in the Colombo District have not been sown in 2013 (see Table 1). That was the highest among the six districts in the wet zone (Apasingha et al., 2009).

In terms of asweddumized lands during *Maha* season, Kesbewa Divisional Secretariat Division has acquired the fourth place among the ten paddy producing Divisional Secretariat Divisions in the Colombo District (Agrarian Development, Minor Irrigation, Industry and Environment Ministry of Western Province 2013). In Kesbewa Divisional Secretariat Division, out of asweddumized paddy lands, around 50% or less has been utilized to cultivate paddy in the recent past (see Table 2). That is the lowest level of asweddumized land usage for cultivation among the major four paddy cultivating DS divisions in the Colombo District[1]. Those findings have shown that the trend of abandoning paddy lands in Kesbewa Divisional Secretariat Division was the severest compared to the other three large paddy producing Divisional Secretariat Divisions. Therefore Kesbewa Divisional Secretariat Division was selected as the study site.

The duration of the study was September 2014 – March 2015, *Maha* season in which the highest cultivation takes place.

The total number of 1641 paddy farmers in Kesbewa Divisional Secretariat Division was the population of the study. There were 73 organic farmers and 1568 conventional farmers represent population. Accordingly multistage random sampling method was used in sample selection.

The farmers were selected on Grama Niladhari Division basis. In order to avoid differentials among farmers and their farming practices, equal sizes of two types of farmers were selected for the sample. Organic farmers were defined as the farmers who were practicing organic farming[2] at least for 3 years (Mendoza 2008). That

---

[1] Homagama, Kaduwela, Padukka and Kesbewa Divisional Secretariat Divisions

[2] United States Department of Agriculture (2005) has defined organic farming as a farming system that does not allow chemical fertilizers or pesticides because it considers mainly the type of inputs and their judicious use, and resists use of foreign materials, such as DNA via biotechnology (as cited in Nelson 2014).

constraint was important in OF as it takes 3 years to recover the soil after it was subject to intensive use of agrochemicals. Conventional farmers were the farmers who were utilizing agrochemicals in the paddy cultivation.

Both primary and secondary sources were used to collect data. The primary data was gathered using a structured and pre-tested questionnaire along with an in-depth interview.

The first section of the questionnaire was devoted to collect information on farmer characteristics with the intentions of identifying the experience in paddy farming, educational status, employment status, training hours received, number of directly involved family members, age, etc. The profile of the farms such as the specific farming practice, the extent sawn, the variety cultivated, the ownership of the land, and the mode of irrigation were questioned in the second section and the fourth part was to record perceived benefits and drawbacks of the two practices. Thirdly, the questionnaire contains questions to collect data on yield, input items, and revenue for *Maha* season 2014/2015 (September-March). Those data was used in a cross sectional analysis. The above data were collected in cash cost and non-cash cost basis. The actually spent expenses were recorded as cash costs and the inputs which are owned by the farmer and the inputs received for free were valued with current market rates and were considered as non-cash costs.

Theoretically, costs are divided into two categories i.e., fixed costs and variable costs. In this study only the variable costs are considered to estimate the cost of farming (Aheeyar et al., 2005). The data collected was analyzed using SPSS (Statistical Package for Social Sciences) 16.0.

Table 1: Sown and Unsown Paddy Lands of Districts in the Wet Zone

District	Highest Paddy Lands Sown (Hectare)	Sown Paddy Lands in 2013 (Hectare)	Unsown Paddy Lands in 2013 (Hectare)	Unsown Paddy Lands (as a % of the highest paddy lands sown)
Colombo	13,292 (1981)	6,167	7,125	53.6
Gampaha	29,151 (1984)	17,753	11,398	39.1
Kalutara	37,629 (1981)	22,201	15,428	40.9
Galle	41,003 (1986)	20,357	20,646	50.3
Matara	39,101 (1981)	27,791	11,310	28.9
Kegalle	22,161 (1985)	14,145	8,016	36.1

Note: In the parentheses, the years when the highest sown paddy lands found are stated.
Source: Author compilation based on data of the Department of Census and Statistics

Table 2: Harvested Paddy Lands as Percentages of Asweddumized Paddy Lands (%)

DS Division	2009-10	2010-11	2011-12	2012-13	2013-14
Homagama	78.0	80.0	80.0	76.6	76
Kaduwela	81.0	81.0	78.5	79.2	79.6
Padukka	75.3	76.9	76.9	77.7	78.1
Kesbewa	49.5	50	50.7	41.2	36.9

Source: Author compilation using data from Agriculture, Agrarian Development, Minor Irrigation, Industry and Environment Ministry of Western Province (2009, 2010, 2011, 2012, 2013)

Analytical Techniques

First objective was achieved through calculating the financial measures. That has been addressed through a set of financial measures in yield, input, cost and revenue items. Moreover independent sample t-tests were used to check the significance of those mean values between the two practices. The financial measures were based on the studies of Mendoza (2002); Mendoza (2008); and Rubinos et al. (2007) covering yield, input and cost aspects (see Annexure 01).

The hypotheses used in the t-test were,

Null hypothesis H_0: There is no significant difference between conventional and organic farms under a specific financial measure

and

Alternative hypothesis H_1: There is a significant difference between conventional and organic farms a specific financial measure

Under the secondary objective farmer related attributes such as education, training, age etc. were compared between two farming practices using SPSS 16.0 and the significance of the differences are checked by calculating the Pearson Chi-square test.

The hypotheses followed in the Pearson Chi-square test were,

Null hypothesis H_0: There is no significant difference between the farmer conventional farmers and organic farmers in a specific farmer characteristic

and

Alternative hypothesis H_1: There is a significant difference between the farmer conventional farmers and organic farmers in a specific farmer characteristic.

RESULTS AND FINDINGS

According to the financial ratio analysis OF was found superior to CF in both the break even yields[3] (BEYs) even with a significantly lower yield under OF (see Table 3). Lower BEY in OF implies a smaller yield required to cover costs. The t-tests have confined significant differences between OF and CF in BEYs. The responsible factor for this situation was higher prices obtained for organic paddy with a great premium. This concludes that the organic farmers should not concern about the level of yield since it needs significantly lower yield than in CF to cover total cost/total cash cost.

The contributory factor for lower harvest obtained in OF was the indigenous rice varieties cultivated where CF obtained higher yields with newly improved varieties (NIVs) (90% OF farms were harvesting indigenous varieties whereas 94% Conventional farms were cultivating NIVs). It was evidenced a significant difference between average yields in two practices. The yield obtained in OF is lower by 36.12% than in CF (see Table 4).

Table 3: Yield and Break Even Yield per Acre

	Practice	Count	Mean	Std. Deviation
Harvest *	Conventional	50	783.6581	362.86478
	Organic	50	439.4400	172.14876
Break Even Yield (with Total Cost)*	Conventional	50	2,371.8055	733.85942
	Organic	50	912.5064	246.75716
Break Even Yield (with Total Cash Cost)*	Conventional	50	1,290.438	554.4261
	Organic	50	518.172	177.8965

* significant under 95% confidence level
Source: Author compilation based on survey data

---

[3] Break Even Yield (BEY) is the yield required to cover the cost and is calculated by dividing total cost/cash cost by market price per 1kg of paddy. For this study BEY has been calculated with both total cash costs and total costs.

Table 4: Yield per Acre by Variety

	Variety	Count	Mean	Std. Deviation
Yield per Acre*	Indigenous	48	472.5575	310.94262
	NIV	52	739.8489	298.31815

* significant under 95% confidence level
Source: Author compilation based on survey data

In gross return to labor inputs[4], and net return to labor inputs[5] demonstrated significant differences between the two farming practices in favor of OF With almost equal average man days spent on both OF and CF (37.24 man days in OF and 37.12 man days in CF), significantly higher returns experienced by organic farmers was responsible for this situation (see Table 5).

Table 5: Gross/Net Revenue per Acre

	Practice	Count	Mean	Std. Deviation
Gross Revenue*	Conventional	50	32,722.6855	15,786.07829
	Organic	50	41,431.1429	15,498.02781
Net Revenue (subtracting Total Cost)*	Conventional	50	-44,490.0048	21,990.27817
	Organic	50	-29,747.0887	21,368.29297
Net Revenue (subtracting Total Cash Cost)*	Conventional	50	-7,674.5234	18,598.40984
	Organic	50	2,032.6548	14,802.81799

* significant under 95% confidence level
Source: Author compilation based on survey data

Average gross revenue per acre of OF is higher by 26.6% with compared to CF. That is significant under 95% confidence level. Net revenue per acre[6] numbers have documented losses. But, the loss is minimized in organic farms by about 33% than conventional farms

---

[4] Gross Return to Labor Inputs = Gross Return/ Total Man Days Consumed
[5] Net Return to Labor Inputs = Net Return/ Total Man Days Consumed
[6] Net Revenue per acre has been calculated in two approaches considering total cost and total cash cost separately.

and that is significant in 95% confidence level. When consider net revenue calculated only deducting cash costs, it has shown a profit figure in organic farms while that was a loss in conventional farms. That can be attributed to a 126.4% disparity than the loss in conventional group.

Except weedicide and pesticide cost items[7], all the other cost items per kg of yield of organic farming have recorded higher values than conventional farming (all are significant at 95% confidence level) (see Table 6). Significantly lower yield in organic farms was responsible there.

Table 6: Composition of Costs (per kg)

	Practice	Count	Mean	Std. Deviation
Labor Cost*	Conventional	50	69.643351 (63.28%)	34.5127649
	Organic	50	124.270335 (69.74%)	71.8072222
Power Cost*	Conventional	50	33.780549 (30.69%)	12.5648376
	Organic	50	43.240508 (24.26%)	17.8409900
Fertilizer (inorganic /organic) Cost*	Conventional	50	1.088378 (0.98%)	0.3666341
	Organic	50	4.855277 (2.72%)	6.8705706
Weedicide Cost*	Conventional	50	1.606048 (1.45%)	0.8474612
	Organic	50	0.000000 (0.00%)	0.0000000
Pesticide Cost*	Conventional	50	0.359048 (0.32%)	0.4573618
	Organic	50	0.000000 (0.00%)	0.0000000
Seed Cost*	Conventional	50	3.561245 (3.23%)	1.5223415

---

[7] Weedicide and pesticide are not utilized in OF

		N		Std. Error Mean
	Organic	50	5.801853 (3.25%)	4.2710146
Total Cost*	Conventional	50	110.038619 (100%)	44.9598375
	Organic	50	178.167974 (100%)	90.8964302

Note: In the parentheses, the percentage of total cost for each cost item is mentioned for each farming practice.
* significant under 95% confidence level
Source: Author compilation based on survey data

Table 7: Gross Return to Cost Categories (%)

	Practice	N	Mean	Std. Deviation	Std. Error Mean
Gross Return to Total Cost*	Conventional	50	0.440657	0.1694796	0.0239680
	Organic	50	0.612953	0.2059766	0.0291295
Gross Return to Cash Cost*	Conventional	50	0.907792	0.5555715	0.0785697
	Organic	50	1.128353	0.5528622	0.0781865
Gross Return to Non Cash Cost*	Conventional	50	1.029137	0.5013894	0.0709072
	Organic	50	1.502336	0.6531824	0.0923739

* significant under 95% confidence level
Source: Author compilation based on survey data

In revenue related measures, OF was better than CF due to the price premiums obtained. In terms of Benefit Cost ratio, OF farmers have earned Rs. 0.61 while Conventional farmers have earned only Rs. 0.44. According to Gross Return to Cash Cost ratio, for one rupee invested as cash costs, OF farmers have earned net revenue of Rs. 1.12 where that of Conventional farmers was only Rs. 0.90. Therefore, OF was better in revenue dimensions (see Table 7). The reason should be the premium price obtained for organic paddy in the

market (the average prices for one kg of indigenous paddy and NIV paddy were Rs. 42.00 and Rs. 94.90, respectively). That premiums have been able to mitigate the lower yield harvested in OF compared to CF.

The Comparison of Farmer Related Characteristics between CF and OF has been aimed to address the secondary objective. Study has identified a same set of farmer characteristics between the two groups of farmers. The highest number of conventional farmers was from 46 - 55 age group and the same is true for organic group (26% and 32% from conventional and organic farmers, respectively). The smallest age group in both sub-samples was the farmers older than 65 years (the oldest group). An important finding is the minor participation of the youth (age 25 – 35 group) which is second only to the oldest group. Various socio-economic changes might have led to that situation.

From the sample of conventional farmers (36%), the majority has passed O/L and the same was true for organic farmers (38%). The other educational levels also did not show considerable disparities. In terms of experience, the highest number of farmers (22% and 48%, respectively for conventional and organic farmers) had experience 11-20 years in each farming practice.

The employment status was checked based on whether the cultivation was full time or part time occupation. 80% of conventional farmers and 82% of organic farmers were engaged in paddy farming as a part time income source. The Pearson Chi-square test has evidenced insignificant differences between two farming practices.

CONCLUSIONS AND IMPLICATIONS

Conclusions

Mendoza (2002) found that the yield of OF was higher than CF. The reason was attributed to the ownership of lands where most of the organic farmers were the owners of paddy fields who manage farms better while conventional farmers were tenants. The situation is different in this study due to the same ownership status found between two practices. The reason could be attributed to the yields. The yield was significantly higher in CF due to cultivation of NIVs where indigenous varieties were mostly cultivated in OF.

The rainy weather condition during the wet season was the reason to have lower yields in the study of Mendoza (2008) but, the gross revenue was not lower since a price premium was received. For this study also price premium has played the leading role to make OF more viable economically. In contrast Quintela and Ricardo (2007) have concluded that the organic farming is economically viable even the producers' prices are the same with conventional products due to higher yield. In net revenues calculated in this study, both the practices were not satisfactory, but OF has mitigated higher costs due to the premium prices.

A study in India revealed that some farmers are reluctant to convert to OF because of the perceived high costs and risks involved (Charyulu and Biswas 2010). In most of the researches, whether it was lower or higher the yield than in CF, OF has had superior net revenues (Mendoza 2002, 2008). The main reason was higher cash cost for agrochemicals which is lower in OF. But, in this regard there was no significant difference between the total cash costs or total non-cash costs or between total costs though agrochemicals in conventional farming is significantly higher than organic farms. The reason for the almost identical total costs was the absence of agrochemicals (fertilizer and pesticides) in OF while incurring higher costs in labour, fertilizer and seed inputs (in terms of per acre costs).

Therefore, the conclusion would be, organic paddy farming is economically more viable compared with conventional practice in Kesbewa DS division.

Implications

Hence, the OF must be promoted by the agricultural authorities through programs to make farmers aware about the comparative economic viability of the two farming practices. Another important finding is that the cost of farming is high irrespective of any practice. Therefore, the government support should be extended beyond the fertilizer subsidy. Most of the time smallholder farmers cultivate paddy as an additional source of income. Due to the limited availability of time to be spent on farming, they always tend to hire labor. Labor cost is the prominent cost category in the production cost (63.28% in CF and 69.74% in OF as a percentage of total cost). Thereby, the farmers should be motivated to cultivate in harmony as a team and exchange labor (*Attam* system).

Identical nature of both the groups could be identified in comparison of farmers' characteristics. Therefore, it could find no influence from those characteristics on the adoption of a specific farming system (OF or CF).

Additionally, it was found that lack of motivation of the youth in the study area to engage in paddy farming. It is recommended to motivate the youth to enter organic paddy farming along with the programmes suggested above.

The findings of this research could be confined only to the study area since the limited scope of the study such as the small sample selected.

REFERENCES

Abdussamie, A.,, Ahmed, M. and Kouser, S. 2010.'Economics of conventional and partial organic farming systems and implications for resource utilization in Punjab (Pakistan)', *Pakistan Economic and Social Review*, vol. 48, no. 2.

Adhikari, R. K. 2011, 'Economics of organic rice production', *The Journal of Agriculture and Environment*, vol. 12, pp. 97-103.

Aheeyar, M. M., Henegedara, G. M., and Rupasena, L. P. 2005, *the cost of production of rice in Kegalle and Kurunegala Districts of Sri Lanka,* Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo.

Apasingha, S., Apakanda, N., and Hitihamu, S. 2009, ශ්‍රී ලංකාවේ තෙත් කලාපයේ වගා කරන කුඹුරු ඉඩම් ප්‍රමාණය අඩුවීමේ ප්‍රවණතා.. Hector Kobbekaduwa Agrarian Research and Training Institute. Colombo.

Department of Agriculture 2014, viewed 4 June 2014, http://www.agridept.gov.lk

Dhanapala, M. P., 2005, 'The wet zone rice culture in Sri Lanka: a rational look', *Journal of National Science Foundation Sri Lanka* , vol. 33, no. 4, pp. 277-279.

Henegedara, G. 2000, *Economics of paddy cultivation in Sri Lanka: with special reference to resource use and profitability based on 1987/88 Maha season,* Hector Kobekaduwa Agrarian Research and Training Institute, Colombo.

Henning, J., Baker, L., and Thomasin, P. 1991, 'Economic issues in organic agriculture', *Canadian Journal of Agricultural Economics*, vol. 39, pp. 877-889.

Jayawardena, S. S. B. D. G. 2000, *Past, present and future of the golden grain, rice in Sri Lanka*, Department of Agriculture,

Peradeniya, viewed 4 June 2014, http://www.agrilearning.goviya.lk

Mendoza, T. C. 2002, 'Comparative productivity, profitability and energy use in organic , LEISA and conventional rice production in the Philippines', *Proceedings of 14th IFOAM Organic World Congress*, Victoria, Canada.

Mendoza, T. C. 2008, 'Evaluating the benefits of organic farming in rice agroecosystems in the Philippines', *Journal of Sustainable Agriculture*, vol. 24, no. 2, pp. 93-115, viewed 21 April 2014, http://www.dx.doi.org

Namdev, G. P., Shrivastav, A., and Awasthi, P. K. 2012, 'Economic viability of organic paddy production in Central India', *International Journal of Current Business and Economics*, vol. 1, no. 1, pp. 6-9.

Pimentel, D., Hepperly, P., Hanson, J., Douds, D., and Seidel, R. 2005, 'Environmental, energetic, and economic comparisons of organic and conventional farming systems', *BioScience*, vol. 55, no. 7, viewed 29 April 2014, http://www.bioscience.oxfordjournals.org

Rigby, D., and Caceres, D. 2001, 'Organic farming and the sustainability of agricultural systems', *Agricultural systems*, viewed 29 April 2014, http://www.elsevier.com

Rubinos, R., Jalipa, A.T., and Bayacag, P. 2007, 'Comparative economic study of organic and conventional rice farming in Magsasay, Davao Del Sur', *Proceedings of 10th National Convention on Statistics (NCS),* EDSA Shangri-La Hotel, Philippines.

Yadav, S. K., Subhash, B., Yadav, M. K., Kalyan, S., Yadav, G.S., and Puresh, P. 2013, 'A review of organic farming for sustainable agriculture in Nothern India', *International Journal of Agronomy*, viewed 28 June 2014.

ANNEXURE

Financial Measures used to compare Organic and Conventional Paddy Farming Practices

Input Related Financial Measures

$$Gross\ Return\ to\ Labor = \frac{Gross\ Return}{Total\ Man\ Days\ Consumed}$$

$$Net\ Return\ (with\ Non\ Cash\ Cost)\ to\ Labor = \frac{Net\ Return\ (with\ Non\ Cash\ Cost)}{Total\ Man\ Days\ Consumed}$$

Cost Related Financial Measures

$$Power\ Cost\ per\ kg\ of\ Yield = \frac{Total\ Power\ Cost}{Yield\ in\ kg}$$

- This ratio was calculated with respective the other cost items also.

$$Total\ Cash\ Cost\ per\ kg\ of\ Yield = \frac{Total\ Cash\ Cost}{Yield\ in\ kg}$$

$$Total\ Non\ Cash\ Cost\ per\ kg\ of\ Yield = \frac{Total\ Non\ Cash\ Cost}{Yield\ in\ kg}$$

$$Total\ Cost\ per\ kg\ of\ Yield = \frac{Total\ Cost}{Yield\ in\ kg}$$

Yield Related Financial Measures

$$Break\ Even\ Yield\ (with\ Total\ Cost)$$
$$= \frac{Total\ Cost}{Selling\ Price\ per\ kg\ of\ paddy}$$

$$Break\ Even\ Yield\ (without\ Non\ Cash\ Cost)$$
$$= \frac{Total\ Cost\ without\ Non\ Cash\ Cost}{Selling\ Price\ per\ kg\ of\ paddy}$$

Return Related Financial Measures

$$Net\ Return\ (without\ Non\ Cash\ Cost)\ to\ Labor$$
$$= \frac{Net\ Return\ (without\ Non\ Cash\ Cost)}{Total\ Man\ Days\ Consumed}$$

$$Gross\ Return\ to\ Total\ Cost\ = (Benefit\ to\ Cost\ Ratio)$$
$$= \frac{Gross\ Return}{Total\ Cost}$$

$$Gross\ Return\ to\ Cash\ Cost = \frac{Gross\ Return}{Total\ Cash\ Cost}$$

$$Gross\ Return\ to\ Non\ Cash\ Cost = \frac{Gross\ Return}{Total\ Non\ Cash\ Cost}$$

Technical Efficiency and Agricultural Biodiversity: Identifying the Role of Knowledge and Attitudes[1]

Wasantha Athukorala

Department of Economics and Statistics, University of Peradeniya,
Sri Lanka
wathukorala@yahoo.com

INTRODUCTION

Agricultural biodiversity is a sub-set of general biodiversity which is essential for global food production, livelihood, security, environmental protection and sustainable agricultural development (Food and Agriculture Organization-FAO, 2007). In addition to providing direct benefits to farmers, agricultural biodiversity improves ecological processes by regulating climate, maintaining soil quality, providing protection from erosion, storing nutrients and breaking down pollution (Di Falco and Chavas, 2009). Despite all these benefits previous experience has shown that agricultural biodiversity has been decreasing rapidly in the world. Low levels of knowledge and lack of integrated research on natural ecosystems and their innumerable components may exaggerate the process, especially in developing countries.

The study attempted to identify the role of farmers' knowledge as well as attitudes on agricultural biodiversity on determining farm level technical efficiency in diverse farming systems in Sri Lanka. It analysed how farmers' knowledge and attitudes affect the farm level technical efficiencies. Randomized Control Method (RCM) is

employed to collect field data and Stochastic Production Function Approach (SFA) was used to analyse the data. In RCM firstly, 21 villages from the Ampara District were selected purposively. Then the villagers were divided into three groups (one control group and two treatment groups) randomly. Accordingly, randomisation to select households into different groups (two treatments and the control) was done at the village level and 'village' is the unit of randomisation in this study. Then a number of 20 farmers were selected from each village randomly (using the farmers' list). The survey involved several steps. First, households for the survey from the district were selected. Second, base line survey was carried out covering all three groups. The main purpose of this survey is to understand their knowledge and attitudes on agricultural biodiversity and test whether there is any significant spillover effect among the respondents. This survey includes a set of simple questions related to agricultural biodiversity and environment concerns. Third, one treatment group was educated using a formal educational program on agricultural biodiversity designed for this study while other treatment group was provided information in order to improve their environmental concerns. the control group is not provided any information. Final survey covers all groups in the district. The questionnaire used for this study was developed using the results from six focus groups' discussions and a pre-test.

The education program included two steps. Firstly, we met respondents of two treated groups and explained the importance of agricultural biodiversity or environmental protection individually. Secondly, we provided leaflets (but not to keep with them; they could read it in front of us or we could read it for them) showing the importance of maintaining diverse farming system in their farms or the importance of protecting environment. Final survey was carried out by administering a questionnaire through a face-to-face interview with the Head or any other working member of the households. The final survey covered 420 households.

REVIEW OF LITERATURE

There have been many studies on technical efficiency in agriculture (Vangelis et al. 2001;Gunaratne and Thiruchelvam, 2002; Binam et al., 2004; Amos et al. 2004; Idiong, 2007; Hadgu et al. 2009). In general the review of these studies suggests that the best option to assist developing countries to raise productivity is increasing efficiency. Moreover, some of these studies support that agricultural biodiversity plays a major role on technical efficiency in small farms. However, to the best of my knowledge, none of those studies attempted to identify the role of farmers' knowledge and attitudes of agricultural biodiversity and its impacts on farm level technical efficiency. This study is attempting to fill this void in the literature.

METHODOLOGY

The empirical model of estimating technical efficiency in this study is based on the stochastic production function proposed by Battese and Coelli (1995). Accordingly, the first stage equation of the stochastic frontier model can be defined by:

$$\ln Y_i = \beta_0 + \sum_{i=1}^{4} \beta_i \ln X_i + V_i - U_i \dots\dots\dots\dots\dots\dots\dots(1)$$

Where, 'ln' represents the natural logarithm. The subscript i, indicates the ith farmer in the sample ($i = 1,2\dots\dots,n$).

$\ln Y_i$ represents the natural logarithm of the value of farm output

$\ln X_1$ represents the natural logarithm of the total area of land (in acres) under cultivation

$\ln X_2$ represents the natural logarithm of labour in man dates

$\ln X_3$ represents the natural logarithm of capital expenditure

$\ln X_4$ represents the natural logarithm of other cost: raw materials

β_j's are unknown parameters to be estimated

V_i's are assumed to be independent and identically distributed normal random errors having zero mean and unknown variance; σ_v^2; U_i's are non-negative random variables, called technical inefficiency effects. The second stage equation that shows the technical inefficiency can be written as follows:

$$U_i = \alpha_0 + \alpha_1 Z_{1i} + \alpha_2 Z_{2i} + \alpha_3 Z_{3i} + \alpha_4 Z_{4i} + \alpha_5 Z_{5i} + \alpha_6 Z_{6i} + \alpha_7 Z_{7i}$$
$$+ \alpha_8 Z_{8i} + \alpha_9 Z_{9i} + \alpha_{10} Z_{10i} + g_i \dots\dots\dots\dots\dots\dots\dots(2)$$

Z_{1i} is the age of the responded in years (AGE)

Z_{2i} is the formal education of the responded in years (EDU)

Z_{3i} is the household size (HS)

Z_{4i} is farming experience in years (FE)

Z_{5i} is full time farmer or Not: Dummy variables if Yes 1, else 0.

Z_{6i} is the land ownership (LO); Dummy variable if owned 1, otherwise 0

Z_{7i} is credit access : Dummy variables if Yes 1, otherwise 2.

Z_{8i} is member of a farm organization: Dummy variables if Yes 1, otherwise 2.

Z_{9i} is agricultural extension services contacts (AEC): Dummy variables if Yes 1, else 0.

Z_{10i} is crops diversity (number of varieties)

Given functional and distributional assumptions, maximum-likelihood estimates (MLE) for all parameters of the stochastic frontier production and inefficiency model were simultaneously estimated using the program, FRONTIER 4.1.

RESULTS AND DISCUSSION

First, the descriptive statistics of the respondents of three groups are compared. The mean value of age 38, 40 and 37 of the two treatment groups and control group respectively. The average number of persons in the household was 5, 4 and 5 while average education levels are 10, 9 and 9 respectively. The comparison of descriptive statistics clearly indicates that there is no significant difference between different groups.

First, we estimated the production functions for three groups separately. Results are reported in Table 1. The production function estimates of all three groups indicate the relative importance of factor inputs in agricultural production. The coefficients of all factors have the expected signs and were highly significance. The values of γ are 0.71, 0.67 and 0.63 respectively. They are statistically significant at one per cent level which implies that more than half of the residual variation is due to the inefficiency effect.

Table 1: Maximum-Likelihood Estimates for Parameters of the Production Function

Variables	Education (biodiversity)	Education (Environment)	Control group
Constant	1.221(0.028)**	2.024(0.012)**	1.974(0.019)**
Land	0.397(0.012)**	0.218(0.033)**	0.112(0.069)***
Labour	0.212(0.032)**	0.254(0.056)***	0.012(0.072)***
Capital	0.136(0.021)**	0.067(0.030)***	0.004(0.071)
Raw Material	0.062(0.013)**	0.125(0.006)*	0.004(0.001)*
Variance Ratio	0.713(0.001)*	0.675 (0.003)*	0.622 (0.002)*

Agriculture Efficiency

Log Likelihood function	-466.083	-426.010	-356.231
Number of observation	140	140	140

Table 2: Maximum-Likelihood Estimates for Parameters of the Inefficiency Model

	Education (biodiversity)	Education (Environment)	Control group
Variable	Coefficient	Coefficient	Coefficient
Constant	0.546(0.002)*	0.787(0.000)*	0.285(0.023)**
Age	0.026(0.000)*	0.031(0.001)*	0.117(0.000)*
Education	-0.013 (0.024)**	-0.061 (0.036)**	-0.033 (0.024)**
HH size	-0.032 (0.057)***	-0.053 (0.004)*	-0.051 (0.006)*
Experience	0.012(0.000)*	0.079(0.044)**	0.018(0.056)***
Full time farmer	-0.046(0.000)*	-0.048(0.000)*	-0.026(0.042)**
Land ownership	-0.054(0.000)*	-0.056(0.000)*	-0.042(0.058)**
Credit	-0.055 (0.008)***	-0.053 (0.065)**	-0.085 (0.080)***
Member of FO	-0.093(0.000)*	-0.064(0.000)*	-0.043(0.004)*

Extension	-0.025 (0.087)***	-0.034 (0.012)**	-0.044 (0.003)*
Crops diversity	-0.056(0.000)*	-0.044(0.003)*	-0.027(0.009)*

*Note: i P values are given in the parenthesis. * denotes significant variables at 1% level and ** indicates significant at 5% level while *** denotes significant variables at 10% level of significant.*

As the second step of the analysis, inefficiency models were run to identify the determinants of inefficiency of production among farmers in three groups. The sign of the variables in the inefficiency models is very important in explaining the observed level of TE of the farmers. A negative sign would imply that the variable had the effect of reducing technical inefficiency, while a positive coefficient would indicate increasing inefficiency. The results are presented in Table 2 and indicate that all included variables had the expected sign. Interestingly, diversity variable is highly significant in all models and has taken negative signs, implying that it helps to reduce the farm level technical inefficiency in study the area.

As the final step of the analysis, we examine the distribution of technical efficiency of farmers. The result is reported in Table 3. Results clearly show that two treated groups are performing better than control group.

Table 3: Frequency and Percentage Distribution of the Technical Efficiencies

	Education (biodiversity)		Education (Environment)		Control group	
Efficiency-range	Number of farms	%	Number of farms	%	Number of farms	%
0.00 - 0.40	0.00 - 0.40	1	0.71	0	0.00	8
0.41 - 0.45	0.41 - 0.45	3	2.14	2	1.43	26
0.46 - 0.50	0.46 - 0.50	6	4.29	7	5.00	27
0.51 - 0.55	0.51 - 0.55	10	7.14	12	8.57	16

0.56 - 0.60	0.56 - 0.60	8	5.71	14	10.00	13
0.61 - 0.65	0.61 - 0.65	15	10.71	13	9.29	15
0.66 - 0.70	0.66 - 0.70	13	9.29	15	10.71	12
0.71 - 0.75	0.71 - 0.75	24	17.14	22	15.71	8
0.76 - 0.80	0.76 - 0.80	22	15.71	18	12.86	10
0.81 - 0.85	0.81 - 0.85	18	12.86	16	11.43	3
0.86 - 0.90	0.86 - 0.90	15	10.71	17	12.14	2
0.91-1.00	0.91-1.00	5	3.57	4	2.86	0

Note: Number of farms used for this analysis are 140 in each group.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

This research is one of the first attempts to use the SPF approach to investigate the technical efficiencies for a RCM sample in Sri Lanka. The overall findings of this research help implement policies to reduce technical inefficiency in agriculture in the country. It also helps increase awareness and generates support for investment in increasing technical efficiency in the agricultural sector. The results show the potential of encouraging the methods of increasing more efficient farms in the country. Econometric analysis of survey data provides the information of current technical efficiency levels as well as the factor which determines the technical efficiency in these farms. These determinant factors, in turn, can be used to make policies in order to reduce technical inefficiencies in agriculture in the country.

REFERENCES

Amos, T. T., D. O. Chikwendu and J. N. Nmadu. 2004. Productivity, technical efficiency and cropping patterns in the Savanna Zone of Nigeria. *International Journal of Food Agriculture and Environment,* 2(2): 173-176.

Battese, G. E. and T. J. Coelli. 1995. A model for technical inefficiency effects in a stochastic frontier production function for panel data. *Empirical Economics*, 20(2): 325-332.

Binam, J. N., Tonye, J., Wandji, N., G. Nyambi and M. Akoa. 2004. Factors affecting the technical efficiency among smallholder farmers in the slash and burn agriculture zone of Cameroon. *Food Policy,* 29(5): 531-545.

Di Falco, S. and J. P. Chavas. 2009. On crop biodiversity, risk exposure and food security in the highlands of Ethiopia. *American Journal of Agricultural Economics*, 91(3): 599-611.

Food and Agriculture Organization (FAO). 2007. The State of Food and Agriculture 2007. Part I: Paying farmers for environmental services. Rome.

Gunaratne, R.U.M.S. and S. Thiruchelvam. 2002. Comparative study on technical efficiency of paddy production under major and minor irrigation schemes in Anuradhapura district. *Tropical Agricultural Research.* Vol. 14.

Hadley, D. 2006. Patterns in technical efficiency and technical change at the farm-level in England and Wales, 1982-2002. *Journal of Agricultural Economics*, 57(1): 81-100.

Hadri, K. and J. Whittaker. 1999. Efficiency, environmental contaminants and farm size: testing for links using stochastic production frontiers. *Journal of Applied Economics*, 2: 337-356.

Hadgu, K. M., Rossing, W.A.H., L. Kooistra and A. H. C. van Bruggen. 2009. Spatial variation in biodiversity, soil degradation and productivity in agricultural landscapes in the highlands of Tigray, northern Ethiopia. *Food Security*, 1:83-97.

Idiong, I. C. 2007. Estimation of farm level technical efficiency in small-scale swamp rice production in cross river state of Nigeria: a stochastic frontier approach. *World Journal of Agricultural Sciences,* 3(5): 653-658.

Vangelis, T., C. J. Pantzios and F. Christos. 2001. Technical efficiency of alternative farming systems: the case of Greek organic and conventional olive-growing farms. *Journal of Food Policy*, 26(6): 549-569.

An Economic Analysis of Technical Efficiency of Paddy Farming: A Case Study in Mahaweli System H

R.M.A.K. Rathnayake [a] and **S.P.P. Amaratunge [b]**

[a] *Department of Business Economics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
anandausjp@gmail.com

[b] *Department of Business Economics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
amaratunge@sjp.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

The credit for introducing a formal definition for economic efficiency goes to the study Koopmans (1951). According to this study, a point of production process is efficient, if the output is maximized at given level of inputs. Ferrell (1957)'s study made a great foundation for efficiency and productivity analysis. In this study, overall economic efficiency (EE) divided into two components: technical efficiency (TE) and locative efficiency (AE). It is appeared that Ferrell (1957)'s explanation on efficiency was greatly influenced by Koopmans (1951)'s works. Farrell (1957)'s explanation on efficiency is based on constant returns to scale. According to Farrell (1957)'s study, technical efficiency is achieved at any combination of inputs which is located on the Iso-quant curve and allocative efficiency is achieved if the unit of output is produced by using any combination of inputs which is located on the Iso-cost curve.

It is obvious that technical efficiency analyses are widely used in the world not only in agriculture but also in other various fields. Since rice is the staple food in Sri Lanka, maintaining a satisfactory level of production of rice is very important. Production of rice can be

increased with the technological improvements without increasing in production inputs.

Percentage changes in paddy production of Sri Lanka during 2009 – 2012, are -5.1%, 17.5%, -8.4% and -6% respectively in each year. Very poor growth of paddy production in Sri Lanka is explained by above statistics. Further, values of paddy productivity index of Sri Lanka during 2009-2012, are 137,115,104.1 and 102.8 respectively in each year. Estimated average yield of paddy production of Sri Lanka for 2012 is 3.43 tons per hectare (Central bank reports from 2009 to 2012). This is a very worse value compared with many other countries those who cultivate paddy. Average yield of paddy per hectare estimated for the year 2012 for Australia, Vietnam, China, Indonesia, Japan, United States, India, Bangladesh and Taiwan, are 9.18 tons, 5.66 tons, 6.74 tons, 4.86 tons, 6.74 tons, 8.35 tons, 3.52 tons, 4.38 tons, 5.93 tons respectively (IRRI data base). Average yield of paddy production for Australia was 6.0 tons in year 1960. Therefore, current average yield of paddy in Sri Lanka is even less than the average paddy yield which was acquired by Australia for the year 1960.

All aforementioned evidences prove that the efficiency of paddy farming is not at a satisfactory level in Sri Lanka. Therefore, efficiency of paddy farming should be improved in order to meet domestic rice consumption and for development of the paddy field. However, all the aforementioned issues emphasized the requirement of new methodologies to be applied to increase the paddy harvest in Sri Lanka. Based on these facts, the research problem of this study can be stated in the following manner: How do we improve the productive performance of paddy farmers in Sri Lanka in order to increase paddy production and their incomes.

METHODOLOGY

Analysis of the study has been done based on cross-sectional data collected from household survey conducted in 2013. The sample of the study consists of 285 households from Mahaweli system H. The stochastic frontier approach was used to produce technical efficiency estimates using Frontier 4.1 developed by Coelli (1994). Cobb-Douglas is the selected functional form for the frontier production function and half normal is the distributional assumption made for the inefficiency term.

Frontier production function defined by the study is given below.

$$\ln Y_i = \beta_0 + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_{5i} + \beta_6 \ln X_{6i} + v_i - u_i$$

Where;

Y_i = Paddy output in kilo grams

X_{1i} = Land area under paddy cultivation in acres (Land)

X_{2i} = Human labor hours (Labor)

X_{3i} = Machinery hours (Machinery)

X_{4i} = Amount of fertilizers used in kilo grams (Fertilizer)

X_{5i} = Amount of seed in kilo grams (Seed)

X_{6i} = Amount of pesticide/herbicide used in litters (Pesti./herbi.)

ln = Natural logarithm

i = 1,2,…N, N = 285.

The inefficiency model based on Battese and Coelli (1995) specification was

$$U_i = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6 + \delta_7 Z_7 + \delta_8 Z_8 + \delta_9 Z_9 + \delta_{10} Z_{10} +$$
$$\delta_{11} Z_{11} + W_i$$

Where,

Z_1 = Age of the household head.

Z_2 = Number of years of schooling achieved by the household head.

Z_3 = Family size (number of members in the family)

Z_4 = Dummy variable 1, indicating if the farmer is consuming liquor frequently: Yes = 1, No = 0

Z_5 = Dummy variable 2, indicating if the farmer has participated for at agricultural trainings within the year: Yes = 1, No = 0

Z_6 = Dummy variable 3, indicating if the farmer has received agricultural extension services within the year: Yes = 1, No = 0

Z_7 = Dummy variable 4, indicating if the farmer has access to the formal credit facilities: Yes = 1, No = 0

Z_8 = Distance between paddy land and residence in meters

Z_9 = Distance between paddy land main water channel in meters (B ela)

Z_{10} = Commitment 01 (Number of observations in the paddy field by the farmer per day)

Z_{11} = Commitment 02 (Dummy variable 5), indicating whether paddy cultivation has been destroyed more than once due to same reason: Yes = 1, No = 0

Z_{12} = Commitment 03 (Number of times a farmer discuss about his farming activities with family members per day)

Z_{13} = Dummy variable 6, indicating whether main livelihood of the household head is paddy farming: Yes = 1, No = 0

Z_{14} = Attitude (Value of attitude index)

RESULTS AND FINDINGS

The results of this study show that the estimated mean technical efficiency of farmers is 79.98 percent. Land, machineries and labor are the most responsive production factors in paddy farming.

Table 1: Maximum Likelihood Estimates of the Stochastic Frontier Production Function

Variables	Coefficient	t-ratios
Constant	0.71408764	1.75697010*
Land (X1)	0.81232865	2.71263914***
Labor (X2)	-0.39863931	-1.69538615*
Machineries (X3)	0.28501599	1.99864379**
Fertilizer (X4)	-0.37680319	-0.23974509
Seed (X5)	0.26930652	0.79496416
Pesticide /herbicide (X6)	0.30079203	0.26010334

Source: Data analysis by the author
*Note: ***, ** and * indicate significance at 1%, 5% and 10% levels respectively.*

Table 2: Estimations of Inefficiency Model

Variables	Coefficient	t-ratios
Age (Z_1)	0.46178367	1.67130782**
Schooling (Z_2)	-0.2110807	-1.69090023**
Number of members in the family (Z_3)	0.14690029	0.47506031
Liquor / Dummy variable 01 (Z_4)	0.82313258	2.37812648***
Training / Dummy variable 02) (Z_5)	-0.4022378	-1.45535276*
Extension / Dummy variable 03 (Z_6)	0.88506040	0.13378431
Access to credit facilities / Dummy variable 03 (Z_7)	0.91806232	0.14295795
Distance 01 (Z_8)	0.90482735	0.29675879

Agriculture Efficiency

Distance 02 (Z_9)	0.33297332	2.53406987***
Commitment 01 (Z_{10})	-0.2414728	1.78213211**
Commitment 02 / Dummy variable 04 (Z_{11})	-0.6293622	0.62431735
Commitment 03 (Z_{12})	-0.1223710	0.44802768
Occupation / Dummy variable 05 (Z_{13})	-0.7120034	-2.25413185***
Attitude (Z_{14})	-0.4873921	-3.0209498****

Source: Data analysis by the author

*Note: ****, ***, ** and * indicate significance at 1%, 5%, 10% and 15% levels respectively.*

Table 3: Diagnostic Statistics

Variables	Coefficient	t-ratios
Sigma-squared ($\sigma^2 = \sigma_U^2 + \sigma_V^2$)	0.32279629	1.88096911*
Gamma ($\gamma \equiv \sigma_U^2 / \sigma^2$)	0.84276935	2.436472268**
Log likelihood function	0.18829590	
LR test	0.27232337	

Source: Data analysis by the author

*Note: ***, ** and * indicate significance at 1%, 5% and 10% levels respectively.*

Table 4: Other Statistics of the Model

Variable	Value
$\chi^2_{0.05,21}$	32.7
No. of observations	285
Mean efficiency	0.79978911

Source: Data analysis by the author

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

The results of the study show that the estimated mean technical efficiency of the farmers is 79.98 percent. Land size is the leading responsive production factor and a hundred percent increase in land size increases paddy harvest by 81.23 percent. The analysis revealed that the sum of partial output elasticities with respect to all inputs is 0.6987 which indicates existing of Decreasing Returns to Scale in paddy production.

Fourteen factors have been considered as determinants of technical efficiency in estimating inefficiency model of the study. Schooling, agricultural training and farmers' positive attitudes are negatively associated with inefficiency of paddy farming. Age, alcohol consumption and distance between land and main water watercourse are positively associated with inefficiency of paddy farming.

Estimated value of overall technical efficiency in the area is 80 percent which implies that farmers in the sample are technically efficient 80 percent or technically inefficient 20 percent. In other words, there is a scope in short run to increase paddy harvest by 20 percent with existing utilization of inputs. This is somewhat different result compared with the studies by Shehu and Mshelia (2007) and Tijani (2006) where technical efficiency of paddy faming exceeds 90 percent. In Sri Lanka, there are many problems regard to increase in production inputs such as land, labor and fertilizer. Especially maximum utilization of land can be seen in Mahaweli development area. 2.5 acres were given for paddy cultivation and 0.5 acres were given for residence per household when Mahaweli development project was established. Even though marginal productivity of land is higher, paddy cultivation is at a difficult position to increase land utilization. All types of fertilizers are provided at maximum concessionary prices by the government. Therefore increase in quantity of fertilizer cannot be done in order to increase paddy harvest in Sri Lanka. A result of the study shows labor input has diminishing marginal returns. With this background utilizing more

labor is also will not be good solution if quantity of land machineries are held constant. Machinery has positive marginal product at current utilization. But doing more mechanization in paddy field is very difficult due to very small scale paddy farming in Sri Lanka.

A new aspect of technical efficiency studies has been introduced by this study through introducing new determinants of technical efficiency. In this study, farmers' attitudes towards paddy cultivation have been included as a new determinant of technical efficiency. Higher efficiency was significantly affected by positive attitudes of farmers and it has been proved through number of dimensions by the study. The study has given criteria to classify attitudes in to three categories; positive, negative and moderate. This classification can be taken as a foundation in analyzing attitudes in future researches. Addiction to liquor is another determinant which has been introduced by this study as a determinant of technical efficiency. This was statistically significant and negatively affected on farmers' efficiency. Framers' commitment is also considered as a determinant of technical efficiency by the study.

REFERENCES

Kalirajan, K. (1981), "An Econometric analysis of Yield Variability in Paddy Production", Canadian Journal of Agriculture Economics, 29: pp.167-80.

Aigner, D.J., Lovell, C.A.K. and Schmidt, P. (1977), "Formulation and Estimation of Stochastic Frontier Production Function Models", Journal of Econometrics, 6: pp. 21-37.

Ali M., and Flinn, J. C. (1989), "Profit Efficiency among Basmati Rice Producers in Pakistan Punjab", American Journal of Agricultural Economics, 71: pp. 303-310.

Battese, G. E. (1992), "Frontier Productions Functions and Technical Efficiency: A Survey of Empirical Application in

Agricultural Economics", Agricultural Economics, 7: pp.185-208.

Coelli, T.J. (1995), "Recent Development in Frontier Modeling and Efficiency Measurement", Australian Journal of Agricultural Economics, 3: pp.219-245.

Farrel, M.J. (1957), "The Measurement of Productive efficiency", Journal of the Royal Statistical Society, Series A, General, 120: pp.253-281.

Entrepreneurship & Knowledge Economy

Assessing Entrepreneurship in Urban Micro Enterprises in Sri Lanka

B.W.R. Damayanthi

Senior lecturer, Department of Economics, University of Sri Jayewardenepura, Gangodawila, Nugegoda
Sri Lanka
bwrdam@gmail.com

BACKGROUND

The role of microenterprise in achieving economy's growth promoting social, economic and human development is increasingly being acknowledged in developing as well as developed world (Green, Kirkpatrick, and Murinde, 2006). It includes a wide range of development objectives such as creation of income, wealth and employment (Daniels, 1999); income distribution and reduction of poverty (Liedholm and Mead, 1999); production and supply of goods and services that meet the basic needs of the poor (Cook and Nixson, 2005); creation of seeds of industrialization (Grosh and Somolekae, 1996; The World Bank, 2004). Moreover, the growth and competitiveness of enterprises of the informal sector are positively related to the growth of the formal sector through production linkages (Pieters et al., 2010). Despite some of the contradicted challenges, microenterprises' contribution on its potential role in the process of development have been signifying in many countries (Levy, 1995; Mullei, 2002; The World Bank 2013). Therefore, the microenterprise approach to the informal sector has been accepted as a policy based approach that takes micro entrepreneurs as the core of the informal sector which needs help to become growing, self-sustaining businesses in order to contribute significantly to foster economic growth, generation of productive employment and poverty reduction (Gunatilaka, 2008; Mead and Liedholm, 1998; Pisani and Patrick,

185

2002; The World Bank, 2013). However, these long lasting objectives suggested by the scholars and international development bodies come true only with graduation of microenterprises.

Graduation of microenterprises is a result of a combination of very complex subjective as well as objective multidimensional matter related to psychological, socio economic, political and regulatory environment. Majority of researchers suggested the access to formal banking sector, level of education, age of the business, stage of the owners' domestic cycle, ownership of assets, availability of accepted collateral, market size technology and the customer base, are some of the stated complementary determinants which are influential in graduating microenterprises towards national contribution of reducing poverty with moving the country's economy ahead. However, recent literature provides substantial evidences on microenterprise failure even with provided complementary facilities leaving further room for exploring the reasons behind successes and failures (Buckley, 1997; Hulme and Mosley, 1996; Mosley and Hulme, 1998; Montgomery, 1996). Then it was identified that the firms are more internally constrained. In other words, entrepreneurship is the key to enterprise development (Green et al., 2005; The World Bank, 2013). Lack of management and skills training can often hinder the success of their enterprises and expansion of these beyond micro businesses (Roy and Wheeler, 2003).

More than 60 percent of urban population in Sri Lanka employed in the informal sector while 70 percent of them are micro enterprises (Nanayakara, 2002; Ebert, 1999; Hettige1989). The share of self employment in the microenterprise sector remained high at around 25% throughout the 1980s (Kelegama and Thiruchelvam, 2001) and at around 28% during last five years (Central Bank of Sri Lanka, 2004). Therefore, any development policy formulae have great deal with urban micro enterprises in Sri Lanka. It is reported that the most significant constraint within micro enterprise sector in Sri Lanka is the lack of entrepreneurship. (De Mel, 2006; Fairoz et al, 2010;

Green et al,2005; Sri Lanka Chamber of Small Industries, 2005). Therefore, it is vital to identify underlying causes that hinder entrepreneurship before any policy intervention. Given this background, this paper aims to analyze the level and the determinants of entrepreneurship of urban micro entrepreneurs in urban Sri Lanka.

METHODOLOGY

Under non-experimental research design, Multi Stage Cluster Sampling Method was used for the study. From 48 wards of Colombo Municipal Council (CMC) the most USS concentrated 6 wards were selected so that all the categories of USS are represented. From the selected wards geographical clusters were selected and then enumeration areas were selected from each cluster. Finally, random samples of micro entrepreneurs were selected. The main survey tool of the study was questionnaire which consisted close ended questions. Self administered method was used for a part of the field survey whilst interview method played a major role.

Since the multifaceted nature of the concept of entrepreneurship and its complexity as well as its sensitivity to local cultural and socioeconomic conditions, therefore, reliance on one dimension, one indicator, is not recommended. Hence, the basic format of the model is Latent Structure Analysis, splitting up many characteristics in to sub groups to represent dimensions of a general concept. In this context, 24 entrepreneurial roles were considered, of which 15 were related to Entrepreneurial Self Efficacy (Chen et al, 1998) and the remainder were related to locus of control (Rotter, 1966) to measure entrepreneurial skills. Performed Principle Component Method (PCM) based retained components were used in constructing latent variables from manifest variables whose original values were of five point scales ranging from one (completely disagree) to five (completely agree). Scale agreements were set using reverse scale for some items. To reduce entrepreneurship roles to a few dimensions

PCM with varimax rotation was used. Orthogonal rotation is used in order to obtain mutually independent dimensions with a clear interpretation. Further, the resulting non-rotated composite was used as a dichotomous dependent to quantify predictors (Gender, Age, Education, Parents' occupation, by tradition, firm size, and firm age) of entrepreneurship by utilizing binary logistic regressions.

RESULTS AND DISCUSSION

Descriptive statistics showed that the majority of the sample consists of males (79 %) while female representation is only a small fraction (21 %). It was observed that approximately half of the entrepreneurs were of the 18 – 40 age groups, while a higher proportion, 26.4 percent, is in the age groups of 30- 40 years. Only 3 % of the entrepreneurs were illiterate, while 7% of them were educated to primary level indicating higher level of educational attainment in the country.

Most of the micro enterprise operators are experienced enough in the same business or in the field. Approximately 85 percent of them have above two years experience while most of them have more than 10 years experience. 16.3 percent of them are very well experienced having more than 25 working years. 32 percent of the sample was salaried employees before starting the business while half of the surveyed entrepreneurs were unemployed previously. More than half of the micro entrepreneurs are self-employed employing no workers other than the owner. 26 percent of them have only one worker while the percentage of firms employing more than 4 workers is negligible. It was obvious that the majority of employees in one worker firms are family members. Only a small proportion, (10%), of micro enterprises have paid workers although mean age of a micro enterprise was 9.5. There cannot be seen a rational approach where most have entered in to the field because of family experience and according to the desire (72 %). Obviously, very few have conducted

any type of market research or competitive analysis of the market(s) in to which they wished to enter. Indeed, not one of the microenterprises interviewed had conducted a market survey before starting their enterprise (not even to evaluate the feasibility of their own enterprise).

Cornbach Alpha value is 0.6 or more for all the variables which is considered as commendable for reliability of the responses of multi point questions. Communality and KMO test shows the variable selection for Entrepreneurial Self Efficacy (ESE) and Locus of Control (LOC) is appropriate enough to reproduce correlations. The first component is good enough to represent extracting more than 30% of total variance. High value of KMO confirmed the relevancy of chosen indicators for best fitted PCA estimates. Communality or strength of linear association for every indicator is high extracting sufficient variance for components.

Marketing is highly significant while risk taking takes the second highest values for communalities. Set and meet market goals seem to play a crucial role in deciding the level of ESE (.842). Though the targets related to profit goals is highly significant it was not loaded heavily. Motivation for searching new markets and trying innovative products are shown very low loading, showing less contribution for the level of ESE. Some of the most important factors for an entrepreneur like achieving multiple targets under pressured environment are low as well for underserved settlement micro entrepreneurs. This factor has been confirmed to the micro entrepreneurs in general (De Mel, 2008). Because of the nature of this sector, competitive with homogenous products, if someone wants to grow more than the others he or she has to find new markets. This factor is also very weak within the sector.

From the reduced form results it is found that gender, parent's occupation or previous employment have no predicting power over the probability of changing entrepreneurship skill while favorable

change in all the other factors plays crucial role increasing entrepreneurs supply in urban informal sector.

