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Determinants of household poverty in the rural sector in Sri Lanka: 1990-2010

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Abstract: *A satisfactory* explanation of why some people are poor is essential to tackle the roots of poverty. Therefore, the causes of poverty and their behavior over time are more important to understand the depth of the problem in a particular sector in a country. This study examines the micro-level factors associated with household poverty and their behavior over the years in the rural sector in Sri Lanka using disaggregated Household Income and Expenditure Surveys (HIES) data in 1990/91 to 2009/10 using Probit regression analyses. The major factors affected for the poverty reduction in the rural sector within last two decades are employment of the head of the household in the public sector, education of the head of the household, the head engaging in the non-agriculture sector, higher female adult ratio, and the receipt of remittances. They are statistically significant variables to the model. Relatively, foreign remittance has played a very important role in poverty reduction in the rural sector. Households with the higher dependency ratio, the large household size, and head engaged in private sector job and the female headed households are more likely to be poor in the rural sector in Sri Lanka. However, almost all the coefficients (both positive and negative factors) show declining trends of their impact on poverty over time while impacts of the head engage in non-agriculture activities and the higher female adult ratio have increased.

Keywords: Poverty Determinants, Probit Regression Analysis, Rural Sector, Sri Lanka

1. Introduction

Poverty measurements are significant yardsticks in understanding the nature of the problem of poverty as it differs from region to region and country to country. Since the poverty profile describes the pattern of poverty, understanding the poverty profile is of key importance for effective planning of poverty reduction for any country. Nevertheless, poverty profiles are not principally concerned with household poverty determinants. Therefore, poverty analysis are much needed same as poverty measurements to observe causes for poverty and the impact of policy changes on it, as it differs region to region and time to time. A satisfactory explanation of why some people are poor is essential to tackle the roots of poverty. Thus, causes of poverty are more important to understand the depth of the problem.

Poverty reduction programs are brought to the forefront in economic development agenda in successive governments in Sri Lanka since its independence. Thus, this force is evidenced by the fact that Sri Lanka has achieved the MDG Goal 1 by 2010 despite of the long-lasting ethnic conflict between the Tamil minority and Sinhalese majority. However, regional and sectoral disparities are significantly large and key concern yet. Eighty three percent of the poor located in rural sector by 2010 (DCS, 2011) depicts that the problem of poverty in Sri Lanka is totally a rural phenomenon. Thus, there is a need of detailed poverty analysis to have a clear understanding of the fundamental causes of poverty in the rural sector in particular for developing an effective strategy for combating rural poverty in Sri Lanka.

This study attempts to analyze and examine the behavior

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of the determinants of poverty in the rural sector in Sri Lanka using most recent disaggregated Household Income and Expenditure Survey (HIES) data 2009/10 compare to HIES data 1990/91. Policy implementation for poverty reduction requires thorough knowledge of poverty picture for each sector in the country. This is timely study to update the poverty profile by adding recent poverty determinants in the rural sector Sri Lanka as Sri Lanka has finished three decades of brutal civil conflict and focusing more on rural development.

2. Objectives of the Study

The objective of this study is to examine the poverty profile and identify the main factors which influenced on household poverty and to explore the changes of poverty determinants over time in the rural sector in Sri Lanka within last two decades.

2.1. Research Method: Probit Regression Analysis

Since the aim of this study is to identify the significant factors which determine the probability of a household being poor in the rural sector in Sri Lanka, we considered the response variable as a binary variable.

In the probit regression, if the per capita expenditure per head per month is below the estimated official poverty line[3], the household is considered as poor. Poverty line is established based on the estimated amount of monetary value that is required to meet the basic needs of the household for a month. If the household is poor it takes the value 1 otherwise zero. Then, the predicted values of the dependent variable lie on zero and one. Hence, the predicted values are interpreted as probabilities.