Total scores of ESE and LOC regression on background variables show that the level of education is the most significant in explaining the dependent variable. Education is positively significant, χ^2 (1) = 2.8, at one percent level of significance. Year change in education will lead to increase odds by more than twice; showing the fact that lack of education is a very discouraging factor that hinders entrepreneurship in the sector. Relative to female business owners male entrepreneurs are more internally controlled as measured by the Rotter Scale (Rotter, 1966). Gender is significant $\chi2$ (1) = 3.6 for the group interested.

CONCLUSION

The role of micro enterprise in reduction of poverty, creation of wealth and generally promoting social, economic and human development is increasingly being acknowledged in developing as well as developed world. However these long lasting goals could be achieved only with graduation of microenterprises.

Graduation of microenterprises is mostly subject to the lack of entrepreneurial skills in the developing countries. This study further confirms this evidence for the urban underserved settlement micro enterprise owners in Sri Lanka. It was shown that the level of education in formal or informal is the most influential factor in determining the level of entrepreneurship in the sector. Findings suggest several practical implications. Firstly, it is essential to develop promotion-based training to overcome the issues related to knowledge, skills and attitudes. Secondly, for the micro entrepreneurs to become better performers, they need to become aware of the central importance of marketing and entrepreneurial skills.

To become a successful entrepreneur with a growth oriented firm it is essential to overcome the issues related to knowledge, skills and attitudes. Changing the mindset beyond the survival level and having high determination to achieve the set goals are crucial in this respect. Secondly, for the micro entrepreneurs to become better performers, they need to become aware of the central importance of marketing and entrepreneurial skills. Promotion-based training can be used to achieve this objective. These trainings must be entrepreneur-centered and should contain simplest approach to improve the required skills such as institutional approach, customer approach, strategic planning etc. Further, the designing of follow-up programs is essential to validate the use of such trainings. In complementary with effective trainings network building can be a useful way to improve skills and awareness. Government can encourage and get basic actions to setup new networks or connect USS micro entrepreneurs to existing micro enterprise networks so that they can gather, exchange and seek opportunities.

REFERENCES

Buckley , Buckley G . (1997). Microfinance in Africa: is it either the problem or the solution.World Development 25(7): 1081–1093

Central Bank of Sri Lanka.(2004). Economic and social statistics of Sri Lanka. Colombo

Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? . Journal of Business Venturing 13, 295–316.

Cook, P., & Nixson, F. (2005). Finance and small and medium-sized enterprise development. In C. J. Green, C. H. Kirkpatrick, & V. Murinde, Finance and development: Surveys of theory, evidence and policy. Cheltenham: Edward Elgar.

Daniels, L. (1999). The role of small enterprises in the household and national economy in Kenya: A significant contribution or a last resort? World Development, 27(1), 55-65.

De Mel, S (2008). Returns to capital in microenterprises: Evidence from a field experiment. The Quarterly Journal of Economics, 123(4), 1329-1372.

Ebert, H. (1999). Improvement to urban infrstructure and service delivery in underserved settlements in Colombo. Colombo: German technical cooperation.

Fairoz, F. M., Hirobumi, T., & Tanaka, Y. (2010). Entrepreneurial orientation and business performance of small and medium scale enterprises of Hambantota District Sri Lanka. Asian Social Science 6 (3), 34 - 42.

Green, C. J., Kirkpatrick, C. H., & Murinde, V. (2006). Finance for small entwrprise growth and poverty reduction in developing countries. Journal of International Development 18, 1017–1030.

Grosh, B., & Somolekae, G. (1996). Mighty oaks from little acorns: can microenterprise serve as the seedbed of industrialization ? World Development 24, 1879-1890.

Gunatilaka, R. (2008). Informal employment in Sri Lanka: Nature, probability of employment, and determinants of wages. New Delhi: International Labour Organization, subregional office for South Asia.

Hettige, S. T. (1989). Urban informal economy, the politico – economic process and the haring of urban space: Recent trends with particular reference to Colombo. Upanathi 4 (1&2), 74.

Hulme, D., & Mosley, P. (1996). Finance against poverty. London: Routledge.

Kelegama, S., & Thiruchelvam, N. (2001). Structural adjustment and employment creation in Sri Lanka. Colombo: Institute of Policy Studies.

Levy. B, (1995). Zimbabwe's new entrepreneurs: emerging success story? Williams College and the World Bank WB, Washington DC

Levy, B. (1991). Obstacles to developing small and medium-sized enterprises: An empirical assesment. Worla Bank working paper No 588.

Levy, B., & Bradburd, R. (1995). Zimbabwe's new entrepreneur : An emerging success story ? In W. Bank, Microeconomics 1. Washington D C.

Liedholm, C., & Mead, D. C. (1999). Small enterprises and economic development. The dynamics of micro and small enterprises. London/New York: Routledge.

Mead, D. C., & Liedholm, C. (1998). The dynamics of micro and small enterprises in developing countries. World Development 26(1), 61–74.

Mosley P, Hulme D. 1998. Microenterprise finance: is there a conflict between growth and poverty alleviation? World Development 26(5): 783–790

Mullei, A. (2002). Growth and transformation of small manufacturing firms in Africa. Nirobi: African center for economic growth.

Nanayakara .M . (2002). "Redevelopment of underserved settlements in the city of Colombo" international institute of geo-information science and earth observation

Pieters, J., Moreno-Monroy, A., & Erumban, A. (2010). Formal-informal linkages and informal sector dynamics: evidence from India.

Pisani, M. J., & Patrick, J. M. (2002). A conceptual model and propositions for bolstering entrepreneurship in the informal sector: The case of Central America. Journal of Developmental Entrepreneurship 7(1), 95–111.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs: General and Applied, 80(1).

Roy, M.-A., & Wheeler, D. (2003). A survey of micro-enterprise in urban West Africa: drivers shaping the sector. Development in Practice 16 (5), 452-464.

World Bank. (2004). World Bank group support for small businesses . Washington D C: World Bank.

World Bank. (2013). World development report. Wachinto D C: World Bank.

Factors Enabling Family Business Succession: A Case Study Based Analysis

S. Weerawansa

Department of Economics, University of Colombo, Sri Lanka

INTRODUCTION

A family business is a profit-making organization in which decision making is influenced by multiple members of several generations of a family, who can be related either by way of blood or marriage, and closely influenced by the ownership or leadership of the firm. This type of business is the oldest, most prevalent type of economic organization worldwide and it can be seen in different types of business entities, such as sole proprietorships, partnerships, limited liability companies, corporations, holding companies and publicly traded companies.

Family Owned Business (FOB) is a unique type of business due to the relationship between the shareholders and the management, and differs from other non-family businesses with regard to a number of elements such as continuity of purpose, business and family relationships, business values, family culture, quick decision making, flexibility, and succession. Family businesses are known to do better than their non-family business counterparts. They could be healthier, growing faster both in terms of revenues and profits and usually would have a better future as members of a homogeneous group would stick together in times of crisis.

The majority of family business owners would like to see their business transferred to the next generation. It is surprising, however, that 70% of family businesses would not survive into the second-

generation and 90% would not make it to the third generation. Thus, the survival rate of family firms beyond the founder's generation is extremely low as per literature. Hence, how to handle succession in family business is a highly topical research issue. It is pertinent to evaluate the strategies that can be applied to secure family businesses, which are known to contribute to the national economy of a country in terms of employment generation and economic growth. From that perspective, family businesses have a special role to play in society.

BACKGROUND, RESEARCH OBJECTIVES AND METHODOLOGY

Family business succession is defined as the handing over of management control to one or more family members (Gasson et al., 1992). All businesses undergo succession of different kinds as time goes by; but, succession of ownership and management in family businesses follows a different logic and different processes from non-family businesses (Brundin et al., 2008). According to Hall (2003) there are multiple roles family members have to perform due to overlapping of family and business, where family issues profoundly impact business issues (Fletcher, 2000) and where ownership and leadership are tightly intertwined (Brundin et al., 2008).

Poor "successions" have been the main contributory factor for non-survival of family businesses (Miller et al., 2003), indicating the importance of planning for business succession as an important ingredient of family business survival. If family members are not committed to the succession, it would block the demonstration of the requisite management capabilities of the successor (De Massis et al., 2008). On some occasions, the family members holding important roles in the enterprise may threaten to leave it because of their dissatisfaction about the selection of a successor. In such a situation,

sometimes, the incumbent might cancel the new appointment, which automatically wipes out the succession process.

The relationships among the different groups in the family play a vital role during the succession (Davis, 1983; Lansberg, 1983). Bad interpersonal relationships could be the cause of potential conflicts that obstruct the succession (Kepner, 1983; Lansberg, 1983).

Given this background, it becomes important to study the "factors" contributing towards family business survival, as identified in literature. The present research was carried out with the objective of undertaking this task. It also attempted to address the issue of family business survival in relation to the Sri Lankan context. The presence of such factors in the family businesses which have managed to successfully survive into second and third generations would be examined using the case study approach. The research, based on the conceptual platform laid, also aimed at commenting on their chances of survival beyond the present generation.

Primary data collection was carried out through interviews using a structured and semi structured questionnaire. Twelve family business owners were interviewed to identify their succession plans and practices. The chosen family businesses were either in their second or third generation businesses covering a period of over thirty years, and were small, medium or large scale enterprises engaged in service or manufacturing sectors.

Based on the preliminary findings, a sample of the six most successful enterprises that consented to be interviewed in-depth was selected as the case study sample.

The triangulation method of data collection and information extraction, namely face-to-face interviews, a structured questionnaire and physical observation of the body language were used as the primary tiers of information. Moreover, each situation was handled

with an open mind in a very informal setting. The depth, quality and the scope of data gathered varied significantly from case to case.

CONCEPTUAL FRAMEWORK OF FACTORS ENABLING SUCCESSFUL FAMILY BUSINESS SUCCESSION

Family business succession is the process of transitioning the management and the ownership of a business to the next generation of family members. The transition may also include family assets as part of the process. Family members typically play a controlling role in both the management succession as well as the ownership succession. The *succession planning* process commonly consists of (i) selecting and training a successor, (ii) developing a vision or strategic plan for the company after succession, (iii) defining the role of the departing incumbent and (iv) communicating the decision to key stakeholders (Sharma et al., 2003a).

There is no agreement among the researchers as to what contributes to the success of effective succession in family own companies. Handler (1989) suggests that satisfaction of the predecessor and other family members with the *succession process* can be used as an indication of the perceived success of the succession process. Some other researchers note that "*successors' ability* to maintain the family business healthy" as a criterion to measure the effectiveness. Venter and Mass (2005) and Sharma and Irving (2005), state that the perceived success of the succession process is determined by the extent of *satisfaction with the process* and *continued profitability* of the business. Here the author has combined both arguments and define the success of the succession as "the subsequent positive performance of the firm, the ultimate viability of the business and the satisfaction of stakeholders with the succession process"

A *well-developed succession plan* is crucial (Sharma et al., 2001 and Morris et al., 1997), but this is a relatively rare occurrence (Sharma et al., 2000, 1996), and there are *psychological and emotional barriers* which hinder inter-family and inter-generational discussions (Lansberg, 1988). Incumbents for instance, may often be reluctant to step aside, creating a common barrier to succession (Sharma et al., 2000). To achieve effective inter-generational succession, there should be a *balance between 'parenting'* (i.e., a personal approach) *and 'mentoring'* (i.e. a more detached, *business-focused approach* (Lansberg, 1997), both working within the business and formal management training from outside providers.

RESULTS AND ANALYSIS

The success factors which help strong business succession, thus ensuring inter-generational survival of family business, as revealed through literature could be summarised in the Table 1 below:

It therefore appears that (a) the presence of explicit planning for succession and (b) family characteristics, have been frequently identified in previous research as the most effective determinants of family business survival.

These characteristics were thus looked for in the sample survey, in order to gauge the extent to which the selected family businesses possess those, and thus how likely their succession beyond the present generation, based on the identified criteria.

Table 1: Factors Helping Family Business Survival

Author	Explicit Planning for Succession			Family Characteristics			Capacity and Qualities of Successor Designate	Role of the Incumbent	Viability of Business
	Having a Plan	Satisfactory Process	Parenting and Monitoring of Successor	Intra-family and Inter-generational Dialogue	Psychological and Emotional Harmony	Strong Family Relations			
Fletcher 2000						✓			
Burndin et al, 2008						✓			
Miller et al., 2003	✓								
De Massis et al., 2008	✓	✓					✓	✓	
Lansberg 1997		✓	✓	✓	✓				
Lansberg 1983				✓	✓				

Lansberg 1988				✔					
Morris et al., 1997	✔								
Venter and Mass 2005		✔							✔
Sherma and Irving 2005		✔							✔
Handler 1989		✔				✔			
Davis 1983				✔					
Kepner 1983				✔	✔				
Sherma et al., 2003	✔	✔	✔					✔	
Sherma et al., 2001	✔								
Sherma et al., 2000	✔							✔	
Sherma et al., 1996	✔								

Source: Author's compilation based on literature survey

Table 2: Summary of Information Pertaining to the Family Businesses Surveyed

Criterion	Family business 1	Family business 2	Family business 3	Family business 4	Family business 5	Family business 6
Type of business	Construction industry	Health care	Manufacturing	Personalized baking	Service and manufacturing	Manufacturing
No. of years of existence	95 years	30 years	48 yrs	49 yrs	50 yrs	50 yrs
Size (No. of employees)	400	2800	3000	2	50	35
Present generation	3rd	3rd	3rd	3rd	2nd	2nd
Firm specific knowledge	Strong	Strong	Strong	Very Strong	Strong	Not strong
Guiding principle	Guided by Christian principles	Excellence in customer service	Quality	Quality of Products	High quality and customer care	Trust, integrity, attention to detail
Time taken to reach the present status	15 yrs	17 yrs	30 yrs	4 yrs	35 yrs	10 yrs
Passed on to present generation by	Bottoms up approach, mentoring	Formal and informal training	Informal training, mentoring	Informal training	Forced into the situation	Informal training, exposure

Intended to be passed to next generation by	Indirect action; based on professional qualifications	Socialization. Succession is part of family affairs, and on-going	Education and capability	No plan yet. Learning important things for succession	Not separated from normal business, but a daily routine	Includes non deliberate successor training.
Decisions are made by	Seniority	Board (family & non-family members)	Board (only among family).	The current owner	All siblings together	Individual decision of owner
Family values		Strong		No expectations		
Family Communication	Weak		Good		Weak	Weak
Retirement plans	When the next generation is competent	No plans, but stepping down with age		Work as long as customers are satisfied	When the son is ready to take over the business	
How conflicts are resolved by	Intervention of a mediator	lapse of time	Prioritizing the goal of the firm		Intervention of the Eldest of the family	Communication

Source: Survey findings

Table 2 above summarises the basic information gathered through the survey, while the Table 3 below presents a qualitative assessment of the presence of survival support criteria in those companies.

Literature essentially reveals that successfully changing an old family business in a durable way means practicing preservation and renewal concurrently. It means preserving the essence of the family business while expressing it in new ways, not changing for the sake of changing or clinging on to the past for the sake of security or nostalgia. It also shows that effective family communication, strong family values and explicit planning and grooming of an appropriate successor helps survival of family businesses. Many firms would ignore the aspect of succession planning amidst of their day-to-day business routine, and thus, risks becoming unsuccessful in long term survival.

Table 3: Qualitative Assessment of the Presence of Survival Support Criteria

Survival Factor		Family Business 1	Family Business 2	Family Business 3	Family Business 4	Family Business 5	Family Business 6
Explicit planning for succession	Having a Plan						
	Satisfactory Process						
	Parenting & Monitoring of Successor						
Family characteristics	Intra-family and Inter-generational Dialogue				✔		
	Psychological and Emotional Harmony						✔
	Strong Family Relations						
Capacity and qualities of successor designate							
Role of the incumbent							✔
Viability of business							

Source: Author's mapping of survey findings on to framework of criteria developed through literature survey

CONCLUSIONS

Out of the six family businesses surveyed, the Family business number five appears to possess the least number of survival support attributes, and therefore, it could be concluded that its chances of survival into the third would be the weakest.

Family business number six has an explicit succession plan, and could possibly survive beyond the present generation. It also has a hierarchical structure, trust among family members, culture of conflict resolution through communication, etc., which also would help in business success, leading to long-term survival.

Family business numbers two and three are the ones surveyed with the largest number of survival support attributes, and thus possibly having the greatest chances survival in the long run. These firms Businesses appear to be parenting and mentoring their potential successors.

Family Business number two has an explicit succession strategy. Moreover, the family business number two has been established in the early1900's and has managed to preserve its institutional identity and entrepreneurial spirit of the family while renewing its line of business from one industry to another. The second and third generations of Family Business number two continuing to adopt simple and humble attitude inherited by its founders and their customer friendly attitude would also help it successfully survive into future generations.

The current owners of the Family Business number three have passed on to their children a passion for their family business from their early days, gearing up the next generation to willingly take over the business after their higher education. The management looking after their employees well and the resultant increase in productivity through worker satisfaction would help it survive in the long run.

Succession planning appears essential for the success of family-owned businesses in the long run. Given that small and medium scale family-owned enterprises dominate business society in Sri Lanka and that they contribute significantly to employment / wealth creation in the economy, it becomes necessary that the authorities take steps to help them and guide them in developing succession plans. This could possibly be achieved through conduction of management development programmes focusing on this aspect.

REFERENCES

Gasson, R., Errington, 1993, A. The farm family business., Wallingford, UK:CAB International. ,pp304

Handler, W.C., 1990, Succession in family firms: A mutual role adjustment between entrepreneur and next-generation family members. Journal of Entrepreneurship Theory & Practice, vol. 15.,vol 1, pp. 37-51

Kepner, E., 1983, The family and the firm: A co evolutionary perspective. Journal f Organizational Dynamics, vol.12, pp.57-70.

Lansberg, I., 1988, The succession conspiracy., Journal of Family Business Review, vol.1, no. 2, pp.119

Miller, D., Steier, L., Le Breton-Mine, R. I. 2003, Lost in time: Intergenerational succession, change and failure in family. Journal of Business Venturing, vol.18 no 4, pp.513 531.

Sharma, P., Chrisman, J. J., Chua, J. H. 2001, Predictors of Satisfaction with the Succession Process in Family Firms: A Conceptual Model. Journal of Business Venturing, vol. 18, no 5, pp.667-687

Venter, E., Boshoff, C., and Maas, G. 2005, An Examination of the Challenges Daughters Face in Family Business Succession. Family Business Review, vol.18, no. 4, pp. 321-345.

Entrepreneurship Matters: Why Not for Management Students in University of Sri Jayewardenepura?
A Case of Undergraduates in the Department of Business Economics

S.D. Senadheera [a] and H.K. Amarasinhge [b]

[a] *Department of Business Economics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
samithasenadheera@gmail.com

[b] *Department of Business Economics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
harinik@sjp.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

Introduction

Sri Lanka is at a juncture where entrepreneurship has a crucial role to play in fueling economic growth. Entrepreneurship especially can be recognized as one of the best ways out of the economic downturn that the country had been in for 30 years (Sarvananthan, 2011). If it is to come out of the Middle Income Trap, it is only with a boom of the innovative entrepreneurs of a country (Wijesinhe, 2013). Further, encouraging entrepreneurship has been suggested as a solution for youth unemployment especially among graduates as it generates new job opportunities (Qunlian, 2011). Thus there is an increasing trend of developing entrepreneurs at university level, which made it imperative to study the challenges that have to be faced in developing undergraduates into entrepreneurs in order to promote a climate of entrepreneurship (Kumara, 2012).

Research Problem

The study is initiated to address the low tendency of graduates to develop into entrepreneurs. Further it examines the challenges in developing entrepreneurship among university students/graduates of the national university system of Sri Lanka.

METHODOLOGY

The study is an exploratory study in a form of a case study. It does not intend to bring out any causality thus far. The population concerned comprises undergraduates studying in the University of Sri Jayewardenepura, Sri Lanka. For the purpose of the survey 100 undergraduates from the Department of Business Economics of the Faculty of Management Studies and Commerce, University of Sri Jayewardenepura, were selected using a random sampling technique. A structured self-completion questionnaire was used for data collection with a pilot survey of 10% of the sample. The measurement scale was the five point Likert scale. The main variables that measured in the questionnaire were; 1. Entrepreneurial Intention, 2. Economic factors, 3. Social factors, 4. Psychological factors, and 5. Political and Legal factors. The Theory of Planned Behaviour and Shapero and Sokol's (1982) Entrepreneurial events model have been used in model building, both of them having been supported by literature (Perera et al., 2012).

RESULTS AND FINDINGS

The reliability of the data was measured calculating Corn Bach alpha. The results confirm that the data which were used to measure entrepreneurial intention, economic, social, psychological, political and legal, and technological factors were reliable as the reliability coefficients were closer to one. There is a significant relationship between entrepreneurial intention and economic, psychological, and

political and legal factors. There is no significant relationship between entrepreneurial intention and technological or social factors.

Entrepreneurial intention- Sixty-nine percent of the students from the sample agreed that they would like to become entrepreneurs and they believe to have the personality suitable to entrepreneurship. However, 70% disagreed that starting a new business is easy. In addition, 70% of them believed that undergraduates must be financially stabilized before starting a business.

Economic factors -It was noted that 63% disagree that the government provides enough subsidies for entrepreneurs. Further, 42% of the sample says that not enough funding is available in financial institutions for entrepreneurs.

Social factors- It could be noted that the 79% of the sample believe that they could become entrepreneurs if they have an entrepreneurial background, family wealth or family support. In addition, 63% agree that entrepreneurship education is important to start a business.

Psychological factors – Forty-five percent of the sample agree that job insecurity is a reason for not being an entrepreneur while 40% admit the reason why they do not want to start a business is the risk associated with it.

Political and legal factors – Thirty-one percent disagree that government policies in Sri Lanka are favorable to start a business. Sixty-three percent says there are not enough programs to encourage young entrepreneurs while 74% emphasize government encouragement is inadequate.

Technological factors – Seventy-three percent confirms that there are not enough research and development and technology. Fifty-nine percent says that undergraduates are not aware of new technologies

and social media. Thirty-six percent state that they do not have enough knowledge on virtual business platforms.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

Undergraduates believe that it is difficult to start a business. Even though the majority of respondents is willing to become entrepreneurs. They also state that it is important to be financially stable first. A challenge has also been recognized with respect to the belief that it is important to have an entrepreneurial background to start a business.

In addition it is also recognized that undergraduates are keener to have job security than become an entrepreneur.

In the political and legal context, it was recognized that the current political background and the government policy scheme were not supportive of entrepreneurs. Further, it was identified that government programmes to develop entrepreneurship in as well as outside of the university system were not sufficient.

In addition, analysis of technological factors shows that there is not enough encouragement for research and development of new technologies. It is also noted that university students do not have enough knowledge about the virtual challenges.

In conclusion, it can be highlighted that even though the majority of undergraduates are willing to become entrepreneurs, due to the above it is highly unlikely to develop entrepreneurs out of university system. Hence, it is important to overcome these challenges through institutional, attitudinal changes within the society.

REFERENCES

Kumara,P. A. P. S., (2012) 'Undergraduates' Intention Towards Entrepreneurship: Empirical Evidence from Sri Lanka', Journal of Enterprising Culture, 20(01), pp. 105-118.

Perera, K., Jayarathna, L. and Gunarathna, R., 2011. "The Entrepreneurial Intention of Undergraduates in Sri Lankan Universities". Kelaniya, University of Sri Lanka Kelaniya.

Qunlian, H.,, (2011) "The major difficulties and countermeasures of current university graduates' entrepreneurship in China", *Journal of Chinese Entrepreneurship*, 03(03), pp.228 – 239.

Sarvananthan, M., (2011) "Sri Lanka: Putting Entrepreneurship at the Heart of Economic Revival in the North, East, and Beyond", Contemporary South Asia, 19(02), pp. .

Wijesinha, A., (2013) Sri Lanka's Middle-Income Transition: Thinking Beyond the "Optics", to the "Mechanics", Available at:http://www.ips.lk/talkingeconomics/2013/10/19/sri-lankas-middle-income-transition-thinking-beyond-the-optics-to-the-mechanics/ [Accessed: 02nd January 2015].

Sustainability of Small Scale Traditional Industries in Sri Lanka – With Specific Reference to the Handicraft Industry

T.L. Navaratne [a] and **R.M.A.K. Ratnayake [b]**

[a] *Department of Business Economics, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura*
thilini.n@sjp.ac.lk

[b] *Department of Business Economics, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura*
rathnayake@sjp.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

Small enterprises in traditional industries are a vital part of the rural economy and their contribution to the development of the whole economy is quite considerable. More importantly small and medium enterprises are considered the backbone of the rural economy in developing nations (Gamage, 2003). In today's context these small scale businesses especially those that operate in traditional industries face many social as well as economic challenges. Such challenges have a considerable impact on the survival and the sustainability of traditional industries. A majority of the handicrafts businesses in Sri Lanka fall into the category of small and medium enterprises. Therefore problems associated with the SME sector in Sri Lanka become applicable to the small handicrafts businesses, while issues common to traditional industries too pose a threat to their sustainability.

The number of artisans engaged in certain handicraft sectors has reduced drastically over the past decade. Such sectors, which are identified by the National Crafts Council as on the verge of being

wiped out, are masks, puppets, and brassware. The prevailing socio economic challenges would threaten some of the existing enterprises and sectors as well and thus negatively affect the sustainability of crafts businesses.

The manner in which traditional transfer of technical knowledge and skills takes place in the Sri Lankan handicraft industry has many weaknesses. A study conducted at national level by the Tertiary and Vocational Educational Commission (TVEC), revealed that traditional methods used are ineffective and thus affects the sustainability of most crafts traditions (Senevirathne et al., 2010).

High potential exists for the handicrafts industry to contribute to the manufacturing sector and economic growth in Sri Lanka. As it is intertwined with the culture and tradition of Sri Lanka, handicrafts can be a sister industry for Tourism and could be a huge foreign exchange earner if handicraft exports are promoted. Nevertheless the industry's fullest potential has not been met due to socio-economic barriers.

In light with this overview the issue central to this paper can be laid out in the form: "Small scale handicrafts enterprises face many socio-economic barriers and such barriers threaten the sustainability of the livelihoods of traditional artisans and the handicraft industry itself."

In line with this the research objectives can be laid out as below:

- To investigate the economic conditions and challenges that are faced by small scale handicraft artisans and the industry as a whole

- To explore the social and environmental dynamics prevailing in the industry

- To analyse the impact of socio economic conditions and challenges on the sustainability of this traditional industry

Previous studies conducted on the handicraft industry of Sri Lanka focus on just one handicraft tradition or sector. An accurate or near-perfect industry analysis cannot be done by looking at one or two sectors. Thus the present study's uniqueness is that it has covered six handicraft traditions which represent roughly 30% of the industry according to the National Crafts Council. At the same time its contribution towards sustainability of small scale artisanship is of paramount use for the policy makers and future scholars.

METHODOLOGY

This study involved two main stages of data collection. The first stage encompassed a series of interviews done with 15 artisans from 15 different traditions and others with officials from the National Crafts Council, which was conducted at the National Crafts Exhibition in September 2014. The results of the interview were analysed in a qualitative manner while the main aim at this stage was the identification of socio-economic challenges faced by the artisans and their expectations about the industry's future. The conceptual framework which is illustrated below was created by the author after this preliminary study and an in depth analysis of related literature.

The second stage of data collection included a questionnaire based survey was conducted which was performed on thirty artisans from six selected handicrafts sectors; namely brassware, leather crafts, Palmyrah crafts, puppets, masks and wooden crafts. Non probability sampling was used for the survey as well and under purposive sampling method, non-proportional -quota sampling was used in selecting the sample of handicrafts artisans belonging to each handicrafts sector. Handicrafts sectors act as the categories that are selected on a purposive basis. Six handicrafts sectors were chosen on the basis of their diversity, area of origin and other major socio economic characteristics. However the ultimate purpose was to select diverse sectors which would represent the overall handicrafts industry.

The survey started in Mannar with the palmyrah crafts producers and then went on to Pilimathalawa and Pahala Kadugannawa to carry out the survey on brassware and leather crafts sectors respectively. It was also carried out in Moratuwa, Good Market at Race Course and Ape Gama in Battaramulla with respect to wooden crafts. Finally the survey was carried out in Ambalangoda on Masks and Puppets sectors. The questionnaires were filled in by the researcher herself except in relation to the artisans in Mannar, the exception being due to language barriers.

The survey results included mainly a descriptive analysis which was done using the statistical package of SPSS. Techniques such as Chi-Square, Correlation and Cross tabs were used for analysis. Basic economic analysis included the areas of production, income and expenditure, sources of capital, cash flow problems, range of product categories and innovations, market conditions, key challenges, labour related problems, competition, managerial skills etc. Social and cultural conditions were analysed through the areas of recognition for artisans, cultural affiliation, livelihood satisfaction, willingness of younger generations to continue the craft etc. Finally environmental sustainability was also looked at, in terms of the nature of raw material, regeneration of raw material, concern for the environment etc.

The conceptual framework upon which the survey was based is presented as below (see Figure 1).

Figure 1: Conceptual Framework

Economic Conditions and challenges
- Production, Income and Expenditure
- Sources of capital and cash flow problems
- Raw material and Labour related issues
- Market conditions
- Managerial skills and Innovations

Social Conditions and barriers
- Cultural influence
- Traditional practices
- Societal perception
- Recognition
- Value placed on arts and crafts
- Perception on the growth of the indutry
- Ypunger generation's willingness to continue the traditions

Environmental Conditions and Challenges
- Use of natural vs artificial resources
- Continious depletion of resources
- Environmental impact of crafts produstion
- Raw material scarcity

Sustainability of Small scale handicrafts enterprises

Source: Author constructed, 2014

218

RESULTS AND FINDINGS

The first stage of the data collection, which consisted of interviews conducted at the *Shilpa 2014* Annual Handicrafts Exhibition revealed that the whole industry is faced with a gamut of socio- economic issues, and that artisans were quite pessimistic about the future of the industry. The most critical challenges faced by each sector, as found out by the interviews are shown in Table 1.

Table 1: Socio-Economic Challenges by Each Handicraft Sector

Handicrafts Sector	Major Socio Economic Challenges faced
Cane	Scarcity of quality raw material, drastic decline in the demand for cane furniture
Clay	Substitutes have resulted in a decline in demand for clay based products
Ornamental Traditional musical items	The hassle of obtaining permits to get even a small quantity of wood, lack of support from the government as it is a new and a small sector
Pulp based crafts	Lack of financial and technical assistance as it is a new sector
Silver jewellery	Lack of skilled labour, threats from imported jewellery
Lace work	Not receiving a fair price for the time and effort that goes into the craft, threat of imported garments
Masks	Lack of demand and limited business opportunities during off season, lack of skilled labour
Wood carving	Permits need to be obtained for even a small quantity of wood
Miscellaneous Crafts	Lack of funds to expand the business, lack of demand for crafts
Leather crafts	Limited availability of the main raw material, due to ethical issues

Source : Author constructed based on survey data, 2014

The survey results were analyzed under three categories as shown in the conceptual framework. The most significant findings are discussed below under each relevant category.

Economic Analysis and Sustainability

Initially the artisans' business aim or intention of being in the handicrafts industry was inquired into and the results revealed that 57% of the artisans' intent was to obtain longer term profits and only 40% of the artisans stated that their main aim is to carry the tradition forward. This fact proves that a majority of the artisans engage in the handicrafts business with aim of earning a living and achieving economic prosperity. If the businesses become unprofitable they would leave the business thus posing threats to the industry's continuity.

Limited availability of funds is a common issue amongst the traditional artisans in continuing their traditional businesses. This was clearly proven with the fact that 57% of artisans fund their businesses with personal wealth. Only 43% of the artisans obtained debt for the purpose of funding the business. The main reason for the minimal use of debt is that the artisans do not have access to loans at concessionary interest rates, and commercial borrowing rates are too costly for such small businesses.

Another fact which was revealed through the Pearson Correlation analysis is that there exists a positive correlation between the number of different products and the retained earnings. That means, as the artisans produce more and more designs or different types of products in the handicraft sector their retained earnings seem to be high. The artisan states that customers prefer to buy from shops that provide them with a wide variety of choice with a number of different items.

More than 50% of these artisans face 3 or 4 major economic challenges. As can be seen in the diagram below, the most common

challenges faced by the artisans are: not receiving a fair price, not having a proper market and limited access to raw material. Thus it can be concluded that, although there exist differences amongst the handicraft sectors, the challenges are common to the industry as a whole.

Use of managerial skills is key to the success of the business, but a common issue is that artisans excel in the field of arts and crafts but not in managing businesses. According to the survey it was revealed that only 66% of the artisans have a business plan, and that too is mostly a rough plan in the mind, not a formal, well-constructed written plan. The worst scenario is that out of the artisans who have a business plan, 95% of them have not sought for any assistance in formulating the business plan.

In order to compete with modern industries and the ever growing consumer markets, the artisans have to adopt new technology. However, only 27% of the artisans engage in such technological advancements.

Social Analysis and Sustainability

With respect to social and cultural influences, it can be concluded that social recognition placed on the industry and the artisans is gradually decreasing and it is affecting the motivation of artisans. According to the survey only 26% of the artisans believe that there is high level of recognition for their occupation. At the same time 80% believe that the businesses are closely associated with the culture and tradition. When cultural and traditional values are given less importance in modern society, industries that have sprung from traditions and cultural values too get negatively affected. Thus there will be indirect but severe impacts on sustainability of enterprises such an industry. Handicrafts is one such example of an industry highly affected by the transformation of social norms and culture.

Figure 2: Key Economic Challenges

Percentage of artisans facing this challenge	limited Access to raw material	No proper market to sell	No fair price	Lack of funds to expand the business	Lack of government assistance	Lack of modern technology	Lack of training and development opportunities	Other challenges
	40%	47%	57%	17%	23%	3%	23%	27%
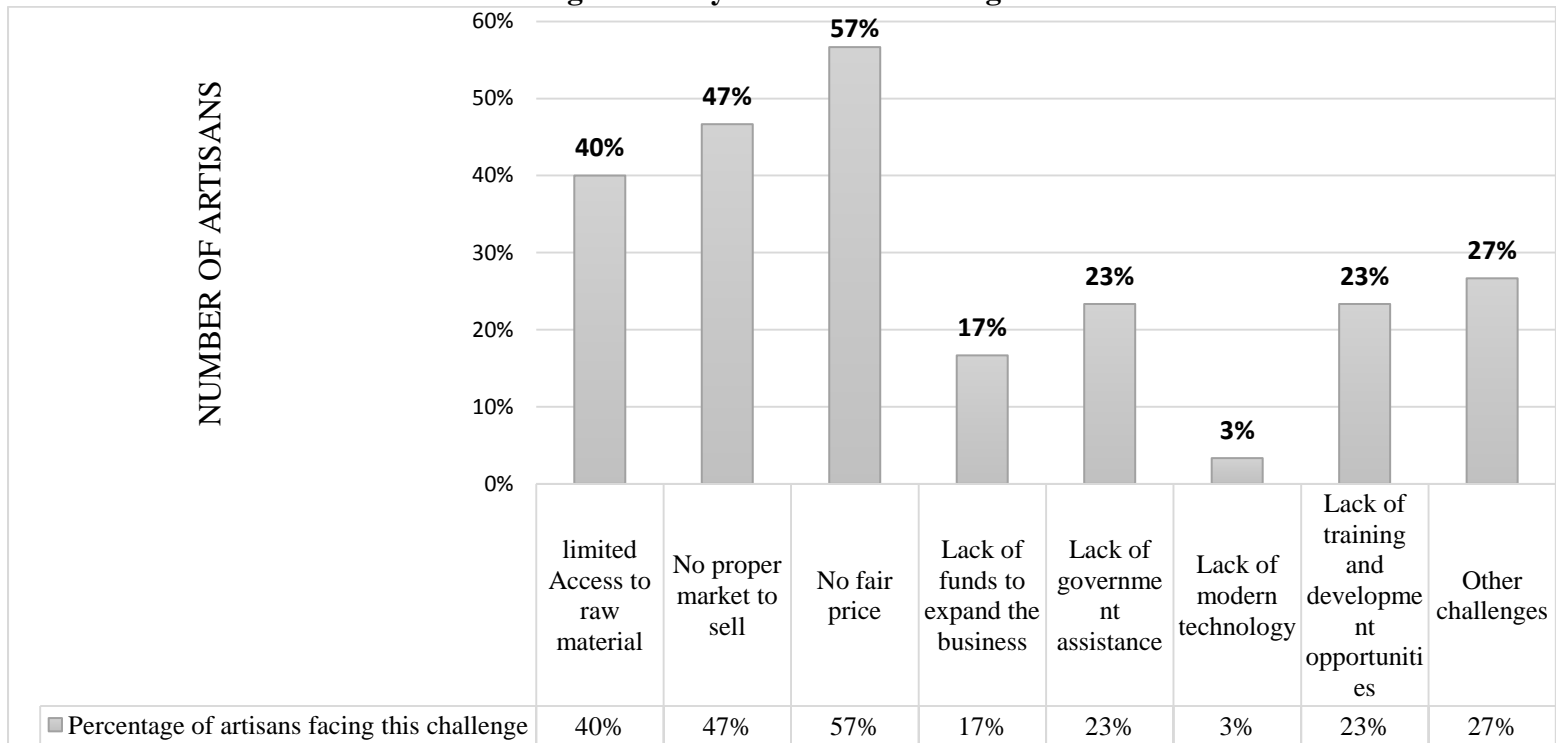
Source: Author constructed based on survey data, 2014

Environmental Analysis and Sustainability

Environmental issues associated with small scale enterprises include the depletion of non-renewable raw material and the use of harmful chemicals and other substances in production of crafts. Fifty-seven percent of the artisans believe that their main raw material would be scarce in the future. The issue of limited raw material, directly threatens the survival of certain handicrafts sectors, especially metal based sectors. Although handicrafts used to be environmental friendly, today they are increasingly becoming artificial. This causes environmental pollution and results in environmentalists and pressure groups going against the industry which would again hamper the industry's growth.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

It can be concluded that traditional handicraft artisans are faced with major challenges and most of these challenges are common to the whole industry. These challenges clearly have a negative impact on survival and sustainability. Such challenges faced by traditional industries, especially comprising of a majority of small enterprises need to be addressed very seriously.

The major economic challenge relating to the non-existence of a stable market has to be addressed by introducing novel ways of producing items and engaging in continuous innovation. In an era where all human beings are highly economical, handicrafts must offer the customers a functionality beyond ornamental benefit.

The social challenge is that the customers do not value the traditional, artistic and aesthetic qualities of these products, mainly due to a high preference for westernized products. However, the government can promote the Arts and Crafts culture, by adding a touch of modernization to these products. In order to do so, it has to be

properly planned as a series of programmes with small scale artisans' active participation.

The handicrafts industry has the potential to be developed on to a level where its products become synonymous with Sri Lanka in the world market. Similar to Ceylon Tea, Sri Lanka can set up the brand of Ceylon Crafts. In order to come to that high position in the world market, there has to be many measures taken at the ground level. As the industry comprises of a majority of small and medium scale craft enterprises, they must be empowered in the first place. Policy makers and the relevant authorities need to address the socio economic issues identified at grassroot levels. Therefore this paper suggests policy actions to be directed towards the revival of the whole traditional arts and crafts culture in order to make this enterprises socially sustainable. Further policy requirements include special assistance schemes, training and development programmes, financial assistance to be provided to the small scale handicrafts enterprises.

Furthermore it can be implied from the study that traditional industries such as handicrafts need to take into consideration modern market trends and to blend in with modern lifestyles while maintaining the traditional touch.

REFERENCES

Export Development Board. (2012). Industry Capability Report: Crafts.

Gamage, A. S. (2003). Small and Medium Enterprise Development in Sri Lanka: A Review.

Kathuria, S. (1986). Handicrafts Exports: An Indian Case Study. Economic and Political Weekly, 21(No. 40), 1743-1755.

Entrepreneurship & Knowledge Economy

Maureen L. T. R. (2013). Handmade in India Preliminary Analysis of Crafts Producers and Crafts Production. Economic and Political Weekly, volume 38.

Sánchez-Medina, P. S., Corbett, J., and Toledo-López, A. (2011). Environmental Innovation and Sustainability in Small Handicraft Businesses in Mexico. *Sustainability* (July 2011), 984-1002.

Senevirathne, S.R.M.P., Wewala, W. H. S. S., Jayasekara, B. M. T. D., Vidanapathirane, T. R., and Oshadie, M. N. L. B. (2010). Study to identify the possibilities and constraints in developing [curricular] for Sri Lankan traditional handicraft sector under the national vocational qualification frame. Tertiary and Vocational Education Commission Research Cell: Colombo.

Tambunan, T. (1994). Long-term Development of Small-scale Industries in Relation to Economic Development: Looking for General Propositions. The Pakistan Development Review, 33, 165-190.

Ted Barber, M. K. (2006). Global Market Assessment for Handicrafts. USAID.

Wood, S. (2011). Sustaining crafts and livelihoods handmade in India craft + design enquiry, vol. 3.

The Role of Higher Education to Create Entrepreneurial Intent

Chinthaka Jayasundara [a] and **Athula Ranasinghe** [b]

[a] *Department of Economics, University of Colombo, Colombo,*
Sri Lanka
chinthaka@econ.cmb.ac.lk

[b] *Department of Economics, University of Colombo, Colombo,*
Sri Lanka
athula@econ.cmb.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

Entrepreneurship is the ability to organize, operate and assume the risk of a business venture. Economic progress of a country heavily relies on the ability of its people to generate income locally or internationally through entrepreneurship. Thus, economically, entrepreneurship will result in employment opportunity creation which in turn will generate income along with improved standards of living with multiplying effects on the economy. Furthermore, higher start-up rates will contribute to economic prosperity of a country. "Graduate entrepreneurship in the UK and around the globe is increasingly being seen as a vital source of competitiveness and the engine for economic growth and development" (Nabi and Linan, 2011). However, the role of graduate entrepreneurship has often been underestimated and the number of graduates moving for an entrepreneurial career is very less in Sri Lanka. The graduate unemployment in Sri Lanka is also quite high. Employability of university undergraduates is one of the widely discussed topics today. Many graduates passing out from the state universities are quite risk-averse and many are persistent on getting jobs in the public sector. Each year, thousands of graduates enter the public sector despite the low salary scales and other incentives. Graduates entering to

entrepreneurship career not only lessen the burden on the government but also create more job opportunities in the economy by boosting overall economic activity. Many authors have identified entrepreneurial intentions as a means to better explain and predict entrepreneurship (Bird, 1988; Krueger et al.,2000).In particular, entrepreneurship education can be considered as one of the key instruments to increase the entrepreneurial attitudes of both potential and nascent entrepreneurs. Thus, this paper attempts to measure entrepreneurial intention levels of Sri Lankan state university undergraduates and investigate the role of entrepreneurial education in creating entrepreneurial intent.

METHODOLOGY

The study is predominantly quantitative in nature. The entrepreneurial intentions questionnaire (EIQ) has been carefully developed and administered among 486 final year undergraduates across the country to draw conclusions about the Sri Lankan state university undergraduates. A previously validated tool by various scholars in the field (e.g., Dinis et al., 2013; Solesvik, 2013; Linan and Chen, 2006) was employed to measure the levels of entrepreneurial intentions. Sampling frame has been carefully selected in a way that it represents the entire state university sector. The universities, whose annual intake is more than 1,500 viz. Colombo, Peradeniya, Sri Jayewardenepura, Kelaniya, Ruhuna, Jaffna and Moratuwa Universities, and Uva-Wellassa University which offers industry oriented degree programmes have been selected to the sampling frame. Furthermore, it consists of the major subject disciplines of Arts, Management, Bio Science, Physical Science, Engineering, Agriculture and Industry oriented study programmes. A joint sampling technique has been employed by combining judgement sampling, proportionate sampling and convenient sampling to draw the final sample. The sample size from each university was drawn in proportionate to the annual intake of 2014. That was further scrutinized according to the number of students

enrolled to different subject disciplines to increase the representativeness.

RESULTS AND FINDINGS

Majority of respondents were females which constitute 55.6 percent of the study sample while males representing 44.4 percent. The sample was drawn from the final year undergraduates and in cases of absences of enough elements in the sample, their immediate juniors were selected as respondents. Thus, more than 95 percent of the participants were 23 years or above. Moreover, the vast majority of the respondents were Sinhala Buddhists while having some representative from other ethnic groups as well.

The researchers attempted to compare entrepreneurial intention levels of undergraduates in different universities. The robust tests of mean differences of Welch and Brown − Forsythe suggest that there is no significant difference of entrepreneurial intentions levels based on the universities they are attached to (p = .121 and .171 respectively). However, the universities of Ruhuna and Jaffna recorded comparatively higher figures for entrepreneurial intentions compared to other universities. Majority of undergraduates in University of Ruhuna come from the Southern Province. Similarly, majority of University of Jaffna come from the Northern Province. This inspired the researchers to think that there could be some relationship between the respondents' native places (native places have not been captured in the questionnaire) and entrepreneurial intention levels.

The following table summarizes descriptive statistics based on respondents' subject disciplines.

Table 1: Entrepreneurial Intentions Vs Subject Disciplines

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Arts	130	4.2631	1.03498	.09077	4.0835	4.4427	1.83	7.00
Management/Commerce	131	4.6137	1.09030	.09526	4.4252	4.8021	1.83	7.00
Bio-Science	44	4.1966	1.11138	.16755	3.8587	4.5345	2.17	6.67
Physical Science	65	4.1377	1.06967	.13268	3.8727	4.4028	1.50	6.50
Engineering	38	4.3942	1.26200	.20472	3.9794	4.8090	1.83	6.67
IT/Computer Science	34	4.6324	1.10232	.18905	4.2477	5.0170	2.50	6.33
Agriculture	24	4.4722	1.23815	.25274	3.9494	4.9950	2.67	6.83
Other Industrial	20	4.5333	1.13761	.25438	4.0009	5.0658	2.83	6.83
Total	486	4.3923	1.10755	.05024	4.2936	4.4911	1.50	7.00

Source: Survey Data

Shapiro-Wilk test has been conducted to test the normality of independent variables. Test statistics obtained for different subject disciplines were, $\alpha = 0.05$, given that p = .524 for Arts, p = .279 for Management/Commerce, p = .633 for Biological Science, p = .691 for Physical Science, p = .254 for Engineering, p = .090 for IT/Computer Science, p = .054 for Agriculture and p = .246 for Industrial Oriented degrees. With these results, it can be concluded that entrepreneurial intention levels of each of these subject disciplines are normally distributed.

The assumptions of homogeneity of variances was tested and found tenable using Levene's test F (7, 478) = .734, p = .0643 (p> 0.05). Analysis of variance (ANOVA) test indicated that at least one subject discipline's mean score has a significantly different entrepreneurial intention level with respect to other disciplines. ($\alpha = 0.1$, p = 0.052).

The post hoc test of Least Significant Difference (LSD) has been administered to investigate which disciplines have significantly different intention levels from each other. According to LSD statistics, entrepreneurial intention levels of Management/Commerce undergraduates were significantly higher than Arts, Biological Science and Physical Science undergraduates ($\alpha = 0.05$, mean differences between Management and Arts, Management and Physical Science, Management and Biological Science were 0.35053*, 0.41710* and 0.47595* respectively).Moreover, the entrepreneurial intention levels of IT/Computer Science undergraduates were significantly higher than Physical Science undergraduates ($\alpha = 0.05$, mean differences between IT/Computer Science and Physical Science was 0.49464*).

Nearly 60 percent of the respondents had taken course/courses that could be considered as entrepreneurial education at their universities. Furthermore, respondents were categorized into four different levels based on their entrepreneurial education as shown in the following table;

Table 2: Entrepreneurial Intentions Vs Entrepreneurship Education at the University

Entrepreneurial Intentions

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Special degree in Entrepreneurship	14	5.479	0.931	.248	4.9415	6.0169	3.67	7.00
Entrepreneurship as a subject/s	138	4.558	1.023	.087	4.3857	4.7302	2.33	7.00
Entrepreneurship as a part of a subject/s	139	4.422	1.1234	.095	4.2337	4.6106	1.83	6.83
Never learnt about entrepreneurship	193	4.164	1.092	.078	4.0097	4.3198	1.50	7.00
Total	484	4.388	1.1038	.050	4.2902	4.4874	1.50	7.00

Source: Survey Data

Shapiro-Wilk test has been administered to test the normality of each category. With the test statistics for the above categories, where $\alpha = 0.05$, given that $p = 0.835$ for who are reading for a special degree in entrepreneurship, $p = 0.140$ for who have taken entrepreneurship as a subject/s, $p = 0.102$ for who have taken entrepreneurship as a part of a subject, $p = 0.276$ for the undergraduates who have never learned about entrepreneurship, it can be concluded that entrepreneurial intention levels of each of the categories are normally distributed. Therefore, the assumption of normality has been met for this sample. The assumption of homogeneity of variances was tested and found tenable using Levene's test $F_{(3, 480)} = .0651$, $p = 0.583$ ($p > 0.05$).ANOVA test was conducted to evaluate the null hypothesis that there is no difference between levels of entrepreneurial intentions of undergraduates based on their levels of entrepreneurial education (N=483). The ANOVA was significant, $F_{(3,483)} = 8.727$ $p=.000$. Thus, there is significant evidence to reject the null hypothesis. The finding was further substantiated by robust tests of Welch and Brown-Forsythe which indicates significant differences of means ($p = .000$ and $.000$ respectively).LSD has been administered ($\alpha = 0.01$) to further examine which groups have a significantly different mean score from each other. According to test statistics, undergraduates who were reading for a special degree in entrepreneurship had significantly higher entrepreneurial intention levels when compared all other groups. Moreover, entrepreneurial intention levels were significantly lower in undergraduates who have never learnt entrepreneurship when compared other groups. No statistically different mean scores have been recorded for the undergraduates who have learnt entrepreneurship as a separate subject/s and who learnt as a part of a subject/s.

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This study provide evidence for policy makers to take necessary actions to either enhance existing curriculum by introducing new Entrepreneurship course modules, promoting special degrees in Entrepreneurship or at least make it mandatory for all undergraduates to follow a non-credit course on Entrepreneurship as important measure/s to increase Entrepreneurial intentions among graduates. For instance, it was evident that entrepreneurial intention levels of Science and Engineering undergraduates were comparatively lower than IT/Computer Science, Management and Agriculture undergraduates. Specifically, Physical Science students demonstrated lowest mean score for the entrepreneurial intention level. A mandatory course on Entrepreneurship can be introduced to all Engineering and Science undergraduates as a mean to foster their entrepreneurial mind-set. That can be employed as a mechanism to inculcate an innovative culture among our graduates and eventually employ them for the development of country's industrial sector. Recognising the importance of entrepreneurial education revealed by this study, it is imperative to take appropriate measures to uplift entrepreneurial education in the country. Since youth and children are county's future potential entrepreneurs, it is essential to teach them how to use their creativity, to trust their ideas and to have self-confidence to try innovative approaches to solve problems. Thus, researchers believe that this grooming should start from school education itself.

Acknowledgement

REFERENCES

Bird, B. J. (1988). Implementing entrepreneurial ideas: The case for intentio. *Academy of Management Revie*w , 442-453.

Dinis, A., Paco, A., Ferreira, J., Raposo, M., and Rodrigues, R. G. (2013). Psychological characteristics. Education+Training , V (8/9), 763-780.

Krueger, N., Reilley, M. D., and Carsurd, A. (2000). Competing models of Entrepreneurial Intentions. Journal of Business Venturing , 411–432.

Linan, F., and Chen, Y.W. (2006). TESTING THE ENTREPRENEURIAL INTENTION MODEL ON A TWO-COUNTRY SAMPLE. Departament d'Economia de l'Empresa, Universitat Autònoma de Barcelona.

Nabhi, G., and Holden, R. (2008). Graduate entrepreneurship: intentions, *Education+ Training*. , 545- 551

Nabhi, G., and Linan, F. (2011). Graduate entrepreneurship in the developing world: intentions, education and development. *Education+ Training*. ,325-334Solesvik, M. (2013). Entrepreneurial motivations and intentions: investigating the role of education major. *Education + Training., 253-271*, 253-271.

Development &
Sustainability Studies

The Impact of Growing Public Debt on Economic Growth: An Empirical Study on Sri Lankan Economy

P.J. Kumarasinghe [a] and **P.R.P. Purankumbura [b]**

[a] *Senior Lecturer, Department of Business Economics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
pivithuru@gmail.com

[b] *Department of Business Economics, University of Sri Jayewardenepura, Nugegoda, Sri Lanka*
purankumburarandula@gmail.com

INTRODUCTION

In contemporary economic theory, indebtedness and its implications on the economy is one of the most popular areas of study. The importance of analysing debt level has grown to critical levels during the past half-decade due to the Greek financial crisis and the European crisis driven by less–than-prudent debt management policies of the respective governments. What constitutes a 'prudent' level of debt depends on various factors: Japan, for instance, may be able to smoothly execute economic activities even though its debt amounts to 200% of GDP. In Sri Lanka, debt levels have risen substantially during the past decade: mainly due to the warfare and post-war rehabilitation programs of the government. As a result Sri Lanka is now one of the most highly-indebted nations in South Asia region (International Monetary Fund, 2011). In this context, it becomes critical to analyze the growth implications of public debt in Sri Lanka and the prudent level of debt to be maintained. It is the major purpose of this study to analyse these growth implications of public debt and the prudent debt level to be maintained.

Considering the theoretical argument on debt and growth, two major arguments can be found: the classical theory and the Ricardian equivalence hypothesis. Fisher and Modigliani initially developed classical theory. As per classical theory, debt has a negative relationship with the growth rate: i.e., an increase in the debt level will negatively impact the growth rate of the economy. Ricardian equivalence hypothesis, another subsequently developed theory in relation to debt and growth, indicates that increase in or change in the debt level will not impact growth: i.e., a debt increase or a reduction of government savings will lead to an increase in private savings and not influence aggregate demand and growth. But both the theories appear vague and lack generalisability. In order to overcome this drawback, scholars like Reinheart, Rogoff, Chechetria, and Phillips conducted empirical analyses on debt and economic growth, based on which comprehensive models were developed. Through their findings, it has been possible to establish threshold level of debt, and more importantly, the non-linear relationship between debt and growth. Although such comprehensive analyses conducted in relation to the subject exist, almost all of them concern developed or OECD economies. Therefore, conclusions drawn from those studies become difficult to generalize in the context of developing economies, leading to the need for a comprehensive model which analyses the impact of continuous expansion of debt level on economic development within the context of developing economies. Therefore, this analysis was conducted in order to fill this gap.

In this paper, the relationship between Sri Lanka's economic growth and public debt will be discussed through the development of a comprehensive model, and be further analysed to arrive at the threshold debt limits that the Sri Lankan economy should maintain. This analysis will be conducted based on the model developed by Chechetria and Phillips in 2010, subject to certain modifications introduced in order to comply with statistical requirements and specifications.

LITERATURE REVIEW

Theoretical Literature

Major theoretical arguments developed by Modigliani and Fisher indicates that a marginal increase in the debt level will lead to reduce economic growth. As per the Ricardian equivalence hypothesis, it concludes that an increase in the debt level will not impact economic growth. A number of empirical studies have been conducted based on this theoretical background.

Empirical Literature

There is a lack of empirical literature in relation to the developing economies context, given that most of the studies have conducted based on developed or OECD economies.

A study was conducted to determine the impact of higher growth on economic growth; and entailed a cross-country study within the euro area, based on 40 years' data. The authors argue that public debt and economic growth have a non-linear relationship, where after a certain point the former will have a negative effect on economic growth: observed to occur past the 90% threshold. It concludes that annual changes in the debt level have a negative relationship with the growth. Finally, it concludes that a higher debt level may not be a remedy for higher growth rate (Checcherita and Philip, 2010).

Cecchetti et al., 2011: A study conducted to determine the real effect of debt based on a cross-country analysis conducted in 18 OECD economies, this mainly examines the relationship between non-financial debt and economic growth. Through the analysis, it is argued that at ratios beyond 85% Public Debt to GDP, a marginal increase in public debt will reduce economic growth by 0.1%. Such a relationship has only been found in relation to Public Debt:no similar impact on growth was observed due to changes in Corporate and Household Debt. The major conclusion is that an ageing population

has a substantial impact on the debt level as well as the growth, as a remedy for which the study proposes the enhancement of domestic savings.

Another study was conducted to determine whether public debt has a causal effect on economic growth, and its analysis was carried out based on public debt data on OECD economies. Through the analysis, it is argued that the level of debt does not have an impact on the economic growth in advanced economies. Thatno relationship was found between debt level and growth may not have the same implications foevery economy, as those operating beyond the threshold limit may experience adverse effects on economic growth if further increases of public debt take place (Ugo and Presbitero, 2012).

A study conducted on advanced and emerging economies, based on the data available from last four decades in order to determine the relationship between level of public debt and economic growth. The major objectives of this analysis was to determine causality, reverse causation and the prudent debt level. The study was conducted through comprehensive econometric tools and techniques, mainly fixed-effect regression, OLS, SGMM and related robustness techniques, in addition to which the behavior of various channels that determine the growth rate and their relationship with the debt were analyzed. Through the analysis, it was concluded that, *ceteris paribus,* growth in debt level will reduce subsequent growth: more precisely that a 10% increase in the debt level will reduce the long run growth rate by 0.2%. However, this rate of change will be diluted in advanced economies. Through the study it has been concluded that growth has a nonlinear relationship with debt level and beyond the 90 % threshold limit the impact on growth becomes irrelevant.The increasing debt stock was found to pose a growth constraint only on countries that follow prudent macroeconomic policies: effects could not be precisely estimated elsewhere (Kumar and Woo, 2010).

Problem Statement

Government debt is critical for economic growth and in the recent past most relevant data indicate high debt in the Sri Lankan economy. In the current economic and political scenario the most popular theme is continuous expansion of public debt, where many argue that increasing public debt will reduce the economic growth.

"Will public debt lead to enhanced economic growth within the Sri Lankan economic context?"

METHODOLOGY

This study was on macroeconomic variables and its implications, and data required for the study were collected through secondary sources. For the purpose of this study, data was gathered mainly through the database of the Central Bank of Sri Lanka, Human Development Reports, World Bank database and various publications and issues of the relevant authorized institutions. For the purpose of the study, data available from 1964-2012 within various sources are under concern. In order to conduct the analysis the initial variables that were required to address the issue in the research area should first be selected. The study intends to analyze the relationship between public debt, economic growth and development; therefore, major variables under the model are public debt/GDP ratio, economic growth rate. Therefore, the basic model will be based on the relationship between the above variables, in addition to which, based on empirical studies, the National Savings/GDP ratio, Investment/GDP ratio, Trade Openness/GDP ratio, and Budget deficit/GDP ratio were included in order to comply with statistical requirements. These model variables are presented below;

Table 1: Variable Description

Variable	Measurement	Scale
Public Debt	Level of Public Debt	Public Debt to GDP ratio
Economic Growth	Level of Growth	Real economic growth rate
Savings	Level of savings	National savings to GDP ratio
Investment	Gross Domestic Capital Formation	Gross Investment to GDP ratio
Trade Openness	Trade competitiveness	Trade Openness to GDP ratio
Budget Deficit	Government Savings	Budget deficit to GDP ratio

The Debt/GDP ratio was calculated based on values available in the Central Bank of Sri Lanka database. Economic growth indicators were also obtained from the same data source, while the National Savings to GDP ratio was calculated as per information provided under the same, with the savings value including public and private savings alike. Investments or Gross Domestic Capital Formation was also calculated as per the information provided in the Central Bank database, which also includes both public and private investments.

Trade openness has been embedded into the model in light of the fact that expansion of foreign trade and finance may impact both growth and the debt stock. Trade openness was calculated as total absolute value of exports and imports as a percentage of GDP. Export and import values were converted to rupee terms using the year-end US dollar rate.

Model Formulation

Analysis of the problem area of the research was evaluated under a model that explains the relationship between debt and growth. Initially the model was developed on the presumption of a linear relationship between variables, with the following specification:

$$g = \alpha_0 + \beta_0(Debt/GDP) + \varepsilon$$

Subsequently the model was improved by embedding debt/GDP squared into the model. The major reason for introducing debt squared into the model was that, under linear Debt/GDP ratio, the initial model did not provide any significant relationship. Therefore the debt-squared value was introduced to the model, to improve model specification as follows:

$$g = \alpha_0 + \beta_0(Debt/GDP) + \beta_1(Debt/GDP)^2 + \varepsilon$$

Further, the model has tested under various polynomial forms in order to determine the most effective and significant functional form. For this purpose the model was tested under the following polynomial functions:

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^{1.2} + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^{1.4} + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^2 + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^{2.4} + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^3 + \varepsilon$$

Testing for Stationary

Time series econometrics could be treating as a complicated area of study, in spite of which it has a huge value in econometric model formulation. Therefore, a number of studies and models have been developed in relation to this subject area. For the purpose of the study, the Augmented Dickey-Fuller (ADF) test was used to determine and correct the non-stationarity.

The ADF test derives from the Dickey Fuller test, developed on the assumption of an uncorrelated error term. ADF test was developed

based on a simplification or relaxation of the above presumption, and the ADF estimation formula can be derived as follows:

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \sum_{i=1}^{m} \propto \Delta Y_{t-1} + \varepsilon$$

Where ε was the pure white noise error term, and δ was the $\rho - 1$, represents the non-stationary or unit root coefficient, ΔY_{t-1} represents the first difference operator embedded to the model in order to adjust to the autocorrelation bias.

All the model variables has checked and corrected for stationarity based on the ADF test explained above. Variables checked for stationarity through the following hypothesis,

H_0: Variable has a unit root (i.e. Non-stationary variable or $\rho = 1$)

H_1: Variable was not having an unit root (i.e. Stationary process or $\rho < 1$)

Detailed calculations regarding the ADF test are in the annexures.

Estimation of the Model

The analysis was conducted in two stages, where the initial model was developed on a linearity assumption, and the subsequent model was improved to quadratic form. In both cases the model estimation was done using the Generalized Methods of Moment (GMM) method. In estimation, the maximum likelihood estimator is the tool that provides most efficient estimates, but is subject to number of assumptions. On the other hand GMM estimator could be applied under a minimum number of assumptions. Most of the time series empirical analysis were conducted using the GMM technique. The rationale behind GMM estimation was that it estimates the sample moments defined under the model, matching the population

moments. A mathematical representation of the GMM estimation technique adopted on the model is as follows:

$$g = \beta(\text{Debt/GDP}) + \varepsilon$$

Then as instrumental variable the Debt/GDP (presumed as $x_{t)}$ ratio was used, and the estimation made on instrumental variables and orthogonality conditions as follows:

$$E[g_t(w_t, \beta)] = E[x_t, \varepsilon_t] = E[\ x_t\ (g - \beta(\text{Debt/GDP}))]$$

Estimation of β will be derived from the following equation,

$$\beta = \Sigma_{xg}^{-1} \Sigma_{xg}$$

Models that were developed under the study based on the GMM estimator followed the above estimation methodology.

ANALYSIS AND RESULTS

Basic Model

Main objective of this study is to determine the relationship between the public debt and the economic growth, in relation to the subject area which indicates that debt has a nonlinear relationship with the growth rate. Therefore, the basic model was developed through nonlinear specification tools. The initial model was estimated on Generalized Methods of Moment (GMM) technique, a tool that can be applied under a minimum number of assumptions. Further, GMM estimates provide an incentive about the long-run behavior between the variables. The initial model estimated under GMM technique is as follows:

$$g = Debt_{GDP(X)} + C$$

$$g = -0.073\left(\frac{Debt}{GDP}\right) + 0.0426$$

From the estimated model the following conclusions were made:

Debt/GDP coefficient has become significant at 10% significance level, indicating that a unit change in debt level will change the growth rate by 7% in the long-run.

Model specified R^2 value 16% where model only explains the 16% of the total variance of the dependent variable, though explanatory power is lower in the model, model could treated as correctly specified under the J statistic.

The model generates very low R^2 values, but this does not indicate model is inadequate is its explanatory power. As explained by Gujarati (2006), "the researcher should be more concerned about the logical or theoretical relevance of the explanatory variables to the dependent variable and their statistical significance. If in this process we obtain high R^2, well and good; on the other hand, if R^2 is low, it does not mean the model is necessarily bad". Further even though the model reports very low R^2 value, it could be treated as correctly specified due to the very small J statistic reported on the model.

Model Improvement and Threshold Limits

The initial model that was estimated through the GMM method was based on a linear relationship between debt and growth. Estimation results provided that β or debt/GDP coefficient has become significant at 10% level of significance. However, from an economic perspective 10% is generally treated as insignificant. Further Chechetria and Philips (2010) suggest that a linear combination of debt and growth does not yield significant results. As an option to resolve this issue they suggest to move to a polynomial functional form, i.e., an equation with power of greater than one. They also suggest that increasing this power will reduce the turning point. Following these suggestions, the model was improved to quadratic form as follows:

$$g \; = \; \alpha_0 \; + \; \beta_1(\frac{Debt}{GDP})^2 + \; \beta_2(\frac{Debt}{GDP}) + \; \varepsilon$$

This improved model was also estimated through the GMM technique. Estimated results generated by the model can be derived in equation form as follows:

$$g \; = \; 0.001 - 0.2561(Debt/GDP)^2 + 0.3121(Debt/GDP)$$

Based on the model it indicates debt and growth follow a nonlinear relationship, and that the curve is globally concave. Further, Debt/GDP squared become significant at 5% level, which is an observed improvement when compared with the linear model. The model is correctly specified as indicated by the very small J statistic. Further, results generated through the improved model were consistent with the findingsof Chechetria and Philips (2010), and Roggof and Reinheart, (2010) in that they conclude debt/GDP was globally concave with a relative maxima.

Through the improved model, the maximum or prudent level of debt that the country should maintain has been estimated. As indicated above Chechetria and Philips (2010) explain that enhancement of the power of Debt/GDP ratio will reduce the optimum debt level until the power reaches to 3. They generated the model on the quadratic functional form to interpret the results and determine the effective threshold limit similar approach applied here.

In order to ascertain the optimum threshold level, the generally suggested approach was the Newton Ramphson method (Gujarati, 2004), though in case of certain polynomial functions this test generates accurate results, due to this limitation the first derivative technique was adopted in place of the Newton Ramphson test. The first derivative technique has a functional form derived on the following basis:

$$\frac{dG}{dDebt} = -2\beta \left(\frac{debt}{GDP}\right) + \beta$$

Based on the results obtained through first derivative technique, it is suggested that the debt turning point resides at 61% debt, beyond which point a unit increase in debt level will reduce the growth rate. Results generated through this study on debt turning point marginally contradicts the results of Cooray and Kumara (2013) which indicate the point as 60%, but based on proximity results could be treated as compatible on approximate terms. Theeason behind the difference between the two results is the increase in the debt level and the rapid increase in GDP, which may both lead to a higher threshold limit than in previous studies.

Channels for the Impact on Public Debt on Growth

In the first part of the study the relationship between debt and growthwas analyzed. In this analysis an important fact that needs to be taken into consideration is the channel by which public debt is likely to impact growth. Based on empirical studies and theoretical implications, the impact of debt on (i) national savings (ii) gross domestic capital formation (iii) trade openness and (iv)budget deficit have been analysed. Through regression, it was observed that each channel had a non-linear relationship between debt stocks. Every variable was checked for the robustness and compatibility with the model and necessary adjustments made.

Impact on national savings due to debt was analyzed based on the following equation:

$$s = \alpha_0 + \beta_1 \left(\frac{Debt}{GDP}\right)^2 + \beta_2 \left(\frac{Debt}{GDP}\right) + \varepsilon$$

Since the savings rate has a non-linear relationship with debt stock, the models was estimated through GMM. As per the estimated results, the savings rate shows a significant relationship between debt stock and growth. Further, savings rate shows an inverted U shaped

relationship with the debt level, debt turning point recorded at 82.14%. These results complied with Checcherita and Philip (2010) study on public debt, and beyond the established threshold level, further increases in debt portion will result in dissaving: a result somewhat contradictory to the Ricardian equivalence hypothesis.

Then the impact of gross domestic capital formation over the debt stock was analyzed based on the following equation:

$$Gross\_Investments\_Rate$$
$$= \alpha_0 + \beta_1 \left(\frac{Debt}{GDP}\right)^2 + \beta_2 (\frac{Debt}{GDP}) + \varepsilon$$

Gross investments rate also having a non-linear with debt stock, the model has been estimated through GMM technique. Gross investment rate also does not provide a significant relationship between debt stock and the derived estimation: compliant with empirical studies (Chechetri and Phillip, 2010), although it is in contradiction with theory.

Thirdly the impact made by debt stock on budget deficit was analysed based on the following equation:

$$Budget\_Deficit/GDP = \alpha_0 + \beta_1 \left(\frac{Debt}{GDP}\right)^2 + \beta_2 (\frac{Debt}{GDP}) + \varepsilon$$

Estimations conclude that Budget Deficit/GDP has a significant relationship with debt stocks. The model equation indicates that a percentage point increase in the debt stock ultimately changes debt stock by 61%. Further, the budget deficit having a globally concave U shaped relationship with the debt stock, the model indicates that if debt stock increases more than 79.94% it starts to increase budget deficit, the minimum threshold level of debt. In relation to above, a relationship supporting empirical literature could not be found.

Then the influence made by debt stock over external trade was analyzed, measuring trade openness as the absolute total value of exports as a percentage of GDP. Trade openness also shows a non-linear relationship with the debt stock based on the equationbelow.

$$to = \alpha_0 + \beta_1(\frac{Debt}{GDP})^2 + \beta_2(\frac{Debt}{GDP}) + \varepsilon$$

Since the variables in the equation show a non-linear relationship, the estimation was done through GMM estimation technique. As in the first two estimations, trade openness does not provide any significant relationship with debt stock. Results generated through the model comply with the empirical findings made by Chechetria and Phillips (2010).

Polynomial Functional Form

Initially as per Chechetria and Philips (2010) analysis, it was concluded that under linearity debt will not have significant relationship with the growth rate, which led to the development of an alternative polynomial functional relationship among model variables. As a result, the Debt/GDP ratio rose to various powers and was analyzed in terms of the significance of the relationship between variables. For this purpose, estimations were done through GMM, since they deal with the non-linear relationship among the variables. For the purpose of the study, the following polynomial functions were developed:

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^{1.2} + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^{1.4} + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^2 + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^{2.4} + \varepsilon$$

$$g = \alpha_0 + \beta_1(Debt/GDP) + \beta_2(Debt/GDP)^3 + \varepsilon$$

Results obtained from each model can be summarized as follows:

- when the power is raised to 1.2, Debt/GDP ratio becomes significant at the 5% level . The model indicates a non-linear globally concave relationship with the growth rate and through first differentiation it was ascertained that the debt turning point resides at 60.97%, a relatively higher turning point compared to the basic model of the study.

- in the second model, with a power of 1.4, the Debt/GDP ratio became significant at 5%. This model also shows a globally concave non-linear relationship between the variables, and with a debt turning point at 60.95%.

- when the power was raised to 2.4, it also indicated a globally concave relationship between debt/GDP and growth as in previous models, but the level of significance rose to 12%. As explained earlier, when power continues to rise, after the power of two, significance between variables in the model will reduce. Debt turning point comes to 60.54%, marginally higher than the basic model developed under the study.

- finally, relationship between debt/GDP and the growth rate was tested on cubic form, i.e. power of debt/GDP raised to 3. In this model, debt/GDP becomes insignificant with the growth rate at 10% significance, though in the statistical context it can accepted as significant at 20% level of significance. As per the model debt/GDP turning point is recorded at 60.17%. It also a relatively higher value compared with the basic model.

From this overall analysis, it can be concluded that the best-fit model to analyze the relationship between debt and growth is in quadratic form, and increasing the power of the debt/GDP ratio will ultimately create a lower threshold limit or debt turning point. Further incrementing the power initially leads to enhance the significance between the variables, but after the power is raised to two, from that point onwards the significance between variables began to decline.

These findings were highly consistent with the previous empirical findings made by Chechetria and Philips, (2010).

CONCLUSION

This study analyzed the impact made by continuous increases in public debt on economic growth and development in Sri Lanka, based on data available over the past 50-year period, i.e., 1963-2012, using econometric estimation and analytical tools.

The initial model on growth and the debt level was developed based on the linearity assumption, but linear relationship between debt and growth does not yield significant results: consistent with previous empirical findings (Chechetria and Phillips, 2010). Therefore, the model was improved and tested for various polynomial functional forms. Through this it was found that increasing the power from linear to quadratic form increases significance. After quadratic form, continuous increases in power will reduce significance; and therefore the basic model was developed based on the quadratic relationship between debt and growth. Increments to the power of debt/GDP ratio will increase the threshold level of debt, but will reduce significance after a certain point.

Based on available data the threshold level of debt was estimated through the first derivative method, and the study found that the optimum threshold of the debt limit resides at 61%: beyond that limit, the marginal increase in the debt level will have an adverse impact on growth. Further, it found that year-on-year changes in debt level, have a negative relationship with economic growth rate. This result shows marginal deviation from the previous study by Cooray and Kumara (2013), which established a threshold level of 60%, mainly due to differences retained in the estimation technique and the continuous improvement recorded in both GDP and debt.

Channels through which public debt impacts growth include the budget deficit and savings rate. Other channels do not indicate any significant relationship with the debt level. Budget deficit indicates a positive relationship with the debt level and the savings rate shows a negative relationship. Debt turning points on savings and budget deficit were recorded at 82.14% and 79.94%, beyond these threshold levels further increases in debt will create negative impacts on each: consistent with the findings of Singh (1999) and Checherita and Philip (2010). Further, it was found that compared with the developed economies' determinants of growth, threshold limits of the determinants lie above the debt threshold limit for the developing countries. Therefore, it can be concluded that increased debt will create an initial impact on growth and it affect growth determinants with a lag.

As these conclusions are drawn purely based on quantitative and statistical grounds, their implications may differ once policy decisions and actions of governments in relation to the public debt are taken into consideration. Therefore, when developing a public debt management policy further qualitative factors also need to be taken into consideration. This will lead to develop more effective policies relating to the growth and development of the economy. Further to reduce the debt/GDP ratio to its 61% threshold, government as well as the central monetary authority should focus on formulating effective strategic plans without compromising on growth prospects. Moving into short term fiscal austerity measures will make adverse impact on the economic performance. Therefore in order to achieve best results, the government must try to formulate prudent and effective mechanisms and debt management policies.

APPENDICES

Appendix 1: Basic Model

Debt_GDP	-0.0739
	$(0.0736)^{*}$
C	0.0426
	$(0.000)^{***}$
R^2	0.1667
J statistic	0.6185

Note: Dependent variable is the economic growth rate (annual), explanatory variables cited in abbreviations as per the Table xx, estimated variables and their significance (*10%,**5%,***1%) are shown in the table. Values indicated in parenthesis are significant values of the each estimate. Model has estimated through GMM technique.

Appendix 2: Model Improvement to Quadratic Form

Debt_GDP	0.3121
	$(0.0901)^{*}$
Debt_GDP^2	-0.2561
	$(0.0290)^{**}$
C	-0.001
	$(0.0000)^{***}$
R^2	0.1215
J statistic	9.43×10^{-31}

Appendix 3: Debt Turning Points and Threshold Limits

	Basic Model	Investment	Savings	Trade Openness	Budget Deficit
Debt_GDP	0.3121	0.1442	0.4153	-0.0807	-0.9394
Debt_GDP^2	-0.2561	-0.1225	-0.4123	0.00351	0.5973

C	-0.001	0.0032	0.0026	0.0012	-0.0037
R^2	12.15%	1.27%	3.09%	4.813%	2.49%
J statistic	9.43×10^{-31}	0.5236	0.6252	3.68×10^{-30}	0.3208
Debt Turning point	60.93%	58.85%	82.14%	114.95%	78.64%

Note: Debt turning points for the above models ascertained through using first derivative method, following general calculus. In the above table columns represents the dependent variable and rows represents the controllable variable. All the models that mentioned above have estimated by using Generalized Methods of Moments technique.

Appendix 4: Polynomial Functional Form

	Debt_GDP	Debt_GDP^{x}	Debt TurningPoint
1.2	1.8349 (0.0443)**	-1.6881 (0.0354)**	60.97%
1.4	0.8844 (0.0525)**	-0.76983 (0.0334)**	60.95%
2	0.31212 (0.0901)*	-0.2561 (0.0290)**	60.93%
2.4	0.20205 (0.1297)	-0.16996 (0.0271)**	60.54%
3	0.11855 (0.2182)	-0.10912 (0.0251)**	60.17%

Note: This table shows the various polynomial functional forms estimated by using the GMM technique. Values in the parenthesis indicates the significant values (10%,5%**,1%***).*

Appendix 5: Data Set

Year	Debt/ GDP	Invest/ GDP	Savings/ GDP	TO/ GDP	Deficit/ GDP
1963	48%	15.70%	13.00%	48.44%	-4.89%
1964	50%	14.30%	11.30%	47.81%	-5.52%
1965	55%	12.50%	12.50%	47.37%	-5.02%
1966	63%	14.30%	10.10%	44.27%	-6.30%
1967	66%	15.20%	11.10%	40.22%	-6.51%
1968	63%	15.90%	12.30%	40.40%	-6.40%
1969	63%	19.30%	12.10%	39.01%	-6.58%
1970	64%	18.90%	15.00%	31.81%	-6.39%
1971	70%	17.10%	14.70%	29.56%	-7.29%
1972	71%	17.30%	14.80%	26.57%	-6.30%
1973	67%	13.70%	11.50%	27.10%	-5.13%
1974	52%	15.70%	7.50%	33.91%	-3.29%
1975	55%	15.60%	7.40%	35.10%	-6.39%
1976	59%	16.20%	13.10%	33.47%	-8.43%
1977	69%	14.40%	17.70%	36.38%	-4.47%
1978	73%	20.00%	15.50%	68.44%	-12.51%
1979	68%	25.80%	14.80%	72.25%	-11.14%
1980	77%	33.80%	14.00%	77.42%	-19.16%
1981	76%	27.80%	14.30%	66.63%	-12.37%
1982	81%	30.80%	15.40%	63.07%	-14.03%
1983	81%	28.90%	16.40%	57.77%	-10.56%
1984	69%	25.80%	22.20%	56.10%	-6.82%
1985	80%	23.80%	14.20%	56.20%	-9.66%
1986	87%	23.70%	14.50%	49.69%	-10.14%
1987	97%	23.30%	15.30%	51.96%	-8.68%
1988	101%	22.80%	14.20%	53.27%	-12.70%
1989	109%	21.70%	14.60%	54.01%	-8.65%
1990	97%	22.20%	16.80%	58.14%	-7.82%
1991	99%	22.90%	15.20%	56.40%	9.75%

1992	95%	24.30%	17.90%	61.49%	6.06%
1993	97%	25.60%	20.20%	66.40%	7.07%
1994	95%	27.00%	19.10%	68.07%	9.06%
1995	95%	25.70%	19.50%	69.98%	-8.72%
1996	93%	24.20%	19.00%	68.60%	8.42%
1997	86%	24.40%	21.50%	69.59%	7.05%
1998	91%	25.10%	23.40%	67.81%	8.44%
1999	95%	27.30%	23.50%	67.40%	6.92%
2000	97%	28.00%	21.50%	77.38%	-9.49%
2001	103%	22.00%	20.30%	68.52%	10.43%
2002	106%	21.20%	19.50%	65.34%	8.47%
2003	102%	22.00%	21.50%	62.52%	7.31%
2004	102%	25.30%	22.00%	66.58%	7.50%
2005	91%	26.80%	23.80%	62.32%	7.03%
2006	88%	28.00%	22.30%	60.62%	7.00%
2007	85%	28.00%	23.30%	58.53%	6.88%
2008	81%	27.60%	17.80%	54.53%	7.02%
2009	86%	24.40%	23.70%	41.10%	9.85%
2010	82%	27.60%	25.40%	44.54%	-7.96%
2011	79%	29.90%	22.10%	52.10%	-6.88%

(Central Bank of Sri Lanka, 2014)

REFERENCES

Anderson, T.G & Sorensen, B.E. (1996) Gmm Estimation of Stochastic Volatility Model. *Journal of Business and Economics Statistics.*14.p.328-352

Cecchetti, S., Mohanty, M.S. &Zampoli, F.(2011) The Real Effect of Debt. *bis working paper series* (352). p. 1-34

Central Bank of Sri Lanka, 2014, *Annual Report 2013,* Central Bank of Sri Lanka, Colombo

Chechetria, C. & Philip, R. (2010) Impact on High and Growing Government Debt on Economic Growth.*Ecb Working Paper.*(1237). p. 1-42

Dellas, H & Galour, O. (1992) Growth Via External Public Debt and Capital Controls. *International Economic Review.*33 (May). p. 269-281

Dornbush, R. Vinals, J. & Porters, R. (1988) Stabilization, Debt & Growth. *Economic Policy.* 3 (Oct). P. 231-283

Engle, R.F And Granger, C.W.J (1987) Co-Integration and Error Correction: Representation, Estimation And Testing. *Econometrica.*55,251-256

Gujarati, D. (2004) *Basic Econometrics.* Fourth Edition. New York. Mcgraw Hill Companies.

Kumara, H. & Cooray, (2013) N. S. Public Debt and Economic Growth in Sri Lanka: Is There Any Threshold Level for Pubic Debt?. *IDEAS Working Paper.*(December). p. 1-21

Kumar, M. & Woo, J. (2010) Public Debt and Growth. *Imf Working Paper.*(July). P. 1-47

Makin, A.J (2005) Public Debt Sustainability and Its Macroeconomic Implications in Asean-4. *Asean Economic Bulletin.*22(December). P.284-296

Presbitaro, A. (2010) Total Public Debt and Growth in Developing Economies.*Journal of Money and Finance Institution Research.*(July). P. 1-22

Reinheart, C.N. & Rogoff, K.S (2010) Growth in a Time of Debt. *The American Economic Review.*100 (December). P. 573-578

Schularick, M. (2012) Public Debt and Financial Crises in The Twenteith Century. *European Review Of Economic History.*(Online) 19 (December). P.881-897 Available From Http://Www.Taylorandfrancis.Com [Acessed 24/03/2014]

Singh, C. (1999) Domestic Debt And Economic Growth in India. *Economic and Political Weekly.*34 (June). P.1445-1453

Ugo, P. &Presbitaro, A. (2012) Public Debt & Economic Growth is There A Causal Effect?. *Journal of Money and Finance Institution Research.*65(April). P. 1-48

Villanueava, D.P. (1972) Public Debt, "Efficient" Labour, and Growth. *Journal of Money Credit And Banking.* 4 (November). P. 1016-1018

Achieving Sustainable Development in Sri Lanka through Public Private Partnership for Infrastructure Projects

H.A.E.C. Jayasena [a] and **S.G.P. Madhusanka [b]**

[a] *University of Moratuwa, Sri Lanka*
ecjayasena@gmail.com

[b] *University of Moratuwa, Sri Lanka*
thuritha.milinda@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

Sustainable development is about ensuring a development that reaches the present needs without compromising the reach of future generations to meet their own needs (Drexhage, 2012). According to Stranger and Bayley (2008), sustainable development can be linked to environment, social and economy as integration. Benefits of the sustainable development should be spread in the widest possible range of sectors, across borders and even between generations.

Infrastructure can be considered as the basic physical and organizational structure required for the proper operation of a society. A long time back, infrastructure services in most countries were provided by state-owned utility companies that were vertically integrated. Although this model initially produced some desirable results, it ultimately led to serious problems. These problems included under-investment; caused, to a large extent, by under-pricing, low productivity, poor service delivery, long queues, lack of access to basic services, lack of transparency and damaging political interference in the operations of these infrastructure entities. Afterwards, as a settlement for above problems, private investment

referred as Public Private Partnership (PPP) for infrastructure was suggested (Zhang, 2005).

The foremost benefit of PPPs alluded to above is that such partnerships allow for public authorities to raise capital for high priority works that might otherwise not be possible in the face of budgetary and borrowing constraints. Moreover, PPPs can draw on private sector expertise in order to deliver services and infrastructure efficiently and cost-effectively and further bridge the gap between the resources required and those available from the public purse (kevin, 2012).

As a developing country, Sri Lanka is yet to build the required infrastructure facilities for the country (Nabi, 2013). Developing infrastructure is a huge challenge for the government, considering the lack of economic and other factors (Central bank report, 2012). Nevertheless, it could be argued that many of these challenges can be overcome through proper application of PPP in Sri Lankan context. Therefore, this research intends to address this issue by formulating the research problem as; 'How to apply PPP for developing infrastructure to achieve sustainable development in Sri Lanka'.

Research Aim

The aim of this research is to explore the possibility of applying Public Private Partnerships for developing infrastructure to achieve sustainable development in Sri Lanka

Objectives

- To identify the effect of infrastructure in achieving sustainable development in a country.
- To identify the obstacles for developing infrastructure in developing countries.
- To identify obstacles for developing infrastructure in Sri Lanka.

- To identify the applicability of PPP in overcoming the obstacles in infrastructure development in Sri Lanka.

- To provide recommendations for proper applicability of PPP in Sri Lankan infrastructure development

METHODOLOGY

Case Study

The research problem is; "how sustainable development can be achieved through application of PPP for infrastructure projects in Sri Lanka". Yin (1994) suggested the case study research approach for the researches trying to address problems like "how" and "why" types. He further stated that, a case study is an empirical inquiry that investigates a contemporary phenomenon within a real-life context.

Since this research is focused on assessment of achieving sustainable development through PPP for infrastructure projects, three cases (infrastructure projects) were selected focusing on two types of infrastructure construction. One from economic infrastructure and other from social infrastructure; including two public private partnership projects and one traditional (government funded) project.

Case 1- Expansion of Container terminal by public private partnership

Case 2- Expansion of Container terminal by port authority

Case 3 - Collecting wastage and waste management project, which is being done by municipal council of the area before January 2014 and after 2014 it is being done by a private partner

Data Collection

Semi structured interviews were used as the main data collection method. The interviews were conducted with individuals who were involved in selected PPP project. The interviews were tape-recorded to secure an accurate account of the conversations and avoid losing data since everything cannot be written down during interviews. Altogether, 12 interviews were conducted and each normally lasted for 30 minutes to one hour.

Table 1: Designation of Expert Interviews

Designation of Expert	Project	Sector
Chief Engineer	Case 1	Government
Marketing manager	Case 1	Private
Deputy director, project finance – BOI	Case 1	Government
Managing Director –Accounting	Case 1	Private
Assistant Marketing manager	Case 2	Government
Chief Engineer	Case 2	Government
Business development manager	Case 2	Government
Financial manger	Case 2	Government
Project manager	Case 3	Private
Project coordinator	Case 3	Private
PHI for municipal council	Case 3	Government
Municipal commissaries	Case 3	Government

A questionnaire survey was carried out to identify the effect of selected cases on social and environment development. There were 30 respondents from direct consumers in case 1 and 2. When considering case 3, there were different consumers. Due to that another 30 questionnaires were carried out for case 3.

RESULTS AND FINDINGS

Obstacles Faced by Client during the Construction and Operation of the Projects

Insufficient capital is the main obstacle for developing infrastructure in developing countries according to the literature synthesis. It can be stated that seeking private partnership or getting a long term loan are the solutions to overcome that main obstacle. Due to that, case 1 was from private partnership and case 2 was from long term loan. According to the literature synthesis and cross case analysis of case 1, 2 and 3, high risk, lack of knowledge and technology and lack of awareness are the other main obstacle faced by the client.

Overcoming Obstacles

When considering case 1 and 2, obstacles were overcome through different ways. Case 1 used a private partner investment to overcome the problem of insufficient capital and case 2 overcame it by a long term loan. In case 1, the government got the infrastructure facility after 30 years without any cost but in case 2, the government had to pay back the loan with interest. In case 3, municipal council decided to overcome insufficient capital by private partner investment.

Developing infrastructure is more risky for the government, because it is a long term investment. Returns of the investment of infrastructure projects are gained after a long time. In case 2, the government decided to bear all the risks on its own and in the case 1 and 3, the government shared the risk with a private partner. PPP helps to share and transfer the risk to the most suitable party. It has been identified as an excellent method of overcoming high risks.

Lack of knowledge can be considered as the next obstacle for developing infrastructure facilities. In case 1 and 3, the private partner was already an expert of the particular infrastructure sector. For example, some private partners of case 1 were from world port

business and case 3 was from the waste management sector. Due to that, they already had the expert knowledge and skills in operating on those projects. However in case 2, the government had to hire the knowledge and skills for the operation. Same as the lack of knowledge, lack of technology was also overcome by case 1 and 3 by using PPP.

Achieving Objectives of Sustainable Development

Achieving objectives under the economic, social and environmental sectors are of paramount importance. According to the cross case analysis, case 1 had more successfully achieved the objectives related to the socio economic and environmental development than case 2. When considering case 3, there was a considerable improvement in achieving those objectives after the involvement of a private partner.

Results, of the questionnaire survey, shown in the following tables suggest that there was better social satisfaction in case 1 compared case 2 and that concludes that case 1 had a better effect on social development.

Table 2: Effect of Achieving Objectives on Sustainable Development (Case 1)

Objectives	Significance		
	Satisfactory	Good	Excellent
Increasing Productivity	0	14	16
Increasing Efficiency	0	18	12
Profitability	2	12	16
Return on equity	4	8	18
Using new system	0	6	24
Using new technology	0	6	24
Customer satisfaction	0	20	10
Creating job opportunities	18	12	0

Table 3: Effect of Achieving Objectives on Sustainable Development (Case 2)

Objectives	Significance		
	Satisfactory	Good	Excellent
Increasing Productivity	2	15	13
Increasing Efficiency	0	18	12
Profitability	5	18	7
Return on equity	13	15	2
Using new system	15	13	2
Using new technology	23	7	0
Customer satisfaction	6	17	7
Creating job opportunities	0	20	10

Strength of PPP

- Best management skills of private sector
- Performance based contracting
- Private party introduce new working tradition to SLPA
- Private sector always practise new system and technology
- Competition between private and public
- Private sector can make decision fast

Challenges of Implementing PPP

- Inadequate framework for public private partnerships
- High implementation cost of PPP
- Lack of success case studies for PPP in Sri Lanka

CONCLUSION AND IMPLICATIONS

Results of the findings show that PPP projects provide a way forward for achieving sustainable development in Sri Lanka. Following criteria can be identified in order to effectively utilise PPP by overcoming the challenges of its implementation.

Identify the Infrastructure which can be Developed under the PPP

As a developing country, Sri Lanka has to develop more infrastructure facilities to achieve development. However, Sri Lanka is lacking sufficient capital to develop all infrastructure facilities. By identifying the infrastructure which can be developed under PPP, the government can reduce budgetary requirement for those projects and that limited capital can be used for another infrastructure development.

Adequate Risk Transfer to the Private Sector

Developing infrastructure is a long term investment and it needs a huge capital investment. Therefore it accompanies a considerable amount of risk for the client. When considering the PPP arrangements, government could and should transfer adequate amount of risk to the private partner.

There must be a PPP Unit within PPP Projects

There must be a PPP unit for assisting the PPP program. Some countries have PPP units for assisting performance. Through the literature it was identified that, United Kingdom, Australia, South Africa, and Korea are example for maintaining proper PPP units for assessing PPP projects. There is a PPP unit in Sri Lanka under the Board of Investment (BOI) and they only involve in BOI projects. There must be a PPP unit to monitor all PPP projects in Sri Lanka. PPP units can help to find bidders and they can also consider the financial and management strength of the bidders. Institutes can have an overall control of project.

There must be Proper a Bidding Procedure

In some Sri Lankan PPP projects, there are nominated partners for the project. It is not the ideal way going forward to find the best partner and it does not denote transparency. Due to that using proper bidding procedures will help the success of PPP projects.

REFERENCES

Asian Development Bank. (2008). Public private partnership (PPP) handbook [online]. Manila, Asian Development Bank. Available from: http://www.adb. org/ Documents/Handbooks/Public-Private-Partnership/ default. asp [Accessed 12 August 2011].

An Analysis of the Effects of Special Commodity Levy on Food Inflation in Sri Lanka

W.D. Dayananda [a] and J. Weerahewa [b]

[a] *Department of Agricultural Economics and Business Management,*
Faculty of Agriculture, University of Peradeniya, Sri Lanka
dushanthi.dayananda@gmail.com

[b] *Department of Agricultural Economics and Business Management,*
Faculty of Agriculture, University of Peradeniya, Sri Lanka
jeevikaw@pdn.ac.lk

INTRODUCTION AND RESEARCH PROBLEM

Having first show signs of an increasing trend in late 2006, world food prices increased with remarkable rapidity in 2007 and 2008, posing serious concerns across the world. By June 2008, the Global Food Price Index computed by the Food and Agricultural Organization reached a peak of 214 index points, recording an increase of 44 per cent year-on-year. This surge of food prices combined with high petroleum prices threatened social stability in some developed and almost all developing nations, where poorer households having a larger share of foods in their total budget suffered the most due to the increasing cost of food.

High food prices have had an adverse impact on Sri Lanka since the country continues to import a significant quantity of its food requirements every year. Out of Sri Lanka's total consumer goods imports, food imports accounted to 43, 47 and 53 percent in 2006, 2007 and 2008 respectively, suggesting that high food prices in the world market could have a significant effect on domestic food inflation. Food accounts for a significant share of the total consumer expenditure, and to provide relief to consumers, the government of Sri Lanka dealt with high food prices on many fronts. One measure

adopted was the reduction of the duties applicable to essential food items through a composite tax in 2008.

Until 2008, Sri Lanka had a very complex food import policy regime characterised by multiple taxes, year-to-year variations, and lack of uniformity across food commodities. The total tax calculation performed by the Department of Customs uses a composite formula which enables the government to charge taxes on taxes. The multiple taxes charged in 2008 included Customs Duty (CD), Port and Airport Development Levy (PAL), Value Added Tax (VAT), Commodity Export Subsidy Scheme (CESS), Social Responsibility Levy (SRL), Surcharge and Regional Infrastructure Development Levy (RIDL).

As stated earlier, the government introduced a single composite levy known as Special Commodity Levy (SCL) in 2008 instead of CD and other applicable taxes at the point of importation. The SCLs were initially applied on eleven essential food items, i.e., sugar, potatoes, dhal, peas, chickpeas, big onion, green gram, sprats, dried chillies, canned fish and milk powder. Later on more products were added into the SCL list, which now contains more than 32 products.

The above phenomenon can be considered as a movement towards uniformity in tariffs. In recent years, many developing countries have moved away from non-tariff barriers and highly complicated tariff structures to a few tariff rates that do not discriminate heavily across sectors. Policy economists, frustrated by the complexities of trade policy regimes in most developing countries, find the replacement of all trade restrictions by a single uniform tariff as the most effective instrument in minimizing trade policy distortions, while academic economists working in the tradition of optimal tariff and tax literature rarely think of a uniform tariff as a serious policy option (Panagariya, 1990 and 1996). A justification for a uniform tariff given by policy economists is transparency and administrative simplicity, avoidance of misclassification of goods for evasion of tariffs and ease of minimizing distortions (Panagariya, 1996).

In light of the above background, the general objective of the study is to examine the extent to which SCL influences the cost of a food basket. The specific objectives are:

(i) To compute the difference between the initial rates of tariffs as introduced in the beginning of the year and the SCL rate

(ii) To compare the cost of food basket with the SCL and without the SCL

METHODOLOGY OF ANALYSIS AND DATA

Out of more than 32 SCL levied food items, 9 were selected for analysis. Each item accounts for more than 1% of total food expenditure of the consumer food basket according to the 2009/2010 and 2012/2013 Household Income and Expenditure Survey (HIES) of the Department of Census and Statistics (DCS). The selected food items were potatoes, big onion, sugar, dried sprats, coconut oil, dhal, chilli powder, milk powder and red onions. The SCL was introduced to potato, chilli, big onion, sugar, dried sprats, milk powder and dhal in 2008, red onions in 2009 and coconut oil in 2012. They were subjected to many revisions within the year that followed.

Initial rates of tariffs for selected food items as introduced in the beginning of each year during the 2008- 2014 period were taken from the Custom Tariff Guides published annually by the Department of Customs. CIF prices of the selected commodities were extracted from the Central Bank Annual Reports and the Trade Map data base. The average monthly expenditure per person on the above items were extracted from the 2009/10 and 2012/13 HIESs and the SCLs applied on those food items were extracted from the Gazette notifications and Sri Lanka Customs. Colombo Consumer Price Indices for 2008-2014 were extracted from Central Bank Annual Reports.

The formula used by Sri Lanka Customs was used to estimate the initial total tax values for each year for each selected food item. After considering the effective time period of initial tariff rate and the effective time period of SCL, the total tax values after imposition of SCL for each and every food item was calculated. The difference between the initially announced total tax value and value after the imposition of SCL was measured for the nine food items.

Average monthly expenditure per person for each selected commodity in 2008 and 2014 were computed using the CCPI and the HIES survey data for 2009/10 and 2012/13. Considering this estimated average monthly expenditure per person for a particular food item as the expenditure in the presence of SCL, the average monthly expenditure without SCL was calculated using the percentage difference between the initially announced total tax value and the total tax value after the imposition of SCL.

RESULTS AND FINDINGS

Food Consumption Pattern of Sri Lanka

According to the 2012/13 HIES, the estimated average monthly household expenditure was Rs.41, 444 and among the major categories of household consumption expenditure, the estimated average monthly expenditure on food was Rs.15, 651. According to the 2009/10 and 2012/13 HIES, average monthly expenditure per person on food and drink was Rs. 3, 481.07 and Rs. 4, 031.97 respectively. The statistics show a clear rise in average monthly household expenditure as well as the average monthly expenditure on food from 2009/10 to 2012/13.

According to 2012/13 HIES, the highest percentage of household expenditure from total expenditure on food and drink was spent on rice (13.6%), followed by fish (9.1%), condiments (9%), milk and milk products (8.9%) and vegetables (8.2%). In the same year, the

highest expenditure was recorded on consumption of cereals followed by prepared food, other food items, fish, condiments, milk and milk food, vegetables, coconuts, meat, dried fish, pulses, sugar juggery and treacle, fruits, and fats and oils respectively. Rice is the highest consumed food item per month followed by sugar, bread and fish.

Initial Tax Rates versus SCL

Table 1 shows the average initial tax rate, average SCL rate and the difference between them during the period of 2008-2014. The highest % change reported as 32.45% for potatoes followed by Red onion (27.18%), chilli (26.065) and milk powder (24.22%).

Table 1: Percentage Change between Average Initial Tax and Average SCL (2008-2014)

Commodity	Average Initial Tax %	Average SCL %	% Change
Potato	99.49	67.04	32.45
Sugar	38.79	25.12	13.66
Dhal	20.51	10.45	10.05
B-onions	83.49	62.70	20.78
Dried sprats	25.01	11.57	13.43
Chilli	57.40	31.33	26.06
Red onion	64.94	37.76	27.18
Coconut oil	55.52	53.41	02.11
Milk powder	26.32	02.09	24.22

Each year, the total tax value after the imposition of SCL has been lower than the initial value for potato, chilli, dried sprats, red onions and milk powder. In some occasions the opposite also was observed: i.e. for sugar in 2008 and 2014, dhal in 2012, coconut oil in 2014 and big onions in 2012, SCL value exceeded initial total tax value.

Table 2: Initial Tax and the Tax after the Imposition of SCL (Rs/kg): 2008-2014

Year	Potato		Chilli		Sugar		Dhal-Whole		Dried Sprats		Coconut Oil		B 'Onions		Red Onions		Milk Powder	
	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL	Initial Tax	Tax wt SCL
2008	21.00	16.59	57.00	30.59	14.00	14.30	13.00	04.20	21.00	20.85	50.00	–	24.00	20.09	15.00	–	86.00	35.22
2009	39.00	22.44	69.00	45.51	24.00	14.42	26.00	10.32	44.00	28.32	52.00	–	29.00	22.40	18.00	16.88	100.85	84.98
2010	30.00	12.68	43.00	25.00	22.00	04.77	26.00	04.55	46.00	30.00	59.00	–	32.00	13.33	30.00	15.88	142.00	–
2011	37.00	26.36	92.00	27.01	30.00	05.00	19.00	10.00	46.00	30.00	110.00	–	30.00	15.92	37.00	25.00	170.00	–
2012	35.00	30.16	122.00	55.93	30.00	15.16	16.00	17.74	59.00	20.66	66.00	55.17	28.00	34.88	28.00	24.41	178.00	–
2013	27.00	23.34	271.00	150.00	28.00	23.25	25.00	18.00	77.00	11.80	129.00	110.00	35.00	20.86	26.00	13.77	186.00	–
2014	43.00	23.33	222.00	150.00	27.00	29.53	22.00	07.10	52.00	26.00	84.00	110.00	31.00	20.66	19.00	05.00	210.00	–

Expenditure with and without SCL

According to results indicated in table 3, the monthly expenditure per person on consumption of potatoes, dhal, chilli powder, red onions and dried sprats has reduced significantly due to the imposition of SCL during the period 2008-2014. After the introduction of SCL on milk powder the total monthly expenditure per person on milk powder shows large reductions, particularly in 2009 and 2010.

In most cases, the monthly expenditure per person on particular food items was reduced after the imposition of SCL but the opposite was also observed for big onion in 2012 and coconut oil in 2014 and sugar in 2008 and 2014.

Table 3: Percentage Change in Monthly Expenditure/Person due to the Imposition of SCL (2008-2014)

Commodity	2008	2009	2010	2011	2012	2013	2014
Potato	17.36	29.80	36.60	22.34	12.15	11.94	31.38
Sugar	-02.19	28.53	43.92	45.45	33.10	14.50	-10.34
Dhal	40.37	38.19	45.40	32.14	12.21	21.88	40.38
B-onions	14.01	18.54	36.84	31.94	-32.57	28.77	25.01
Dried sprats	00.70	26.28	25.81	25.81	39.39	45.85	33.33
Chilli	31.66	25.40	29.51	41.40	35.13	30.87	24.49
Red onion	0.00	05.95	32.01	24.49	11.36	31.99	42.42
Coconut oil	0.00	0.00	0.00	0.00	14.10	12.84	-44.82
Milk powder	38.16	13.60	0.00	0.00	0.00	0.00	0.00

Reduction in Total Food Expenditure due to SCL

The results indicate that due to the imposition of SCL, the total monthly expenditure per person on consumption of selected 9 food items was reduced by Rs.213.26, Rs.197.11, Rs.265.33, Rs.254.05, Rs.127.45, Rs.174.49 and Rs.155.46 in the years spanning 2008 to 2014, respectively.

Figure 1: Percentage Reduction in Food Expenditure due to Imposition of SCL (2008-2014)
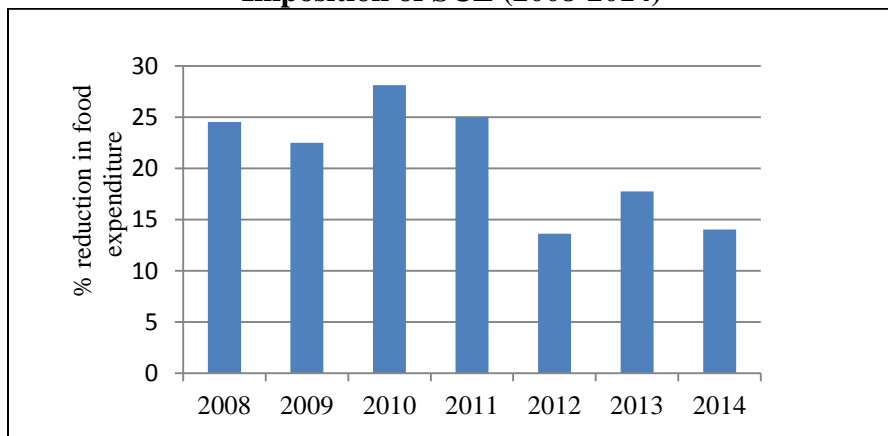
Assuming the cost of all the other food items remained the same, the reduction in total food expenditure due to the SCL was 5.66%, 7.62%, 3.16% and 4.33% in 2009, 2010, 2012 and 2013, respectively.

CONCLUSION

In conclusion, through the introduction of a single composite levy on specified commodity items in lieu of all other import taxes, the government has succeeded in reducing consumer expenditure on food and in simplifying the tax system by reducing the number of taxes and the non-uniformity of taxes across commodities. This shows that the government is attempting to move towards a uniform tariff structure which in turn will improve the transparency and administrative simplicity.

REFERENCES

Central Bank of Sri Lanka, 2008-2014. *Annual Report*, Colombo: Central Bank of Sri Lanka.

Department of Census and Statistics, 2012-2013. Household Income and Expenditure Survey 2012/13, Colombo: Department of Census and Statistics.

Panagariya, A., 1990. *How Should Tariffs be Structured?*, PRE Working Paper No. 353, The World Bank, Washington, DC.

Panagariya, A., 1996. *The Economics and Politics of Uniform Tariffs*, [Online] Available at: <http://www.columbia.edu/~ap2231/Policy%20Papers/UTRULE2-AP.pdf> [Accessed 6 July 2015].

Sri Lanka Customs, 2008-2014. *Custom Tariff Guide*, Colombo: Sri Lanka Custom.

Economics of Managing Energy Related Transport Externalities:
A Strategic Niche in Defending Public Transport Modal Share

T. Lalithasiri Gunaruwan

Senior Lecturer (Economics), University of Colombo
Sri Lanka
tlgun@econ.cmb.ac.lk

INTRODUCTION

Transportation constitutes an essential ingredient of development, particularly by way of providing the necessary mobility to factors of production (including labour and material) and outputs of economic activities (Centre for Economic Research and Industrial Policy Analysis, 2012). It is also recognised as having a significant bearing on development sustenance in all three angles, namely, Social, Economic and Environmental. Transport activities, as a productive sector in the economy, also contributes to the national value added, to the tune of around 12% by the end of 2012. Over 2.3 million motorised vehicles and 3 million bicycles were used for 10 million passenger trips daily (over 95% of which is on land), and nearly 1.5 million were employed, either directly or indirectly in the sector, of which 85% was informal (Kumarage, 2009).

However, transportation, at the same time, is recognised as associated with significant negative externalities. Emission of fumes (due to combustion of fossil fuels) causing morbidity and mortality, road congestion leading to increased travel times and thus increasing generalised costs, and accidents are the commonly found negative externalities associated with transportation. Increased traffic has

resulted in severe congestion, reducing travel speeds to little over 10 kmph in the peak hours. This has caused inefficient burning of fuel, excessive and toxic vehicular emissions, and loss of valuable time of commuters in long hours of travel. According to Yatagama et al. (2010), Colombo's atmosphere looks "unhealthier" than that of Hong Kong, Singapore, Bangkok, Taipei or Tokyo.

The consequences are costly. Sirithunga et al. (2006) found high prevalence of cough, throat irritations, nasal discharges and respiratory disorders among school children attending Colombo and Kandy schools compared to those of rural areas. Also, only 8% of children attending "city schools" could be categorised as having "perfect health" whereas the corresponding share of children attending schools outside the cities was 32% (Yatagama et al., 2010). This is mirrored by Sri Lanka's "Disability-Adjusted Life Years" (DALYs) related to transportation (Table 1), where total life years lost owing to transportation works out to be over 280000, which amounts to a value loss of approximately USD 930 Mn, if estimated based on the per-capita GDP of the economy in 2013.

Table 1: DALYs Associated with Transportation – As at 2010

Category	DALYs	Share (%)
Ambient Particulate Matter	77992	28%
Ambient Ozone	3126	1%
Lead Exposure	43041	15%
Transport Injuries	159402	56%
Total – Transport Related	283562	100%

Note: DALYs for a disease or health condition are calculated as the sum of Years of Life Lost (YLL) due to premature mortality and Years Lost due to Disability (YLD) for people living with the health condition or its consequences.
Source: Institute of Health Metrics and Evaluation (http://ghdx.healthmetricsandevaluation.org/record/sri-lanka-global-burden-disease-study-2010-gbd-2010-results-1990-2010)

It therefore becomes evident that managing transport externalities is a national priority. This research attempts to appraise the strategy of promoting public transportation in view of managing fuel consumption related transport externalities, and to assess, wherever possible, economics associated with such a strategy.

RESEARCH METHODOLOGY

The research adopts a scenario-based futuristic examination, using transport modal shares as the key to project externality effects and their economics. It considers three hypothetical scenarios (Low, Medium and High) of transport demand growth over the period between 2015 and 2020, and uses projected public and private modal ratios to constitute the "base case" applicable for each scenario. The estimated fuel savings and the corresponding emission reductions are worked out using the hypothesis that appropriate strategic interventions could prevent public transport modal share drop below 50%. Possible policy interventions which would help realise this objective also are discussed at the end. Necessary information and data are obtained from secondary sources such as published reports, professional data bases, and regulatory stipulations.

ANALYSIS

Growing Fuel-Related Negative Externalities

Inefficient burning of fuel drives this unfavourable trend; the main cause behind being high and increasing share of private transport modes, having lower carrying capacities in relation to their road space usage, and thus leading also to severe traffic congestion. It is estimated that over 80% of total fuel consumed in passenger transportation is attributable to highly "fuel intensive" private transport modes, which caters to a mere 45% of the estimated passenger transport modal share (Kumarage, 2009).

The rapid growth of private vehicle ownership is driven by the increased affordability of the general public in line with increased per-capita income (Dargay et al., 2007). Simultaneous expectations for greater comfort, travel flexibility and reduced travel times, would increasingly induce public to own and use their private modes of transport. This trend has been observed in almost all countries through their process of development. This, together with the relative stagnation of the supply and qualitative standards of public transport, have pushed the public transport modal share down to less than 60% by 2012, from as high as over 80% by the turn of the millennium. Unabated continuation of this trend would mean Sri Lanka facing greater ill-effects in the years to come, on her way towards achieving middle income country status.

Future Projections: A Scenario-Based Analysis

Table 2 depicts the platform for the scenario-based analysis to estimate the potential of reducing fuel consumption related ill-effects of transport. Public and private transport modal shares by 2020 are presented under three plausible scenarios of transport demand growth, and under the hypothesis that no explicit policy intervention would be made to manage the modal split. It is observed that the private vehicular modal share, estimated using the average income elasticity of travel demand (Gunaruwan and Jayasekera, 2012), could increase beyond 55% by 2020 if the events evolve without any policy interventions.

Expected Benefits of Sustainable Policy Interventions

The economic and environmental benefits that could be secured through the avoidance of wasteful burning of fuel, proposed to be brought about by strategic intervention to control the above projected declining trend of public transport modal share, thus, could be estimated by academically studying the hypothetical case of maintaining a minimum public transport modal share of 50% (the level in 2014) by 2020.

Table 2: Projected Modal Split – 2020: "Business as Usual" Case

Modal Class	2010 (Psgr km Bn)	2020		
		Low Estimate (Psgr km Bn)	Medium Estimate (Psgr km Bn)	High Estimate (Psgr km Bn)
Public Modes	65.65 (65%)	59.85 (45%)	72.45 (45%)	85.50 (45%)
Private Modes	35.35 (35%)	73.15 (55%)	88.55 (55%)	104.50 (55%)
Total	101	133	161	190

Source: Author's estimates based on data sets maintained by Jayaweera D S, and Kumarage A S.

Fuel Saving Potential

Table 3 summarises fuel savings that could be achieved by realising the targeted public transport modal share assuming the entire shift is from private cars to public buses.

Table 3: Expected Fuel Savings if 50% Public Modal Share is Maintained by 2020

Benefit / Cost	Low	Medium	High
Shift of Psger Km (Bn) from Pvt to Public modes	6.5	8.5	10
Saving of Pvt Veh km (Bn) @ 3 psgsr/vehicle (Vans)	2.16	2.83	3.33
Saving of Fuel on Vans (Mn Lts) @ 8 km/l	264	345	407
Addl Bus km (Bn) @ 45 psgrs / vehicle	0.14	0.18	0.22
Addl fuel (Mn Lts) @ 3.4 km / l	42	55	65
Net Fuel Saving (Mn Ltrs / Yr)	222	290	342
Foreign exchange savings potential by 2020 ($ Mn /Yr)	222	290	342

Total Fuel Savings over 6 Yrs (Mn Litres for 6 years)	666	871	1024
Total Foerx Savings on fuel over 6 years ($ Mn)	666	871	1024

Source: Estimations by the Author.

These estimates show that the transport sector could potentially reduce nearly 7% of its fuel consumption by encouraging the growing additional transport market to use public transportation instead of relying on private modes of transport. The annual savings potential corresponding to the "Medium scenario" would be USD 0.3 Bn by 2020, which would correspond to nearly 1% of the total expenditure on imports, or nearly one-third a percent of the projected GDP at market prices of the economy. The cumulative savings over the six years from 2015 to 2020, under an assumed straight-line growth of savings potential, would be nearly USD 900 Mn; which could pay off nearly 4% of the total outstanding (by end 2012) foreign debt of the country, or, if invested, could newly construct 1200 km of high-speed single carriage-way rail track, almost doubling the extent of Sri Lanka's present railway network.

Emission Avoidance Potential

These estimated fuel economics would translate into substantial reduction of vehicular emissions. Table 4 depicts the avoided emissions corresponding to the estimated fuel savings over the period of six years up to 2020, expressed in terms of total emissions, Carbon emissions and Carbon Dioxide emissions to the atmosphere. This, no doubt, will translate into substantial environmental health benefits in the medium to long run, potentially easing healthcare expenditure burden on the public coffers.

Table 4: Avoidable Emissions (in Million Tons) by Strategic Management of Transport Modal Split 2015-2020

Emission Type	CO2	CO	HC	Tot C	NOx	PM	Total
Low Estimate	1.773	0.011	0.008	0.490	0.033	0.0016	1.827
Medium Estimate	2.318	0.015	0.011	0.641	0.044	0.0021	2.390
High Estimate	2.728	0.017	0.012	0.754	0.051	0.0025	2.811

Sources:

- *Estimates based on USEPA data (www.epa.gov/otaq/climate/documents/420f11041.pdf)*
- *Hong et at (2012), Atmospheric Environment Vol: 54; p.163*
- *Mobile Emission Factors, Environment Canada (www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=AC2B7641-1)*

It is also noteworthy that any portion of such effort to defend the public transport modal share, through railway playing a greater role, would further enhance the realisable fuel saving benefits as transport by railway is likely to be much less fuel intensive. For instance, Gunaruwan and Sannasooriya (2013) demonstrated that a modal shift of freight transport from road to railway would help secure significant fuel saving benefits.

Investment Requirements

The above analysis indicates the potential savings on fuel imports and reduction of emissions that could be achieved through relying more on public modes for both passenger and freight transportation. A question could, however, be raised as to what levels of capital injections that would be necessary to realise such an objective. Technically, 4500 more buses would be needed to the fleet by 2020 if the bus sector is to carry 10 Bn more passenger kilometres by then, corresponding to the "High" estimate in Table 3, which would mean an additional capital injection of approximately USD 200 Mn in six years. This estimated injection is only one-fifth of the realizable fuel saving benefits of USD 1 Bn, even if the external benefits are

completely ignored, indicating the overall viability of such a strategic approach.

It must be noted, however, that such a modal shift would make approximately 3 Bn private vehicle km (if three persons per vehicle in average is assumed) unnecessary, which would amount to a potential capital saving on private vehicles of approximately USD 1.5 Bn over the next six years, assuming a lower side estimate of investment requirement on four wheeler vehicles. Moreover, the necessity to expand the highway capacity also would be correspondingly less because public modes of transport are much more "space efficient" than private vehicles.

Therefore, such a modal shift from private modes of transport to public modes can be considered "investment economising" and not needing any additional capital injections, and thereby would correspond to a "win-win" strategy.

A similar modal shift, if realised towards railway, would be even more beneficial in the long run, though the initial additional capital outlay required railway would be more. This is because railway rolling stock have several fold longer life spans compared to buses and also because greater relative fuel savings could be realised through a modal shift from road to rail.

CONCLUSIONS

The study clearly demonstrated that a modal shift away from private transport modes to public modes will be associated with significant national economic and environmental benefits, particularly at the angle of fuel consumption efficiency. It could therefore be concluded that the Government of Sri Lanka should strategically intervene to prevent or retard the presently observed declining trend of public transport modal share. It should vigorously pursue a public transport

priority policy, particularly focusing on greater fuel economics, which yields both foreign exchange saving and emission reduction benefits.

This strategy of public transport promotion would figure in the middle of three-pronged strategic framework to secure economic and environmental benefits through reduction of fossil fuel consumption in the transport sector (Gunaruwan, 2014). Firstly, the Government should further intensify its currently pursued efforts to reduce emissivity in all modes of transportation. This should essentially consist of improving combustion efficiency of existing fleet of motor vehicles, introducing new and less energy intensive vehicles (such as hybrid and electric motorisation) within the current modal structure, and switching for better and less polluting fuel varieties. The Government may also consider strategically adjusting taxation and pricing policies associated with vehicle imports and petroleum products. Secondly, and in the middle, figures the vigorous pursuance of public transport promotion policy, the core theme of the present research. All encouragements should be provided to promote public transportation, with particular emphasis on the railway mode. Railway infrastructure development should be strategically favoured over highway or expressway development in relation to public investment choice. A vigorous drive to uplift the standards and attractiveness of railway services is a necessity. The existing policy biases against railway transportation, such as railway having to cover infrastructure maintenance cost while the road-based competitor modes are given highway usage right free of charge, have to be explicitly addressed and eliminated. Third, sustainable mobility drive also requires minimization of unproductive transport demand, which has to be addressed through transport demand management strategies. Transport substitution methods such as telecommunication have to be implemented with a view to minimise that share of derived demand for mobility which is costly and avoidance, wherever feasible, is beneficial. Appropriate land-use planning and bringing the social infrastructure facilities (such as schools, hospitals and public

services) closer to human settlements also will help reduce demand for travel, thus saving on transport costs and reducing emissions.

REFERENCES

CERIPA, "*Transport Development Sustenance : Sector Report for Transport*", Report Prepared for the Government by T L Gunaruwan, Centre for Economic Research and Industrial Policy Analysis (CERIPA), University of Colombo, 2012.

Dargay J, Gately D, & Sommer M, "*Vehicle Ownership and Income Growth,   Worldwide: 1960-2030*",   2007 http://www.econ.nyu.edu/dept/courses/gately/DGS_Vehicle%20Ownership_2007.pdf

Gunaruwan T L, "*Environmental Action in the Transport Sector of Sri Lanka*", Report (unpublished) submitted to the World Bank in view of compiling the Policy Action Note on Fiscal and Economic Benefits of Environment Action, Colombo, April 2014.

Gunaruwan T L and Jayasekera D H W, "*Transport Sector Driving Economic Activities in Sri Lanka : Opportunities and Challenges*", South Asia Economic Journal, Vol 13 (2), 2012.

Gunaruwan T L and Sanasooriya I, "*Transport Modal Deployment for Petroleum Haulage in Sri Lanka : A Linear Programming Optimisation Analysis",* Proceedings of the Sri Lanka Economic Research Conference-2013, Sri Lanka Forum of University Economists, Peradeniya, Sri Lanka, December 2013, pp 55-61.

Hong H, Zhiliang Y, Yingzhi Z, Xianbao S, Qiang Z, Kebin H, "*On-board measurements of emissions from diesel trucks in five cities in China*", Atmospheric Environment, Vol 54, 2012, pp 159-167

Kumarage A S, *Presentation slides at the University of Colombo, Sri Lanka,* 2009

Sirithunga T L J C, Kumarasiri R P K, Illeperuma O A, "*Effects of outdoor air pollution on the respiratory health of children in a rural and an urban area in the Kandy district*", "Air That We Breath", National Symposium on Air Resource Management in Sri Lanka: 2006.

Yatagama L S N, Wickremasinghe A R, Sathiakumar N (2010), "*Air Pollution and Health in Sri Lanka : a review of epidemiologic studies*", BMC Public Health10:300 DOI:10.1186/1471-2458-10-300, ISSN 1471-2458 .

Two-Gap Model of Development: Relevance and Applicability to Rural Development in Sri Lanka

A.J.M. Chandradsa

Department of Economics, University of Ruhuna, Matara.
chandrabeykoon@gmail.com

INTRODUCTION

Sri Lanka, with a population of over 20 million is endowed with human and natural resources. Agriculture remains the dominant sector of the economy, despite the relative decrease of its share of output as a percentage of GDP. Macroeconomic data gathered by the Central Bank of Sri Lanka suggest that significant improvements in the macroeconomic variables related to internal balance have been achieved by the country in the recent past. Economic growth in last fifteen years, for example, has averaged out at 5.7% with the highest growth rate of 8.2% recorded in 2011. Unemployment rate has continually declined, reaching 4% in 2012 from 8.8% in 2002. Per capita income GNP at market prices in US$ terms has remarkably increased to $2,866 in 2012 from $ 881 in 2000. In the government fiscal operation, budget deficit averaged 7.8% in the period 2000 - 2012. However, variables relating to external balance in the country during the study period indicate a crisis situation. For example, Sri Lanka faced its worst balance of payments (BOP) crisis in terms of current account deficit over the period, 2002-2012. Sri Lanka's share of world exports has declined from 0.08% in 2008 to 0.05% in 2010 and the ratio remained stable for the next five years. The outstanding foreign debt ratio was nearly 50% of GDP for the decade, means that Sri Lanka's economy largely depends on foreign assistants. The situation is a result of two problems: a savings-gap (or savings constraints) internally and a trade gap (or foreign exchange constraints) externally. With this context, the two-gap model of

development will be used to explain the current situation of the Sri Lankan economy from a policy making point of view.

Research Problem

Export diversification has gained more attention by policy makers in successive governments of independent Sri Lanka by means of solving the foreign exchange constraints. However, export diversification in the agricultural sector has lagged behind expectations. This was mainly due to the lack of knowledge and information among potential investors about theory, policy and opportunities to invest in the agricultural sector. This study attempts to fill the gap.

Objective of the Study

The objective of this study is twofold:

(i) To examine whether or not the theoretical prescription that the two-gap model of economic growth purports to hold in Sri Lanka and

(ii) If not, how the Sri Lankan economy may be guided towards the correct path using policies suggested by the two-gap model of development.

METHODOLOGY

The two-gap model is based on the gap between the country's own provision of resources and its absorptive capacity. Post Keynesian growth models have identified two major constraints: lack of savings and foreign exchange in the effort to develop the developing countries like Sri Lanka. An incidence of inadequate domestic savings or inappropriate mobilisation of savings for financing planned investment is termed a savings constraint (savings-gap). This gap can be corrected by encouraging foreign direct investment otherwise known as foreign capital inflow. On the other hand foreign

exchange constraints or trade-gaps exist where export earnings fall short of the amount needed to purchase necessary intermediate imports and capital imports. This problem can correct using external assistance such as foreign debt and grants.

The derivation of the two-gap model can start with the basic macroeconomic identity where aggregate output = aggregate expenditure. Thus, assuming there is no government sector:

$$Y = C + I + (X - M) \text{-------------------------------[01]}$$

Where, Y = GNP; C = Consumption; I = Investment of Gross domestic capital formation; X = Exports and M = Imports

The variables in equation [01] can be divided into two as:

Source of resources in the economy = Use of resources in the economy

$$Y + M = C + I + X$$

Subtracting C from both sides we get:

$$Y + M - C = I + X$$

Since $Y - C = S$ (where S is domestic savings):

$$M + S = I + X$$

This relationship can be rearranged focusing as internal and external factors:

$$M - X = I - S \text{---[02]}$$

Trade-gap = Saving-gap

These two constitute two separate constraints, meaning that eliminating one does not get rid of the other. Planned investment in an economy can be financed by using domestic savings as well as through inflows of foreign capital. If we let $(M - X) = F$, then we can represent the equation [02] as follows:

F = I –S or as in the text I = F + S---------------------------------------[03]

Total foreign inflows to a country could be in the form of foreign aid [FAID], foreign borrowing [FBR] or foreign direct investment [FDI].

In empirical literature, MaKinnon (1964), Chenery and Stout (1966), Findlay (1978) and others applied the Harrod-Dormar growth model to show that foreign capital inflows can raise the growth rate by raising the availability of capital for production, where the capital output ratio remains constant. With this theoretical and empirical literature, six exogenous variables affecting growth can be identified under the two-gap model. These include Exports (X), Imports (M), Investment (I), Foreign Aids (FAID), Foreign Debt (FD), and Foreign Direct Investment (FDI). If we assume non-inter-correlation between these variables and the existence of a linear relationship to GDP growth (GDPG), we can develop a linear function: ,

$$GDPG = \propto_0 + \propto_1 X + \propto_2 M + \propto_3 I + \propto_4 \text{FAID} + \propto_5 \text{FD} + \propto_6 \text{FDI} + \varepsilon \text{ [04]}$$

Where $GDPG$ is the annual average growth rate of real GDP, $\propto$ are coefficients, all the variables from X to FDI are ratios to GDP and ε defined as an error term.

FINDINGS AND DISCUSSION

We regress six independent variables in the right-hand side of the equation [04] against economic growth which is the dependent

variable in order to achieve the first objective of the study: "to examine whether or not the theoretical prescription of the two-gap model of economic growth holds in Sri Lanka?" during the country's second wave of trade liberalization (1989-2013).

Table 1: Model Summary

R^2	Change Statistics				
	R^2 Change	F Change	df1	df2	Sig. F Change
.466	.466	2.477	6	17	.066

The model summary in table 1 indicates that change of F statistic (2.477) is statistically significant at 10% confidence interval. It means that fitness of the model is statistically significant at highest level.

Table 2: Coefficients

Model	Standardized Coefficients		
	Beta	T	Sig.
(Constant)	-8.738	-1.350	.195
X	.198	.410	.687
M	-.316	-.664	.516
INV	.748	2.425	.027
GRANT	.192	.668	.513
DBT	.083	.236	.816
FDI	.228	1.101	.286

Estimated data in Table 2 shows that all the explanatory variables except imports are positively correlated with the GDP growth rate in Sri Lanka. Another important finding is that there is a strong relationship between investment and GDP growth rate in the study period. For example, *t* value (2.425) for the investment coefficient is statistically significant at 5% confidence level. On the question of external financial inflow, this study found that less contribution of

external debt to economic growth but relatively higher contribution of FDI in economic growth in the country. Although export sector contribution to GDP growth was positive, the coefficient is not statistically significant. The findings based on Table 2 support the idea that the Sri Lankan economy exhibits the theoretical prescription that the two-gap model of economic growth purports.

To prove this idea, we have to introduce a new variable, Current Account Balance of the BOP, to our analysis, and explore its relationship to investment which was relatively the most significant contributor to GDP in our estimated model. To see this we estimate the following simple regression:

$$CAB = f(In)$$

Where, CAB is the Current Account Balance of the Balance of Payments as a ratio of GDP and *In,* the investment ratio. The estimated equation appears below.

CAB = - 0.29 – 0.56(In)---[05]

$R^2 = 55$, t = 3.155 and *sig 0.005*

Estimated equation [05] indicates that a 100 dollar investment in the economy results in a 56 dollar cents increase in the deficit of the current account balance of the BOP. Taking findings based on equation [04] and [05] together, it can be concluded that Sri Lanka's economic behavior can hold in the mid-way of the theoretical prescription that the two-gap model of economic growth postulated.

Now we can explore the second objective: how can the Sri Lankan economy be guided towards the correct path using policies which have been suggested by the two-gap model of development? To see this, we have to summarize the postulate made by the two-gap model of development.

Figure 1 explains the theory of the complete two-gap model of development, where the vertical axis measures two constrains: savings gap (S-I) and trade gap (M-X) while the horizontal axis represents the macro equilibrium or internal and external balance simultaneously.

Figure 1: Complete Two- Gap Model: Graphical Presentation
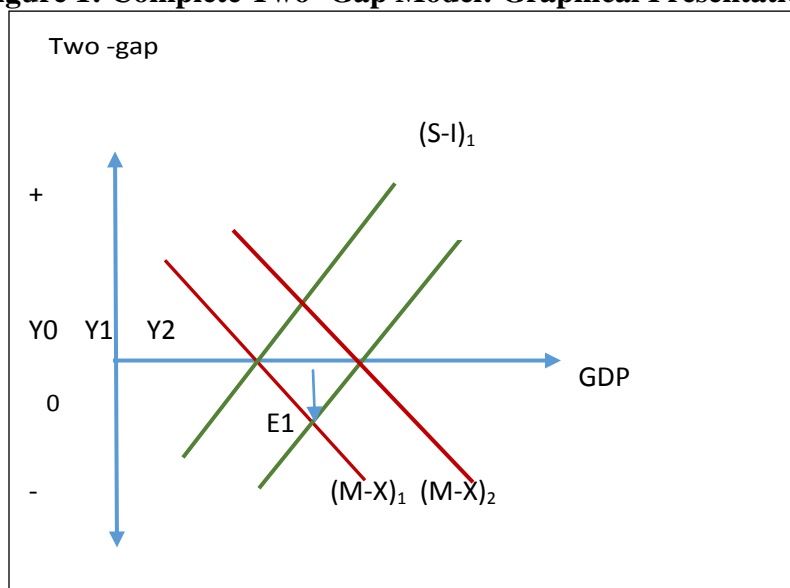
Initially the economy is in equilibrium at Y0 level of output - however this income level is far below the potential GDP (e.g. Y2). Now suppose the economy has planned a national investment project (without focusing any specific economic sector) using external financial sources expecting a higher level of growth. The policy will result the (S-I)1 curve in Figure 1 to shift rightward along (M-X)1 curve, and achieve a relatively higher level of equilibrium income Y1, corresponding to new equilibrium at point E1. At E1 however there is a widened current account deficit. As shown in Figure 1, Y1 is less than the potential level of GDP (Y2) in the economy, a theoretical characteristic similar to the current economic situation of Sri Lanka. The policy recommendation suggested by the two-gap model is that foreign inflows should be invested in the export sector which has the capability to gain a relatively greater competitive

advantage. This policy will result in a shift of the (M-X)1 schedule upward to (M-X)2 and a higher level of macro-equilibrium where external and internal balance can be achieved simultaneously.

The next important question is the choice of an appropriate export sector in which to invest foreign inflows (including FDI or grant or foreign debt) in order to hold the Sri Lankan economy in the two-gap model in development. In empirical literature, using panel data for 22 countries over 1984-2000, Asiedu (2005) found that presence of a number of conditions (or absolute advantages) including natural resources, large markets, educated population, openness, political stability and good governance support in gaining higher benefits from foreign inflow of capital. Since most of these conditions in Sri Lanka are fulfilled by the minor agricultural sector, we choose the fruit and vegetable sector as ideal for rural development using two-gap development model.

Why the Fruit and Vegetable sector? As shown combined Figure 2 and 3 for example, there is growing export performance in the fruit and vegetable sector of the country in terms of both the share contributed to merchandized exports and export earnings over the past decade. The other striking factor is that the sector has a large market worldwide (Figure 4 and 5).

Figure 2: Fruit and Vegetables Contribution to Merchandize Exports in Sri Lanka 2005-2014
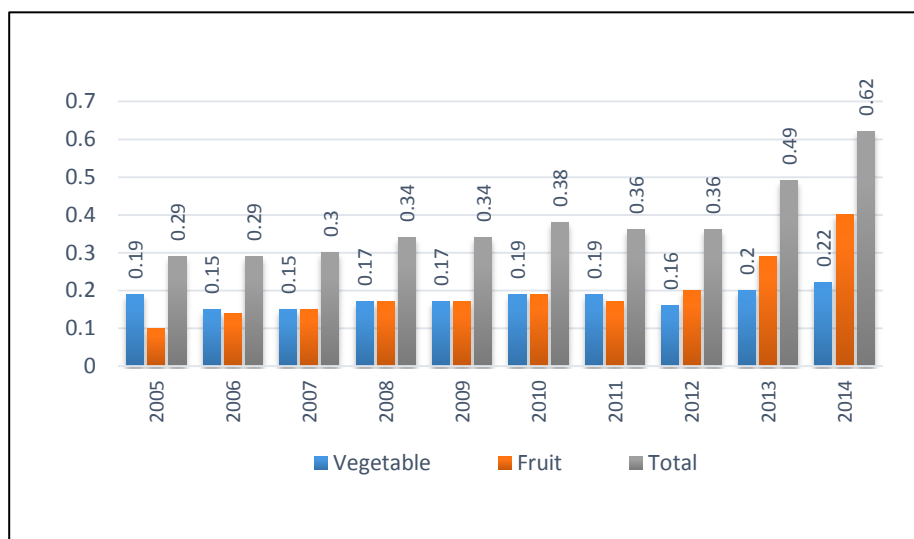
Source: Export Development Board

Figure 3: Export Performance Fruit and Vegetable Secrtor in Sri Lanka 2005-2014
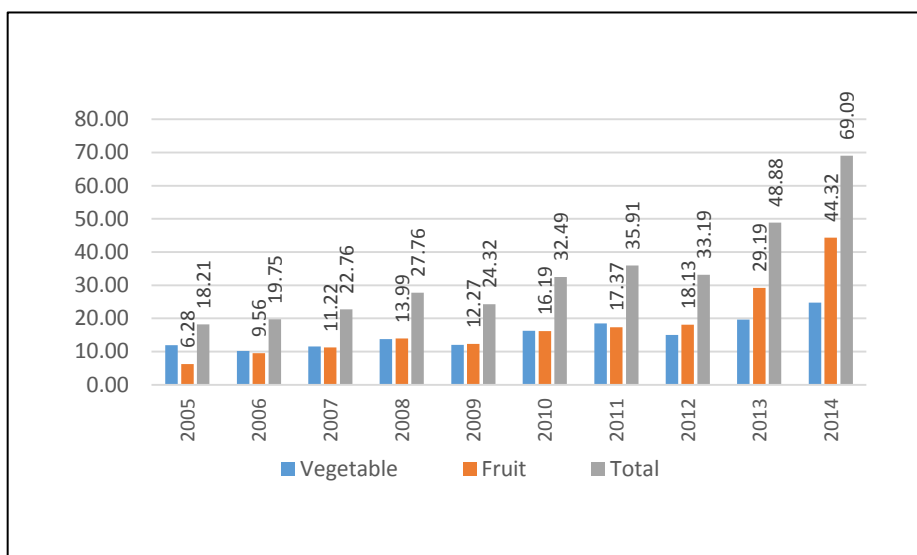
Source: Export Development Board

Figure 4: Major Market Fruit Sector in Sri Lanka 2005-2014

Source: Export Development Board

Figure 5: Major Market Vegetable Sector in Sri Lanka 2005-2014

Source: Export Development Board

In addition to the growing export performance of the fruit and vegetable sector, Sri Lanka has an absolute advantage due to its natural and man-made facilities, naturally rich soil, wide range of agro climatic zones, and well distributed rainfall patterns together with its strong network of irrigation facilities supported by an intelligent educated younger generation to facilitate uninterrupted production from the sector.
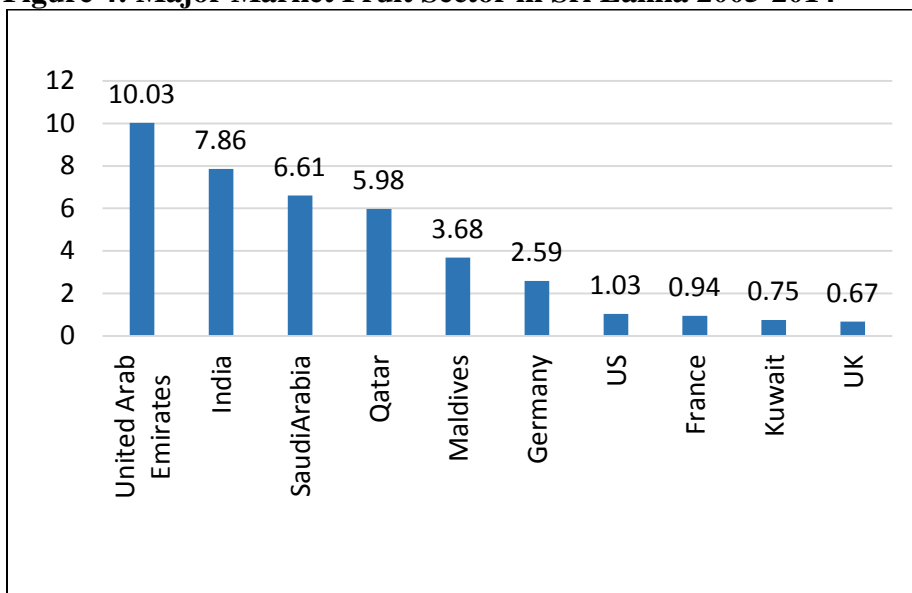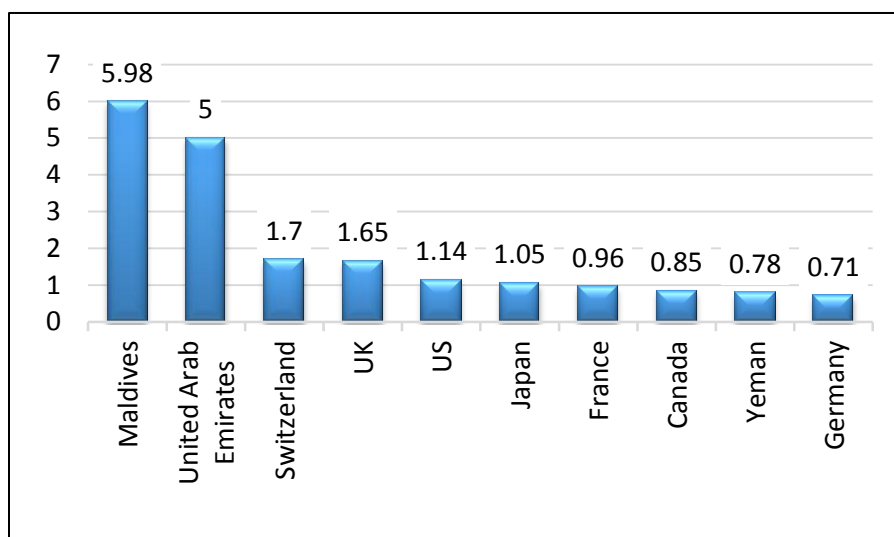
CONCLUSION

This study has explained the central importance of developing the fruit and vegetable sector in Sri Lanka for export led growth through rural development using the two-gap development approach. The most obvious finding to emerge from this study is that the Sri Lankan economy is currently experiencing the mid-way features of a two-gap development model. The findings of this study suggest that foreign financial inflows should be invested to develop the minor agricultural export sector, particularly the fruit and vegetable sector, to achieve internal and external balance in the country. The current findings add to a growing body of literature applying the exogenous growth model to small open economies like Sri Lanka. Future research should therefore concentrate on investigation into strategies to develop fruit and vegetable production as an export sector using new technologies and rural natural and human resource endowments.

REFERENCES

Asiedu, E. (2002). "On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different?", *World Development,* 30(01), pp.107-19.

Central Bank of Sri Lanka, Annual Report, various years.

Chenery, H. B. and Stout,T. (1967). "Foreign Assistance and Economic Development", *American Economic Review*", 55, pp. 679-733.

Findlay, R. (1978). "Relative Backwardness, Foreign Direct Investment and the Transfers of Technology: A Simple Dynamic Model", *Quarterly Journal of Economics,* 92, pp. 1-16.

MaKinnon, R. E. (1964). "Foreign Exchange Constraints in Economic Development and Efficient Aid Allocation", *Economic Journal*, 74, pp.388-409.

International Trade & Finance

Review of Competitive Advantage Measurements: The Case of Agricultural Firms

Vilani Sachitra

Lecturer, Department of Commerce, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
Vilani3164@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

Competitive advantage is an important factor in retaining the long-term prosperity of a nation (Porter, 1990). At the level of individual firms, competitiveness is the ability of a firm to survive and prosper. Creating and sustaining competitive advantage hence requires firms to always stay ahead of competition (Hoefter, 2001).

Competitiveness of global agribusiness has raised concerns among economists and policy makers about the need for competitive advantage in the agribusiness sector of developing countries (Dziwornu, 2014) such as Sri Lanka. A better understanding of the measurements of competitive advantage in agriculture products hence provides the necessary framework to enhance competitiveness in both domestic and global markets.

The agricultural sector plays an important role in the development of any nation's economy (Nwachukwu et al., 2014) while contributing significantly to its exports, employment opportunities, and expansion of its production base of any nation. In view of the Sri Lankan economic structure, as at independence in 1948 agricultural product exports - tea, rubber and coconut - contributed more than 92 percent of total export earnings. Currently, 24.8 percent of total export earnings derive from agricultural sector exports. The contribution of agricultural sector towards country's gross domestic product (GDP)

is 12.1 percent. Further, it accounts for 35.6 percent of employment (Central Bank of Sri Lanka, 2014).

With that much of contribution, it is required pay close attention to competitive advantage in the agricultural sector. Towards this end, it is necessary to adopt a valid and reliable measure of competitive advantage (Sigalas et al., 2013). Hence, this study attempts to critically review the measurement criteria of competitive advantage and to develop an operational definition of competitive advantage and a measure at agricultural firm-level.

LITERATURE REVIEW

Competitive Advantage Definitions

Prior definitions of competitive advantage most commonly focused on indicators such as profitability, productivity, and market share (Kennedy et al., 1997). Competitive advantage is regarded as part of the foundation for high level performance (Ismail et al., 2010). A firm's ability to improve the quality of its products, reduce costs, or enlarge market share or profit is known as competitive advantage (Grupe and Rose, 2010). Porter (1990) defines competitive advantage at firm-level as productivity growth that is reflected in either lower costs or differentiated products that charge premium prices. Smith (2013) indicates that competitive advantage is the extent to which firms in a specific region can compete with firms elsewhere. Newbert (2008) defines competitive advantage as the degree to which a firm explores its opportunities, neutralizes threats, and reduces cost. However, Sigalas et al. (2013) argue that exploring opportunities, neutralizing treats and reducing costs represent the degree of *competitiveness* of a firm.

From the above definitions, competitive advantage appears to be relative. As concluded by Esen and Uyar (2012), competitive advantage is a situation defined and measured as against a

competitor. As such, there is no common definition of the term competitive advantage, either in theory or in practice (Grupe and Rose, 2010). Piatkowski (2012); Sigalas and Economou, 2013; and Sigalas et al. (2013) highlight that the term competitive advantage does not have a uniform definition in national or international literature. The theory of competitiveness is constantly developing.

After having reviewed the constructed definitions, the study composes its operational definition of competitive advantage. This definition of competitive advantage can be expressed as a specific way of using resources available and other precise activities to keep firms separate from their competitors as well as to keep them active and growing. From the given definition, competitive advantage consists of three characteristics: (Meutia and Ismail, 2012) namely; survival, difficulty to imitate, and difficulty in identification. However, this definition should be viewed as a generic rather than a specific guide to future studies. The lack of a uniform theoretical and operational definition of competitive advantage causes an unclear operationalization of the concept.

Measurements of Competitive Advantage

In concert with the concept of competitive advantage, there is a rich foundation for measurements of competitive advantage in relation to different sectors or industries (Kiel et al., 2014). Competitive advantage can be analyzed by using past performance indicators or potential competitiveness indicators, for example: market share, productivity (Farole et al., 2010, Kortelainen and Karkkainen, 2011); product cost, gross margin, returns on assets, net income, unit cost ratio (Toit et al., 2010); total factor productivity (Yee et al., 2004); Revealed Comparative Advantage (RCA) (Balassa, 1977); Domestic Resource Cost (DRC) and Social Cost Benefit Ratio (SCB) analysis (Nivievskyl and von Cramon, 2008); financial performance (profit, sales growth, returns of investment), non-financial performance (customer satisfaction, employees growth (Rahman and Ramli,

2014); and benchmarking, balanced scorecard (Kozena and Chladek, 2012).

In order to measure competitiveness at the firm level, the assessment should include determinants from firm level factors (Porter, 1990). Productivity, market share, and profitability are traditional economic indicators to measure competitive advantage. In fact, studies by Delgado et al. (2012), Farole et al. (2010), Frohberg and Hartmann (1997), Kortelainen and Karkkainen (2011), Rahman and Ramli (2014), Sagheer et al. (2009), and Voulgaris et al. (2013) have concluded that in order to measure a firm's competitive position, market share is an important indicator. Delgado et al. (2012), Farole et al. (2010), Kortelainen and Karkkainen (2011), Kozena and Chladek (2012), Nivievskyl and von Cramon (2008), Notta and Vlachvei (2011), Petrovic et al. (2008), Voulgaris et al. (2013), Yee et al. (2004) have utilized productivity as a measurement indicator of competitive advantage. Similarly, the studies of Dziwornu (2014), Grant (2001), Notta and Vlachvei (2011), Omerzel and Gulev (2011) use profitability as a measurement indicator.

DISCUSSION

Measurement of competitive advantage of the agriculture sector is concerned with relative market share, productivity, profitability, and RCA indices. The RCA index is widely used to measure competitive advantage in agricultural sector (Bojnec, 2003; Gaytán and Benita, 2014; Ferto and Hubbard, 2003; Kumar and Rai, 2007; Thamiem et al., 2011; Zhemoyda and Gerasymenko, 2009). However, Latruffe (2010) claims that the RCA measures competitive advantage at aggregate level rather than firm level. In order to measure competitiveness at the firm level, an assessment should include determinants from the firm level factors.

The study of Notta and Vlachvei (2011), use market share, profitability, and productivity as measurement indicators of competitive advantage for the food and beverage manufacturing industry. Kozena and Chladek (2012) measure competitive advantage of agricultural sector utilising productivity as a ratio indicator. Woodford et al. (2003) use productivity to assess competitiveness of the dairy farming sector. In addition, Toit et al. (2010) employ profitability to measure competitiveness of commercial milk producers in South Africa, while Yee et al. (2004) utilize total factor productivity of agricultural firms in South-eastern States.

However, there are certain limitations to productivity and profitability measures: among them the lack of availability and reliability of data, and failure to measure quality (Voulgaris et al., 2013). Any measurement indicator of a firm's competitiveness should take into account a long- rather than short-term orientation. The concept of profitability may be ambiguous because it requires the definition of a period of time over which the measurements are carried out (Depperu and Cerrato, 2005). Productivity in the agricultural sector can be defined in different terms, namely land productivity, labour productivity and capital productivity. There is no universally accepted criterion: Notta and Vlachvei (2011) use labour productivity, whilst Kozena and Chladek (2012) employ land, material and labour productivity.

In addition, Fischer and Schornberg (2007) claim that both profitability and productivity are taken as determinants of competitive advantage. Acknowledging that claim, Wijnands et al. (2008) insist that labour productivity is a determinant of competitive advantage and Woodford et al. (2003) find that productivity is a determinant of competitive advantage. Hence, Latruffe (2010) concludes that competitive advantage could be measured through firm level concepts such as, price/cost, net income, time, flexibility, sales growth, and employee growth.

Similar to the limitations of productivity and profitability dimensions, lack of availability and reliability of financial data on total market sales keep market share away from the dimension of competitive advantage measurement. While competitive advantage is often observed through changes in market share, a firm or country may hide its competitive weakness by manipulating price or exchange rate (Farole et al., 2010). This limitation becomes more severe in the agricultural sector because many farms operating in the sector are family-owned and are mostly small and medium scale enterprises (SMEs). As such, although market share is one indicator that a firm can use to measure its competitive advantage (Fischer and Schornberg, 2007), it may be problematic when analyzing aggregates.

In order to measure small scale firms' competitive advantage, previous studies used non-financial performance indicators than financial performance indicators. The main reasons behind the selection of non-financial performance indicators are that small-scale firms lack human resources to establish performance measurement and there is no appropriate culture of collecting data for the decision making process (Heilbrunn et al., 2011). Therefore, subjective measurement indicators are frequently used to measure SMEs' performance (Sidik, 2012 in the form of sales growth and employee growth.

Wilson and Thompson (2003) to conclude that indicators which are used to measure competitive advantage are uncertain due to difficulties in defining it. Therefore, it is a complicated task to reach consensus on methods of measuring competitive advantage in the agricultural sector. A unique measure of competitive advantage in agriculture sector hence provides supplementary value for enhancing competitive advantage.

CONCLUDING REMARKS

Competitive advantage is adopted as a management or economics idea that is superior to the traditional economic indicators such as profitability, productivity, or market share (Voulgaris et al., 2013). However, traditional indicators can only reflect the historic quantitative facts. Depperu and Cerrato (2005) argue that a single explanatory factor of firm performance is not an adequate indicator of competitiveness. Therefore, competitive advantage is considered a multidimensional construct, including a number of indicators jointly adapted to measure the concept.

Considering prior studies' proposed measurements of competitive advantage and their limitations, the studies of Awwad (2011), Sukati et al. (2011), and Thatte (2007), operationalize the competitive advantage construct using price/cost, delivery dependability, and time-to-market dimensions. In order to overcome the limitations of data availability and reliability when measuring market share and profitability in assessing the competitive advantage of the agricultural sector, subjective measurement indicators like sales growth and employee growth need to be utilized.

After developing the inclusive operational definition, it is required to construct valid and reliable measurements of competitive advantage of agricultural sector firms. Thus, based on levels of measurement classified as Awwad (2011), Sidik (2012), Sukati et al. (2011), and Thatte (2007), the variable will be firm competitive advantage. The items included in five dimensions of the competitive advantage will number fifteen, and be derived from their operational definitions. The values of the items depend on whether the items are measured through scale or ratio (Sigalas et al., 2013). Firm competitive advantage is an unobservable construct (Sukati et al., 2011) and hence, measurement will be carried out by a latent variable (Sigalas et al., 2013). The values of the items will be based on scale and the

selected scale is the five-point Likert scale. The measurement level of firm competitive advantage is shown in Figure 01 (Annexure 01).

The proposed measure of competitive advantage of an agricultural sector firm needs empirical assessment with respect to the respondents who represent the agricultural sector. The assessments of content validity, convergent validity, discriminant validity, predictive validity, concurrent validity, reliability, inter-rater reliability, and test-retest reliability need to be carried out in order to develop a reliable and valid measure of competitive advantage. In so doing, the scholarly community will have an empirically tested measure of competitive advantage. Hence, the newly developed measure of competitive advantage could be used for valid measurements in future empirical studies, especially in agribusiness sector. Further, review of comprehensive operational definitions for competitive advantage could enhance practitioners' attentiveness to establish competitive advantage of their firms' physical and human resources, capabilities and market.

REFERENCES

Awwad, A. S. 2011. "The Influence of Tactical Flexibilities on the Competitive Advantage of a Firm: An Empirical Study on Jordanian Industrial Companies", International Journal of Business and Management, Vol. 6(1), 45-60

Balassa, B. 1977. "Revealed comparative advantage revisited: An analysis of relative export shares of the industrial countries 1953-1977", The Manchester School, Vol. 45, 327-344

Bojnec, S. 2003. "Three concepts of competitiveness measured for livestock production in Central and Eastern Europe", Agriculturae Conspectus Scientificus [online], Vol.68 (3), 209-220

Central Bank of Sri Lanka. 2014. Annual Report, Central Bank of Sri Lanka, Colombo

Delgado, M., Ketels, C., Porter, M.E. and Stern, S. 2012. "The Determinants of National Competitiveness" NBER Working Paper No. 18249

Dziwornu, R.K., and Raymond K. 2014. "Econometric analysis of factors affecting competitive advantage of broiler agribusinesses in Ghana", Journal of Development and Agricultural Economics, Vol. 6(2), 87-93

Esen, S., and Uyar, H. 2012. "Examining the competitive structure of Turkish tourism industry in comparison with diamond model", Journal of Procedia - Social and Behavioral Sciences, Vol. 62, 620 – 627

Farole, T., Guilherme R. J., and Wagle, S. 2010. "Analyzing trade competitiveness: A diagnostics approach", Policy Research Working Paper 5329, The World Bank, Poverty Reduction and Economic Management Network, International Trade Department

Farole, T., Guilherme R., J., and Wagle, S. 2010. "Analyzing trade competitiveness: A diagnostics approach", Policy Research Working Paper 5329, The World Bank, Poverty Reduction and Economic Management Network, International Trade Department

Ferto I., Hubbard L. J. 2003. "Revealed comparative advantage and competitiveness in Hungarian agri-food sectors". The World Economic, 26(2): 247–259

Frohberg, K., and Hartmann, M. 1997. "Comparing measures of competitiveness", Discussion Paper No:2, Institute of Agricultural Development in Central and Eastern Europe

Gaytán, D., and Benita, F. 2014. "On the competitiveness of Mexico's dry chili production", Economics of Agriculture, Vo. 61(2), pp. 307-317

Grupe, C., and Rose, A. 2010. "China, India, and the Socioeconomic Determinants of Their Competitiveness", Journal of Economics Research International [online], Vol. 2010, 860425, 1-15

Heilbrunn, S., Rozenes, S., and Vitner, G., 2011. "DEA" Based Taxonomy to Map Successful SMEs", International Journal of Business and Social Science, Vol. 2 (2), 232-241

Hoefter, A. F. 2001. "The competitiveness of Ghana's Industry", *Msc thesis*, Chinese Culture University, Taipei [online], Available from: http://verdi.unisg.ch/www/edis.nsf/SysLkpByIdentifier/2494/$FILE/dis2494.pdf (Accessed 05/02/2015)

Ismail, A.I., Rose, R. C., Abdullah, H., and Uli, J. 2010. "The relationship between organizational competitive advantage and performance moderated by the age and size of firms", Asian Academy of Management Journal, Vol. 15(2), 157–173

Jack, E., and Raturi, A. 2002. "Source of volume flexibility and their impact on performance". Journal of Operations Management, Vol. 20, 519-548

Kennedy, P. L., Harrison, R.W., Kalaitzandonakes, N.G., Peterson, H.C., and Rindfuss, R. P. 1997. "Perspectives on Evaluating Competitiveness in Agribusiness Industries", Agribusiness, Vol. 13(4), 385–392

Kiel, J,. Smith, R., and Ubbels, B. 2014. "The impact of transport investments on competitiveness", Transportation Research Procedia, Vol. 1, 77 – 88

Kortelainen, S., and Karkkainen, H. 2011. "Dynamic model in understanding dynamics of competitiveness: system dynamics approach in mobile handset vendor business" [online], Available from: www.systemdynamics.org/conferences/2011/proceed/papers/P1283.pdf (Accessed 27/06/2014)

Kozena M., and Chladek, T. 2012. "Company competitiveness measurement depending on its size and field of activities". Journal of Procedia - Social and Behavioral Sciences, Vol. 58: 1085 – 1090

Kumar, N.R., and Rai, M. 2007. "Performance, Competitiveness and Determinants of Tomato Export from India", Agricultural Economics Research Review, Vol. 20, 551-562

Latruffe, L. 2010. "Competitiveness, Productivity and Efficiency in the Agricultural and Agri-Food Sectors", OECD Food, Agriculture and Fisheries Papers, No. 30, OECD Publishing

Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., and Rao, S. S. 2006. "The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance". Omega, Vol. 34, 107-124

Martinez, J.A., Bonales, J., Zamudio, A.G., and J. Gaytan. 2014. "Competitiveness's Determinants in the Avocado Export Sector's Value Chain", American Journal of Experimental Agriculture, Vol. 4(3): 275-289

Meutia, T. I.. 2012. "The Development of Entrepreneurial Social Competence and Business Network to Improve Competitive Advantage and Business Performance of Small Medium Sized Enterprises: A Case Study of Batik Industry In Indonesia", Journal of Procedia - Social and Behavioral Sciences, Vol. 65, 46 – 51

Newbert, S. L. 2008. "Value, rareness, competitive advantage, and performance: a conceptual level empirical investigation of

the resource-based view of the firm", Strategic Management Journal, Vol. 29(7), 745-768

Nivievskyl, O., and von Cramon, T.S. 2008. "The Determinants of Dairy Farming Competitiveness in Ukraine", Proceeding of 12th Congress of the European Association of Agricultural Economists – EAAE 2008

Notta, O., and Vlachvei, A. 2011. "Competitiveness in food and beverage manufacturing industries", Proceeding of International Conference on Applied Economics – ICOAE 2011, 437-442

Nwachukwu, I. N., Onyenweaku., C. E., Nwaru., J. C., Mbanasor, J. A., and Daramola, A. 2014. "Competitiveness in the export demand for Nigerian rubber", *The Journal of Agricultural Sciences, Vol. 9(1), 1-11*

Ojeda-Gomez. J., Simpson, M., Lenny K. S. C., and Padmore, J. 2007. "Achieving competitive advantage in the Mexican footwear industry", Benchmarking: An International Journal, Vol. 14(3), 289–305

Petrovic, P., Antevski, M., and Vesic, D. 2008. "The international competitiveness and economic integration", Journal of Economics and Organization, Vol. 5(1), 1-8

Piatkowski, M. 2012. "Factors Strengthening the Competitive Position of SME Sector Enterprises. An Example for Poland", Procedia - Social and Behavioral Sciences, Vol. 58(2), 69 – 278

Porter, M. E. 1990. Competitive Advantage of Nations, New York: The Free Press

Rahman, N. A. A., and Ramli, A. 2014. "Entrepreneurship management, competitive advantage and firm performances in the craft industry: concepts and framework", Journal of Procedia - Social and Behavioral Sciences, Vol. 145, 129 – 137

Saboniene, A. 2009. "Lithuanian export competitiveness: comparison with other Baltic States". Inzinerine Ekonomika-Engineering Economics, Vol.2, 49-57

Sagheer, S., Yadav, S.S., and Deshmukh, S.G. 2009. "Developing a conceptual framework for assessing competitiveness of India's agrifood chain", International Journal of Emerging Markets, Vol. 4 (2), 137-159

Serin, V., Civan, A. 2008. "Revealed Comparative Advantage and Competitiveness: A Case Study for Turkey towards the EU". Journal of Economic and Social Research, Vol. 10(2), 25-40

Sidik, I.G. 2012. "Conceptual framework of factors affecting SME development: Mediating factors on the relationship of entrepreneur traits and SME performance", Procedia Economics and Finance, Vol. 4, 373 – 383

Sigalas, C. and Economou, V. P. 2013. "Revisiting the concept of competitive advantage: problems and fallacies arising from its conceptualization", Journal of Strategy and Management, Vol. 6(1), 61-80

Sigalas, C., Economou, V.P. and Georgopoulos, N.B. 2013. "Developing a measure of competitive advantage", Journal of Strategy and Management, Vol. 6(4), 320 – 342

Smith, M. 2013. "Issues of competitiveness and regional growth in relation to transport infrastructure investment: a literature review on assessment methodology". Available from: http://www.i-c-eu.eu/deliverables/I-C-EU_WP1_D1.1.pdf (Accessed 14/10/2014)

Sukati, I., Hamid, A.B.A., Baharun, R., Tat, H.H. and Said, F. 2011. "An investigation of the relationship between supply chain management practices and competitive advantage of the firm", Contemporary Marketing Review, Vol. 1(4), 01 – 13

Thamiem, S., Weerahewa, J., Pushpakumara, D.K.N.G. and Singh, V.P. 2011. "Trade Competitiveness of Agroforestry Crop Sector in Sri Lanka", Tropical Agricultural Research, Vol. 22 (4), 38 – 347

Thatte, A.A. 2007. "Competitive Advantage of a Firm through Supply Chain Responsiveness and SCM Practices". Doctoral dissertation, The University of Toledo [online]. Available from: http://202.154.59.182/ejournal/files/thatte_a_-competitive_advanta.pdf(Accessed 14/11/2014)

Toit, J.P., Ortmann, G.F. and Ramroop, S. 2010. "Factors influencing the long-term competitiveness of commercial milk producers: evidence from panel data in East Griqualand, South Africa", Agrekon, Vol. 49(1), 80-101

Voulgaris, F., Papadogonas. P. and Lemonakis, C. 2013. "Drivers of Competitiveness in the Manufacturing Industry: The Case of Technology Sectors in Greece, Journal of Economics and Development Studies, Vol. 1(3), 32-40

Wijnands, J., Bremmers, H., van der Meulen, B. and Poppe, K. 2008. "An economic and legal assessment of the EU food industry"s competitiveness", Journal of Agribusiness, Vol. 24(4), 417-439

Wilson, P.N. and Thompson, G.D. 2003. "Time Integration: Agribusiness Structure for Competitive Advantage", Review of Agricultural Economics, Vol. 25(1), 30-43

Woodford, K., Greer, J. and Phillips, A. 2003. "Searching for productivity and competitive advantage on New Zealand dairy farms", International farm management congress

[online], Available from: http://ageconsearch.umn.edu/bitstream/24322/1/cp03wo01. pdf (Accessed 17/11/2014)

Yee, J., Ahearn, M.C. and Huffman, W. 2004. "Lnkings among far productivity, off-farm work and farm size in the Southeast", Journal of Agricultural and Applied Economics, Vol. 36(3), 591-603

Zhemoyda, O. and Gerasymenko, N. 2009. "Concentration of agriculture and competitive advantages of East European countries", Conference proceeding at the 113th EAAE Seminar "A resilient European food industry and food chain in a challenging world", Chania [online]. Available from http://ageconsearch.umn.edu/bitstream/58147/2/Zhemoyda. pdf (Accessed 10/07/2014)

ANNEXURE

Figure 1: The Measurement Level of Competitive Advantage of Firm

Variable	Dimensions	Items
Competitive Advantage	Price	Offer competitive price
		Price lower than competitors
		Offer at low price
	Delivery Dependability	Deliver orders on time
		Provide dependable delivery
		Deliver products needed
	Time to Market	First in the market
		Lower time-to-market
		Delivering product quickly
	Sales Growth	Able to increase the number of product sold
		Able to sell new customers
		High sales growth relative to competitors
	Employee Growth	Able to increase part-time employees
		Able to increase full-time employees
		High employment growth relative to competitors

Trade Openness and Economic Growth: A Cross-Country Analysis

Nadeesha Lakmali [a] and **Priyanga Dunusinghe** [b]

[a] *Department of Economics, University of Colombo, Sri Lanka*
nadeesha_lakmali@yahoo.com

[b] *Department of Economics, University of Colombo, Sri Lanka*
pmdunu@yahoo.com

BACKGROUND AND RESEARCH PROBLEM

The question of as to whether openness to international trade boosts long run economic growth is highly debated, and an enduring question in economies. Nowadays it can be seen that the objective of trade policies in most countries is to promote international trade. Countries continuously engage in trade negotiations with the aims of promoting international trade. The existing theories provide complicated answers to the question of whether international trade boosts economic growth or not. The traditional Ricardian model and Hecksher-Ohlin trade theories say that trade openness brings only a one time increase in the per capita output and does not contribute to any long run economic growth[1]. But in the neoclassical growth model it says that the long run growth rate of per capita output is determined by the exogenous technology. Openness to international trade facilitates the transmission of technology by providing communication with other countries, effective usage of domestic resources and increases market size. Only the endogenous growth theories pay attention to implications of trade openness on long run economic growth. However these models do not correctly predict that

---

[1]The Ricardian model uses the concept of opportunity cost and comparative advantage and Heckscher-Ohlin model says that factor skill differences are the reasons why countries engage in international trade because of the gains from specialization and income distribution effects.

trade openness leads to economic growth in all circumstances and for all countries. Whether trade openness causes long run growth depends on country specific conditions.

Therefore studying the relationship between trade openness and economic growth is an interesting empirical pursuit which has been investigated by cross country work dating back to the 1970s. At the beginning of the 1970s much attention was paid to the benefits of trade openness. During that period a number of empirical studies had been carried out to test the hypothesis of whether export oriented policies were necessary for economic growth. In the 1970s and 1980s the neoclassical production function has been used to investigate the effect of production function towards the economic growth. Until the late 1980s the Solow model represented that growth by exogenous factors[2]. In other words, it attributed long term growth to technological progress.

From 1990s till recently, economists sought to make a precise model by including endogenous factors into growth models. These new endogenous growth theories pay attention to the implications of trade openness on long run economic growth. Trade openness led to accessing new technology in advanced economies, effective usage of domestic resources, and increase market size. Barro (2003) says in his study of determinant of economic growth in a panel of countries, that growth increases with favourable movements in terms of trade. He concluded in the same study that there is not enough evidence to conclude that international openness in trade stimulates economic growth.

With regards to the theoretical relationship between openness and economic growth most of the studies shows that trade openness affects economic growth positively. Economists Grossman and

---

[2]The Solow Growth Model is a model of capital accumulation in a pure production economy: that is, there are no prices because it is strictly interested in output = real income. Everyone works all the time, so there is no labor/leisure choice

Helpman (1991) and Barro and Sala-i-Martin (1995) have shown through their studies that countries which are more open have a greater ability to keep up with new technologies and innovations from leading economies. In addition several other researchers (Abdullahi et al., 2013; Harrison, 1996; Madsen, 2008; Nannicini and Billmeier, 2011) have shown through their studies that there exists a positive relationship between trade openness and economic growth. Though most of the existing literature shows a positive relationship between trade openness and economic growth there are some studies which show contradictory results on the hypothesis. Ulasan (2012) has concluded in his study that "trade openness does not matter for economic growth. However, it may be more resonable to conclude that without building better institutions, maintaining conflict management along ethnolinguistic dimention, and following sound and stable fiscal policies, openness to international trade will not guarantee economic growth" (Ulasan, 2012, p.47). Shamsadini et al. (2010) have said in their study that only the rich and open countries experience real higher growth which is itself associated with a higher trade share. Therefore in order to answer this question, it is important carry out more empirical studies in this research area. However, in a nut shell it can be said that cross country analyses suffer from a lack of robust and convincing evidence on the trade openness and economic growth relationship, rendering research into the question at hand most interesting.

Objectives of the Study

The main objective of this study is finding empirical evidence to support the hypothesis that higher openness to international trade stimulates per capita GDP growth in an economy.

The other objectives are to find out the statistical significance of cross country growth determinants such as initial per capita GDP, secondary education enrolment ratio, life expectancy, population growth, government consumption, domestic and foreign investment ratios, inflation rate and government democracy.

Outline of the Study

In this research we revisit empirical evidence as to whether increase in trade openness stimulate long-run economic growth by selecting the sample period 1980-2012. The data was selected from over 103 countries from which data was available, having dropped some outliers because outlier countries may (arguably) determine the regression results. We carry out our empirical investigation by employing various measures: not only the trade openness measures but also other cross country growth determinants. The explanatory variables are initial per capita GDP, gross domestic investment ratio, secondary education enrolment ratio, population growth, life expectancy, government consumption ratio, inflation rate, rule of law index, foreign direct investment (FDI), total trade to GDP ratio, exports to GDP ratio and imports to GDP ratio whereas explained variable is per capita GDP growth. These measures are collected from three sources which are World Development Indicators, Penn World Tables version 8.0 and the World Governance Indicators.

The major advantage of carrying out cross section study is that it can overcome the lack of observations per country by increasing the number of country and also we can use even a single observation of a country. In the estimation we have used the cross country estimation method over the sample period. First we used sample averages of each measure except initial per capita GDP over the period from 1980-2012 and for this period we carried out nine different regression equations. Next we sub divided time period in to two, from 1980 to 2000 and from 2001 to 2012, and got period averages in order to get a better picture about the role of trade openness towards economic growth in different decades. The major reason to choose 2000 as the breaking point is we can see that after 2000 most economies moved towards the trade protectionism and slowed down liberalization. In both sample periods we employed eight models and observed the effect of not only trade openness measures but other growth determinants towards the per capita GDP growth.

In contrast to existing literature which indicates a strong positive correlation between trade openness and economic growth, the cross country empirical investigation in this study concludes that there is no statistically significant evidence to support the hypothesis that trade openness stimulate economic growth. Among other outcomes, regression results for all the models in all the time periods show that the existence of convergence property by giving negative coefficient on initial per capita GDP as predicted by neoclassical model. Among other explanatory variables we have found that gross domestic investment ratio, secondary education enrolment ratio, rule of law index, FDI and exports to GDP ratio provides positive effect towards the economic growth whereas the population growth, life expectancy, government consumption ratio, inflation rate and imports to GDP ratio negatively affect economic growth.

LITERATURE REVIEW

Barro (1996) has done a historically important analysis on economic growth across countries in order to capture the determination of growth by using the extended version of the neoclassical model. In his study he has included government policies, human capital and the diffusion of technology variables to the cross country analysis model. He has used roughly 100 countries over the period of 1960 to 1990 and finally concluded that growth is stimulated by greater starting levels of life expectancy and of male secondary and higher schooling, by lower fertility rates, and by improvement in the terms of trade.

Barro conducted another study (2003) on determinants of economic growth in a panel of 113 countries over the period 1965 to 1995. In this study also he has used a set of quantifiable explanatory variables such as initial per capita GDP, variables which reflects human capital, policies, institutions and national characteristics. Ratio of exports plus imports to GDP has been used a measure of degree of international openness in his study and he has highlited in the study

that there is only weak statistical evidence to axcept the hypothesis that greater internatioal openness stimulates economic growth.

 In order to find how robust the growth openness connection is Vamvakidis (2002) has carried out research using historical data from 1870 to 1990 with reference to not only the openness variables but also other growth determinants. In this study he has concluded that "postive corelation between openness and growth is only a recent phenomenon".

Many of early empirical studies shows that trade volumes provide substantial support to the hypothesis that trade promotes growth through a number of channels such as technology transfer, scale economies and comparative advantage. Harrison (1996) has conducted a research on openness and growth and found that "greater openness is associated with higher growth" (Harrison, 1996, p.443). When Harrison conducted his research, existing literature at the time was still unresolved on the issue of causality. But the study found that the causality between openness and growth runs in both directions.

Nannicini and Billmeier (2011) has conducted a study to explore the effect of trade liberalization on growth in transition economies. They used a homogeneous group of countries, which was ideal to analyse and compare the impact of different economic policies and found through their study that trade liberalization mostly had a positive impact on economic growth in such economies.

Abdullahi et al. (2013) conducted a research to emperically examine the relationship between trade liberalization and economic growth in Sub-Saharan Africa using a panel data for the period of 1970 to 2010. According to its results they indicate that the trade lebralization and foreign direct investment have significant positive impact on the economic growth of Sub-Saharan Africa. Finally they conclude that since trade could serve as an engine of growth, countries should trade - especially among themselves - for mutual benefits.

Madsen (2008) has conducted an empirical study over the 1870 to 2006 period in order to test the influence of openness on Total Factor Productivity (TFP) growth for 16 industrialized countries. In his study he has used TFP as dependent variable and several openness measures as independent variables - especially the domestic stock of knowledge, foreign stock of knowledge, spill overs through the channel of imports, productivity adjusted innovative activity, domestic research intensity, foreign research intensity spill overs through the channel of imports, trade openness, product variety etc. He found that estimated coefficients of the interaction between the propensity to import and trade weighted research intensity were mostly highly significant and growth in foreign knowledge through the channel of imports was highly influential for productivity growth. Finally he concluded that interaction between the growth in the import of knowledge through the channel of imports and the propensity to import was influential for growth and openness was important for growth when conditioned on knowledge spill overs.

Shamsadini et al. (2010) have conducted research in order to examine the relationship between trade openness and economic growth in 19 Middle East and North African Countries (MENA) over the period from 1980 to 2005. He categorized the sample into four overlapping sub categories which are 'open', 'closed', 'rich' and 'poor', then conducted analysis by considering three alternative models : between effect model, country fixed effect model and the random effect model - same as done by the Madsen (2008). In this study they showed that only the rich and open countries reach higher growth associated with higher trade shares. This study was further expanded to analyze the time series study for individual country experience. The time series analysis has shown that only four countries have a significant positive relationship between trade openness and growth and that other countries have no significant long-term relationship.

Busse and Koniger (2012) have conducted a research in order to re-examine the empirical evidence between trade and growth. In their paper they argue that the effect of trade in dynamic panel estimations

depends crucially on the specification of trade. It is argued in this paper that the often used volume of exports and imports as a share of total GDP or "trade openness" ratio does not adequately capture the impact of trade on GDP per capita growth because of the causal linkage between trade and income. Therefore, several other trade measures were taken in to the empirical growth estimation it was argued that measure of the volume of exports and imports as a share of lagged total GDP avoids a potentioal bias. Selection of this measure for the empirical estimation is totally different from previous studies mentioned above, where the tradional trade openness ratio was considered the independent variable. Though the trade measure is different however finally they concluded that trade does indeed have a positive and significant impact on growth. Busse and Koniger (2012) conducted the same analysis for developing countries and confirmed the positive influence of trade on income growth for this sample also.

In order to measure the contribution of trade openness on economic growth in the case of Tunesia, Hassen et al. (2013) have conducted a research using OLS over the period 1975 to 2010. According to their study it was found that trade openness, foreign direct investment and human capital as well as financial development exert long-term positive and significunt effects economic growth.

Kundu (2013) conducted a panel data analysis to test the validity of the "export-led hypotheses in the seven SAARC member countries over the period 1971-2011. He used six methods in his analysis of panel data to examine the relationship between GDP growth and export growth: the unit root test, cointegration test, pooled ordinary least squares, fixed effect approach, random effects approach and Hausman test methods. Fixed effects and random effects models have found no significant relationship between the size of GDP growth rate and export rate for these SAARC member countries. But panel unit root tests imply that there is strong evidence of stationary process for both GDP and export while the panel cointegration test indicates that there is a cointegrating relationship between exports

and GDP. Finally, Kundu (2013) has concluded that export could be seen as the 'engine' of growth in SAARC member countries.

Yeboah at al. (2012) have conducted a research in order to analyze the effect of trade openness on economic growth for 38 African countries from 1980 to 2008. In this study they have used a Cobb-Douglas production function to estimate the impact of FDI, exchange rate, capital-labor ratio and trade openness on GDP. The study has found that trade openness per capita exhibits a positive and significant impact on GDP per capita. However they concluded that effect of trade on productivity is much greater in outward-oriented economies than the inward-oriented nations.

Zeren and Ari (2013) have conducted a research to investigate the causality between trade openness and economic growth for the G7 countries between 1970 and 2011. Throughout the empharical result they have shown that there is bidirectional causality relationship. They say that "as advocated by theories of endogenous growth, as openness increases, growth increases in G7 countries and, subsequently, the increase in growth increases openness" (Zeren and Ari, 2013, p. 1). Seetanah (2012) studied the relationship between trade openness and economic growth in selected African countries, using annual data for the period 1990-2009. He found through his study the presence of a bi-directional causality between openness and economic growth, concluding that openness inderectly promotes growth through financial development and foreign direct investment.

Gries and Redlin (2012) has conducted a panel causality analysis on trade openness and economic growth and those results suggested that the long run causality between trade openness and growth runs in both directions which are in line with Zeren and Ari (2013) and Seetanah (2012) as mentioned above. That is more open trade polices precede higher growth rates. Gries and Redlin (2012) in his research the entire panel was subdivided into income related subpanels and the lower income subpanel showed a negative causality while higher

income countries exhibited a positive relationship between openness and growth. Desired growth led openness and openness led growth hypotheses could only be supported for industrialized countries.

Bajwa and Siddiqi (2011) conducted a research by selecting four south Asian countries over the period of 1972-1985 and 1986-2007 to investigate the casual link between trade openness and economic growth before and after the implementation of SAARC. They use panel cointegration technique and a panel based error correction model to find out this relation. They found that "there exists short run unidirectional causality running from GDP to openness but not vice versa in the time period of 1972-85, A negative relation exists between the two in the long-run, whereas, in 1986-2007 there exists short-run bi-directional causation between GDP and openness" (Bajwa and Siddiqi, 2011, p. 5). Finally they conclude that these countries should introduce export oriented policies to help in earning foreign exchange and rapid economic growth.

Sarkar (2007) conducted research to examine the relatonship between trade openness and growth for 51 countres over the period 1981-2002. He has conducted cross country panel data analysis on various regions and groups which are under 'open', 'close', rich' and 'poor, overlapping calegories. Given that in cross country analysis each and every country is implicitly given the same weight, it is difficult to justify how fair the conduct of time series analysis for the countries was. Accordingly, in cross country panel data analysis he concluded that for only 11 rich countries and highly trade dependent Least Develop Countries (LDCs) higher real growth is associated with a higher trade share which is similer to the findings of Gries and Redlin (2012). In a time series study of individual countries he concluded that a majority of countries covered in the sample including East Asian countries experienced no positive long-term relationship between openness and growth during the period. Finally he concluded that among various regions and groups only the middle income group exhibited a positive long-tearm relationship.

Many major studies have attempted to find out the relationship between trade restrictions and growth. Rodriguez and Rodrik (2001) has found that average tariff rates had a positive and significant relationship with total factor productivity (TFP) growth for a sample of 43 countries over the period 1980-1990. However by expanding the sample to 66 countries, imports duties became insignificant with a positive coefficient.

Yanikkaya (2003) conducted a research using a large number of openness measures which were of two types: trade volumes and trade restrictions. He says in his study that "all measures of trade barriers used in the study are significantly and positively correlated with growth except for restrictions on current account payments, which is negatively but insignificantly correlated with growth" (Yanikkaya, 2003, p. 84) contradicts the findings of earlier empirical studies. So in his study he provided considerable evidence for the hypothesis that restrictions on trade can promote growth, especially in developing countries under certain conditions. Also according to his regression results he concluded that trade volumes provide substantial support for the hypothesis that trade promotes growth through a number of channels such as technology transfers, scale economies, and comparative advantage.

Although many studies have shown that there is a positive relationship between trade openness and economic growth as we discussed earlier, Ulasan (2012) has shown in his studies completely the opposite result. Ulasan (2012) conducted a cross country empirical investigation on openness to international trade and economic growth and used openness measures under four broad categories, which is trade volumes, direct trade policy measures, deviation measures and subjective indexes. In order to find the relation between trade volumes and economic growth he carried out a regression with the dependent variable real GDP per worker between 1960 and 2000 and several independent variables. The regression results for economic growth and trade volumes confirm the findings of Yanikkaya (2003) that technology spill over effects on

international trade on economic growth are not very important compared to the effects of comparative advantage and scale economies. Finally he concluded on no positive and significant association between trade volume and economic growth except real openness. He said that trade openness does not matter for economic growth. Then Ulasan (2012) investigated the openness-growth connection by employing direct trade policy measures, namely tariff rates, non-tariff barriers on imports and black market premium for exchange rate. Then he found that among the direct trade policy measures only tariff rates and black market premium are negatively and significantly correlated with economic growth. He concluded that without building better institutions, maintaining conflict management along ethno linguistic dimensions, and following sound and stable fiscal policies, openness to international trade will not guarantee economic growth.

Hepenstrick and Tarasov (2013) found through their studies that 40-50% of the variation in per capita income across countries can be explained by different endowments and remaining variation is attributed to exogenous differences in technology, whose nature remains at least partly a black box.

Consequently, the conclusion emerging from these studies is that there are contradictory results on trade openness and economic growth. So the main objective of this study is to carry out an appropriate model to explain the relationship between trade openness and economic growth.

ECONOMETRIC METHODOLOGY

In this study a cross sectional data analysis was used to examine the relationship between per capita GDP growth and the set of cross country growth determinants. To identify the suitable model for this analysis, by following empirical study by Barro (Determinants of

Economic Growth in a Panel of Countries, 2003), the following empirical framework has been used to investigate long- run economic growth:

$$Y_i = \beta_0 + \beta_1\ PCGDP_{t-1} + \beta_2 X_i + \beta_3 Z_i + \varepsilon_i \text{----------------Equation 1}$$

where $i = 1,2,\dots.103$ (Number of countries).

Here the variable Y represents per capita GDP growth rate of each countries, X is a vector which includes the cross country growth determinants, Z is a vector which includes countries openness measures and ε is the error term[3].

The variable PCGDP represent the initial per capita GDP. The vector X includes the variables gross domestic investment ratio as the percentage of GDP, secondary education enrolment ratio, population growth, government consumption ratio as the percentage of GDP, life expectancy, inflation rate and rule of law index. Initial per capita GDP level is employed to assess the issue of conditional convergence and it is also possible to interpret it as a proxy for the initial stock of capital for a country. (Barro, Determinants of Economic Growth in a Panel of Countries, 2003), (Harrison, 1996), (Ulaşan, 2012), (Yanikkaya, 2003) and many other researchers have generally included the initial per capita GDP in their cross country growth regression. The vector Z includes the variables foreign direct investment (FDI), total trade as a percentage of GDP (i.e. exports plus imports as the percentage of GDP) which is very common proxy as the openness measure in the cross-country growth literature, exports as the percentage of GDP and imports as the percentage of GDP. The vector Z indicates the openness measures of the countries.

---

[3] $PCGDP_{t-1}$ is initial per capita GDP and t-1 indicates that if data is taken for the period average from 1980 to 2012 then $PCGDP_{t-1}$ indicates the per capita GDP in 1980.

In order to check the classical linear regression model assumptions, tests were carried out to check the validity of each regression model. Three residual tests have been carried out: histogram normality test, heteroscedasticity test and variance inflation factor (VIF) test.

Data Analysis

Empirical investigation has been carried out under four sub topics. Before regression analysis a pair wise correlation between the variables was carried out to check whether the multi collinearity problem arises. The simple correlation between the variables which used in this study is reported in the Table 1.

The result shows that almost all the variables are not strongly correlated with each other whereas only few variables present correlations. Secondary education enrolment ratio and life expectancy, secondary education enrolment ratio and rule of law index, exports to GDP ratio and imports to GDP ratio show significantly high correlation coefficients according to the Table 2

The relationship between per capita GDP growth and initial per capita GDP shows negative relationship as expected by showing the conditional convergence property. The correlation between per capita GDP Growth to secondary education enrolment ratio, life expectancy, role of law index, FDI and total trade to GDP ratio shows weak positive relationship. The relationship between per capita GDP growth and the population growth shows strong negative relationship. However per capita GDP growth and the domestic investment ratio shows strong positive relationship and whereas the correlation between per capita GDP growth to inflation rate, government consumption, the exports to GDP ratio and the imports to GDP ratio shows weak negative relationship.

Table 2 : Correlation Coefficients between Variables: 1980-2012 Averages[4]

Variable	Per Capita GDP Growth	Per Capita GDP 1980	Secondary Education	Life Expectancy	Population Growth	Gov. Consumption to GDP	Dom. Investment to GDP	Inflation Rate	Rule of law index	FDI	Total Trade to GDP	Exports to GDP	Imports to GDP
Per Capita GDP Growth	1.00												

Per Capita GDP 1980	-0.11	1.00											
	-1.13	-----											
Secondary Education	0.16	0.63	1.00										
	1.59	8.26	-----										
Life Expectancy	0.26	0.58	0.89	1.00									
	2.72	7.22	19.22	-----									
Population Growth	-0.29	-0.06	-0.58	-0.53	1.00								
	-3.00	-0.63	-7.23	-6.21	-----								
Gov. Consumption to GDP	-0.05	0.43	0.43	0.32	-0.17	1.00							
	-0.48	4.75	4.85	3.34	-1.69	-----							
Dom. Investment to GDP	0.61	0.08	0.22	0.29	-0.11	0.25	1.00						
	7.69	0.83	2.27	3.00	-1.14	2.60	-----						
Inflation Rate	-0.16	-0.11	-0.06	-0.13	0.03	-0.05	-0.17	1.00					
	-1.62	-1.12	-0.56	-1.36	0.31	-0.51	-1.71	-----					
Rule of law index	0.24	0.68	0.83	0.77	-0.53	0.52	0.25	-0.24	1.00				
	2.52	9.38	15.08	12.23	-6.22	6.04	2.57	-2.43	-----				
FDI	0.22	0.31	0.31	0.31	-0.29	0.12	0.10	-0.07	0.35	1.00			
	2.25	3.29	3.25	3.30	-3.08	1.19	1.00	-0.68	3.73	-----			
Total Trade to GDP	0.07	0.08	0.15	0.10	0.01	0.38	0.27	-0.07	0.12	-0.07	1.00		
	0.69	0.85	1.47	0.96	0.05	4.19	2.83	-0.70	1.18	-0.72	-----		
Exports to GDP	-0.05	0.49	0.39	0.36	-0.15	0.34	0.00	-0.13	0.40	0.11	0.46	1.00	
	-0.51	5.63	4.31	3.84	-1.50	3.69	0.03	-1.29	4.35	1.16	5.23	-----	
Imports to GDP	-0.02	0.15	0.23	0.22	-0.21	0.27	0.09	-0.13	0.22	0.01	0.41	0.80	1.00
	-0.24	1.51	2.43	2.30	-2.21	2.80	0.86	-1.31	2.29	0.10	4.49	13.47	-----

[4]The top figures shows how simple correlation coefficients for averaged over entire time period: the bottom figures indicate the t-statistics of the test.

However the existing higher correlation among some independent variables as mentioned above may cause the multicollinearity problem when estimating the ordinary least square (OLS) method in the analysis by violating the OLS assumption. Therefore in order to check whether model estimations violated the classical linear regression model assumption and gave a spurious result, variance inflation factor (VIF) tests were conducted for each and every regression analysis to verify the existence of the multicollinearity problem. According to Larose (2006) if the value of VIF is greater than 5 it is an indicator of moderate multicollinearity and if value of VIF is greater than 10 it is an indicator of severe multicollinearity.

In each regression, the constant error variance assumption was checked by employing the White test for heteroscedasticity. We have found in some regression analyses a heteroscedasticity problem. So we carried out a 'HAC' (Hetroscedasticity and Autocorrelation Consistent) Newey-West procedure (Whitney K. Newey and Kenneth D. West, May 1987) in order to correct this heteroscedasticity.

Table 3, Table 4 and Table 5 represent the empirical findings for a panel of 103 countries over three time periods. According to the regression result, initial per capita GDP, gross domestic investment ratio and the secondary education enrolment ratio are the significant variables for the per capita GDP growth of a country over the three sample period averages and the insignificant variables for the three time period averages are government consumption to GDP ratio and total trade to GDP ratio. The significance of other explanatory variables is changed over the time period to time period.

The negative coefficient of the initial per capita GDP which has entered in the system in logarithmic form was the interpretation of a conditional rate of convergence which predicts by neoclassical model. The estimated coefficient of the initial per capita GDP is highly significant at 1% significance level over the three sample period averages and it is similar to the findings of empirical study done by Barro (1996) by using around 100 countries from 1960 to

1990. But in Harrison's (1996) study he used 27 year average data and GDP in 1960 as the initial GDP to invest the openness and growth relation for developing countries and it can be seen that the initial per capita GDP is not a significant variable for the GDP growth.

Figure 2 shows the partial relation between the per capita GDP growth and the level of initial per capita GDP as implied by the model 9 of Table 3 which is for the time period 1980 to 2012. The x-axis plots the per capita GDP in 1980 and y-axis shows the corresponding growth rate of GDP after filtering out the parts explained by all explanatory variables other than initial per capita GDP. The negative slope in Figure 2 shows the conditional convergence relation which is the effect of logarithmic form of initial per capita GDP on the growth rate for given values of other explanatory variables. However this finding is similar to findings of Barro (1996).

Table 3 : Cross Sectional Estimation using 1980-2012 Averages[5]

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	-6.82*** (-3.69)	-5.27*** (-2.73)	-0.65 (-0.29)	-5.23 (-0.77)	-8.38 (-1.52)	-4.45 (-1.51)	-4.15 (-1.36)	-4.22 (-1.42)	-3.07 (-1.40)
Log(Per Capita GDP in 1980)	-0.60*** (-4.54)	-0.56*** (-3.56)	-0.84*** (-6.70)	-0.88*** (-6.18)	-0.82*** (-5.49)	-1.00*** (-6.31)	-1.00*** (-6.14)	-1.04*** (-6.28)	-1.21*** (-7.02)
Log(Gross Domestic Investment % GDP)	3.17*** (4.36)	3.20*** (4.11)	2.81*** (3.95)	2.66*** (3.83)	2.78*** (4.16)	2.59*** (4.30)	2.56*** (4.14)	2.65*** (4.37)	2.68*** (5.27)
Log(Secondary Education)	0.84*** (2.87)	0.85** (2.47)	0.63** (2.13)	0.41 (1.04)		0.61* (1.91)	0.57* (1.85)	0.59* (1.84)	0.74** (2.47)
Log (Population Growth)	-0.40** (-2.27)	-0.38* (-1.91)	-0.08 (-0.45)	-0.06 (-0.37)	-0.10 (-0.59)	0.01 (0.09)	-0.00 (-0.04)	0.01 (0.07)	-0.10 (-0.57)
Log(Government consumption % GDP)		-0.64 (-1.44)	-1.02*** (-2.58)	-0.92** (-2.38)	-0.92** (-2.45)	-0.53 (-1.19)	-0.61 (-1.37)	-0.59 (-1.33)	-0.49 (-1.22)
Log(inflation rate)		-0.13 (-1.45)	0.02 (0.26)	0.03 (0.38)	0.08 (0.88)	-0.04 (-0.47)	-0.03 (-0.32)	-0.02 (-0.24)	-0.03 (-0.24)
Rule of Law Index			0.97*** (4.44)	0.95*** (4.21)	0.94*** (4.21)	0.78*** (3.23)	0.80*** (3.27)	0.80*** (3.34)	0.82*** (3.81)
Log(Life expectancy)				1.41 (0.78)	2.36* (1.67)				
Log(FDI)						0.23** (2.32)	0.23** (2.29)	0.22** (2.29)	0.18*** (2.75)
Total trade % GDP							0.23 (0.64)		
Exports % GDP								0.63 (1.33)	2.76*** (2.76)
Imports % GDP									-1.61** (-2.50)
No. of Observation	103	103	103	103	103	103	103	103	103
R²	0.47	0.49	0.58	0.58	0.58	0.63	0.63	0.63	0.66

*Note: ***, ** and * imply the significant at 1%, 5% and 10% level respectively.*

---

[5]Dependent variable is per capita GDP growth rate. The bottom figures indicate the t-statistics of the test

Table 4 : Cross Sectional Estimation using 1980-2000 Averages[6]

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	-7.95*** (-3.93)	-4.63* (-1.68)	0.43 (0.15)	-21.77*** (-3.06)	-7.28*** (-2.65)	-6.76** (-2.42)	-6.88** (-2.52)	-7.04*** (-3.01)
Log(Per Capita GDP in 1980)	-0.49** (-2.23)	-0.64*** (-2.90)	-0.94*** (-4.19)	-0.84*** (-3.77)	-0.83*** (-3.74)	-0.84*** (-3.64)	-0.90*** (-3.83)	-0.96*** (-4.06)
Log(Gross Domestic Investment % GDP)	3.70*** (5.44)	3.39*** (4.53)	3.07*** (4.51)	2.82*** (4.29)	3.27*** (3.78)	3.07*** (3.32)	3.31*** (3.73)	3.75*** (4.48)
Log(Secondary Education)	0.53 (1.53)	0.74** (2.07)	0.37 (1.06)	0.10 (0.23)	0.62* (1.85)	0.56* (1.67)	0.59* (1.68)	0.64* (1.83)
Log (Population Growth)	-0.77*** (-3.01)	-0.81*** (-3.00)	-0.42** (-2.11)	-0.75*** (-3.39)	-0.72*** (-2.88)	-0.78*** (-3.24)	-0.73*** (-2.98)	-0.81*** (-2.90)
Log(Government consumption % GDP)		-0.57 (-0.95)	-0.97* (-1.66)	-0.23 (-0.47)	-0.08 (-0.14)	-0.22 (-0.38)	-0.22 (-0.39)	-0.09 (-0.17)
Log(inflation rate)		-0.26** (-2.45)	-0.12 (-1.21)	-0.23 (-1.62)	-0.25** (-2.43)	-0.23** (-1.99)	-0.23** (-2.10)	-0.24** (-2.14)
Rule of Law Index			1.24*** (4.71)					
Log(Life expectancy)				5.25** (2.52)				
Log(FDI)					0.19* (1.70)	0.20* (1.76)	0.19* (1.74)	0.14 (1.19)
Total trade % GDP						0.60 (0.86)		
Exports % GDP							1.49 (1.21)	3.60* (1.85)
Imports % GDP								-2.10 (-1.50)
No. of Observation	103	103	103	103	103	103	103	103
R²	0.50	0.52	0.61	0.56	0.57	0.57	0.58	0.60

Note: ***, ** and * imply the significant at 1%, 5% and 10% level respectively.

---

[6]Dependent variable is per capita GDP growth rate. The bottom figures indicate the t-statistics of the test.

Table 5: Cross Sectional Estimation using 2001-2012 Averages[7]

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	-4.15 (-1.45)	-1.66 (-0.62)	-0.12 (-0.03)	-0.08 (-0.01)	-1.58 (-0.23)	-1.76 (-0.23)	-1.69 (-0.25)	-3.26 (-0.47)
Log(Per Capita GDP in 2001)	-0.79*** (-5.28)	-0.74*** (-3.83)	-0.87*** (-2.88)	-0.87*** (-2.78)	-1.03*** (-3.84)	-1.04*** (-3.84)	-1.05*** (-3.78)	-1.15*** (-4.01)
Log(Gross Domestic Investment % GDP)	2.63*** (2.75)	2.70*** (3.04)	2.60*** (2.75)	2.60*** (2.85)	2.31*** (3.75)	2.28*** (3.63)	2.32*** (3.73)	2.33*** (3.76)
Log(Secondary Education)	1.06** (2.14)	1.05** (1.99)	1.11** (2.08)	1.11* (1.92)	1.14* (1.90)	1.11* (1.81)	1.15* (1.90)	1.13* (1.88)
Log (Population Growth)	-0.13 (-0.58)	-0.21 (-0.79)	-0.19 (-0.67)	-0.19 (-0.67)	-0.17 (-0.72)	-0.18 (-0.75)	-0.16 (-0.70)	-0.28 (-1.13)
Log(Government consumption % GDP)		-1.05** (-2.15)	-1.25** (-2.55)	-1.25** (-2.31)	-0.96 (-1.57)	-0.99 (-1.60)	-0.95 (-1.56)	-0.85 (-1.38)
Log(inflation rate)		-0.16 (-0.57)	-0.12 (-0.41)	-0.12 (-0.40)	-0.21 (-1.02)	-0.20 (-1.01)	-0.20 (-0.97)	-0.20 (-0.97)
Rule of Law Index			0.31 (0.68)	0.31 (0.68)	0.13 (0.36)	0.14 (0.39)	0.14 (0.38)	0.11 (0.30)
Log(Life expectancy)				-0.01 (-0.00)	-0.85 (-0.46)	-0.74 (-0.39)	-0.82 (-0.44)	-0.12 (-0.07)
Log(FDI)					0.31*** (3.40)	0.31*** (3.38)	0.31*** (3.37)	0.27*** (2.82)
Total trade % GDP						0.18 (0.32)		
Exports % GDP							0.10 (0.22)	1.62 (1.32)
Imports % GDP								-0.97 (-1.33)
No. of Observation	103	103	103	103	103	103	103	103
R²	0.34	0.37	0.37	0.37	0.45	0.45	0.45	0.47

*Note: ***, ** and * imply the significant at 1%, 5% and 10% level respectively.*

---

[7] Dependent variable is per capita GDP growth rate. The bottom figures indicate the t-statistics of the test

The gross domestic investment ratio is a highly significant variable with positive correlation which is significant at 1% over the three time periods represented in above tables. The coefficient of the gross domestic investment ratio is positive. This implies that domestic investment ratio is a key indicator for economic growth and the findings are similar to the study done by Adams (2009) to find the effect of FDI and domestic investment towards the economic growth. Also we can see that the coefficient for 1980 to 2000 is higher than the coefficient for 2001 to 2012 from which we can say that the effect of domestic investment towards per capita GDP growth is high during the former period than the latter. The study done by Vamvakidis (2002) on robustness of the growth-openness connection has also used a historical data set for the determinants of growth such as initial real per capita GDP, the average investment share, secondary school enrolment ratio, population growth and inflation rate ect. Vamvakidis (2002) also concludes in his study that the investment ratio has a positive impact on economic growth. The partial relation between the per capita GDP growth and the domestic investment ratio is shown in Figure 3 for the time period from 1980 to 2012.

In cross country growth regression estimation literature Barro (1996), Vamvakidis (2002), Ulaşan (2012) and   several other researchers have used the secondary education enrolment ratio as an independent variable in cross country growth regression and found that there exists a positive impact on economic growth. The secondary education enrolment ratio is used as proxy for human capital across countries. This cross country regression result also found that the secondary education enrolment ratio is statistically significant for all three time periods and the coefficent is positive. The coefficent is higher for 2001 to 2012 than 1980 to 2000. The reason for this difference may be that from 2001 to 2012 growth was driven by. Education enhances economic growth as a highly skilled labour force absorbs new technology, displaying competitive and comparative advantages. The partial relation between the per capita GDP growth

and the secondary education enrolment ratio is shown in Figure 4 for the time period from 1980 to 2012.

Other than secondary education enrolment ratio two more explanatory variables are used as proxy variables for human capital - population growth and life expectancy [8]. Here it can be seen that population growth is negatively related to the economic growth as Vamvakidis (2002) and Barro (1996) found and the variable is only significant to the time period from 1980 to 2000 which is significant at 1% level. In Barro (1996)'s study he has used fertility rate instead of population growth. We can assume that the increasing population growth affects per capita GDP growth negatively because the increasing population may increase the consumption of resources which can be used for production purposes. As well it can be said that if the population increases then the economy has to invest capital for new labourers rather than increaseing the capital per labourer. Barro (1996) concluded in his study that "although population growth cannot be characterized as the most important element in economic progress, the results do suggest that an exogenous drop in birth rates would raise the growth rate of per capita output" (Barro, 1996, p. 18). The variable life expectancy is negativly related but not statistically significant with the per capita GDP growth and therefore this variable has appeared only in model 3 of the Table 3 as we have dropped this variable from the regression equation in 1980-2012 and 1980-2000 since it returns a multicollinearity problem with high VIF values. Life expectancy is not only a proxy for health status but also it indicates the quality of human capital. However in Barro's study a relation was found between per capita GDP growth and the life expecatancy. The research done by Acemoglu and Johnson (2007) to investigate the effect of life expectancy on economic growth concluded that "there is no evidence that the large exogenous increase in life expectancy led to a significant increase in per capita economic growth" (Acemoglu and Johnson, 2007, p. 925). Partial relation between per capita GDP growth and the population growth

---

[8]The variable life expectancy is indicator of health states.

over the period 1980-2012 and partial relation between per capita GDP and life expectancy over the period 2001-2012 is shown in Figure 5 and 6 resepectively.

The variable government consumption ratio has a negative relation with per capita GDP growth (Barro has shown this relation) over all time periods and none of them are statistically significant. However the variable is significant with a negative coefficent in the absence of openness variables which are FDI, total trade to GDP ratio, exports to GDP ratio and imports to GDP ratio. The reason for this negative relation can be assumed to be government spending on nonproductive sectors decreasing per capita GDP growth. The partial relation between per capita GDP growth and the government consumption ratio is ilustrated in Figure 7.

The relation between inflation rate and the per capita GDP growth shows a negative relation over the three time periods which is similar to the findings of Barro (1996) and Vamvakidis (2002). According to the result the variable is significant only for the time period 1980-2000. Barro (2013) has carried out a study in order to investigate the relation betweeen inflation and growth using 100 countries over the period 1960-1990 and concludes in his research that "an increase in average inflation by 10 percentage points per year is a reduction of the growth rate of real per capita GDP by 0.2-0.3 percentage points per year" (Barro, 2013, p. 121) which is similar to the findings in this regression analysis. The partial relation between per capita GDP growth and the inflation rate is shown in Figure 8 for the regression result over the time period 2001-2012.

The rule of law index interprets the quality of governance provided by each economy. The results indicate that there is a positive association between per capita GDP growth and the rule of law index by supporting the findings of Barro (1996). Maintaining proper governance is very important for a country to efficiently engage in economic activities using both physical and human capital. Therefore

it can be concluded through this interpretation that maintainance of the rule of law index is favourable for economic growth. Partial relation between per capita GDP growth and rule of law index is shown in Figure 9 for the period 1980-2012.

Considering openness measures we can see that FDI has a positive effect on growth whereas it is statistically significant over the period 1980-2012 and 2001-2012. However in the absence of exports to GDP ratio and imports to GDP ratio FDI becomes a significant variable for the period 1980-2000 also. The study of Laura et al. (2010) has found that "increases in the share of FDI or the relative productivity of the foreign firm leads to higher additional growth in financially developed economies compared to those observed in financially under-developed ones, and other local conditions such as market structure and human capital are also important to generate a positive effect of FDI on economic growth" (Laura et al., 2010, p. 242). So that it can be concluded that the since market structure and human capital are favourable and financial markets have developed during 2001-2012 than 1980-2000 makes the coefficient significant for growth during 2001-2012 than in previous period. The partial relation between per capita GDP growth and the FDI is shown in Figure 10 for the period from 1980 to 2012.

When considering the exports to GDP ratio it can be seen that the effect is positive for all time periods and is strongly statistically significant for the time periods 1980-2012 and 1980-2000. Yanikkaya (2003) and Ulaşan (2012) have found same results for periods 1970-1990 and 1960-2000 respectively in their studies: coefficients are positive and significant. When comparing the periods 1980-2000 and 2001-2012 we can see that rather than the coefficient is also higher in value for the time period 1980-2000 than in 2001-2012. After World War II global economy has focused on trade liberalization by reducing the trade barriers. This resulted in multilateral and bilateral trade agreements among countries and an increase in trade share. However, when it comes to the past decade we can see that the trade liberalization strategy has slowed down and

countries moved towards trade protection mechanism. the present global economy focuses on trade in services rather than merchandise. These may be the reasons why exports to GDP have become significant with larger coefficients during the period 1980-2000 than 2001-2012. The trade openness measure which is imports to GDP ratio shows a negative effect on per capita GDP growth over the three time periods and the variable is statistically significant during 1980-2012. It cannot find any literature which supports this regression result. Partial relation between exports to GDP ratio and imports to GDP ratio over the period 1980-2012 is shown in Figure 11 and Figure 12 respectively.

When considering trade openness, total trade to GDP ratio is not statistically significant in any model or time period but has a positive coefficent. Harrison (1996) has also found same result in his study for the regression result of cross section estimation when using 27 years averages. But when using the lagged values of trade share Harrison (1996) and Yanikkaya (2003) both have found that there is a positve and statistically significant relation between trade share and GDP growth. Similerly Ulaşan (2012) has found that trade ratios are significantly and positively correlated with economic growth. However, results in this study do not provide enough evidence to support the hypothesis that open economies grow faster than closed economies as the correlation in this study, although positive, is not statistically significant. A similar result was shown by Barro (2003) using the ratio of exports plus imports to GDP as measure of the degree of openness. He pointed out that "the estimated coefficient on the openness variable is positive but only marginally significant: 0.0080(0.0046). Hence, there is only weak statistical evidence that greater international openness stimulates economic growth", (Barro, 2003, p. 251), similar to the argument in this study. The sample period in this study starts from 1980 and it can be argued that most of the countries may already open during this period and so the effect of trade openness towards economic growth may not be captured when using this period. Another argument is that total trade to GDP ratio may be a poor indicator to capture the effect of trade openness

towards economic growth. Partial relation between per capita GDP growth and the total trade to GDP (trade openness) is shown in Figure 13 over the period from 1980 to 2012.

CONCLUSION AND DIRECTIONS FOR FURTHER RESEARCH

Most of the previous literature found that there is a positive and significant impact exerted by trade openness towards economic growth, and few studies have shown that there is no perceptible positive impact. Through this research we have revisited the empirical evidence on the relationship between trade openness and economic growth over the sample period 1980-2012 across 103 countries. The paper also used several growth determinants as explanatory variables rather than trade openness measures which provided useful conclusions in cross country growth estimations.

The results of this research show that the trade openness variable which is measured as exports plus imports to GDP ratio has a positive coefficient in growth regression but is not statistically significant over the three sample periods. Therefore the final conclusion we can arrive at is that we do not have enough statistical evidence to support the hypothesis that greater openness through international trade stimulates economic growth.

The trade openness measure exports to GDP ratio has become significant in the presence of imports to GDP ratio as an explanatory variable both in 1980-2012 and 1980-2000. This implies that the statistical significance of this correlation depends on other explanatory variables of the regression and also the proxy variable for openness. Therefore, this underscores the importance of developing a better openness measure.

Though we have dropped the outlying countries in the regression analysis here we did not categorize the countries initially along the lines of developed and least developed economies or 'open' and 'closed' economies. This may be a major limitation in our study which allows the assumption that that these results may be driven by some major economies. Therefore carrying out this empirical analysis for different categories of economies such as 'rich', 'poor', 'open' and 'close' may give a different, clearer picture as to whether trade openness accelerates economic growth.

The research has focused on period averages to identify the determinants of long run economic growth. However using these period averages may hide significant variance in individual economic performance and therefore considering the time series effect it is important to opt for panel data analysis rather than cross country regression which will give a more robust answer on the openness growth relation.

The effect of trade openness on economic growth may not be instant. It may take some time to affect economic growth through the effective usage of intermediate and investment goods and also through spill over of new technology and skills. Therefore it is important to further extend this research by considering the lag when carrying out regression analysis to find the determinants of growth.

Throughout this research we have considered only trade volume measures and did not try to include the effect of trade policy measures towards the economic growth. Therefore adding trade policy measures such as tariff rates, non-tariff barriers, black market premium etc. as explanatory variables in our regression analysis may give additional value to our conclusion.

In sum, we can conclude that this empirical research does not provide statistically significant evidence to support the hypothesis that trade openness stimulates economic growth.

REFERENCES

Adams, S. (2009) 'Foreign Direct investment, domestic investment, and economic growth in Sub-Saharan Africa', *Journal of Policy Modeling*, 10(1), pp. 939-949.

Alfaro, L, Areendam, C, Sebnem, K, and Selin, S. (2010) 'Does Foreign Direct Investment Promote Economic Growth? Exploring the Role of Financial Markets on Linkages?', *Journal of Development Economics*, 11(2), pp. 242-256.

Amith, K. (2013) 'Bi-directional Relationships between Exports and Growth: A Panel Data Approach', *Journal of Economics and Development Studies*, 9(2), pp. 10-23.

Arrow, K. (1962) 'The Economic Implications of Learning by Doing', *Retiew of Economic Studies*, 9(2), pp. 155-173.

Barro, R. J. (1996) 'Determinants of Economic Growth: A Cross Country Empirical Study', *NBBR Working Paper no 5698*, pp. 1-40

Barro, R. J. (2003) 'Determinants of Economic Growth in a Panel of Countries' *Annals of Economics and Finance*, 13(2) pp. 231-274.

Barro, R. J. (2013) 'Inflation and Economic Growth', *Annals of Economics and Finance*, vo 8(1), pp. 121-144.

Christian, H. and Alexander. T. (2013) 'Trade Openness and Cross country Income Differences', *Governance and the Efficiency of Economic Systems - Discussion Paper No-402*.

Daron, A. and Simon, J. (2007) 'Disease and Development: The Effect of Life Expectancy on Economic Growth', *Journal of Political Economy*, 12(1), pp. 925-985.

Fatma, Z. and Ayse, A. (2013) 'Trade Openness and Economic Growth: A Panel Causality Test', *International Journal of Business and Social Science*, 6(1), pp. 317-324.

Francisco R. and Rodrik, D. (2001) 'Trade Policy and Economic Growth: A Skeptic's Guide', *National Bureau of Economic Research Macroeconomics Annual*, pp. 261-338.

Grossman, G.M. and Helpman, E. (1991) *Innovation and Growth in the Global Economy.* Cambridge: MIT Press.

Harrison, A. (1996) 'Openness and growth: A time-series, cross-country analysis for developing countries', *Jurnal of Development Economics*, vol 21(1) pp 443-462.

Larose, D. T. (2006) *Data Mining Methods and Models.* New Jeresy: John Wiley & Sons.

Madsen, J. B. (2008) 'Trade Barriers, Openness, and Economic Growt', Monash University Business and Economics, Discussion Paper No. 27/08.

Matthias, B. and Koniger, J. (2012) 'Trade and Economi Growth: A Re-examination of the Empirical Evidence', *Hamburg Institute of International Economics Research Paper 123*.

Osei-Yeboah, C, Shaik S, and Akua, A. (2012) 'Effects of Trade Openness on Economic Growth: The Case of African Countries', *Southern Agricultural Economics Association Annual Meeting.* Birmingham.

Robert J. B. and Sala-i-Martin (1995) *Economic Growth.* Cambridge, MA: McGraw-Hill.

Romer, P. M. (1987) 'Growth Based on Increasing Returns Due to Specialization' *American Economic Retiew,* 77(1), pp. 56-62.

Romer, P. M. (1990) 'Endogenous Technological Change', *Joumai of Political economy,* 98(1), pp. 71-102.

Samra, B. and Muhammad, W. (2011) 'Trade Openness and Its Effects on Economic Growth in Selected South Asian Countries: A Panel Data Study', *World Academy of Science, Engineering and Technology,* 50(1) , pp. 1073-1078.

Sarkar, P. (2007) 'Trade Openness and Growth: Is There Any Link?', Munich Personal RePEc Archive Paper No. 4997.

Solmaz, S. Reza, M, and Mahdieh, K. (2010) 'Relationship Between Trade Openness and GDP Growth a Panel Data Analysis', *World Applied Sciences Journal,* 8(7), pp. 906-911.

Tommaso, N., and Andreas, B. (2011) 'Economies in Transition: How Important Is Trade Openness for Growth?', *Oxford Bulletin of Economics and Statistics,* 7*3*(2), pp. 287-314.

Vamvakidis, A. (2002) 'How Robust is the GRowth-Openness Connection? Historical Evidance', *Jurnal of Economic Growth*, 13(1), pp. 57-80.

Whitney, K. N. and Kenneth, D. (1987) 'A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix', *Econometrica*, 13(1), pp. 703-708.

Yanikkaya, H. (2003) 'Trade openness and economic growth: a cross-country empirical investigation', *Jurnal of Development Economics,* 72(1), pp. 57-89.

Zakari, A, Yusuf, U, and Abdullahi, M. (2013) 'Relationship Between Trade Liberalization and Economic Growth: Empirical Evidence from Sub-Saharan Africa', *African Journal of Social Sciences*, 20(1), pp. 111-120.

APPENDIX

Figure 2: Partial Relation between Per Capita GDP Growth and Initial Per Capita GDP
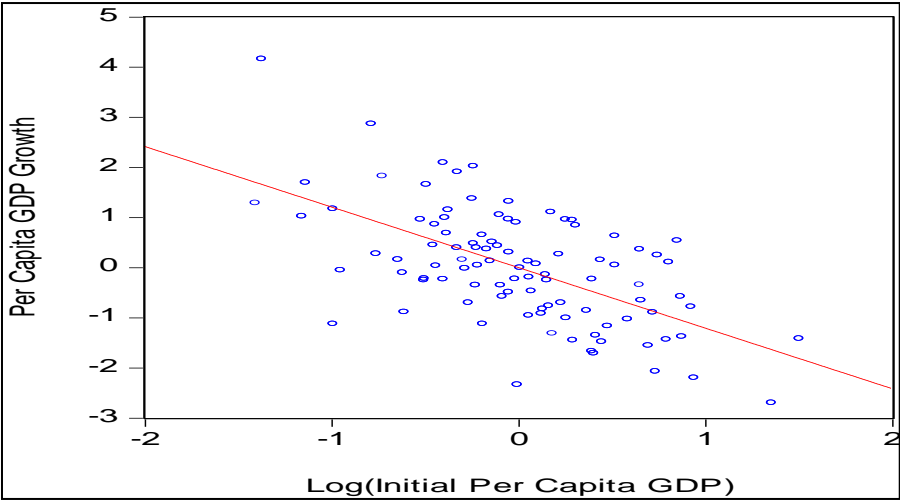

Figure 3 : Partial Relation between Per Capita GDP Growth and Gross Domestic Investment Ratio
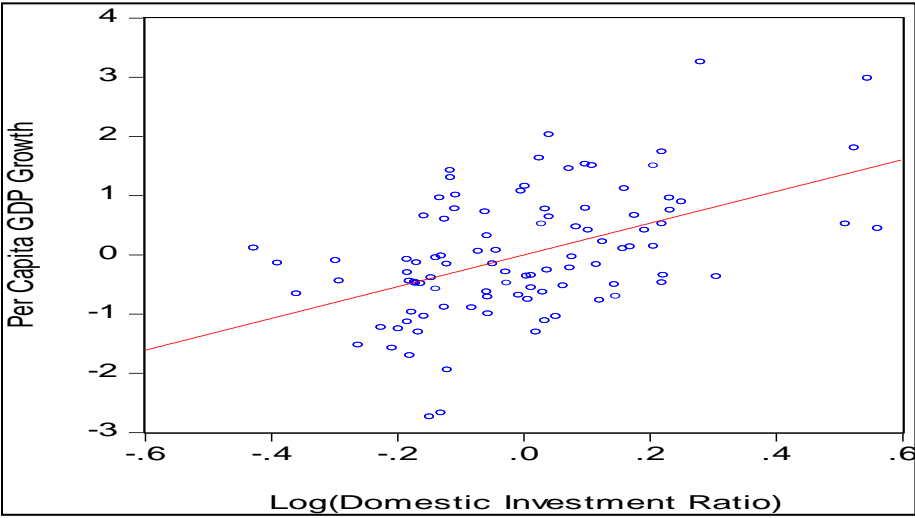
**Figure 4 : Partial Relation between Per Capita GDP Growth and
Secondary Education Enrolment Ratio**

**Figure 5 : Partial Relation between Per Capita GDP Growth and
Population Growth**
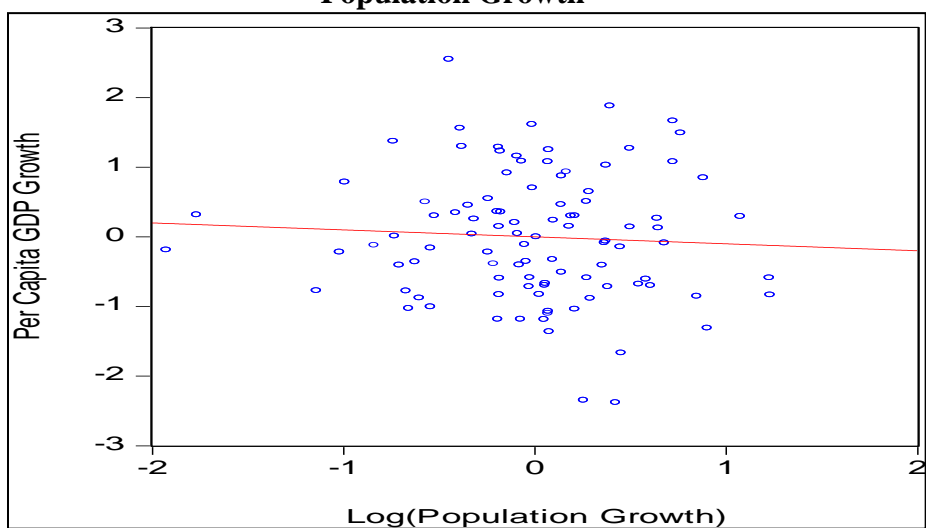
**Figure 6: Partial Relation between Per Capita GDP
Growth and Life Expectancy**

**Figure 7: Partial Relation between Per Capita GDP Growth and
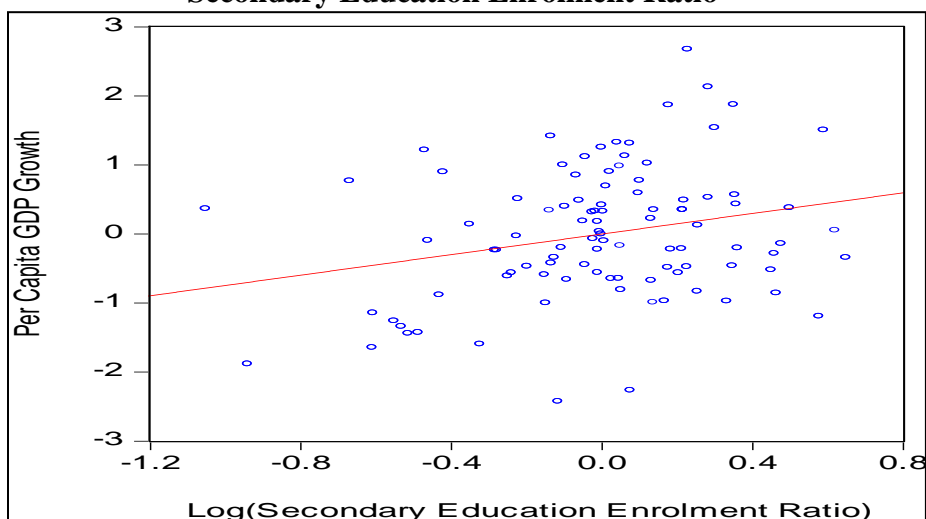Government Consumption Ratio**

**Figure 8: Partial Relation between Per Capita GDP
Growth and Inflation Rate**

**Figure 9 : Partial Relation between Per Capita GDP Growth and
Rule of Law Index**
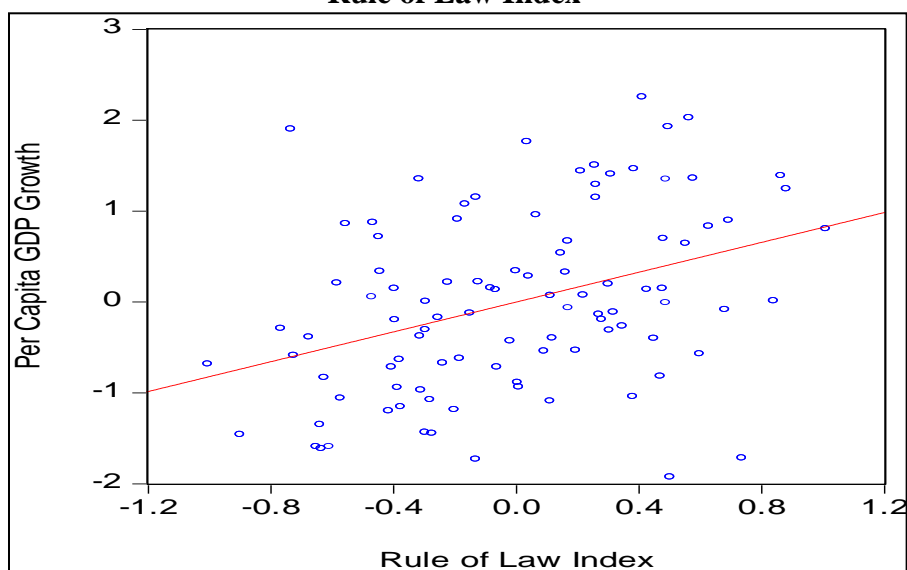
**Figure 10 : Partial Relation between Per Capita GDP Growth
and FDI**

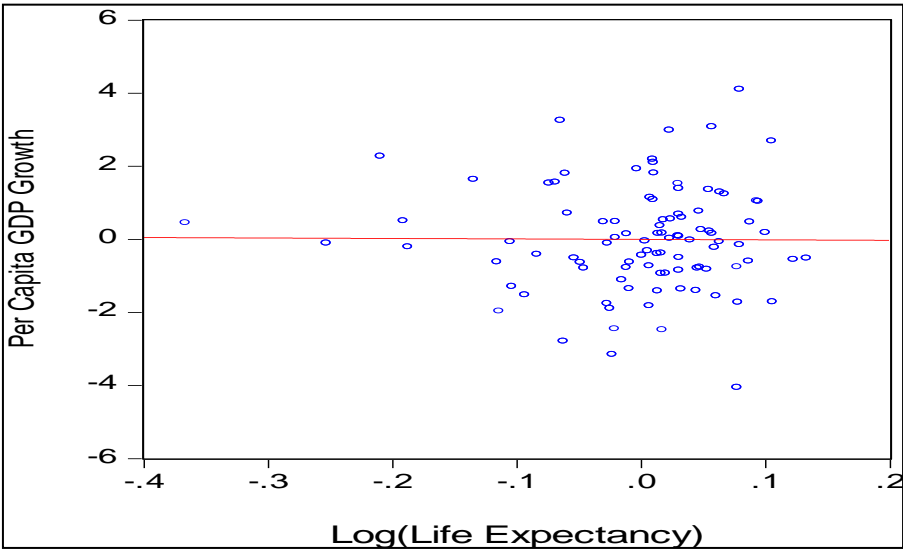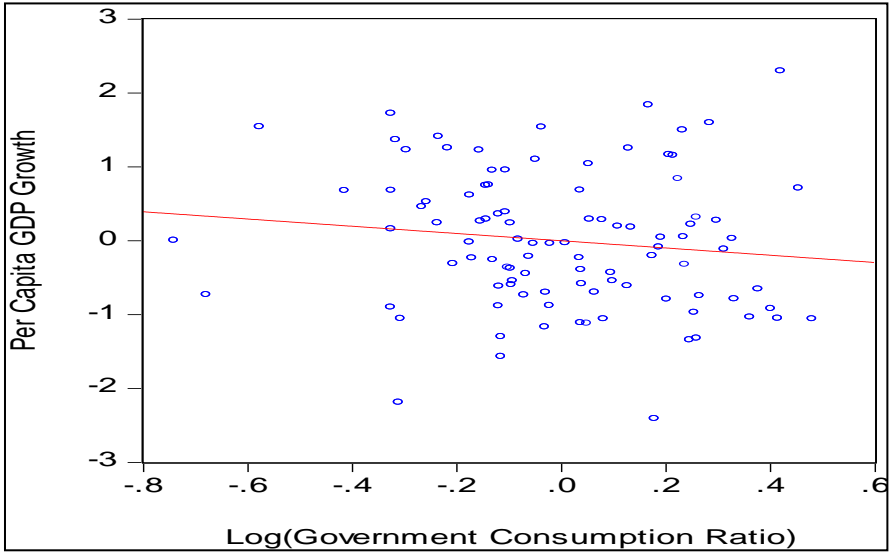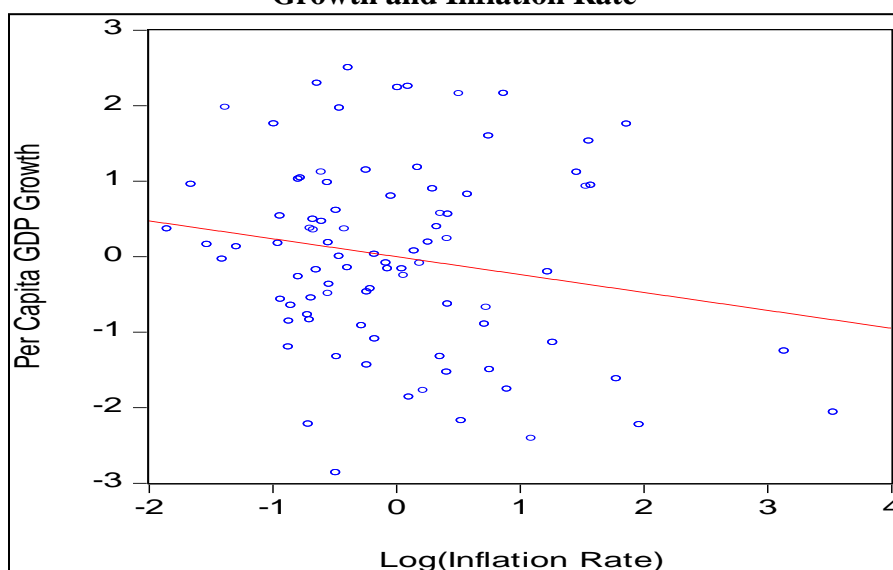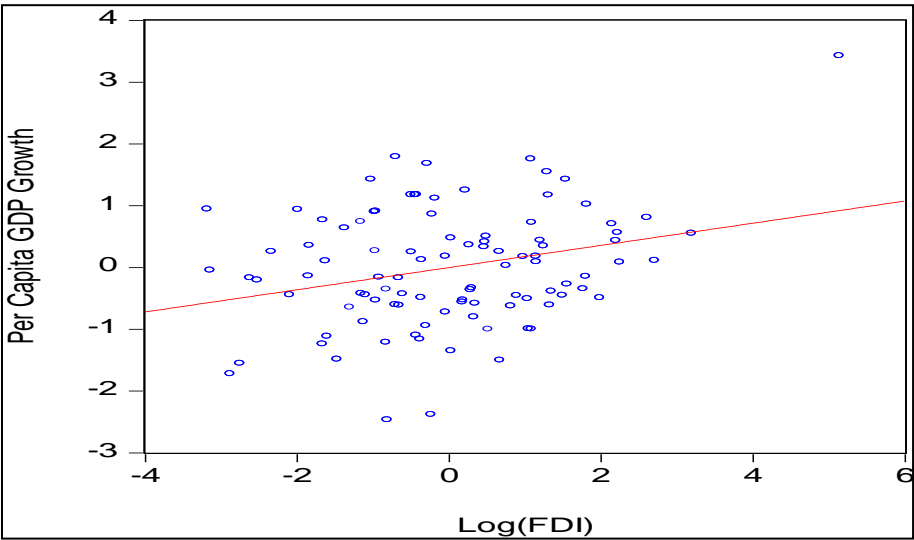**Figure 11 : Partial Relation between Per Capita GDP Growth
Exports to GDP Ratio**
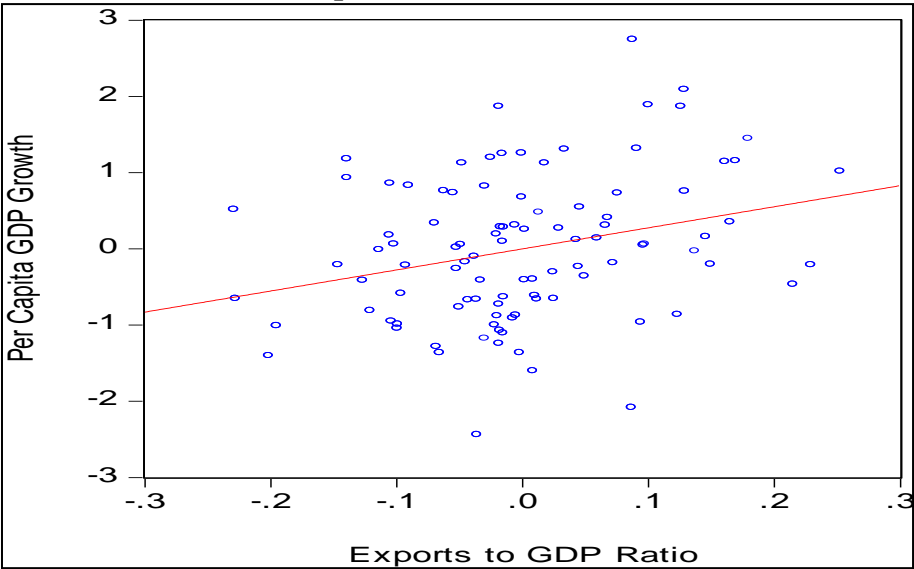
**Figure 12 : Partial Relation between Per Capita GDP Growth
Imports to GDP Ratio**
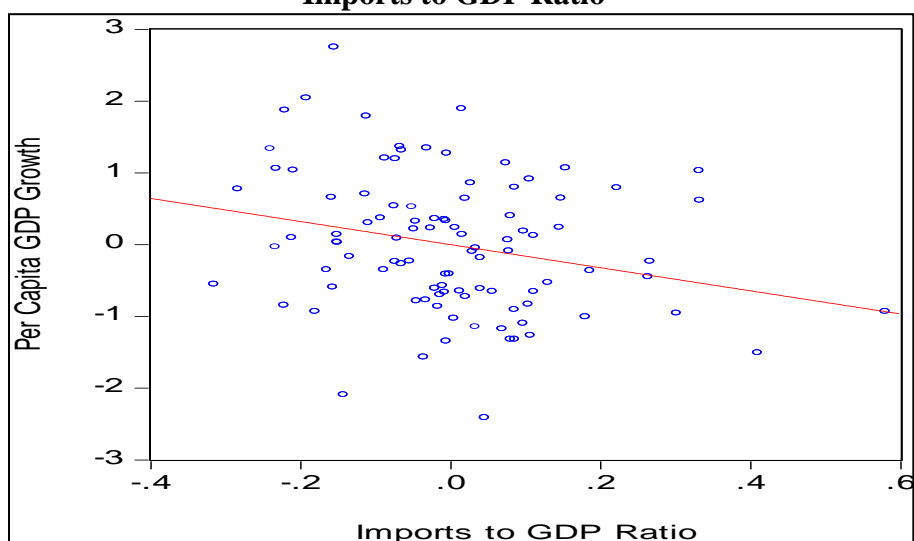
**Figure 13 : Partial Relation between Per Capita GDP Growth
and Total Trade to GDP Ratio**
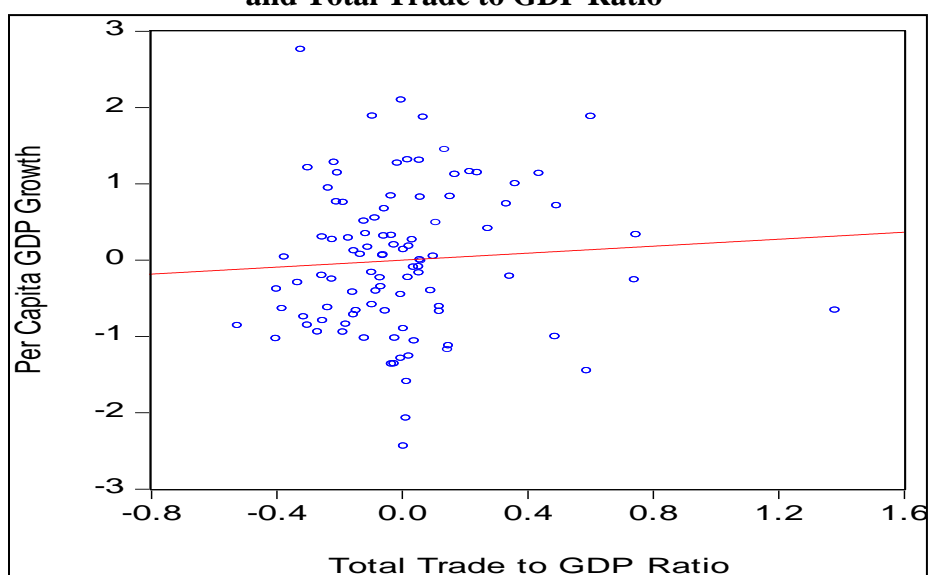
List of Countries

Antigua and Barbuda	Kuwait
Australia	Lesotho
Austria	Liberia
Bahrain	Luxembourg
Bangladesh	Madagascar
Barbados	Malawi
Belgium	Malaysia
Belize	Maldives
Benin	Mali
Bhutan	Malta
Bolivia	Mauritania
Botswana	Mauritius
Bulgaria	Mexico
Burkina Faso	Morocco
Burundi	Mozambique
Cameroon	Namibia
Canada	Nepal
Central African Republic	Netherlands
Chad	New Zealand
Chile	Niger
China	Nigeria
Colombia	Norway
Comoros	Oman
Costa Rica	Pakistan
Cyprus	Panama
Denmark	Paraguay
Dominica	Peru
Dominican Republic	Philippines
Ecuador	Portugal
El Salvador	Qatar

Fiji	Rwanda
Finland	Senegal
France	Sierra Leone
Gabon	South Africa
Germany	Spain
Ghana	Sri Lanka
Greece	Suriname
Grenada	Swaziland
Guatemala	Sweden
Guinea-Bissau	Switzerland
Honduras	Thailand
Hungary	Togo
Iceland	Trinidad and Tobago
India	Tunisia
Indonesia	Turkey
Ireland	Uganda
Israel	United Kingdom
Italy	United States
Jamaica	Uruguay
Japan	Zambia
Jordan	Zimbabwe
Kenya	

Forecasting Agriculture Exchange Trade Funds (ETFs): The Application of Grey Relational Analysis (GRA) and Artificial Neural Networks (ANNs)

Jo-Hui, Chen [a] and **Maya, Malinda [b]**

[a] *Dept. of Finance, Chung Yuan Christian University,*
Chung Li, Taiwan
johui@cycu.edu.tw

[b]*Management Department, Maranatha Christian University,*
Bandung, Indonesia
Hmy.malinda@yahoo.com

INTRODUCTION AND RESEARCH PROBLEM

ETFs and ETNs have become favoured research topics. Since their launch in 1993, ETFs have witnessed spectacular growth, with more than 4,980 ETFs currently being offered to investors. ETNs have shown rapid growth since their launch in 2006 by Barclays Bank PLC. Similar to ETFs, ETNs have many categories, such as commodity ETNs, currency ETNs, emerging market ETNs, and strategy ETNs. An example of commodity ETNs is agricultural ETN. Both agricultural ETFs and ETNs are desired by investors because of their rapid growth. However, despite many studies on ETFs, only a few have examined agricultural ETFs and ETNs. This study aims to fill this research gap and help investors select the best investment by identifying the best model to forecast agricultural ETFs and ETNs. Macroeconomic and financial variables are extracted to examine their effects on agricultural ETFs and ETNs. Several variables, namely, put/call ratio, EUR/USD exchange rate, volatility index (VIX), commodity research bureau index (CRB), short-term trading index (TRIN), New York Stock Exchange composite index (NYA), and

weather index (WINX), are utilized. The weather index is added because agricultural products are influenced by weather conditions.

METHODOLOGY

To the best of our knowledge, this paper is the first to forecast agricultural ETFs and ETNs using grey relational analysis (GRA) and two types of the ANN model, namely, back-propagation perception (BPN) and time-delay recurrent neural network (TDRNN). This study also compares and contrasts agricultural ETFs with agricultural ETNs. Jiang and He (2012) also found that the GRA model could accurately compute and predict three real financial time series in China. Bekiros and Georgoutsos (2008) and Sookhanaphibarn et al. (2007) tested the predicting power of the artificial neural network (ANN) model in the financial area. They found that the ANN model has the capacity to offer accurate forecasts in financial areas. Singhal and Swarup (2011) found that electricity price follows a strong trend in deregulated markets.

The localization GRA reflects the association between the reference sequences $x_i^{(0)}(k)$ (is chosen by localization GRG) and the relative sequences $x_i^*(k)$. Hence, the grey relational coefficient $\varepsilon(x_0(k),\ x_i(k))$ is illustrated as: $\varepsilon(x_0(k),\ x_i(k))\ = \frac{\Delta_{min}+\ \zeta\Delta_{max}}{\Delta_{0i}(k)+\ \zeta\Delta_{max}}$, where $\zeta\ \in (0,1)$ denotes the notable coefficient.

$$\Delta_{0i}(k) =\ |x_0(k) -\ x_i(k)|,$$

$$\Delta_{min} =\ \min_{\forall i}\min_{\forall k}\Delta_{0i}(k) =\ \min_{\forall i}\min_{\forall k}|x_0(k) -\ x_i(k)|,\ \text{and}$$

$$\Delta_{min} =\ \max_{\forall i}\max_{\forall k}\Delta_{0i}(k) =\ \max_{\forall i}\max_{\forall k}|x_0(k) -\ x_i(k)|.$$

BPN reduces the differences between the actual network output and the target output. The learning quality from this supervised learning is provided by error function E as follows:

$$E = \frac{1}{2}\sum_{j}(T_j - A_j)^2,$$

where T_j represents the target output of processing element j and A_j indicates the network output of processing element j.

The TDRNN model is an extensive neural model that has both the advantages of adaptive time delays and recurrences. This model manipulates the temporal information of input sequences by utilizing adaptive time delays and recurrent connections. The internal state units serve as the additional inputs at time t and duplicates from the processes of hidden units at time t-1. The TDRNN has adaptable synaptic weights and adjustable time lags through the interconnections between the input and hidden units while both time delays and weights are also adjusted. The delay box, which is unique on this ANN model, is made up of interconnections from the input layer to the first hidden layer and also from the internal state layer to the first hidden layer.

The net inputs from the activation values of the previous neuron are summed up through the equivalent time delays on each connection line at time t_n of unit j on the layer h that receives a weighted sum.

$$net_{j,h}(t_n) = \sum_{i \in N_{h-1}} \sum_{k=1}^{K_{ji,h-1}} \omega_{jik,h-1} \cdot \alpha_{i,h-1}(t_n - \tau_{jik,h-1}),$$

where $\alpha_{i,h-1}(t_n - \tau_{jik,h-1})$ denotes the activation level of unit i on the layer $h-1$ at time $t_n - \tau_{jik,h-1}$; N_{h-1} represents for the set of nodes of

layer $h-1$; and $K_{ji,h-1}$ represent the total number of connection to node j of layer h from node i of layer $h-1$.

RESULTS AND FINDINGS

Agricultural ETNs are strongly influenced by CRB, NYA, WINX, and EUR/USD, whereas agricultural ETFs are strongly influenced by CRB and NYA. Following previous studies, 10%, 20%, 33%, and 50% of the data were utilized to test the available forecasting information applicable to time series data (Andreou et al., 2002; Chen and Fang, 2011; Diaz, 2012). The BPN model suggests that 10% of the time series data must be used to forecast agricultural ETNs and ETFs, whereas the TDRNN model suggests that 33% and 50% of the time series data must be used for the forecasting. GRA and the ANN model can strongly capture nonlinear trends and improve the precision of forecasting the agricultural ETFs and ETNs of Canada, United Kingdom, and the United States. Investors, fund managers, and traders can effectively use CRB, NYA, WINX, and EUR/USD to forecast agricultural ETFs and ETNs.

Consistent with Kim (1998) and Ge et al. (2009), they found that TDRNN can forecast stock market trends and identify and control dynamic systems better than other models. This study presents information on the agricultural ETFs in all variable groups. TDRNN obtained better forecasting results for CORN, COW.TO, and WEAT when 10% of the data were used. Better forecasting results were obtained for DBA when 50% of the data were used. Similarly, better forecasting results were obtained for COTN.L when 33% of the data were used.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

We find that the CRB and stock indexes strongly influence agricultural ETFs and ETNs. Some agricultural ETNs, such as AGA and ADZ, are strongly influenced by WINX. Coincidentally, the sources of these ETNs are corn, wheat, soybean, and sugar. CRB and NYA can benefit investors, traders, and fund managers when they invest in agricultural ETFs, and CRB, NYA, EUR/US, and WINX can benefit them when they invest in agricultural ETNs. The brief analysis of GRA model strongly suggests that investors should pay more attention to Commodity Index (CRB), New York Stock Exchange Composite Index NYA and weather index (WINX).

The GRA and ANN models can accurately forecast agricultural ETFs and ETNs in the United States, United Kingdom, and Canada as well as support investors, fund managers, and traders in making better predictions. The BPN model reveals that most agricultural ETFs and ETNs can be accurately predicted by using 10% of the time series data. Finally, this study reveals that GRA and ANNs models can accurately forecast agriculture ETFs and ETNs in United States, UK and Canada, and are able to support investors, fund managers and traders to make better-informed prediction.

REFERENCES

Andreou, A., Georgopoulos, E., and Likothanassis, S. (2002). Exchange-rates forecasting: A hybrid algorithm based on genetically optimized adaptive neural networks. Computational Economics, 20 (3), 191-210.

Bekiros, S. D., and D. A. Georgoutsos (2008). Direction-of-change forecasting using a volatility-based recurrent neural network. Journal of Forecasting, 27 (5), p.407-417.

Chen, J. H., and Fang, Y. P. (2011). A study on the modified components of Asian Currency Unit: An application of the artificial neural network. Quality and Quantity, 45 (2), 329-347.

Diaz, J. F. (2012) Application of grey relational analysis and artificial neural networks on currency exchange trade notes (ETNs). Doctoral Dissertation Chung Yuan Christian University. 87-89.

Ge, H. W., Du, W. L., Qian, F., and Liang, Y. C. (2009). Identification and control of nonlinear systems by a time-delay recurrent neural network. Neurocomputing, 72 (13–15), 2857-2864.

Jiang, H., and He, W. (2012). Grey relational grade in local support vector regression for financial time series prediction. Expert Systems with Applications, 39 (3), p.2256-2262.

Kim, S. S. (1998). Time-delay recurrent neural network for temporal correlations and prediction. Neurocomputing, 20 (1–3), 253-263.

Sookhanaphibarn K., Polsiri, P., Choensawat, W., and Lin, F. C. (2007). Application of neural networks to business bankruptcy analysis in Thailand. International Journal of Computational Intelligence Research, 3 (1), p.91-96.

Singhal, D., and Swarup, K. S. (2011). Electricity price forecasting using artificial neural networks. International Journal of Electrical Power & Energy Systems, 33 (3), p.550-555.

Is There a Long-Run Relationship between Exports and Imports? Evidence from Sri Lanka (1977-2014)

B.M. Sumanarathne [a] and **K.T. Udari Niranjala** [b]

[a] *Department of Economics, University of Ruhuna*
bmsumana@econ.ruh.ac.lk

[b] *Department of Economics, University of Ruhuna*
udari.niranjala@yahoo.com

INTRODUCTION AND RESEARCH PROBLEM

Trade deficit is a common issue in many developing and developed countries. Short-run disequilibria in exports and imports are not considered as bad, but long-run equilibrium is important to maintain the international budget constraint of a country. Sustainable trade balance is a key feature of an effective macroeconomic policy of an economy (Perera and Verma, 2008).

Sri Lanka, the first South Asian country to open up the economy in 1977, has been showing a growing deficit in its trade account.

Figure 1 shows a continuous and growing deficit in the trade balance of Sri Lanka after liberalization of the economy in 1977. Recent large trade deficits have been creating a balance of payments crisis and increasing foreign borrowing. In 2011 import expenditure significantly increased while the earnings from exports declined and led Sri Lanka's trade deficit ballooned to a recorded high of US $ 9.7 billion[1]. This could not be offset by capital inflows and created a

[1] Central Bank of Sri Lanka, Annual Report 2012
[2] Central Bank of Sri Lanka, Annual Report 2014

balance of payments crisis that required remedial measures in 2012. This expansion in the trade deficit has been continued and recorded US $ 9.4, 7.6 and 8.2 billion in 2012, 2013 and 2014 respectively[2]. The sustainability of the trade account is questioned under this background. Hence, this study intends to examine the long run relationship between exports and imports of Sri Lanka for the period of 1977 to 2014.

Figure 14: Exports, Imports and Trade Balance of Sri Lanka from 1977-2004 (US $ Millions)
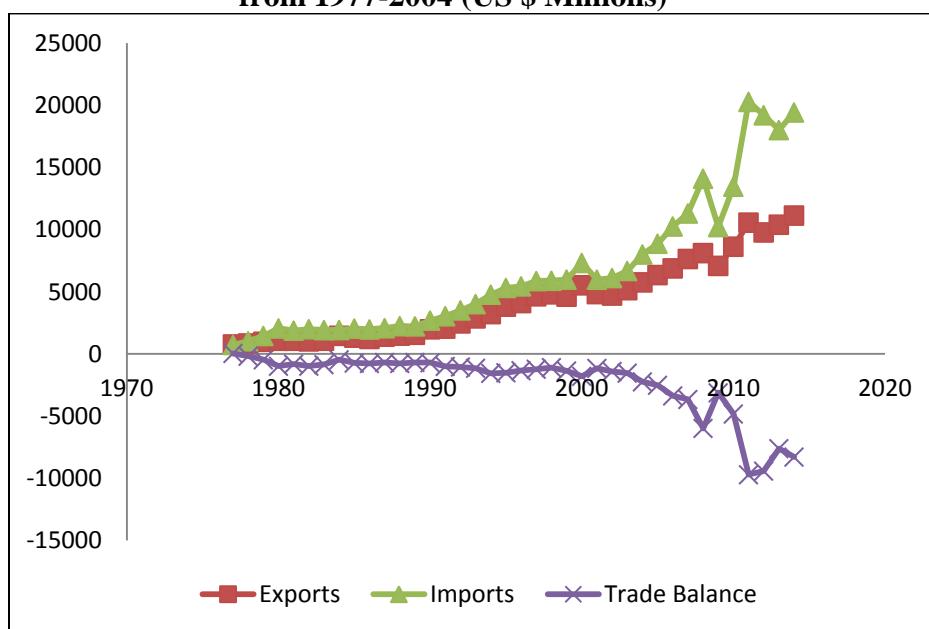
Source: Annual reports of the Central Bank of Sri Lanka

The long-run relationship between exports and imports and the sustainability of trade deficit have been empirically examined by many researchers under different approaches. Husted (1992), Ahmed and Rogers (1995), Apergis et al. (2000), Bahmani-Oskooee (1994), Wu, Fountas and Chen (1996) and several other researchers have tested the relationship between exports and imports to capture the sustainability of the current account of different countries. Perera and Verma (2008) test the sustainability of trade deficit of Sri Lanka using unit root and co-integration techniques for the period of 1950 to

2006. They have concluded that Sri Lanka is in violation of its international budget constraint and the current account of Sri Lanka is not sustainable. The deficit in the trade balance in Sri Lanka and its sustainability could be analysed using recent trade statistics. Thus, this study uses annual data for the period after liberalizing the Sri Lankan economy (1977 to 2014) and analyses the behaviour of exports and imports of Sri Lanka.

METHODOLOGY

To date various methods have been developed and introduced to measure the long run relationship between exports and imports. Husted (1992) derived the following simple testable model to analyse the long run equilibrium between exports and imports:

$$X_t = a + bM_t + e_t$$

X is exports of goods and services and M is imports of goods and services. According to Husted (1992), 'b' should be equal to one and 'e' should be stationery in the equation to satisfy the inter-temporal budget constrain of an economy. This study is mainly based on the above model.

Annual data for exports and imports of Sri Lanka are gathered from annual reports of the Central Bank of Sri Lanka. Study covers for the period of 1977 to 2014.

The Phillips- Perron test is implemented on data series to investigate the random walk nature. Engle-Granger co-integration test is used to capture the long-run relationship between variables. Wald coefficient test found whether the coefficient of Imports is equal to one. Finally the Engle-Granger causality test is conducted to identify the causal relationship between exports and imports. Stata, E-Views and MS Excel computer packages are used for the data analysis.

RESULTS AND FINDINGS

Table 6 : Phillips-Perron Unit Root Tests for Levels and First Differences of Variables

Variable	PP test statistic		Mackinnon Critical for Rejection of Hypothesis of a Unit Root			Decision	Order of integration
	Levels	First Difference	1%	5%	10%		
Exports	2.407583 (2)	6.744677** (3)	-3.621023	-2.943427	-2.610263	Non stationary at level, but stationary at first difference	I(1)
Imports	1.515703 (8)	-6.820200** (2)	-2.636	-1.951	-1.610	Non stationary at level, but stationary at first difference	I(1)

Source: Author's computation

Note: The numbers in brackets are the lag length. The lag length for PP test is selected according to Newey-West bandwidth criterion.

*** indicates significance at 1 percent level*

Exports and imports series had logarithmic transformation before estimation. Then presence of unit root in the time series data of exports and imports of Sri Lanka is tested using Phillips-Perron unit root test.

According to Table 1, the results of the Phillips- Perron Test for unit root suggest that the data series are non-stationery at levels and become stationery at first difference. Two variables are integrated in order one. Hence, appropriate for test co-integration between two variables.

In order to identify whether there is a long run relationship between exports and imports of Sri Lanka, Engle-Granger co-integration test is conducted. The equation developed by Husted (1992) is estimated using OLS and generated the residual series. This residual series is tested for unit root following Augmented Dickey-Fuller (ADF) unit root test. Table 2 presents the output of the co-integration test and Table 3 presents the ADF unit root test results.

Table 7: Engle-Granger Co-Integration Test Results

Variable	Coefficient	Standard error	t-stat	p-value
C	0.039892	0.241570	0.165137	0.8698
Imports	0.949179	0.028489	33.31703	0.0000

Source: Author's computation

Table 8: ADF Unit Root Test for Engle-Granger Cointegration Approach

$\Delta u_t = 0.047902 - 0.370900_t + 0.001939\ u_{t-1}$
$\quad\quad(0.033)\quad\quad(0.1119)\quad(0.0015)$

$R^2 = 0.2531$	
Durbin Watson d= 1.77	Prob. (F statistic) = 0.007

Source: Author's computation

According to the ADF test for unit root, test statistic (-3.3120) is more negative than the Mackinnon critical value (-2.9424) at five percent significant level. The hypothesis that the error term is unit root at levels is rejected. Thus, co-integration is found between exports and imports. This implies a long run equilibrium relationship between exports and imports of Sri Lanka. According to the Table 2, the coefficient of imports is statistically significant. Imports elasticity of exports is 0.95 and implies that imports have a positive impact on exports of Sri Lanka.

Table 9 : Wald Coefficient Test Results

Equation	Coefficient	Null hypothesis	F-statistic
Exports =f (Imports)	0.95	b = 1	2.78

Source: Author's computation

Wald coefficient test rejects the null hypothesis of 'b' coefficient equals to one. Estimated equation in the Table 2 shows that the slope coefficient is lower than one and equals to 0.95. This implies a growing trend of the trade deficit of Sri Lanka.

Next, the causal relationship between exports and imports of Sri Lanka is checked by employing the Engle-Granger causality test. Table 5 shows the results of the Engle-Granger causality test.

Table 10: Engle-Granger Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Probability
LIMPORTS does not Granger Cause EXPORTS	37	0.16148	0.69031
LEXPORTS does not Granger Cause LIMPORTS		7.35713	0.01040

Source: Author's computation

According to the above results, there is a unidirectional causality from exports to imports in Sri Lanka.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

This study attempted to analyse the long run relationship between exports and imports of Sri Lanka after liberalisation of the economy in 1977. Engle-Granger co-integration approach confirms a long run equilibrium relationship between exports and imports of Sri Lanka. Estimated results conclude that only US $ 0.95 could be earned as exports income when Sri Lanka spend one dollar for imports. This implies that the trade deficit is growing. Results of the Engle-Granger causality test indicate that exports depend on imports.

Therefore, to fix the problem of country's gapping trade deficit, policy changes must be followed to increase the exports income to the country. This includes releasing resources for science and technological base human resources and protection of property rights. In the longer run the diversification of exports and export markets and ensuring an investment climate to generate exportable products is needed. Dependence of production on the imported inputs should be reduced. Improving productivity and having more value addition in local exports would reduce this unsustainable trade deficit in Sri Lanka.

REFERENCES

Ahmed, S., and Rogers, J. H. (1995), Government Budget Deficits and Trade Deficits. Are Present Value Constraints Satisfied in Long-term Data?" Journal of Monetary Economics, 36 (2), pp. 351-374.

Apergis, N., Katrakilidis, K. P., and Tabakis, N. M. (2000), Current Account Deficit Sustainability: The Case of Greece. Applied Economics Letters, 7, pp. 599-603

Bahmani-Oskooee, M. (1994), Are Imports and Exports of Australia Cointegrated?, Journal of Empirical Integration, Vol. 9 No. 4: 525-533.

Central Bank of Sri Lanka, Various years, *Annual Report*. Colombo: Central Bank of Sri Lanka.

Husted S. (1992), The Emerging US Current Account Deficit In The 1980s: A Cointegration Analysis, The Review of Economic and Statistics, 74, 159-166.

Perera, N. and Verma, R. (2008), An empirical analysis of sustainability of trade deficit: evidence from Sri Lanka, International Journal of Applied Econometrics and Quantitative Studies, 5(1), 2008, 71-92.

Wu, J. L., Stilianos, F., and Chen, S. L. (1996), Testing for the Sustainability of the Current Account Deficit in Two Industrial Countries. Economics Letters, 52 (2), pp. 193-198.

Monetary Policy Analysis

கிராமிய அபிவிருத்தியும், வங்கிகளின் நுண்கடன்களும்
(கிளிநொச்சி மாவட்டத்தின் திருவையாறு கிராமத்தை மையமாகக் கொண்ட சிறப்பாய்வு)
Rural Development and Bank's Micro Loans
(Special Reference to the Thiruvaiyaru Village in Kilinochchi District)

M. Suthesini [a], **S.S. Uthayakumar** [b] and **M. Sutharsini** [c]

[a]*Department of Economics, Jaffna, Sri Lanka*
sudeciny2011@gmail.com

[b]*Department of Economics, Jaffna, Sri Lanka*
bssuthayan@yahoo.com

[c]*Department of Economics, Jaffna, Sri Lanka*
sutharsinym@gmail.com

1. ஆய்வின் அறிமுகம் (Introduction)

கிராமிய அபிவிருத்தியில் வங்கிகளின் நுண்கடன்கள் எவ்வகையான தாக்கங்களினை ஏற்படுத்தியுள்ளது என்பதனை ஆராய்வதே இந்த ஆய்வினது நோக்கமாகும். இன்றைய உலகப் பொருளாதாரங்களில் அபிவிருத்தி என்பது முக்கியத்துவமுடைய ஒரு செயற்பாடாக உணரப்பட்டு வருகின்றது. அபிவிருத்தியினை முன்னேற்றுகின்ற நோக்குடன் நிதி நிறுவனங்கள் (Financial Institutions) மிக அதிகளவாக செயற்பட்டு வருகின்றன. இவை பெரும்பாலும் கிராமப்புறங்களிலேயே தமது பணிகளை ஆற்றி வருகின்றன. வறிய மக்களுடைய வாழ்வாதாரத்தை முன்னேற்றும் நோக்குடனும், அவர்களினது வாழ்க்கைத்தரத்தினை மேம்பாடடையச் செய்யும் நோக்குடனும் இவை செயற்பட்டு வருகின்றன. குறிப்பாக உள்நாட்டு யுத்தம், இடப்பெயர்வு என்பன காரணமாக பாதிப்புக்கள் ஏற்படுகின்ற போது அவற்றை சீர்செய்யவென நிதிநிறுவனங்கள் செயற்பட்டு வருகின்றன. நிதி நிறுவனங்கள் என்கின்ற போது **குத்தகைக் கம்பனிகள் (Leasing Company),** காப்புறுதி நிறுவனங்கள்

(Insurance company), வங்கிகள் (Banks) போன்ற நிறுவனங்களை
எடுத்துக்காட்ட முடியும். இவற்றில் வங்கிகள் என்கின்ற போது BOC,
People's Bank, Commercial Bank என்பன ஆய்வுப்பிரதேசத
மக்களுக்கு கடன் வழங்குவனவாகக் காணப்படுகின்றன. அத்துடன்
ஆய்வுப்பிரதேசத்தவர்கள் வங்கிகளிடமிருந்து 10,000 – 25,000
மற்றும் 25,000 – 50,000 மற்றும் 50,000 - 1,000,000 வரை கடன்
பெற்றவர்களாகக் காணப்படுகின்றனர். 2009ன் யுத்தத்தின்
மீள்குடியேற்றத்தினைத் தொடர்ந்து வங்கிகள் மிக அதிகளவாக
தமது செயற்பாடுகளை மேற்கொள்ளத் தொடங்கின. இலங்கையின்
வடபகுதியானது யுத்தத்தினால் மிக அதிகளவான இழப்புக்களை
சந்தித்த ஒரு பகுதியாகும். இப்பகுதியின் மையத்தில் அமைந்து
விளங்கும் கிளிநொச்சி மாவட்டத்தின் கிழக்குப் பகுதியில்
அமைந்துள்ள **"திருவையாறு கிராமமே"** ஆய்வுக்கென தெரிவு
செய்யப்பட்டுள்ளது. இப்பிரதேசத்தினது அபிவிருத்தியினை
மேம்படுத்தும் முகமாக இதுவரை காலமும் எந்த விதமான
ஆய்வுகளும் மேற்கொள்ளப்படாத நிலையில் இந்த
இடைவெளியினை நிறைவு செய்யும் நோக்குடன் இந்த ஆய்வானது
மேற்கொள்ளப்படுகின்றது. இந்த ஆய்வானது யுத்தத்தின் பின்னர் மீள்
குடியேறிய மக்களின் வருமானம் மற்றும் நிதி நிறுவனங்களின்
செயற்பாடுகள் என்ற இரு மாறிகளைக் கொண்டு
விளக்கப்படுகின்றது. இங்கு சார்ந்த மாறியாக (Dependent Variable)
மீள் குடியேறிய மக்களின் வாழ்க்கைத்தரமும், சாராத மாறியாக
(Independent Variable) நிதி நிறுவனங்களின் செயற்பாடுகளும்
எடுத்துக் காட்டப்பட்டுள்ளன.

1.1 ஆய்வுப்பிரதேசம்

இலங்கையின் வடக்கு மாகாணத்தின் மத்தியில் அமைந்து
விளங்குகின்ற கிளிநொச்சி மாவட்டமானது 04 பிரதேச செயலர்
பிரிவுகளைத் தன்னகத்தே கொண்டுள்ளது. கரைச்சி, கண்டாவளை,
பூநகரி, பளை என்பனவே அவையாகும். இதில் கரைச்சிப்
பிரதேசமானது 42 கிராமங்களை உள்ளடக்கிக் காணப்படுகின்ற
போதும் கிழக்குப் பகுதியில் காணப்படுகின்ற "திருவையாறு கிராமம்"
மட்டுமே ஆய்வுப் பிரதேசமாக எடுத்துக் கொள்ளப்பட்டுள்ளது..
ஆய்வுப்பிரதேசமானது வடக்கே மருதநகர் மற்றும் பன்னங்கண்டி
கிராமங்களையும், தெற்கே கனகாம்பிகைக்குளம் கிராமத்தினையும்,
கிழக்கே அம்பாள்நகர் கிராமத்தையும், மேற்கே இரத்தினபுரம்
கிராமத்தையும் எல்லையாகக் கொண்டதாகவும் 11.55sqkm
பரப்பளவினைக் கொண்டதாகவும், 648 குடும்பங்களைச் சேர்ந்த 1908
குடும்ப உறுப்பினர்களைக் கொண்டதாகவும் காணப்படுகின்றது.

ஆய்வுப்பிரதேசமானது திருவையாறு (KN/020), திருவையாறு மேற்கு (KN/021) என்ற இரு கிராம அலுவலர் பிரிவுகளை உள்ளடக்கியதாகக் காணப்படுகின்றது. இங்கு திருவையாறு கிராமமானது (KN/020) 280குடும்பங்களைக் கொண்டதாகக் காணப்படுகின்றது. திருவையாறு மேற்கு (KN/021) கிராமமானது 368 குடும்பங்களை உள்ளடக்கியதாகக் காணப்படுகின்றது.

<p align="center">வரைபடம்: 1.1</p>
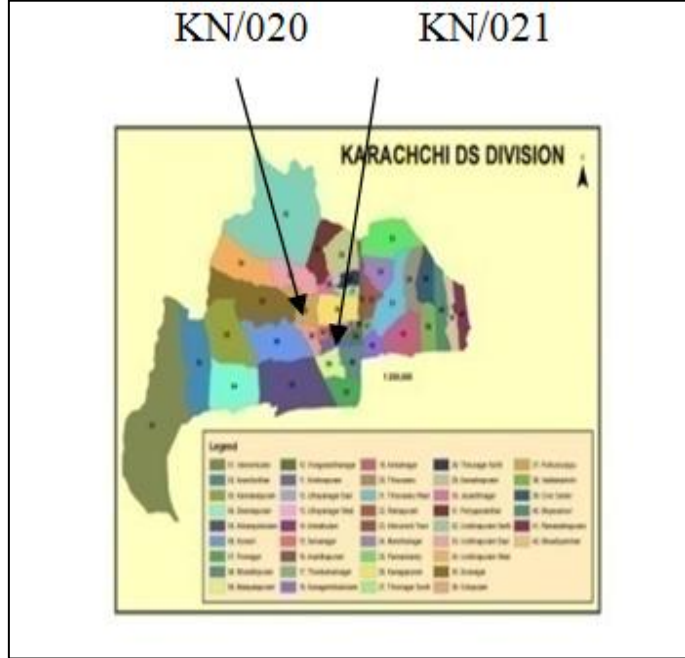
<p align="center">*மூலம்: பிரதேச செயலர் அறிக்கை -2013*</p>

1.2   ஆய்வுப்பிரச்சினை

ஆய்வுப்பிரதேசத்தில் வசிக்கும் மக்கள் மிகவும் பின்தங்கிய நிலையிலேயே வாழ்கின்றனர். தொடர் யுத்தங்கள் மற்றும் இடப்பெயர்வுகள் காரணமாக ஆய்வுப்பிரதேச மக்கள் மிகவும் கஸ்டங்களை அனுபவித்து வருகின்றனர். மிக அதிகளவான ,ழப்புக்களை இவர்கள் சந்தித்துள்ளனர். இப்பிரதேச மக்களின் வாழ்க்கைத்தரம் மிகவும் பின்தங்கிய நிலையிலேயே காணப்படுகின்றது. இவர்களின் வாழ்வாதாரம் விருத்தியடைவதில் எவ்வகையான பங்களிப்புக்களை மேற்கொள்ளலாம்? வறுமையினைத் தவிர்ப்பதற்கு என்ன செய்யலாம்? வருமானத்தை அதிகரிக்கச் செய்வதற்கான வழிவகைகள் எவை? ஏன்பன ஆய்வுப்பிரதேசத்தின்

<p align="center">375</p>

பாரிய பிரச்சினைகளாகக் காணப்படுகின்றன. (மூலம்: கரைச்சிப் பிரதேச செயலக அறிக்கை – 2013)

1.3 ஏற்கனவே செய்யப்பட்ட ஆய்வுகள் தொடர்பான மீள் பார்வை

"வினைத்திறனான நிதி நிறுவனங்களானவை மக்களினது வருமான அதிகரிப்பிலும், அவர்களது வாழ்வாதாரத்தினை முன்னேற்றுவதிலும் மிக முக்கிய பங்காற்றுகின்றன." (Kenneth and Heron ,2002)

"பெரும் எண்ணிக்கையிலான நிதி நிறுவனங்கள் கிராமப் புறங்களை நோக்கி தமது செயற்பாட்டினை மேற்கொள்வனவாகவும், கடன் வழங்கும் செயறபாடுகளில் முன் நிற்பனவாகவும் காணப்படுகின்றன." (Nishanth Vasudevan , 2013)

"உலகப் பொருளாதாரத்தினை பொறுத்த வரையில் நிதி நிறுவனங்களானவை மிக அதிகளவான தாக்கத்தினை ஏற்படுத்துவனவாக உள்ளன. இவை உற்பத்தி, சந்தைப்படுத்தல் போன்ற அனைத்து செயற்பாடுகளிலும் தாக்கம் செலுத்துகின்றன." (Sasitharan and Mathews, 2013)

பயன்படுத்தப்படாத வளப்பயன்பாடு விவசாயத்துறையில் விருப்பத்தைத் தூண்டுதல், சுயதொழில் முயற்சிக்கு மூலதனம் பெறும் வசதிகளை ஏற்படுத்துதல், திறமையான வளப்பயன்பாடு, சந்தைப்படுத்தல் என்பவற்றின் மூலம் அபிவிருத்தியை ஏற்படுத்தலாம். (Kunaraatnam Sutharsan -2001)

இலங்கையில் குறைவிருத்தியைத் தடுக்கக்கூடிய வளங்கள் கிராமியத் துறையிலேயே காணப்படுகின்றன. எனவே நாட்டை அபிவிருத்தி செய்ய கிராமியத்துறைச் சேமிப்புக்களைத் திரட்டி அதனை உற்பத்தி முயற்சியில் பயன்படுத்த வேண்டும். (Sasikaran – 1998)

விவசாயம், வர்த்தகம், பொருளாதார வளர்ச்சி, பொருளாதார அபிவிருத்திக்கு அரச வங்கிக் செயலாற்றுகின்றன. ஆனாலும் அரச வங்கித் துறைச் செயற்பாடுகளை பலமாக்க நடவடிக்கை எடுப்பதோடு வங்கிச் சேவை சகல மக்களையும் சென்றடைய நடவடிக்கை எடுக்க வேண்டும். (Thivviyarajh – 1999)

உள்நாட்டுச் சட்டத்திற்கு அமைவாக கடன் கொடுத்தல் திட்டத்தின் கிழ் கொழும்ப தேயிலை தரகர்களிடம் தேயிலை கொள்வனவிற்கான

முற்பணத்தைப் பெறுவதற்கு தங்கியிருந்த நிலையை இல்லாமல் செய்து பதிலாக அரச, தனியார் தாபனங்களினால் நிதியாக்கப்பட்டது. தேயிலை கொள்வனவு தொழிற்சாலைகளில் காணப்பட்ட தொழிற்படு மூலதன பிரச்சனைக்குத் தீர்வாக இத்திட்டம் அமைந்தது. (W.L.L Theresha – 1994)

1.4   நோக்கங்கள்

❖ **பிரதான நோக்கம்**

> கிராமிய அபிவிருத்தியில் வங்கிகளின் நுண்கடன்கள் ஏற்படுத்தியுள்ள தாக்கங்களினை கண்டறிதல்

❖ **துணை நோக்கங்கள்**

> வங்கிகளின் நுண்கடன்கள் ஆய்வுப்பிரதேச மக்களினது வருமானத்தில் ஏற்படுத்தியுள்ள தாக்கங்களினைக் கண்டறிதல்

> வங்கிகளின் செயற்பாடுகள் எதிர்கால கிராமிய அபிவிருத்திக்கு எவ்வாறு அமைய வேண்டும் என்பதனைக் கண்டறிதல் என்பனவும் முன்வைக்கப்பட்டுள்ளன.

1.5   கருதுகோள்கள்

H1   :   ஆய்வுப்பிரதேசத்து மக்களின் வாழ்வாதாரத்திற்கும், வங்கிகளின் நுண்கடன்களுக்குமிடையேயான தொடர்பினை இனங்காணல்

H2   :   ஆய்வுப்பிரதேசத்து மக்களின் வறுமைக்கும் வங்கிகளின் நுண்கடன்களுக்கும் இடையேயான தொடர்பினை இனங்காணல்

H3   :   ஆய்வுப்பிரதேசத்து மக்களின் வருமானத்துக்கும் வங்கிகளின் நுண்கடன்களுக்கும் இடையேயான தொடர்பினை இனங்காணல்

2   எண்ணக்கருச்சட்டவாக்கம்

உரு: 2

```
                    வங்கிகளின் நுண்கடன்கள்

    வருமான அதிகரிப்பு    மக்களின்         வறுமை நிலையினை
                         வாழ்க்கைத்தரத்தினை   குறைத்தல்
                         மேம்பாடடையச் செய்தல்

        பொருளாதார ரீதியான              சமூக ரீதியான
        மேம்பாடு                        மேம்பாடு

    வாைேர  தொடர்பிபாடல்  திட்டமிடல்    வருமானம்  போக்குவரத்து  கல்வி, சுகாதாரம்

                    கிராமத்தின் அபிவிருத்தி
```
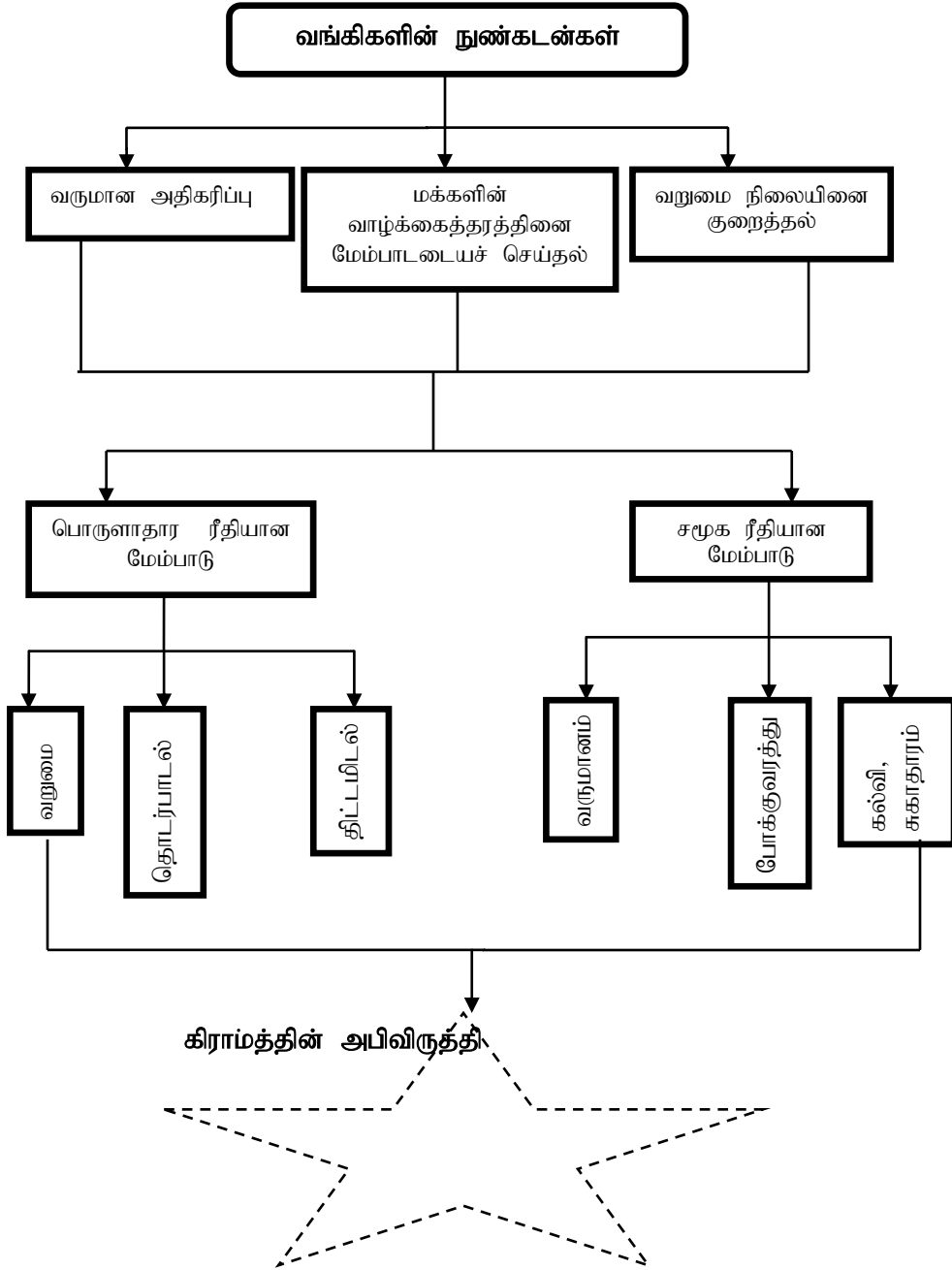
மூலம்: ஆய்வாளனால் தொகுக்கப்பட்டது

3 ஆய்வு முறையியல்

பெறப்பட்ட தரவுகளானவை முதலாம் நிலைத் தரவுகள், இரண்டாம் நிலைத் தரவுகள் என்று வகைப்படுத்தப்பட்டுள்ளன. முதலாம் நிலைத் தரவுகள் என்கின்ற போது ஆய்வுப் பிரதேசத்தில் ஆய்வாளனினால் நேரடியாகச் சென்று நேர்காணல், வினாக்கொத்து, கள ஆய்வு, நேரடி அவதானம், கலந்துரையாடல், புகைப்படம் எடுத்தல் போன்ற கருமங்களில் ஈடுபடுவதன் மூலம் பெறப்படுகின்ற தகவல்கள் ஆகும். முதலாம் நிலைத் தரவுகள் என்பது இந்த ஆய்விற்கு மிகவும் முக்கியமானதொன்றாக காணப்படுகின்றது. ஆய்வுப் பிரதேசத்தில் ஆய்விற்கென மாதிரியாக தெரிவு செய்யப்பட்ட குடும்பங்களிடம் நேர்காணலினை மேற்கொள்வதுடன் வினாக்கொத்தினை வழங்குவதன் மூலம் தரவுகள் சேகரிக்கப்பட்டுள்ளன. வினாக்கொத்தானது ஆய்வுப்பிரதேசத்தில் மிக அதிகளவாக போரினால் பாதிக்கப்பட்ட மக்கள் வங்கிகளிடமிருந்து பணத்தினைப் பெற்று எவ்வகையான வாழ்க்கைத்தர முன்னேற்றத்தினைப் பெற்றுள்ளனர் என்பதனை இனங்காணும் நோக்கில் எழுமாற்று அடிப்படையில் (Random Sampling) குடும்பங்கள் தெரிவு செய்யப்பட்டு வினாக்கொத்தானது வழங்கப்பட்டுள்ளது. இங்கு ஒட்டுமொத்த சனத்தொகையிலிருந்து 10% இனர் மாத்திரமே ஆய்விற்கென தெரிவு செய்யப்பட்டதுடன் வினாக்கொத்தும் வழங்கப்பட்டு தரவுகள் பெறப்பட்டவர்களாகக் காணப்படுகின்றனர். கள ஆய்வினை மேற்கொள்கின்ற போது பெறப்படுகின்ற தரவுகளை மேலும் நம்பகத்தன்மை வாய்ந்ததாகவும் பெற்றுக் கொள்ள முடியும். இங்கு **"வினாக்கொத்துமுறை"** மூலமாகவே தரவுகள் கிட்டத்தட்ட 80% மானவை திரட்டப்பட்டுள்ளன. இங்கு தெரிவு செய்யப்பட்ட குடும்பங்கள் வங்கிகளிடமிருந்து கடன் பெற்றவர்களாகக் காணப்படுகின்றனர்.

கிராம அலுவலர் பிரிவு	மொத்த சனத்தொகை	மாதிரி (10%)
KN/020	280	28
KN/021	368	37

மூலம்: ஆய்வாளனால் தொகுக்கப்பட்டது

4   தரவும், பகுப்பாய்வும்.

இங்கு விபரண ரீதியான அணுகுமுறையானது (Descriptive Analysis) பயன்படுத்தப்படுகின்றது. அந்த வகையில் இந்த ஆய்வு முறையினுள் சிதறல் வரைபடம், இணைவுக்குணகம், மற்றும் வரைபடங்கள், அட்டவணைகள் என்பவற்றின் உதவியுடன் பகுப்பாய்வு மேற்கொள்ளப்படுகின்றது. இதன் மூலம் ஆய்வின் பெறுபேறுகளினை எடுத்துக் காட்டுவதுடன் வீதாசாதார அடிப்படையிலான பங்கினை விளக்குவதற்காக Micro Soft Excel பயன்படுத்தப்படுவதுடன், வட்டவரைபடம், சலாகை வரைபு என்பனவற்றினூடாகவும் விளக்கப்படுகின்றன. மேலும் புள்ளிவிபர ரீதியாக கணித்துக் காட்டுவதற்கு கணித ரீதியிலான அணுகுமுறையும் (Statistical Analysis) பயன்படுத்தப்படுகின்றன. இதில் முக்கியமாக Statistical Package for Social Science (SPSS) பயன்படுத்துவதனூடாக இரண்டு மாறிகளுக்கிடையிலான தொடர்பினை (Relationship) காட்டுவதற்கு Correlation இனை பயன்படுத்துவதுடன், ஒரு மாறி இன்னொரு மாறியில் எவ்வளவு தாக்கத்தினை ஏற்படுத்தியுள்ளது (impact) என்பதனைக் காட்டுவதற்கு Regression இனை பயன்படுத்துவதுடன் மூலமாகவும்   தீர்வு காணப்பட்டுள்ளது.

இதனை விட வங்கிகள் என்கின்ற போது BOC, People's Bank, Commercial Bank போன்றவற்றிடமிருந்து மிக அதிகளவாக கடன் (Loan) பெற்றவர்களாகக் காணப்படுகின்றனர்.

உரு: 4.4
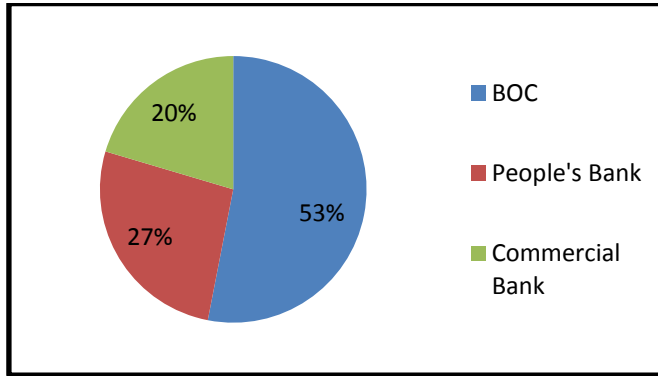
மூலம்: களஆய்வு -2014

இங்கு இலங்கை வங்கியிடமிருந்து ஆய்வுப்பிரதேச மக்கள் 53% மானவர்கள் கடன் பெற்றவர்களாகவும், மக்கள் வங்கியிடமிருந்து

27% மானவர்களும், கொமர்ஷியல் வங்கியிடமிருந்து 27% மானவர்களும் கடன் பெற்றவர்களாகக் காணப்படுகின்றனர். இதனை விட வங்கிகளின் கடன் வழங்கும் செயற்பாடுகள் அதிகரிக்கின்ற போது ஆய்வுப்பிரதேச மக்களினது வருமானங்களும் அதிகரிக்கின்ற தன்மையினை அவதானிக்க முடிகின்றது. இதனை வரைபடத்தில் எடுத்து நோக்குவோம்.

உரு: 4.4
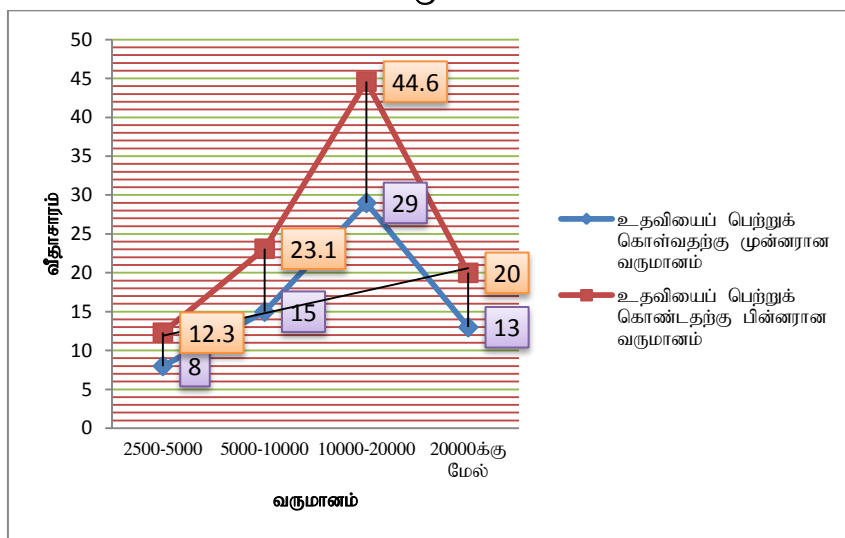
மூலம்: களஆய்வு -2014

இங்கு கடன்களை பெற்றுக் கொள்வதற்கு முன்னரான வருமானமானது 2500-5000, 5000-10000, 10000-20000, 20000 க்கு மேல் என்பது முறையே 8%, 15%, 29%, 13% எனவும், கடன்களை பெற்றுக் கொள்வதற்கு பின்னரான வருமானமானது முறையே 12%, 23%, 44%, 20% எனவும் காணப்படுகின்றன.

4.1 ஆய்வுப்பிரதேசத்து மக்களின் வாழ்வாதாரத்திற்கும், வங்கிகளின் நுண்கடன்களுக்குமிடையேயான தொடர்பினை இனங்காணல்

ஆய்வுப்பிரதேச மக்களினது வாழ்வாதாரத்தில் வங்கிகளின் நுண்கடன்கள் எவ்வகையான தாக்கங்களினை ஏற்படுத்தியுள்ளன என்பதனை எடுத்து நோக்குகின்ற போது, அவை பின்வருமாறு காணப்படுகின்றது. இதனை இணைபு மற்றும் பிற்செலவு மாதிரி மூலமாக எடுத்து நோக்க முடிகின்றது.

இணைபு(Correlation)

	P.Value	Significant
வங்கிகளின் நுண்கடன்கள்	0.82	0.1
மக்களின் வாழ்வாதாரம்	0.79	0.1

**. Correlation is significant at the 0.01 level (2-tailed).

பிற்செலவு மாதிரி (Regression)

	R^2	Impact
வங்கிகளின் நுண்கடன்கள	0.70	82%
மக்களின் வாழ்வாதாரம்	0.68	79%

மூலம்: கள ஆய்வு 2014

வாழ்வாதாரத்திற்கும், நிதி நிறுவனங்களின் செயற்பாடுகளுக்கும் இடையேயான இணைவுக்குணகம் (Correlation) 0.826 என்பதுடன் இதுவே P. Value எனக் கொள்ளப்படுகின்றது. இங்கு Two tailed of Significant காணப்படுகின்றது. அதாவது Significant ஆனது 0.05 இற்கு குறைவான நிலையில் அதாவது 0.01 எனக் காணப்படுகின்றது.

ஆய்வுப்பிரதேசத்து மக்களின் வாழ்வாதாரத்திற்கு நிதி நிறுவனங்களின் செயற்பாடுகள் 82% மான பங்களிப்பினை வழங்குகின்றன என்பதனை அறிந்து கொள்ள முடிகின்றது. இங்கு இவ்விருமாறிகளுக்கும் இடையிலான தொடர்பானது நேரானதாக இருப்பதனை அவதானிக்க முடிகின்றது.

4.2 ஆய்வுப்பிரதேசத்து மக்களின் வறுமைக்கும், வங்கிகளின் நுண்கடன்களுக்கும் இடையேயான தொடர்பினை இனங்காணல்

ஆய்வுப்பிரதேச மக்களினது வறுமைக்கும் வங்கிகளின் நுண்கடன்களுக்கும் இடையிலான தொடர்பினை நோக்குகின்ற எடுத்து நோக்குகின்ற போது, அவை பின்வருமாறு காணப்படுகின்றது. இதனை இணைபு மற்றும் பிற்செலவு மாதிரி மூலமாக எடுத்து நோக்க முடிகின்றது.

<div align="center">இணைவு(Correlation)</div>

	P.Value	Significant
வங்கிகளின் நுண்கடன்கள்	0.52	0.1
வறுமை தணிப்பு	0.49	0.1

**. Correlation is significant at the 0.01 level (2-tailed).

<div align="center">பிற்செலவு மாதிரி (Regression)</div>

	R^2	Impact
வங்கிகளின் நுண்கடன்கள்	0.46	52%
வறுமை தணிப்பு	0.42	49%

மூலம்: கள ஆய்வு 2014

வங்கிகளின் நுண்கடன் செயற்பாடுகளிற்கும், வறுமைக்கும் இடையிலான இணைவு 52 வீதமாக காணப்படுகின்றது. இங்கு இவ்விரு மாறிகளுக்கும் இடையிலே நேரான தொடர்பு காணப்படுகின்றது. ஆய்வுப்பிரதேசத்து மக்களின் வறுமை தணிப்பிற்கும், வங்கிகளின் நுண்கடன்களுக்கும் இடையேயான தொடர்பினை நோக்குகின்ற போது வங்கிகளின் செயற்பாடுகள் அதிகரித்த போதிலும் மக்களிடையேயான வறுமை நிலையானது முற்று முழுதாக குறைவடையவில்லை, அதாவது ஒரு சிறியளவிலான தாக்கமே காணப்படுகின்றது என்ற முடிவுக்கு வர முடிகின்றது. அதாவது வங்கிகளின் செயற்பாடுகள் அதிகரித்த போக்கானது மக்களின் வாழ்க்கைத்தரத்தினை அதிகரிக்கின்றதே தவிர வறுமை நிலையினை முற்றாக குறைத்து விடவில்லை என்ற முடிவுக்கு வர முடிகின்றது.

4.3 ஆய்வுப்பிரதேசத்து மக்களின் வருமானத்துக்கும் வங்கிகளின் நுண்கடன்களுக்கும் இடையேயான தொடர்பினை இனங்காணல்

ஆய்வுப்பிரதேச மக்களினது வருமானத்தில் வங்கிகளின் நுண்கடன்கள் எவ்வகையான தாக்கங்களினை ஏற்படுத்தியுள்ளன என்பதனை எடுத்து நோக்குகின்ற போது, அவை பின்வருமாறு காணப்படுகின்றது. இதனை இணைபு மற்றும் பிற்செலவு மாதிரி மூலமாக எடுத்து நோக்க முடிகின்றது.

இணைவு (Correlation)

	P.Value	Significant
வங்கிகளின் நுண்கடன்கள	0.76	0.1
வருமான அதிகரிப்பு	0.68	0.1

**. Correlation is significant at the 0.01 level (2-tailed).

பிற்செலவு மாதிரி (Regression)

	R^2	Impact
வங்கிகளின் நுண்கடன்கள	0.69	76%
வருமான அதிகரிப்பு	0.59	68%

மூலம்: கள ஆய்வு 2014

வருமானத்திறகும், நிதி நிறுவனங்களின் செயற்பாடுகளுக்கும் இடையேயான இணைவுக்குணகம் (Correlation) 0.76 என்பதுடன் இதுவே P. Value எனக் கொள்ளப்படுகின்றது. இங்கு Two tailed of Significant காணப்படுகின்றது. அதாவது Significant ஆனது 0.05 இற்கு குறைவான நிலையில் அதாவது 0.01 எனக் காணப்படுகின்றது.

ஆய்வுப்பிரதேசத்து மக்களின் வருமானத்திற்கும் நிதி நிறுவனங்களின் செயற்பாடுகள் 76% மான பங்களிப்பினை வழங்குகின்றன என்பதனை அறிந்து கொள்ள முடிகின்றது. இங்கு இவ்விருமாறிகளுக்கும் இடையிலான தொடர்பானது நேரானதாக இருப்பதனை அவதானிக்க முடிகின்றது.

அதாவது வங்கிகளின் நுண்கடன்களின் அதிகரித்த போக்கானது மக்களின் வாழ்க்கைத்தரத்தினை அதிகரிக்கின்றதே தவிர வறுமை நிலையினை முற்றாக குறைத்து விடவில்லை என்ற முடிவுக்கு வர முடிகின்றது. அதாவது மீள்குடியேறிய மக்கள் அடிப்படை வசதிகள் குறைவான நிலையில் காணப்படுவதனால் இந்நிறுவனங்களினது செயற்பாடுகளானவை ஆய்வுப்பிரதேச மக்களினது வாழ்வாதாரத்திலும், வறுமை தணிப்பிலும், வருமானத்திலும் நேரான தாக்கத்தினைக் கொண்டிருந்தாலும், வறுமை நிலையானது முற்று முழுதாக குறைவடையவில்லை என்ற முடிவிற்கு வர முடிகின்றது.

5 முடிவுரை

"*கிராமிய அபிவிருத்தியும், வங்கிகளின் நுண்கடன்களும்*" என்னும் தலைப்பில் மேற்கொள்ளப்பட்ட இந்த ஆய்வின் மூலம் பெறப்பட்ட தரவுகளையும், பகுப்பாய்வுகளையும் அடிப்படையாகக் கொண்டு ஆய்வுப்பிரதேச மக்களின் வாழ்வாதார மேம்பாட்டிற்கும், வங்கிகளின் நுண்நிதிக்கடன்களுக்கும் இடையே நேர்தொடர்பு காணப்படுகின்றது என்பதனையும், ஆய்வுப்பிரதேசத்து மக்களின் வறுமை தணிப்பிற்கும், நுண்நிதிக்கடன்களுக்கும் இடையேயான தொடர்பினை நோக்குகின்ற போது வங்கிகளின் செயற்பாடுகள் அதிகரித்த போதிலும் மக்களிடையேயான வறுமை நிலையானது முற்று முழுதாக குறைவடையவில்லை என்பதனையும் அவதானிக்க முடிகின்றது. மற்றும் ஆய்வுப்பிரதேசத்து மக்களின் வறுமை தணிப்பிற்கும், நுண்நிதிக்கடன்களுக்கும் இடையேயான தொடர்பினை நோக்குகின்ற போது அவை நேரான தொடர்பினைக் கொண்டிருப்பதனை அவதானிக்க முடிகின்றது. இவ்வகையில் ஆய்விற்கான பிரதான நோக்கமான கிராமிய அபிவிருத்தியில் வங்கிகளின் நுண்கடன்கள் ஏற்படுத்தியுள்ள தாக்கங்களினை கண்டறிதல் என்பதும் துணை நோக்கங்களாக வங்கிகளின் நுண்கடன்கள் ஆய்வுப்பிரதேச மக்களினது வருமானத்தில் ஏற்படுத்தியுள்ள தாக்கங்களினைக் கண்டறிதல் மற்றும் வங்கிகளின் செயற்பாடுகள் எதிர்கால கிராமிய அபிவிருத்திக்கு எவ்வாறு அமைய வேண்டும் என்பதனைக் கண்டறிதல் என்பனவும் முன்வைக்கப்பட்டுள்ளன. இந்த நோக்கங்களிற்கேற்ப இரண்டு கருதுகோள்களும் முன்வைக்கப்பட்டுள்ளன. முதலாவதாக "ஆய்வுப்பிரதேசத்து மக்களின் வாழ்வாதாரத்திற்கும், வங்கிகளின் நுண்கடன்களுக்குமிடையேயான தொடர்பினை இனங்காணல்" என்ற கருதுகோளும், இரண்டாவதாக "ஆய்வுப்பிரதேசத்து மக்களின் வறுமைக்கும் வங்கிகளின் நுண்கடன்களுக்கும் இடையேயான தொடர்பினை இனங்காணல்" என்ற கருதுகோளும், மூன்றாவதாக "ஆய்வுப்பிரதேசத்து மக்களின் வருமானத்துக்கும் வங்கிகளின் நுண்கடன்களுக்கும் இடையேயான தொடர்பினை இனங்காணல்" போன்றன நிறைவேற்றப்பட்டிருப்பதுடன், கருதுகோள்களும் பரிசீலனை செய்யப்பட்டு முடிவுகளும் பெறப்பட்டுள்ளன. கிட்டத்தட்ட 80 வீதமான தரவுகள் வினாக்கொத்தின் மூலமாகப் பெறப்பட்டு, அவை கணிதவியலுக்கான மென்பொறியினூடாக பகுப்பாய்வு செய்யப்பட்டு முடிவுகளும் பெறப்பட்டுள்ளன. இங்கு வங்கிகளின் நுண்கடன்கள் அதிகரிக்க மக்களின் வாழ்வாதாரமும் அதிகரிக்கின்றது. ஆனால் வறுமையானது குறைகின்றதே தவிர முற்றுமுழுதாகக் குறைவடைந்து விடவில்லை என்பதனை அவதானிக்க முடிகின்றது.

6 விதந்துரை

ஆய்வுப் பிரதேசத்து மக்களின் வாழ்வாதாரத்தினை முன்னேற்றும் வகையில் வங்கிகள் வழங்குகின்ற நுண்கடன்களானவை அபிவிருத்தி நோக்கிய செயற்பாடுகளை மேற்கொள்வதற்கு துணை புரிய வேண்டும். செயற்றிட்டங்களை முன்னெடுக்கும் போது ஊழல்கள், தன்னிச்சையான பணியாளர் சேவை என்பவற்றை நிறுத்தி மக்களின் நலனை கவனத்தில் கொள்ள வேண்டும். நிலைத்து நிற்கும் அபிவிருத்திக்கு முக்கியத்துவம் கொடுக்கப்பட வேண்டும். வறிய மக்கள் இனங்காணப்பட்டு அவர்களுக்கான கடனுதவிகள் வழங்கப்பட வேண்டும். அத்துடன் அனைவரையும் சென்றடையும் விதத்தில் இவை அமைதல் வேண்டும். இதன் மூலமாக ஆய்வுப்பிரதேசத்தின் அபிவிருத்தியினை முன்னெடுக்க முடியும்.

உசாத்துணைகள்

articles.economictimes.indiatimes.com

Dr. Ranee.Jeyamaha (2009), "Banks and financial Institutions: Hibernation is over" 21th Anniversary convention, India.

Dilini. Aruppaala, PMC Thilakarathne (2014), Lease Accounting disclosure practice of Non- Bank Finance Institutions (NBFIs) in Sri Lanka; A Lessor's perspective, Kelaniya journal of management.

"Financial system stability" , Central bank of Sri Lanka.

Laveesh Bhandhari, Sudipto Dssgupta and Shubhashis Gangapadhyay (2003), "Development Financial Institutions Financial constraints and Growth: evidence from the Indian corporate sector, Journal of emerging market finance.

Determinants of Access to Credit in Sri Lanka

Roshan Perera

Additional Director, Central Bank of Sri Lanka, Colombo, Sri Lanka
roshan@cbsl.lk

INTRODUCTION AND RESEARCH PROBLEM

There is growing evidence that developing financial institutions and financial markets and improving access to finance has a significant impact on economic development, poverty alleviation and economic stability. However, for various reasons, people are excluded from access to financial services. On the supply side, individuals who are considered high risk and lack collateral are excluded from accessing finance from formal financial institutions. On the demand side, the high cost of financial services, the non-availability of products required by people and the lack of awareness of products, as well as the fear of being rejected prevent individuals from approaching formal financial institutions to access their services. Identifying who is excluded and why people are excluded is necessary to develop appropriate policies to improve access to finance. Further, understanding the level of financial inclusion in a country is important to ascertain the impact of financial reforms and liberalisation on the development of the financial sector. While most studies examine financial inclusion at the aggregate or national level, this empirical study is carried out using data on household indebtedness from the HIES by the Department of Census and Statistics, Sri Lanka..The uniqueness of this empirical analysis is that it includes both households that borrow and those that do not : hence it does not suffer from the problem of data truncation resulting from the omission of non-borrowers. Secondly, since this study is based on the HIES it allows for multiple borrowings by households which is relevant if there are credit constraints in the formal sector and

alternative sources of credit are available. By identifying the determinants of access to credit, the study sheds light on the barriers to accessing finance from formal institutions and provides insights to policymakers to develop a formal strategy to reduce constraints faced by households in obtaining finance from the formal sector.

METHODOLOGY

A univariate probit model is used to estimate the probability that a household has obtained a loan (y), where the binary dependent variable y takes the value 0 if the household has not taken a loan and 1 if the household has obtained a loan. This is further disaggregated into whether the household has obtained a loan from formal sources, informal sources or both formal and informal sources. The dependent variable y_i is related to a vector of explanatory variables (x) including the main income earner's individual characteristics and educational qualifications, general characteristics of households, spatial characteristics and income and asset holdings of households through a linear specification with error term $\varepsilon_i \sim N[0,1]$..

$$y_i = x_i\grave{}\beta + \varepsilon_i$$
$$\text{and } y_i = 1 \quad \text{iff} \quad y_i > 0$$
$$\text{so that Prob } (y_i = 1) = \varphi(x\grave{}\beta)$$

Data for the study is from the Household Income and Expenditure Survey 2009/10 conducted by the Department of Census and Statistics. The survey collected information on the indebtedness of households to formal financial institutions such as banks and finance companies, and informal arrangements such as loans from employers, money lenders and retail outlets as well as borrowing through pawning.

RESULTS AND FINDINGS

62 per cent of households surveyed had obtained at least one loan, with around 32 per cent from the formal sector. The empirical analysis found a positive and significant relationship between earnings and borrowing both from the formal and informal sectors. Although there was a positive relationship between the ownership of a house and borrowing from the formal sector it was not significant. There was a positive and significant relationship between having a secondary education or more and borrowing from formal sources. Empirical studies for other regions also find that having an education increases the likelihood of obtaining a loan from formal sources. Gender did not seem to have a bearing on access to credit either in the formal or informal sectors. A private employee or self-employed person was found to have a lower likelihood of obtaining a loan from the formal sector compared to someone working in the public sector. The ability to show a steady source of income probably drives this result. Households in both the rural and estate sectors were more likely to obtain a loan from the informal sector than a household in the urban sector. Except in the Northern Province, all the Provinces other than the Western Province had a greater likelihood of accessing credit from the formal sector.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

Although Sri Lanka's progress in relation to financial inclusion according to some measures such as account penetration which measures the ownership of accounts at financial institutions, has been impressive, there is still room for improvement in relation to other measures such as access to credit particularly from the formal sector. The study using household level data on indebtedness finds that households have easier access to finance from informal sources than formal, and that household characteristics such as income and education are important determinants of access to credit. The location of the household also determined the access to finance from either

formal or informal sources. The findings of the study highlight the importance of developing a strategy to enhance access to finance from the formal sector, as the lack of access to finance has been identified as a major obstacle to economic growth. From a financial stability stand point as well, access to formal sources of financing should be encouraged; as rapid expansion of credit and growth in unregulated institutions could adversely affect financial system stability. Ensuring adequate protection is also important as this is one of the major impediments to utilisation of financial services by low income groups. This would mean developing a good regulatory and supervision framework particularly encompassing financial institutions that serve lower income segments of the market and establishing a suitable mechanism for consumer protection.

REFERENCES

Iqbal, F. (1983). The demand for funds by agricultural households: Evidence from rural India. *Journal of Development Studies*. 20, p. 68-85.

Kochar, A. (1997). An Empirical Investigation of Rationing Constraints in Rural Credit markets in India. *Journal of Development Economics*. 53, p. 339-371.

Kumar, S. M. (2013). Does Access to Formal Agricultural Credit Depend on Caste? *World Development* 43, p. 315-328.

Nagarajan, G., Meyer R., and Hushak L.. (1995). Demand for Agricultural Loans: A Theoretical and Econometric Analysis of the Philippine Credit Market. Economics and Sociology Occasional Paper No. 2233, Department of Agricultural Economics, Ohio State University, Columbus, Ohio.

Pal, S. (2002). Household Sectoral Choice and Effective Demand for Rural Credit in India. *Applied Economics* 14, p. 1743-1755.

Solo ,T. M. (2008). Financial Exclusion in Latin America- or the social costs of not banking the urban poor. *Environment and Urbanisation*, 20(1), p. 47-66.

Swain, R. (2007). The Demand and Supply of Credit for Households. *Applied Economics*. 39, p. 2681-2692.

Estimating Alternative Monetary Policy Rules for Sri Lanka

Roshan Perera[a] and **Vishuddhi Jayawickrema**[b]

[a]*Central Bank of Sri Lanka, Colombo, Sri Lanka*
roshan@cbsl.lk

[b]*Central Bank of Sri Lanka, Colombo, Sri Lanka*
vishuddhi@cbsl.lk

INTRODUCTION

The debate on whether monetary policy should be conducted according to predetermined rules or according to the discretion of policymakers continues to engage both policymakers and academics. In recent times, central banks have increasingly moved towards rule based monetary policy frameworks such as inflation targeting that requires greater discipline and accountability. A good monetary policy rule provides a useful starting point for central bank deliberations. Moreover, a central bank can benefit from having a collection of alternative rules that have optimal properties in a variety of models. This in turn helps to deal with the uncertainty inherent in the monetary policy process (Feldstein, 1999).

Two monetary policy rules have been proposed in the literature. The policy rule proposed by McCallum (1987, 1993) has nominal income growth as its target and the monetary base as the instrument. Adopting a different approach, Taylor (1993) proposed an interest rate based rule, which specifies the setting of the nominal interest rate in response to observed or predicted values of the inflation gap and

the output gap[1]. In proposing these rules, McCallum (1987) and Taylor (1993) attempt to improve the credibility of monetary policy decision making, thereby avoiding inefficiencies of time inconsistency associated with discretionary policies while reducing uncertainty.

A substantial amount of work has been carried out empirically to test the operability of the alternative monetary policy rules for advanced economies. Reflecting improvements in the institutional frameworks of monetary policy regimes there is increasing evidence of the operation of these rules in emerging economies.

In this paper, we seek to characterize monetary policy decision making in Sri Lanka using alternative monetary policy rules. An empirical analysis is conducted to evaluate the operational performance of the McCallum rule, the Taylor rule, and their hybrid variants in the Sri Lankan context, for the period 1996 to 2013. As the objectives of monetary policy and monetary operations of the Central Bank have changed over the period of analysis, this research sheds light on the operational feasibility of monetary policy rules in the Sri Lankan context and how it has changed with the evolution of the monetary policy framework. However, the paper only looks at the past response of policymakers to an identified set of macroeconomic variables. Estimating the optimal policy response to changes in macroeconomic variables is an area for future research.

Section 2 provides an overview of the theoretical and empirical literature relating to monetary policy rules and in section 3 the monetary policy framework in Sri Lanka and its evolution over time are discussed. Section 4 provides a discussion of the methodology adopted and sets out alternative specifications of the monetary policy reaction functions. In section 5 the data used in the estimation are described and the results from the empirical analysis are presented

---

[1] The inflation gap is difference between actual inflation (or inflation expectations) and the desired level of inflation. The output gap is measured as the gap between actual output and potential output expressed as a ratio of potential output.

and discussed. The final section concludes and discusses some policy implications and areas for further research.

LITERATURE REVIEW

One of the earliest forms of a rule was the Friedman rule (Friedman, 1960), which proposed that the central bank maintain a constant rate of growth of money supply equivalent to the rate of growth of real GDP. The advantage of this constant money growth rule was that only information regarding the economy's natural growth of output was required to operationalize the rule, provided velocity did not exhibit a secular trend. However, high inflation and a breakdown in the stability of the velocity of money with the developments in the financial sector made the Friedman rule difficult to operationalize.

This led to the development of two separate formulations of monetary policy rules which were simple and easy to operationalize. In the McCallum rule the monetary authority sets the growth rate of the monetary base in a feedback rule for nominal GDP in the form:

$$\Delta b_t = \Delta x^* - \Delta v_t + \alpha(\Delta x^* - \Delta x_{t-1}) \ (1)$$

where Δb_t is the rate of growth of the monetary base; Δv_t is the moving average rate of growth of base velocity averaged over previous four years; Δx_t is the rate of growth of nominal GDP and Δx^* is the targeted rate of growth of nominal GDP, α is the feedback coefficient informing how quickly deviations of output from its target are offset by the central bank. In the original McCallum rule for the US, Δx^* was assumed to be 5 percent which was the sum of the target inflation rate (2 percent), and the long-run average rate of growth of real GDP (3 percent). Since there could be changes to velocity from year to year due to technological and regulatory changes, Δv_t was taken as an average over the past four years.

In essence, base money growth must be equal to the targeted growth of nominal GDP. There is a proportional feedback to the growth rate of base money from the gap between nominal GDP growth and its targeted rate. Therefore, if the relationship between the monetary base and nominal income changes (for example on account of financial innovations), the growth rate of the monetary base must be adjusted accordingly.

The McCallum rule prefers nominal GDP over monetary aggregates such as M_1 or M_2 as the monetary authority's principal target variable. Under nominal GDP targeting, monetary policy would adjust to offset disturbances to aggregate demand. Another important feature of the nominal GDP targeting is that it would help the policymaker balance the goals of stable output growth and inflation in response to aggregate supply disturbance (Clark, 1994). Furthermore, nominal GDP is preferred to real GDP as the policy target because a central bank cannot control or predict with accuracy how nominal GDP growth is dividing between quarters and between real growth and inflation (McCallum, 1988).

On the other hand, Taylor (1993) proposed an interest rate based rule, which specifies setting of a nominal interest rate instrument in response to observed or predicted values of the inflation gap and the output gap. The original specification of the Taylor rule was as follows:

$$i_t = \pi^* + r^* + \varphi(\pi_t - \pi^*) + \gamma(y_t - y^*) (2)$$

where i_t is the nominal policy interest rate, π_t is the inflation rate, π^* is the targeted or desired rate of inflation, r^* is the average equilibrium real interest rate, y_t is the actual output and y^* is the estimated potential output level. In the original version of the rule for the US economy, Taylor set the average real rate of interest to 2 per cent and also assumed that the targeted rate of inflation was 2 per cent. Further in the original specification, the adjustment coefficients φ and γ, were both set at 0.5 reflecting the behaviour of the Federal

Reserve bank during the late 1980s and early 1990s. Subsequent applications of the Taylor rule have modified or extended the specification in several ways. A lag of the interest rate(i_t)has been included to reflect the interest rate smoothing behavior of many central banks (Clarida, Gali and Gerlter, 2000).Further, exchange rate smoothing has been found to be important particularly in the case of emerging economies (Mohanty and Klau, 2004).

Determining whether the specification of a monetary policy rule should be forward looking, backward looking or contemporaneous would depend on the time horizon adopted by the central bank as well as the identified lags in the transmission of monetary policy. Judd and Rudebusch (1998) and Rotemberg and Woodford (1999) found that backward looking specifications of the Taylor rule were relatively good approximations of optimal policy. In contrast, Clarida, Gali and Gerlter (1998) found that a monetary policy reaction function incorporating forward looking behaviour of agents was the more preferred specification in the case of the US, Japan and the UK.

When the two rules are compared, a major advantage of the McCallum rule over the Taylor rule is that the McCallum rule does not include unobservable variables such as the output gap and the real interest rate. The use of nominal income targeting avoids the need to measure unobservable variables such as the natural rate output (for the output gap) or the real interest rate as required by the Taylor rule (Orphanides, 2003).However, the McCallum rule has been less popular than the Taylor rule, primarily because central banks have been increasingly focusing on the interest rate instead of monetary base growth rates in designing policies (McCallum, 2002).

MONETARY POLICY FRAMEWORK IN SRI LANKA

The mandate of the Central Bank of Sri Lanka has evolved with the economic and financial developments in Sri Lanka as well as the

evolution of central banking around the world. In the Monetary Law Act No. 58 of 1949 (MLA), under which the Central Bank of Sri Lanka[2] was established, the Bank was mandated with multiple objectives of stabilizing the domestic monetary value and the exchange rate of the Sri Lanka rupee vis-à-vis foreign currencies, promoting a high level of production, employment and real income and encouraging and promoting the full development of the productive resources of the country. In 2002, an amendment to the MLA redefined the objectives of the Central Bank whereby the multiple objectives of the Central Bank were replaced with two objectives: economic and price stability and financial system stability.

Similarly the monetary policy framework, in which Sri Lanka has operated, as in the case of most other countries, has evolved over time. From its inception to the early 1980s the Central Bank adopted a dirigisme approach in managing the economy by imposing direct controls on credit and interest rates with a view to encourage identified sectors in the economy and impose strict exchange controls. The focus during this period was economic development even at the cost of high inflation. The liberalization of the economy in 1977 set the stage for the move away from direct instruments to more market oriented monetary policy instruments. The ascendance of Monetarist economics led to an increasing recognition of the long run relationship between monetary growth and inflation. In the 1980s the Central Bank formally adopted a monetary targeting policy framework. Under this policy framework the Central Bank seeks to achieve its final objectives, by conducting monetary policy so as to maintain reserve money, the Bank's operating target, at a level that is consistent with a desired growth of broad money, its intermediate target. The efficacy of this policy framework depends entirely on there being an identifiable relationship between money supply growth and inflation, which is econometrically determined by testing for the stability of the money demand function. The development of the financial system and financial innovations saw many central banks

---

[2] It was known as the Central Bank of Ceylon until 31 December 1985.

moving away from monetary targeting to inflation targeting policy frameworks. The Central Bank of Sri Lanka has also stated that it is gradually refining its policy framework towards an inflation targeting type monetary policy framework which does not depend on a strict relationship between money and inflation. With the shift from a crawling band exchange rate regime to a floating exchange rate system in January 2001, the role of the exchange rate for stabilization has reduced and reserve money became the nominal anchor of monetary policy.

In the conduct of monetary policy there has been a move away from direct instruments to more market oriented instruments with greater reliance placed on open market operations (OMO) as the main instrument of monetary policy. Although initially OMO were 'passive' in that the Central Bank offered unlimited repurchase (repo) and reverse repurchase (reverse repo) facilities to counterparties which they could avail at their discretion, to improve the conduct of monetary policy the Central Bank moved to a system of more active open market operations in March 2003. In this new system, monetary policy is conducted to maintain reserve money around a targeted level while ensuring that the short term interest rate is maintained at a level compatible with the target of reserve money (Wijesinghe, 2006). A key element of this new system was the establishment of an interest rate corridor formed by the lower bound of the overnight Repurchase (repo) rate and the upper bound of the overnight Reverse Repurchase (reverse repo) rate[3]. Monetary policy operations are conducted to maintain the overnight interest rate (call market rate) at around the middle of the corridor. With the move to more active open market operations the overnight call market rate and consequently the interest rate channel took on a more important role in the transmission of monetary policy. Although reserve money continues to be the operating target of monetary policy, policy interest rates and specifically the policy interest rate corridor are the

---

[3] The Repurchase rate and the Reverse Repurchase rate were renamed as the Standing Deposit Facility Rate (SDFR) and the Standing Lending Facility Rate (SLFR), respectively in January 2014.

main instruments used to signal the monetary policy stance of the Central Bank of Sri Lanka.

Figure 1: Frequency of Policy Interest Rate and SRR Changes 2000 - 2013
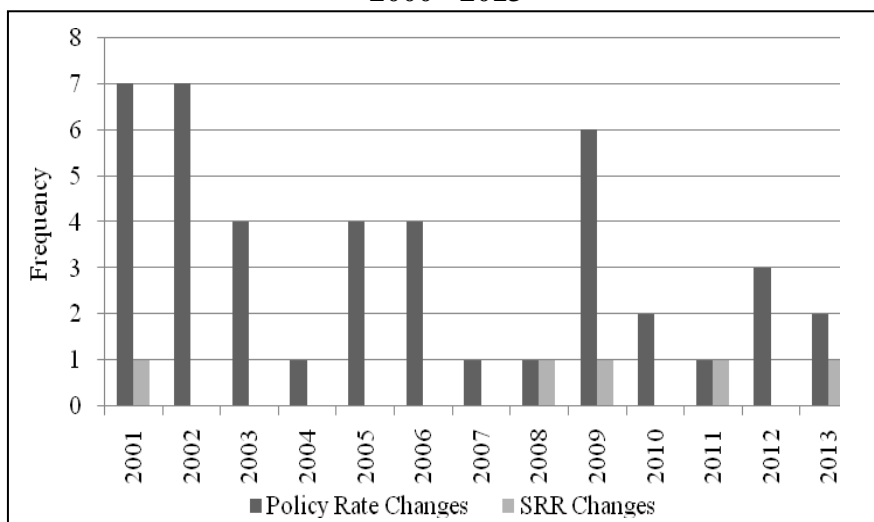
Estimating a monetary policy rule for Sri Lanka is not straightforward given the changes in the conduct of monetary policy. Although reserve money continues to be the target of monetary policy there has been a shift towards the use of the interest rate corridor to signal the stance of monetary policy. Further, with the developments in financial markets there has been an improvement in the transmission of policy rates to other interest rates further justifying the use of the interest rate as the policy instrument. However, difficulties arise in estimating a monetary policy rule for Sri Lanka as it requires measuring potential output which is unobserved and could change due to structural changes taking place in the economy.

METHODOLOGY

Several alternative specifications of the McCallum rule and the Taylor rule as well as hybrid variations of the rule were estimated for

Sri Lanka. In both Taylor and McCallum's formulation of monetary policy rules, the policy instrument was assumed to adjust to lagged or contemporaneous macroeconomic variables. Forward-looking versions of these rules were also evaluated where the policy instrument reacts to expected future behaviour of the respective macroeconomic variables to account for lags in the transmission of monetary policy.

With regard to the McCallum rule, Patra and Kapur (2012) found that the policy rule with exchange rate change as an additional variable works best in the Indian context. Further, they found that instrument smoothing was significant across all specifications of the McCallum rule. Accordingly, following Patra and Kapur (2012), a backward-looking and a forward-looking specification of the form given in equations (3) and (4) below, respectively were estimated:

$$\Delta b_t \ = \ a_0 \ + \ a_1(\Delta x^* \ - \ \Delta x_{t-1}) \ + \ a_2\Delta e_{t-1} + a_3 b_{t-1} + u_t (3)$$

$$\Delta b_t \ = \ a_0 \ + \ a_1(\Delta x^* \ - \ \Delta x_{t+1}) \ + \ a_2\Delta e_{t-1} + a_3 b_{t-1} + u_t (4)$$

where Δb_t is the rate of growth of the monetary base; Δx_t is the rate of growth of nominal GDP; Δx^* is the targeted rate of growth of nominal GDP; Δe_t is the change in the nominal exchange rate and u_t is a random disturbance term.

Following Perera and Jayawickrema (2013), three alternative specifications of the Taylor rule were estimated. Accordingly, a contemporaneous specification of the form given in equation (5), a backward looking specification of the form set out in equation (6) and a forward-looking version of the policy reaction function of the form set out in equation (7) were estimated.

$$i_t = b_0 \ + \ b_1(\pi_t - \pi^*) + b_2 ygap_t \ + \ b_3\Delta e_{t-1} + b_4 i_{t-1} + u_t (5)$$

$$i_t = b_0 \ + \ b_1(\pi_{t-1} - \pi^*) + b_2 ygap_{t-1} \ + \ b_3\Delta e_{t-1} + b_4 i_{t-1} + u_t (6)$$

$$i_t = b_0 + b_1(\pi_{t+1} - \pi^*) + b_2 ygap_{t+1} + b_3 \Delta e_{t-1} + b_4 i_{t-1} + u_t \quad (7)$$

where i_t is the nominal policy interest rate, π_t is the inflation rate, π^* is the targeted or desired rate of inflation, $ygap_t$ is the output gap, Δe_t is the change in the nominal exchange rate and u_t is a random disturbance term.

Following the analysis by McCallum (2000), replacing the monetary base in McCallum rule with interest rate as the policy instrument produces a modified rule (hybrid McCallum-Taylor rule) that is highly co-integrated with the standard Taylor rule. Patra and Kapur (2012) provide strong support from the Indian context for both backward and forward looking specifications of the hybrid McCallum-Taylor rule. Accordingly, a backward-looking and a forward-looking specification of the form given in equations (8) and (9) below were estimated:

$$i_t = c_0 + c_1(\Delta x^* - \Delta x_{t-1}) + c_2 \Delta e_{t-1} + c_3 i_{t-1} + u_t \quad (8)$$

$$i_t = c_0 + c_1(\Delta x^* - \Delta x_{t+1}) + c_2 \Delta e_{t-1} + c_3 i_{t-1} + u_t \quad (9)$$

Hall and Mankiw (1994) defined a 'hybrid' target variable $h_t = [(\pi_t - \pi^*) + ygap_t]$ modifying the standard McCallum rule. This hybrid McCallum-Hall-Mankiw rule features responses to the same macroeconomic conditions as in the Taylor's rule but with a base instrument. Accordingly, following Patra and Kapur (2012), a contemporaneous specification of the form given in equation (10), a backward-looking specification of the form given in equation (11) and a forward-looking specification of the form given in equation (12) below were estimated.

$$\Delta b_t = d_0 + d_1[(\pi_t - \pi^*) + ygap_t] + d_2 \Delta e_{t-1} + d_3 b_{t-1} + u_t \quad (10)$$

$$\Delta b_t = d_0 + d_1[(\pi_{t-1} - \pi^*) + ygap_{t-1}] + d_2 \Delta e_{t-1} + d_3 b_{t-1} + u_t \quad (11)$$

$$\Delta b_t = d_0 + d_1[(\pi_{t+1} - \pi^*) + ygap_{t+1}] + d_2\Delta e_{t-1} + d_3 b_{t-1} + u_t \quad (12)$$

Following Clarida, Gali and Gertler (1998, 2000), Generalised Method of Moments (GMM) estimation methodology was used for estimating equations with forward-looking specifications of the monetary policy rules. This is expected to account for possible endogeneity between variables. Estimation of contemporaneous and backward-looking specifications estimation was carried out using ordinary least squares (OLS) regressions.

DATA DESCRIPTION AND ESTIMATION RESULTS

Quarterly data for the period 1996 to 2013 was used for the analysis, as quarterly data for GDP is available only from 1996.In the estimation for the US, McCallum (2000) used the monetary base series computed by the Federal Reserve Bank of St. Louis which incorporates adjustments for changes in reserve requirements. Similarly, Patra and Kapur (2012) used reserve money adjusted for the cash reserve ratio (CRR) impact, in view of frequent changes in the CRR in the conduct of monetary policy in India. However, as the Central Bank of Sri Lanka does not publish a separate series of reserve money adjusted for the changes in Statutory Reserve Requirement (SRR), unadjusted reserve money was used for the analysis.

Nominal income growth was measured by the year-on-year growth of the quarterly GDP. With regard to specifying a nominal income growth target, several alternative approaches were described in literature. McCallum (1987) assumed the nominal income growth target for the United States to be 5 per cent per year. However, McCallum (2000) suggested the sum of the long-run average rate of growth of real GDP and the central bank's target inflation rate be considered as a target growth rate for the nominal GDP. Moreover, the constant trend growth rate assumption for nominal GDP may not hold for emerging countries. Therefore, following Patra and Kapur

(2012) a time-varying trend growth rate for nominal income was specified in line with McCallum (2000). Accordingly, the sum of seasonally adjusted real output passed through a Hodrick Prescott filter and the inflation target announced by the Central Bank, which is 5 per cent, was used to derive a time-varying trend growth rate of nominal income for Sri Lanka. Figure 2 depicts the year-on-year nominal income growth and the time-varying nominal income growth target computed for Sri Lanka.

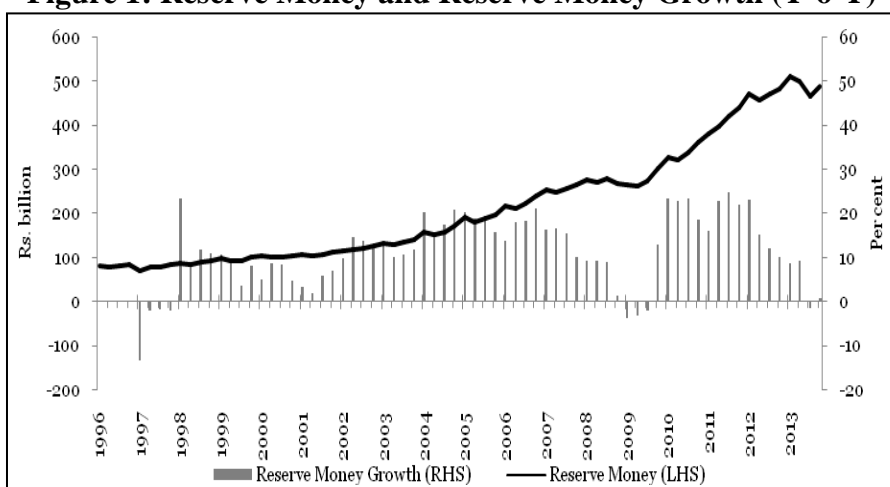**Figure 1: Reserve Money and Reserve Money Growth (Y-o-Y)**

Figure 2: Deviation of Nominal Income Growth from a Time-Varying Trend Growth Target
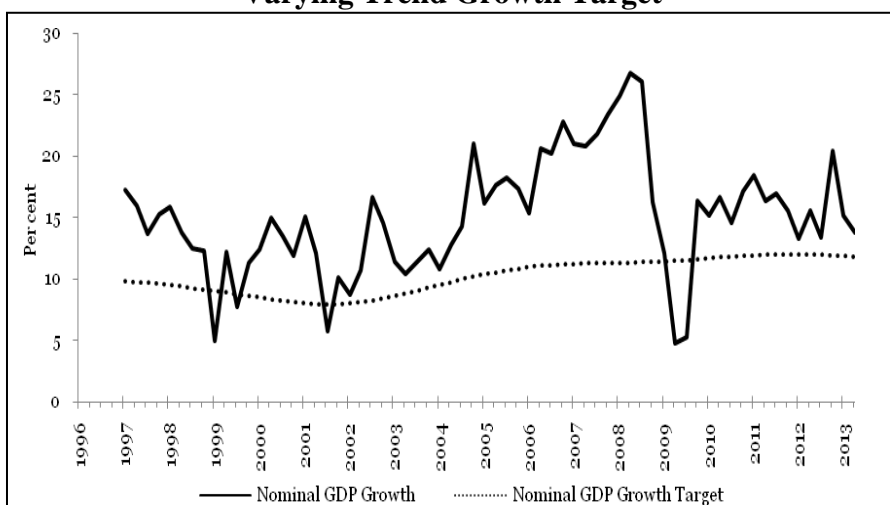
In estimating the Taylor rule, the Colombo Consumer Price Index (CCPI)[4] was used as the measure of inflation due to its wide acceptability. Since the Central Bank of Sri Lanka has stated its desire to maintain inflation at mid-single digit levels over the medium term in its policy documents, the desired level of inflation was set at 5 per cent for the entire sample period.

Figure 3: Inflation (Spliced Index)
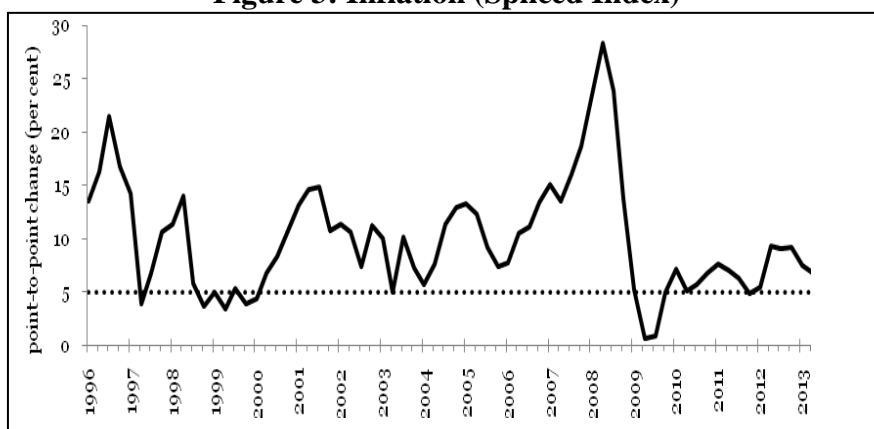
Estimation of a Taylor Rule requires measuring the output gap, which is an unobserved variable. Alternative measures of the output gap for Sri Lanka are available based on estimates of potential output using several alternative methods such as the Hodrick Prescott filter, Baxter King and Christiano-Fitzgerald band pass filters as well as multivariate model based methods. Figure 4 presents the output gap estimate as measured by the alternative methods mentioned above, and a close correspondence can be observed between them. Further, the robustness of these alternative methods of potential output was tested in Perera and Jayawickrema (2013) and the Hodrick Prescott filter based output gap was used as the desired output gap estimate for the preferred model specification. Given the availability of the longest data series and the wide acceptability as a less complicated

---

[4]The inflation indices that were calculated using previous base years under CCPI (i.e. 1952 and 2002) were rebased to the latest base year of 2006/7.

output gap measure, the Hodrick Prescott filter based output gap was used for this paper as well.[5]

Figure 4: Alternative Measures of the Output Gap
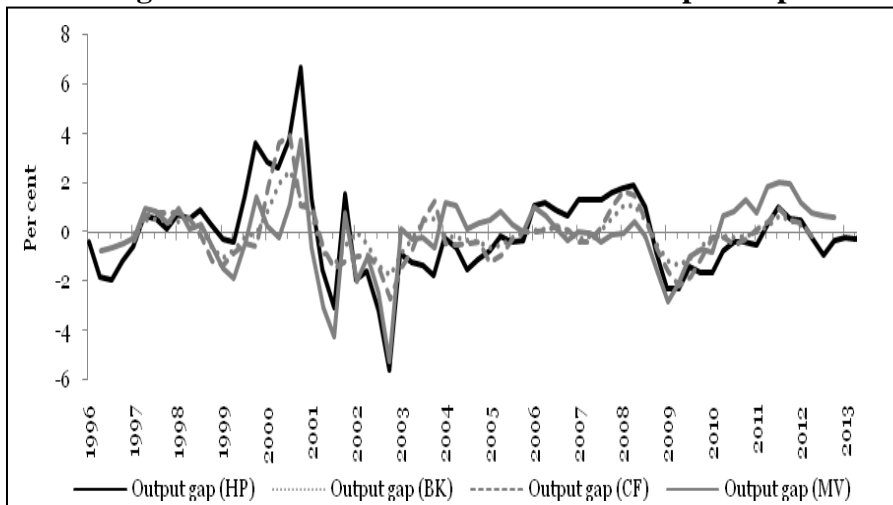
Several options are available in selecting a short term interest rate that appropriately reflects the monetary policy stance of the Central Bank. The Repurchase rate, the Reverse Repurchase rate, the average weighted call money rate (AWCMR) and the 91-day Treasury bill rate are the commonly used indicators of short term interest rate in Sri Lanka. However, the use of a single measure of short term interest rate across a broader time horizon to reflect the policy rate of a central bank has been a concern (Patra and Kapur, 2012).

---

[5]However, it is well known that the Hodrick-Prescott filter suffers from an end-point bias. This is problematic when the filter is used for economic policy, especially in the case where the end-point is the point of interest. In order to deal with this problem, the literature suggests extending the series with forecasts. Accordingly, even though the analysis is carried out only up to 2013, estimated data on real GDP growth for 2014 was used in deriving the Hodrick-Prescott filter based potential output for the sample period.

**Figure 5: Policy Interest Rates and Overnight Short Term
Interest Rates**
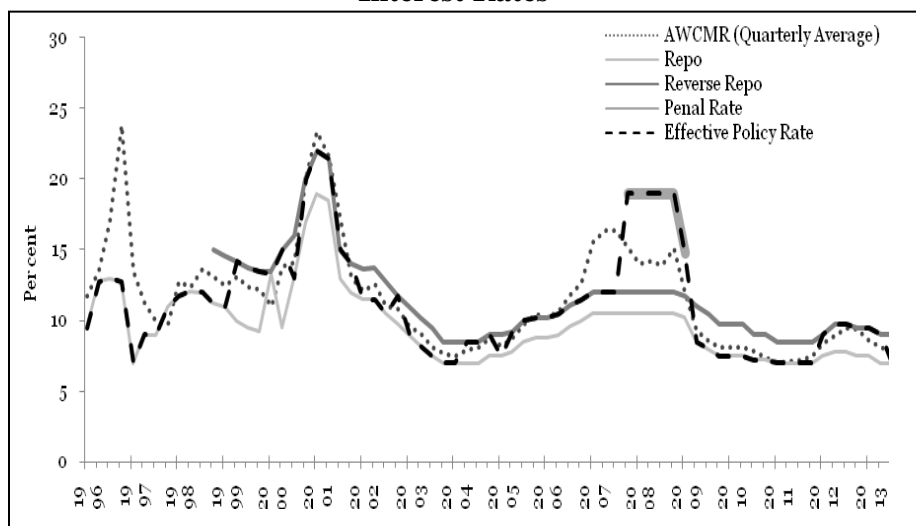
In order to address the above issue, following Perera and Jayawickrema (2013), an 'effective policy rate' was constructed by choosing the policy interest rate that most appropriately reflected the monetary policy stance during each period of analysis. Accordingly, the Repurchase rate was considered as the effective policy interest rate until the commencement of open market operations. Thereafter either the Repurchase rate or the Reverse Repurchase rate was selected as the effective policy rate depending on macroeconomic conditions and liquidity conditions in the market. However, robustness checks were carried out using alternative measures of short term interest rate such as the AWCMR and the 91-day Treasury bill rate.

In all the permutations of monetary policy rules, the exchange rate variation is added as an explanatory variable to assess whether there is exchange rate smoothing by the Central Bank. For this purpose, the annualized quarter-on-quarter change in the nominal exchange rate was used. Accordingly, a positive value represents depreciation of the Sri Lanka rupee against the US Dollar.

Details of the data series used for the analysis, the stylized facts of the variables, their descriptive statistics and the results of the unit root tests are provided in the Annex. Summarising the stylised facts for the entire sampling period, the year-on-year growth of reserve money showed an average of 11.4 per cent for the sample period 1996 to 2013, whereas the corresponding year-on-year growth of nominal GDP showed an average of 15.0 per cent. Meanwhile, year on year change in inflation as measured by CCPI had an average of 9.9 per cent over the sample period. Accordingly, the inflation gap, which is the difference between the actual inflation and the desired inflation, recorded a mean of 4.9 during the period under consideration. The mean of the alternative measures of short term interest rates, namely the effective policy rate, the AWCMR and the 91-day Treasury bill rate were 11.2 per cent, 11.5 per cent and 11.6 per cent, respectively during the sample period 1996 to 2013. The average depreciation in the exchange rate was 5.1 per cent during the entire sample period.

McCallum Rule

The empirical results for the McCallum rule are summarized in Table 1. Even though the original McCallum rule is purely backward looking, both forward looking and backward looking versions of the rule were estimated. Further, the monetary policy response to exchange rate dynamics was also assessed. Accordingly, columns 1 to 5 summarize empirical results for the backward looking specifications which were estimated using OLS, while columns 6 to 8 summarize results for the forward looking specifications that were estimated using GMM.

As the nominal income growth term of the rule is defined as trend growth minus actual growth, the nominal income gap term ($\Delta x_t^* - \Delta x_t$) is expected to have a positive coefficient. Accordingly, when the actual income growth is declining relative to trend growth, monetary policy is expected to be accommodative and base money expands.

The findings reveal that there is a positive and statistically significant reaction of base money growth to deviations of trend growth in

nominal income from its two quarter ago actual growth (Column 3) as well as three quarter ago actual growth (Column 4). The coefficients of the nominal gap term in the above two specifications were 0.38 and 0.48, respectively, in comparison to 0.50 proposed in the original McCallum rule for the United States. However, the expected relationship between base money growth and deviations in nominal income growth does not hold true for the forward looking specifications (column 6, 7 and 8). Even though the coefficient is correctly signed, the relationship is not statistically significant.

All specifications of the McCallum rule indicate a considerable degree of policy smoothing with the coefficient of Δb_{t-1} being larger than 0.6. Meanwhile, the variable to account for changes in the exchange rate was found to have the correct sign in all specifications. However, it was statistically significant only in the backward looking specifications. According to Patra and Kapur (2012), monetary policy reactions through smoothing interventions to large movements in exchange rates could affect net foreign assets and base money.

Since the backward looking specification in column 3 has statistically significant coefficients for all parameters and better model fit, the McCallum rule specified in column 3 was selected as the preferred specification[6]. Accordingly, the actual growth in reserve money was plotted against the growth in reserve money based on the estimates of the McCallum rule from the preferred specification (Figure 6). The reserve money growth estimated from the model appears to closely track the actual growth in monetary base reasonably well.

---

[6]The selected specification has a Durbin-Watson statistic of 2.4, which is approximately close to the desired level of 2. Therefore the level of serial correlation is not significant. As the values of Ljung-Box Q-statistic are insignificant with large p-values, the autocorrelation problem is not evident.

Table 1: Estimates of McCallum Rule

(Dependent variable: Growth in Base Money (Δb_t))

Column Number	1	2	3	4	5	6	7	8
Constant	3.99	5.13	5.96	7.19	6.64	2.01	3.20	5.97
	(3.31)	(3.94)	(4.37)	(5.02)	(3.73)	(2.03)	(1.40)	(2.94)
Δb_{t-1}	0.72	0.70	0.72	0.65	0.61	0.87	0.82	0.88
	(9.04)	(8.89)	(9.08)	(8.21)	(6.49)	(8.58)	(5.66)	(3.55)
$\Delta x_t^* - \Delta x_{t-1}$	0.11	0.15						
	(0.74)	(0.98)						
$\Delta x_t^* - \Delta x_{t-2}$			0.38					
			(2.72)					
$\Delta x_t^* - \Delta x_{t-3}$				0.48				
				(3.52)				
$\Delta x_t^* - \Delta x_{t-4}$					0.25			
					(1.58)			
$\Delta x_t^* - \Delta x_{t+1}$						0.19	0.16	
						(0.82)	(0.63)	
$\Delta x_t^* - \Delta x_{t+2}$								0.84

								(0.86)
Δe_{t-1}		-0.14	-0.15	-0.12	-0.12		-0.07	-0.09
		(-2.05)	(-2.28)	(-1.95)	(-1.77)		(-0.56)	(-0.67)
Observations (adj)		67	67	66	65	64	65	65	64
Adjusted R-squared		0.55	0.57	0.60	0.61	0.53	0.46	0.47	0.20
F-statistic/J-statistic		41.91	30.75	33.22	34.17	24.35	3.30	3.11	4.18
S.E. of regression		5.12	5.00	4.78	4.63	4.98	5.49	5.43	6.53

Notes:

i.   *Absolute value of t-statistics is given in parentheses.*

ii.   *Forward looking specifications were estimated using GMM methodology. Two lags of Δb_t, $(\Delta x_t^* - \Delta x_t)$ and Δe_t were used as instruments for the GMM estimation*

Figure 6: Actual Versus Estimated Reserve Money Growth
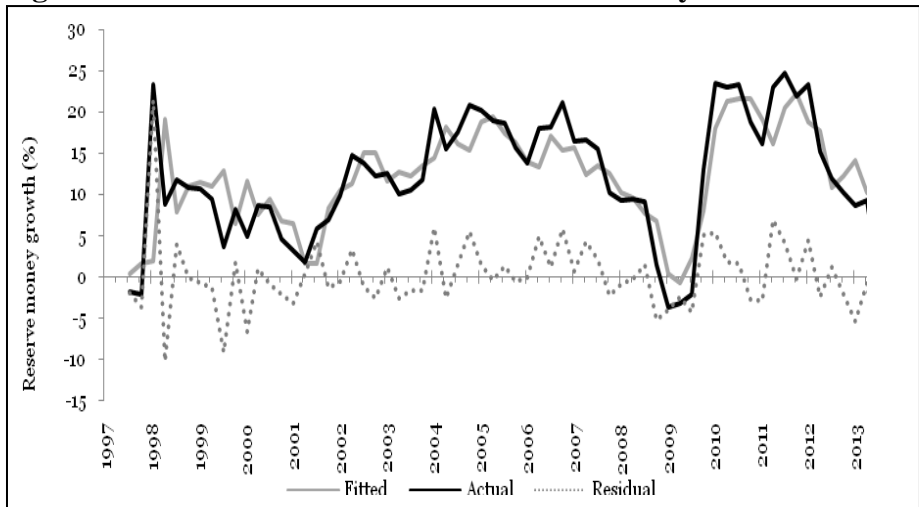
Further, a recursive regression was carried out for the backward looking specification in column 3 to assess the evolution of the coefficient on the nominal income gap. The results are presented in Figure 7. According to the estimates, the response of monetary policy to deviations of trend growth in nominal income from its actual growth has strengthened since 2007, reaching a peak in 2010.

Figure 7: Recursive Estimates of Coefficients of Nominal Income Gap
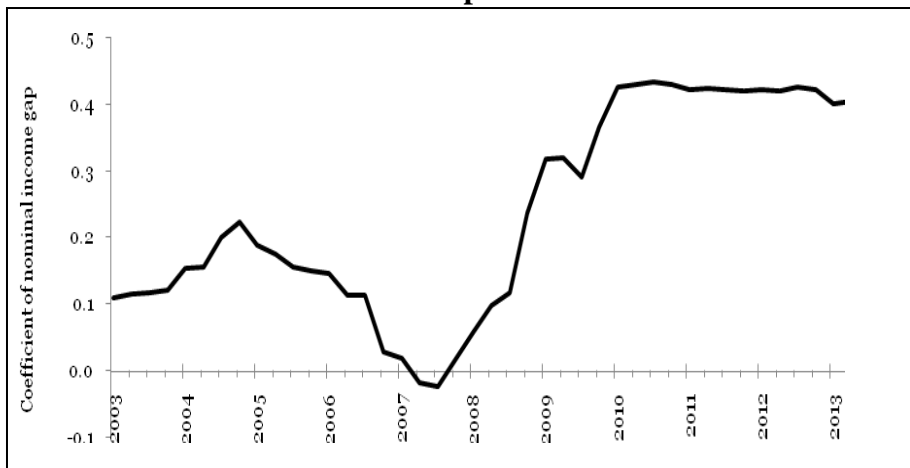
Taylor Rule

The empirical results for the Taylor rule are summarized in Tables 2 and 3. Table 2 presents a summary of the results from estimates of contemporaneous and backward looking specifications of the Taylor rule. The effective policy interest rate was used as the primary measure of short term interest rate, while results are also presented for AWCMR as an alternative measure of short term interest rate. Similar estimations were also carried out using the 91-day Treasury bill rate in order to perform robustness checks.

The baseline contemporaneous specifications (column 1 and 5) include contemporaneous values for inflation and output gap, while the first lag of the short term interest rate was included to take into account interest smoothing behaviour. These baseline specifications were augmented with changes in the nominal exchange rate (column 2 and 6). Similarly, the baseline backward looking specifications (column 3 and 7) included lagged inflation and output gap, and the short term interest rate with one quarter lag. These baseline specifications were also augmented with changes in the nominal exchange rate (column 4 and 8).

Empirical results from a contemporaneous Taylor rule show that the coefficients on both inflation and output gap remain positive and significant for all specifications. Further, the coefficient on inflation is lower than the coefficient on the output gap. Even though the long-run coefficient on the output gap is above unity, the long-run coefficient on inflation is less than unity indicating that the Taylor principle is not fulfilled [7]. The Taylor principle requires the long-run coefficient on inflation to be greater than unity, because if the coefficient on inflation is less than one, real interest rate would

---

[7]*The long run coefficients are computed as follows*:

Long run coefficient on inflation
$$= \frac{coefficient\ on\ inflation\ gap}{(1 - coefficient\ on\ short\ term\ interest\ rate)}$$
Long run coefficient on output gap
$$= \frac{coefficient\ on\ output\ gap}{(1 - coefficient\ on\ short\ term\ interest\ rate)}$$

decline with a rise in inflation, leading to higher inflation in the future. The use of a contemporaneous specification which ignores the lags in the transmission of monetary policy could be a reason for this.

Similar to the contemporaneous specification, estimates from the backward looking Taylor rule also show that the coefficients on both inflation and output gap remain positive and significant for all specifications. However, the long-run coefficient on inflation is less than unity, contrary to the Taylor principle, whereas the coefficient on the output gap is greater than one. The exchange rate variable is found to be significant only in some of the specifications (column 6 and 8) and the coefficient is relatively small.

Table 3 presents empirical results from estimates of a forward looking Taylor rule. Similar to the previous specifications, the effective policy interest rate was used as the primary measure of the short term interest rate, while results are also presented for the AWCMR. Estimations were also carried out using the 91-day Treasury bill rate in order to perform robustness checks.

The baseline specifications included one quarter ahead inflation and output gap together with the short term interest rate with one quarter lag for interest rate smoothing (column 1 and 4). The baseline specifications were augmented with a dummy variable to account for the volatility of the short term interest rates during the period 2001 and 2008 (columns 2 and 5). Further, the above specifications were also augmented with changes in the nominal exchange rate (column 3 and 6).

Table 2: Estimates of Contemporaneous and Backward-Looking Taylor Rule

Dependent variable	Effective Policy Rate				AWCMR			
Column Number	1	2	3	4	5	6	7	8
Constant	2.32	2.40	3.24	3.30	2.25	2.57	2.84	3.14
	(3.52)	(3.63)	(4.58)	(4.60)	(2.99)	(3.44)	(3.68)	(4.05)
INFGAP	0.14	0.15			0.13	0.16		
	(3.12)	(3.32)			(2.69)	(3.24)		
INFGAP(-1)			0.11	0.11			0.11	0.13
			(2.25)	(2.33)			(2.11)	(2.61)
YGAP	0.53	0.54			0.36	0.38		
	(4.48)	(4.55)			(2.76)	(2.96)		
YGAP(-1)			0.69	0.69			0.53	0.53
			(5.46)	(5.45)			(3.94)	(4.01)
EFFECTIVE(-1)	0.73	0.71	0.66	0.65				
	(11.72)	(10.69)	(9.57)	(8.76)				
AWCMR(-1)					0.75	0.68	0.71	0.64
					(10.92)	(9.30)	(9.79)	(8.24)
Δe_{t-1}		0.03		0.02		0.06		0.05

	(1.17)		(0.65)		(2.17)		(1.85)
Observations (adj)	71	71	71	71	71	71	71	71
Adjusted R-squared	0.80	0.80	0.80	0.80	0.75	0.76	0.76	0.77
F-statistic	94.51	71.62	96.69	72.00	70.05	56.63	74.02	58.38
S.E. of regression	1.73	1.72	1.71	1.72	1.93	1.88	1.89	1.85
Long-run coeff. on inflation	0.52	0.52	0.31	0.32	0.51	0.50	0.36	0.38
Long-run coeff. on output gap	1.97	1.83	2.05	1.97	1.43	1.19	1.79	1.48
Long-run coeff. on exchange rate		0.10		0.05		0.19		0.14
Neutral policy rate	8.65		9.67		8.88		9.68	

Notes:

i.   *Absolute value of t-statistics is given in parentheses.*

ii.   *Output gap measure: Hodrick-Prescott filte*

Table 3: Estimates of Forward-Looking Taylor Rule

Dependent variable	Effective Policy Rate			AWCMR		
Column Number	1	2	3	4	5	6
Constant	1.86	0.38	0.36	2.02	-0.61	-0.71
	(2.07)	(0.08)	(0.07)	(2.29)	(-0.16)	(-0.18)
INFGAP(+1)	0.28	0.29	0.32	0.28	0.35	0.42
	(2.61)	(2.03)	(2.17)	(1.86)	(1.75)	(2.02)
YGAP(+1)	0.99	1.00	0.96	0.67	0.72	0.61
	(1.83)	(1.84)	(1.87)	(1.08)	(1.19)	(1.04)
EFFECTIVE(-1)	0.72	0.76	0.73			
	(8.74)	(4.66)	(3.76)			
AWCMR(-1)				0.71	0.75	0.68
				(7.71)	(7.04)	(5.77)
Δe_{t-1}			0.03			0.07
			(0.84)			(1.63)
DUMMY		0.98	1.04		1.95	2.24
		(0.30)	(0.31)		(0.67)	(0.78)

Observations (adj)	70	70	70	70	70	70
Adjusted R-squared	0.61	0.59	0.60	0.63	0.58	0.57
J-statistic	0.00	0.00	0.00	0.00	0.00	0.00
S.E. of regression	2.42	2.46	2.44	2.34	2.48	2.50
Long-run coeff. on inflation	0.98	1.22	1.20	0.97	1.42	1.32
Long-run coeff. on output gap	3.49	4.21	3.60	2.29	2.91	1.90
Long-run coeff. on exchange rate			0.12			0.20
Neutral policy rate	6.58	5.75		6.88	5.38	

Notes:

i.   *Absolute value of t-statistics is given in parentheses.*

ii.   *Output gap measure: Hodrick-Prescott filter*

iii.   *Estimation is by GMM methodology. One lag of INFGAP, YGAP, EFFECTIVE/AWCMR and Δe_t were used as instruments for the GMM estimation.*
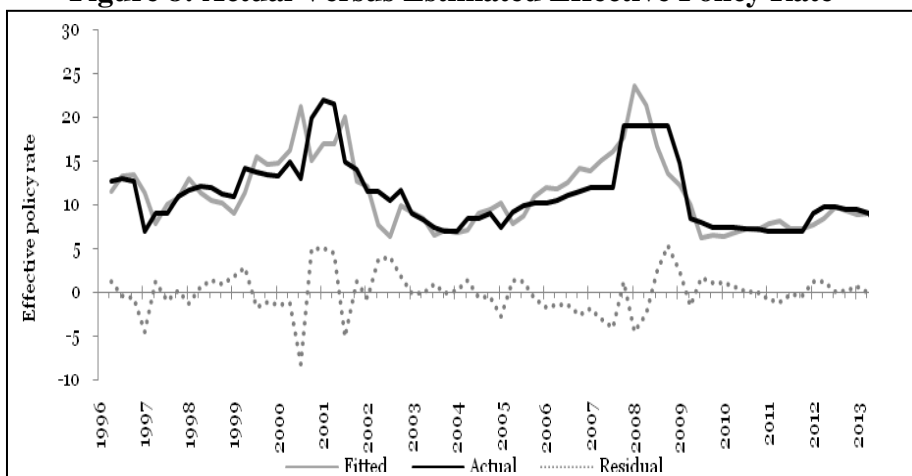
All specifications have coefficients on the inflation gap that are statistically significant and of correct sign. However, the output gap is statistically significant only in the specifications that include the effective policy rate as a measure of short term interest rates. Further, the coefficient on the output gap is found to be larger than the coefficient on inflation gap. Meanwhile, the coefficient on lagged interest rate is large and significant implying a relatively high degree of interest rate smoothing.

The long run coefficient on inflation is greater than or equal to 1 in all forward looking specifications satisfying the Taylor principle. However, the long run coefficient on the output gap is larger than the coefficient on inflation indicating that monetary policy seems to react more strongly to fluctuations in output than to deviations in inflation. In addition, the coefficient on the exchange rate is found to be of the right sign, but the coefficient is relatively small and not significant.

Considering all specifications of contemporaneous, backward looking and forward looking Taylor rules, the forward looking specification augmented with a dummy variable (column 2 of Table 3) [8] is considered as the preferred specification considering its adherence to the Taylor principle of having a long-run coefficient on inflation which is larger than unity and better model fit indices. Figure 8 plots the actual effective policy rate and the policy interest rate based on the estimates of the monetary policy rule from the preferred specification. The policy interest rate proposed by the model appears to closely track the effective policy rate reasonably well.

---

[8]The selected specification has a Durbin-Watson statistic of 1.7, which is approximately close to the desired level of 2. Therefore the level of serial correlation is not significant. As the values of Ljung-Box Q-statistic are insignificant with large p-values, the autocorrelation problem is not evident.

Figure 8: Actual Versus Estimated Effective Policy Rate

In order to assess the evolution of the coefficients on the inflation gap and the output gap over time, a recursive regression was carried out for the backward looking specification in column 3 of Table 2. The results are presented in Figure 9, according to which the response of monetary policy to deviations of inflation from the desired level and output from the potential level has improved since 2007 reaching a peak in 2009. However, the response of monetary policy to the inflation gap has stabilized thereafter, whereas that to the output gap appears to have gradually declined.

Figure 9: Recursive Estimates of Coefficients of Inflation Gap and Output Gap

a. Inflation Gap   b. Output Gap
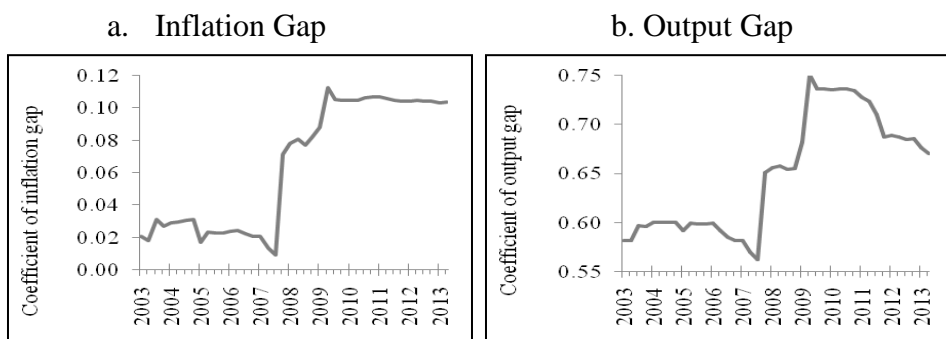
Since there appears to be a definite shift in the coefficients on inflation gap and output gap after 2007, the monetary policy reaction function was estimated over two sub sample periods. The first sample period covered the period 1996 Q:1 to 2007 Q:4, while the second sample period was from 2008 Q:1 to 2013 Q:2. Due to insufficient number of observations in the second sample period the results from that period are not reported. However, comparing the results from the first sample period and the entire sample provide some important insights into the changes that have taken place in the conduct of monetary policy. During the first sample period, the long run coefficient on inflation was less than one which was below the threshold prescribed by the Taylor principle, implying that during this period monetary policy has reacted less than proportional to changes in inflation. On the other hand, for the entire sample period, the long run coefficient was above 1, indicating that during the second sample period the Taylor principle was met. With monetary policy reacting more than proportionately to the inflation gap, there is an increase in the real interest rate leading to lower inflation. Further the long run coefficient on output gap is higher during the second period indicating a higher weight on output stabilization.

Hybrid Taylor-McCallum Rule

The empirical results for the hybrid Taylor-McCallum rule are summarized in Table 4. The effective policy interest rate was used as the primary measure of short term interest rate, while results are also presented for AWCMR as an alternative measure of short term interest rate.

The results are presented for both backward-looking and forward-looking specifications, where the baseline backward-looking specifications (column 1 and 5) included both the nominal income gap and the short term interest rate with one quarter lag, and the baseline forward-looking specifications (column 4 and 8) included one quarter ahead nominal income gap and the lagged short term interest rate.

The expectation is that the nominal income growth deviation will be negatively signed, implying that when nominal output growth is falling relative to trend, monetary policy becomes accommodative and policy interest rates are reduced, and vice versa. The empirical results also reveal that the coefficient on the nominal income growth deviation term is negative in all cases consistent with *a priori* expectations and is also statistically significant in most cases (column 1, 2, 4, 5 and 6).

Further, the baseline specifications were also augmented with changes in the nominal exchange rate (column 2 and 6). However, consistent with the results for the Taylor rule, the exchange rate coefficient is found to be insignificant in all specifications.

Figure 10 plots the actual effective policy rate and the policy interest rate based on the estimates of the monetary policy rule from the forward-looking specification in column 4.[9] As in the case with Taylor rule, the policy interest rate proposed by the model appears to closely track the effective policy rate reasonably well.

Figure 10: Actual Versus Estimated Effective Policy Rate

---
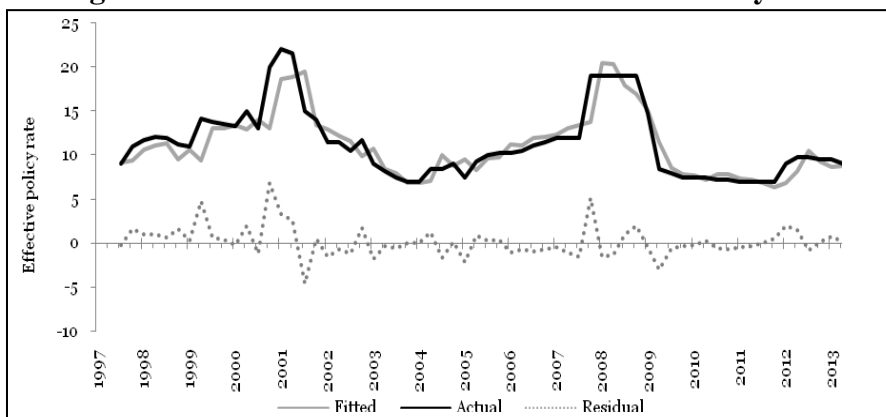
[9]The selected specification has a Durbin-Watson statistic of 1.9, which is approximately close to the desired level of 2, and the values of Ljung-Box Q-statistic are insignificant with large p-values.

Table 4: Estimates of Hybrid Taylor-McCallum Rule

Dependent variable	Effective Policy Rate				AWCMR			
Column Number	1	2	3	4	5	6	7	8
Constant	1.35	1.37	1.37	-0.14	0.81	0.96	0.89	0.04
	(1.89)	(1.91)	(1.86)	(-0.20)	(1.31)	(1.54)	(1.41)	(0.06)
$\Delta x_t^* - \Delta x_{t-1}$	-0.12	-0.13			-0.09	-0.11		
	(-2.07)	(-2.15)			(-2.04)	(-2.35)		
$\Delta x_t^* - \Delta x_{t-2}$			-0.09				-0.05	
			(-1.40)				(-1.10)	
$\Delta x_t^* - \Delta x_{t+1}$				-0.24				-0.10
				(-2.12)				(-1.35)
EFFECTIVE(-1)	0.83	0.81	0.84	0.89				
	(12.99)	(12.03)	(12.36)	(24.02)				
AWCMR(-1)					0.88	0.85	0.89	0.94
					(16.21)	(14.24)	(15.68)	(16.42)
Δe_{t-1}		0.02				0.03		
		(0.61)				(1.40)		

Observations (adj)	67	67	66	65	67	67	66	65
Adjusted R-squared	0.76	0.76	0.76	0.78	0.82	0.82	0.82	0.83
F-statistic/J-statistic	107.72	71.24	101.92	3.85	152.77	104.02	147.00	6.60
S.E. of regression	1.91	1.92	1.95	1.83	1.50	1.49	1.53	1.48

Notes:

i. *Absolute value of t-statistics is given in parentheses.*

ii. *Forward looking specifications were estimated using GMM methodology. Two lags of Δb_t, $(\Delta x_t^* - \Delta x_t)$, EFFECTIVE/AWCMR and Δe_t were used as instruments for the GMM estimation*
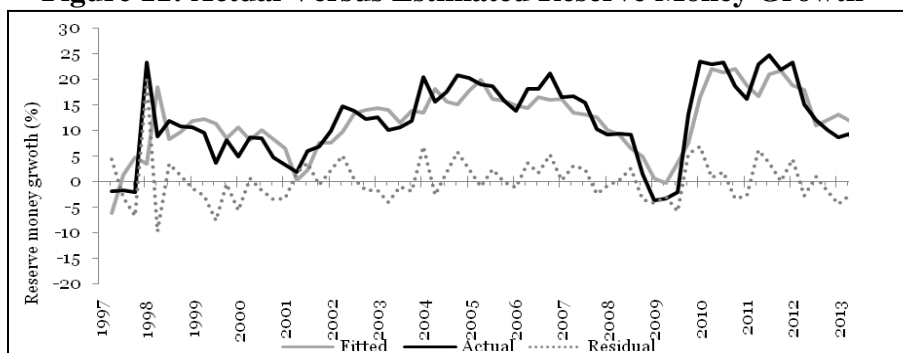
Hybrid McCallum-Hall-Mankiw Rule

The empirical findings with regard to the hybrid McCallum-Hall-Mankiw rule are summarized in Table 5. Accordingly, the response of base money growth to the sum of the inflation gap and the output gap was examined for contemporaneous, backward-looking and forward-looking specifications.

The coefficient on the inflation gap plus output gap term is correctly signed (negative) in all specifications of the rule. However, this coefficient is found to be statistically significant only in certain backward-looking specifications (column 4, 5 and 6). Meanwhile, consistent with the findings for the McCallum rule, the exchange rate coefficient is correctly signed and significant in all specifications.

Since the backward-looking specification in column 4 has statistically significant coefficients for all parameters with better model fit indices, the rule specified in column 4 was selected[10] to analyze the actual growth in reserve money against the growth in reserve money proposed by the hybrid McCallum-Hall-Mankiw rule (Figure 7). In line with the McCallum rule, the reserve money growth estimated from the model appears to closely track the actual growth in monetary base.

Figure 11: Actual Versus Estimated Reserve Money Growth

---

[10]The selected specification has a Durbin-Watson statistic of 2.2 which is approximately close to the desired level of 2, and the values of Ljung-Box Q-statistic are insignificant with large p-values.

Table 5: Estimates of Hybrid McCallum-Hall-Mankiw Rule
(Dependent variable: Growth in Base Money (Δb_t))

Column Number	1	2	3	4	5	6	7	8
Constant	3.83	4.86	5.29	6.29	7.80	7.14	3.60	5.68
	(3.31)	(3.91)	(4.16)	(4.94)	(5.79)	(4.29)	(2.18)	(2.97)
Δb_{t-1}	0.71	0.69	0.68	0.65	0.57	0.57	0.75	0.70
	(9.11)	(8.88)	(8.95)	(8.82)	(7.58)	(6.34)	(6.33)	(5.79)
[INFGAP+YGAP]	-0.06	-0.08						
	(-0.58)	(-0.70)						
[INFGAP(-1)+YGAP(-1)]			-0.15					
			(-1.39)					
[INFGAP(-2)+YGAP(-2)]				-0.29				
				(-2.79)				
[INFGAP(-3)+YGAP(-3)]					-0.40			
					(-3.89)			
[INFGAP(-4)+YGAP(-4)]						-0.26		
						(-2.12)		
[INFGAP(+1)+YGAP(+1)]							-0.17	-0.28

							(-0.89)	(-1.36)
Δe_{t-1}		-0.13	-0.14	-0.13	-0.12	-0.13		-0.13
		(-1.99)	(-2.03)	(-2.02)	(-1.99)	(-1.97)		(-2.26)
Observations (adj)	67	67	67	67	67	67	65	65
Adjusted R-squared	0.55	0.57	0.58	0.62	0.65	0.60	0.51	0.49
F-statistic/J-statistic	41.67	30.37	31.54	36.28	42.19	33.59	4.14	0.00
S.E. of regression	5.13	5.02	4.96	4.75	4.52	4.87	5.35	5.43

Notes:

i. *Absolute value of t-statistics is given in parentheses.*

ii. *Forward looking specifications were estimated using GMM methodology. One lag of Δbt, (INFGAP+YGAP) and Δe$_t$ were used as instruments for the GMM estimation*

CONCLUSION

This study seeks to characterize monetary policy behaviour in Sri Lanka under different rules by empirically evaluating the operational performance of the McCallum rule, the Taylor rule, and their hybrid variants in the Sri Lankan context for the period 1996 to 2013. By doing so, this research attempts to shed light on the operational feasibility of each rule in the Sri Lankan context and how this has changed with the evolution of the monetary policy framework.

In this paper the McCallum rule and the Taylor rule were assessed as alternatives rather than as competing models for the characterization of the monetary policy decision making process. The McCallum rule proposes a monetary policy rule that features a monetary base instrument and a nominal income growth target while avoiding the issues relating to the measurement of unobservables. The Taylor rule on the other hand, mirroring the practice of modern day central banks, proposes an interest rate based rule, wherein the nominal interest rate is set in response to observed or predicted values of the inflation gap and the output gap. Although Taylor and McCallum rules differ in terms of both instrument and target variables, they are both applicable in the Sri Lankan context given the evolution of the monetary policy framework over time.

In the McCallum rule, a backward-looking specification where reserve money changes with respect to the deviations in nominal income growth with a significant degree of instrument smoothing was found to be more appropriate. With regard to the Taylor rule, a forward-looking specification with the effective policy interest rate reacting to the expected inflation and output gap appears to be best suited to the Sri Lankan context. In general, backward-looking specifications were found to be best suited for monetary policy rules with a monetary base instrument, whereas forward-looking specifications were found to be best suited for interest rate based rules. Meanwhile, exchange rate movements were found to play a significant role in policy rules with a monetary base instrument,

whereas it was found insignificant in interest rate based rules. By conducting simulation exercises it would be possible to identify whether following a McCallum type rule or a Taylor type rule would lead to more optimal monetary policy setting. This is left for future study.

The monetary policy rules evaluated in this paper provide a simple and transparent framework for conducting monetary policy. Moreover, there is a wide consensus that policy rules have major advantages over discretion in improving economic performance (Taylor, 1993). However, mechanically following rule based monetary policy formulation is not recommended as monetary policy rules provide only a guide to policy makers in their decision making process. There will be episodes where monetary policy will need to be adjusted to take account of special factors and therefore judgment is always required when evaluating macroeconomic developments in the decision making process.

REFERENCES

Clarida, R., Gali, J., and Gerlter, M. (1998). Monetary Policy Rules in Practice: Some International Evidence.*European Economic Review*, 42, 1033-1067.

Clarida, R., Gali, J., and Gerlter, M. (2000). Monetary Policy Rules and Macroeconomic Stability.*Quarterly Journal of Economics*, 115, 147-180.

Clark, T. E. (1994). Nominal GDP Targeting Rules: Can They Stabilize the Economy? *Economic Review*, Federal Reserve Bank of Kansas City, Quarter 3.

Feldstein, M. (1999). Comment, in John B. Taylor (ed.), *Monetary Policy Rules,* University of Chicago Press, Chicago, pp, 119-123.

Friedman, M. (1960).*A Program for Monetary Stability*. New York: Fordham University Press.

Hall, R.E., and Mankiw, N. G. (1993).Nominal Income Targeting. In N.G. Mankiw, (ed.), *Monetary Policy*(pp. 71-93), Chicago: University of Chicago Press.

Judd, J. P., and Rudebusch, G. D. (1998). Taylor's Rule and the Fed: 1970-1997,*Federal Reserve Bank of San Francisco Economic Review*, 3, 3-16.

Kydland, F., and Prescott, E. (1977). Rules Rather than Discretion: The Inconsistency of Optimal Plans.*Journal of Political Economy*, 85 (3), 473-492.

McCallum, B. T. (1987).The Case for Rules in the Conduct of Monetary Policy: A Concrete Example, *Economic Review*, September/October, Federal Reserve Bank of Richmond, pp. 10-18.

McCallum, B. T. (1988).*Robustness Properties of a Rule for Monetary Policy*, Carnegia-Rochester Conference Series on Public Policy, 29, 173-204.

McCallum, B. T. (1993). Specification and Analysis of a Monetary Policy Rule for Japan.*Working Paper 4449*, National Bureau of Economic Research.

McCallum, B. T. (2000). Alternative Monetary Policy Rules: A Comparison with Historical Settings for the United States, the United Kingdom, and Japan. *Working Paper 7725*, National Bureau of Economic Research.

McCallum, B. T. (2002). *Monetary Policy rules and the Japanese Deflation*. Conference Paper for the March 20, 2002 Workshop Sponsored by the Economic and Social Research Institute of the Japanese Government.

Mohanty, M. S., and Klau, M. (2004). Monetary Policy Rules in Emerging Market Economies: Issues and Evidence, *Bank of International Settlements Working Paper No. 149.*

Orphanides, A. (2003). Historical Monetary Policy Analysis and the Taylor Rule. *Journal of Monetary Economics*, 50 (5), 983-1022.

Patra, M. D., and Kapur, M. (2012).Alternative Monetary Policy Rules for India. *IMF Working Paper No. 12/118.*

Perera, R., and Jayawickrema, V. (2013). *Monetary Policy Rules in Practice: Evidence for Sri Lanka.* Conference Proceedings, 6th International Research Conference, Central Bank of Sri Lanka, Colombo, Sri Lanka.

Rotemberg, J., and Woodford, M. (1999). Interest Rules in an Estimated Sticky Price Model. In John B. Taylor (ed.), 1999, *Monetary Policy Rules* (pp. 57-126), Chicago: University of Chicago Press.

Taylor, J. B. (1993). *Discretion versus Policy Rules in Practice*, Carnegie-Rochester Conference Series on Public Policy, 39, pp. 195-214.

Taylor, J. B. (1999). A Historical Analysis of Monetary Policy Rules. In John B. Taylor (ed.), 1999, *Monetary Policy Rules* (pp. 319-348), Chicago: University of Chicago Press.

ANNEXURE

Table 1: Data Description

Variable Name	Definition	Period	Source
Δb_t	Growth (y-o-y) in reserve money	1996 – 2013	CBSL[1/]
Δx_t	Growth (y-o-y) in nominal GDP	1996 – 2013	CBSL
Δx_t*	Trend growth (y-o-y) in nominal GDP	1996 – 2013	Author's estimates
Δe_t	Annualised quarter-on-quarter variation in the monthly average exchange rate	1996 – 2013	CBSL
AWCMR	Average weighted call money rate (quarterly average)	1996 – 2013	CBSL
EFFECTIVE	Effective policy rate	1996 – 2013	CBSL
TBILL	91-day Treasury bill rate	1996 – 2013	CBSL
INFGAP	Deviation of actual inflation (change of the Colombo Consumers' Price Index (CCPI)) from the indicative inflation projection of 5 per cent	1996 – 2013	DCS[2/] Author's estimates
YGAP	Output gap measure (computed using seasonally adjusted GDP)	1996 – 2013	Author's estimates
DUMMY	2001:Q1-Q3 and 2008:Q1-Q3 are set to 0	-	-

1/ CBSL – Central Bank of Sri Lanka
2/ DCS – Department of Census and Statistics, Sri Lanka

Table 2: Unit Root Tests

Variable	Augmented Dickey-Fuller test statistic	
	t-Statistic	Probability
Δb_t	-3.819600	0.0044
Δx_t	-3.323766	0.0176
AWCMR	-2.836805	0.0583
EFFECTIVE	-2.213982	0.2033
TBILL	-2.587934	0.1003
Δe_t	-5.358634	0.0000
INFGAP	-3.897576	0.0034
YGAP	-3.715105	0.0058

Table 3: Stylised Facts (Averge for Period) Per Cent

Period	Reserve Money Growth(Δb_t)	Nominal GDP Growth (Δx_t)	Real GDP Growth	Headline Inflation (CCPI)	Output Gap (YGAP)	Call Money Rate (AWCMR)	Dep. in Rs/US$ Exchange Rate (Δe_t)
1996-2013	11.4	15.0	5.3	9.9	0.0	11.5	5.1
1996-2001	5.6	12.4	4.0	10.1	0.7	14.5	9.3
2002-2007	15.6	16.3	5.4	10.8	-0.6	10.8	3.1
2008-2013	11.9	16.0	6.6	8.8	-0.3	9.3	2.9

Sources: Central Bank of Sri Lanka, Department of Census and Statistics, Author's calculations

Table 4: Descriptive Statistics: 1996 – 2013

	Δbt	Δxt	AWCMR	EFFEC-TIVE	TBILL	Δet	INFGAP	YGAP
Observations	68	68	72	72	72	72	72	72
Mean	11.4	15.0	11.5	11.2	11.6	5.1	4.9	0.0
Median	11.4	15.0	10.9	10.4	11.2	5.1	4.1	-0.3
Maximum	24.8	26.7	23.8	22.0	21.3	37.5	23.4	6.7
Minimum	-13.4	4.8	7.0	6.5	7.0	-18.9	-4.3	-5.6
Std. Dev.	8.2	4.7	3.8	3.8	3.7	9.0	5.3	1.7
Skewness	-0.5	0.2	1.2	1.1	0.8	1.0	1.1	0.5
Kurtosis	2.9	3.3	4.6	3.6	2.7	6.0	4.5	5.9
Jarque-Bera	2.9	0.7	26.1	16.1	7.2	38.8	20.5	27.8
Probability	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Sum	773.8	1022.1	829.3	805.0	834.3	368.4	352.3	-2.9
Sum Sq. Dev.	4502.8	1469.5	1029.1	1048.0	954.6	5736.5	2010.1	217.1

Micro Credits and Agricultural Productivity: With Special Reference to Paddy Cultivation in Akmeemana Divisional Secretariat Division

S K G N De Silva [a] and **D W K Hemachandra [b]**

[a] *University of Sri Jayewardenepura, Colombo and Sri Lanka*
kushani.gn@gmail.com

[b] *University of Sri Jayewardenepura, Colombo and Sri Lanka*
kinkini2009@gmail.com

INTRODUCTION AND RESEARCH PROBLEM

Agricultural contribution to the Gross Domestic Product has significantly declined from 46 % in 1950 to 10% in 2013 (Central Bank of Sri Lanka, 2013). Technological issues, credit availability issues, quality of seeds, etc., have contributed to such low productivity and hence, low contribution to the national output.

Despite the fact that many financial institutions are involved in financing agricultural sector in Sri Lanka, lack of accessibility to finance sources remained as the key constraint to the growth in the agricultural productivity in the country (World Bank, 2009). Inadequate term finance, complex paper work procedures and strict collateral requirements made farmers' limited access to formal financing services. On the other hand constraints such as high transaction cost, lack of tangible security and high repayment risks also reduce the chances of targeting the agricultural sector. Therefore, small farmers largely depend on microfinance, rural cooperatives and Regional Development Banks to get the required financial resources for them.

Microfinance loans are expected to remove those constraints in accessing productive capital sources to the farming community (LMFPA, 2012).

Therefore, this study attempts to examine the relationship between microcredit facilities and agricultural productivity with special reference to the paddy cultivation in the Akmeemana Division of the Galle District. This study has also focused on the differences in socio-economic characteristics between beneficiaries and non-beneficiaries.

METHODOLOGY

Walahanduwa and Pilana agrarian service centers in Akmeemana Divisional Secretariat Division, were selected out of eleven agrarian service centers in the eastern division of the Galle District. Study population of the selected area was about two thousand six hundred paddy farmers. The sample consisted equal sizes of both beneficiaries and non-beneficiaries and it is 80 in total. (Ashaolu et al., 2011; Girabi and Elishadai, 2013; Nosiru, 2010; Hasan et al., 2013). Simple random sample method was used for selecting the non-beneficiaries and beneficiaries are selected based on the snowball sampling technique. Primary objective is achieved by calculating productivity differential between credit beneficiaries and non-credit beneficiaries. Agricultural productivity is expressed as the ratio between the input and the output. Total output is the value of the paddy production. This is taken by multiplying total quantity of production with its average market price. Total inputs mean the value of inputs used for the paddy cultivation. However, in this study, it was assumed that the total productivity is the total output per unit of land available. T-test was used to measure the average productivity difference. (Girabi and Elishadai, 2013). Accordingly, following two hypotheses were constructed to achieve the first objective:

Ho: There is no productivity differential between credit beneficiaries (CB) and non-beneficiaries (NCB) of microfinance loans in the Akmeemana Divisional Secretariat Division.

H1: There is a productivity differential between credit beneficiaries (CB) and non-beneficiaries (NCB) of microfinance loans in Akmeemana Divisional Secretariat Division.

Cobb-Douglas production function proposed to use in this study could be depicted in detail as follows. $\ln Q = \ln S_0 + S_1 \ln X_1 + S_2 \ln X_2 + S_3 \ln X_3 + S_4 D + ú$

RESULTS AND FINDINGS

This study defines productivity as the total output per unit of land available.

Table 1: Productivity Differences between Beneficiaries and Non-Beneficiaries

	Are you a microcredit beneficiary or not?	N	Mean	Std. Deviation	Std. Error Mean
Total Output per Acre	MF Beneficiary	40	50.72	14.158	2.239
	Non Bneficiary	40	49.30	11.041	1.746

Source: Author compilation based on survey data, 2014

As depicted in the above Table 01, average output per acre (50.72 bushels per acre) of microcredit beneficiaries are slightly higher than the average output per acre of non-beneficiaries of the microcredit facility (49.30 bushels per acre). Moreover, the above results show that standard deviation values of the group of beneficiaries and non-

beneficiaries respectively. Those values explained that microcredit beneficiaries' actual output acre can vary among the range of 50.72 +/- 14.15 whereas non beneficiaries' actual outputs per acre vary between 49.3 +/- 11.04.

CONCLUSIONS, IMPLICATIONS AND SIGNIFICANCE

According to the independent sample t-test, the sig value of the t-test statistics when assuming equal variance is 0.617. Since the value is greater than 0.05, null hypothesis is accepted. This concludes that there is no significant differential of average productivity between microcredit beneficiaries and non-beneficiaries.

In terms of differences in socioeconomic characteristics, majority of beneficiaries are female (26 people out of 40) and their participation rate as credit beneficiaries is 65% and from total study sample it is about 32.5%. Highest numbers of farmers are in the age category of 46-60 and as a count it is about 38 respondents out of total sample of 80. The level of education among the beneficiaries is higher (45%) than non-beneficiaries (35%). At all levels of income categories beneficiaries recorded a lower income level compared to non-beneficiaries. However, within the income range of Rs.30,001/= - Rs.50,000/= beneficiaries are only 17%, whereas non-beneficiaries are 47%. The major finding of the above result is majority of non-beneficiaries have earned higher monthly income than the beneficiaries.

Table 2: Independent Sample t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		Lower	Upper
Total Output per Acre	Equal variances assumed	2.758	.101	.502	78	.617	1.425	2.839		-4.227	7.077
	Equal variances not assumed			.502	7.363E1	.617	1.425	2.839		-4.232	7.082

Source: Author compilation based on survey data, 2014,

REFERENCES

Ashaolu, A. F., Momoh, S., Phillip, B. B., and Tijani, I. A. 2011, 'Microcredit Effects on Agricultural Productivity: A comparative analysis of rural farmers in Ogun State, Nigeria,' International Journal of Applied Agricultural and Agricultural Research, vol.7, pp 23-25.

Central Bank of Sri Lanka 2013, Annual Report 2012 and 2013, Colombo

Girabi, F., and Mwakaje, A. E. G. 2013, 'Impact of Microfinance on Smallholder Farm Productivity in Tanzania: The case of Iramba district,' Asian Financial and Economic Review, vol.3 (2), pp 227-242.

Hasan, K. M., Billah, M., Hossen, S. S., and Mamun, T. M. 2013, 'Effect of Microcredit on Agricultural Output: Evidence from Rural Bangladesh,' Journal of Asian Development Studies, vol. 2(4), pp 51-61.

LMFPA News Bulletin, April 2013, Lanka Microfinance Practitioners' Association, Colombo.

Nosiru, M. A. 2010, 'Microcredit and Agricultural Productivity in Ogun State, Nigeria,' World Journal of Agricultural Sciences, vol. 6(3), pp 290-296.

World Bank 2009, 'Sri Lanka Agricultural commercialization- Improve farmers' income in the poorest regions,' Poverty Reduction and Economic Management Sector Unit, South Asia Region, Report no. 48968.