The functional form of the probit model is as follows;

$$Y_i^* = X_i\beta + \varepsilon_i \quad (1)$$

Where Y_i^* is the latent variable which indicates propensity to have Y=1(i.e. Household to be below the poverty line) , X_i is a matrix of explanatory variables (K x 1 regressor vector), β is a vector of parameters to be estimated and ε_i is the error term (residuals)which is assumed to be normally distributed. Binary variable can be defined as:

$s_i = 1$ if $y_i \leq z$,

$s_i = 0$ otherwise

z is the national poverty line of the corresponding years.

β_i are the regression parameters to be concern.

X_i are the independent variables. Most of the categorical independent variables were fitted to the regression model converting to dummy variables.

2.2. Dependent Variable

This study uses household consumption expenditure to form the dependent variable as the income data is believed to be less reliable than consumption data. Household per capita expenditure per month is used for the poverty measuring variable, adjusted for household size (number of household members). This is calculated considering both food and non-food expenditure including in-kind values in the household.

2.3. Explanatory Variables

Table 1. *Explanatory variables*

Variable Name	Explanation
Household Head:	
Age	Number of years
Employed in government sector	Dummy if head engaged government job=1
Employed in private sector	Dummy if head engaged private sector job=1
Self-employed	Dummy if head engaged in self-employment =1
Engaged in Non-agriculture job	Dummy if head engaged in non-agriculture job=1
Education	Number of years of schooling
Ethnicity(Non-Sinhalese=1)	1 If head is non-Sinhalese
Household Demography :	
Spouse employed	1 if spouse employed
Female-headed Household	1 if household head is female
Average education of other members	Average number of schooling years of the members of the household except head and those who are schooling
Household size	Number of household members living in the household
Female adult ratio	Number of female above the age 15 over household size
Dependency ratio	number of children below the age of 15 and elderly above 60
Remittance:	
Local Remittance	1 if household receive local remittances
Foreign Remittance	1 if household receive foreign remittance
Region:	
Rural	1 if household is located in rural sector
Estate	1 if household is located in estate sector
Urban	1 if household is located in urban sector

The explanatory variables included in this study are household demographic and socio-economic variables and human capital variables and other attributes of the households as indicated in the Table 1. Both continuous variables and dummy variables[3]have been included.

3. Empirical Studies on Poverty Determinants

Poverty measurement and analysis are needed to identify the poor, the nature and extent of poverty and its determinants, and to assess the impact of policies and welfare programs on the poor (Gunawardena, 2004). Considerable analytical efforts have been made within last two decades in poverty related literature directed toward driving good practices in measuring poverty in all its dimensions and generating the data required. Those studies primarily focus on determinants of poverty, how changes in economic policies influence poverty and various other poverty measures (Datt & Jolliffe D., 1999; Datt & Ravallion, 1992; I. De Silva, 2008; Deaton, 1997; Mok, Gan, & Sanyal, 2007).

Most of the poverty studies are mostly based on multivariate regression analysis to identify the determinants of poverty at the household level, using reduced form models of various structural relationships (Glewwe, 1991). The literature indicates that regardless of the definition of poverty line, the most commonly used dependent variables in poverty functions are dichotomous in nature or measures of the poverty gap. However, the multiple regression models as a tool for poverty analysis in those kinds of studies has been criticized for number of drawbacks (Mok et al., 2007).

Although there is a rich literature on poverty focusing on the measurement of poverty and related issues[4], there are very limited studies on poverty determinants in Sri Lanka (I. De Silva, 2008; Gunawardena, 2004). De Silva shows that education of the head of the household, having a head engaged in salaried employment or engaged in business are the most significant positive poverty determinants for Sri Lanka for the year 2000. She further has identified that probability of being poor rises with the large household size, household head being female, living in rural area, and being a casual wage earner. These results are obtained by estimating a logistic regression for poverty determinants using data from Sri Lanka Integrated Survey conducted by the World Bank in 2000.

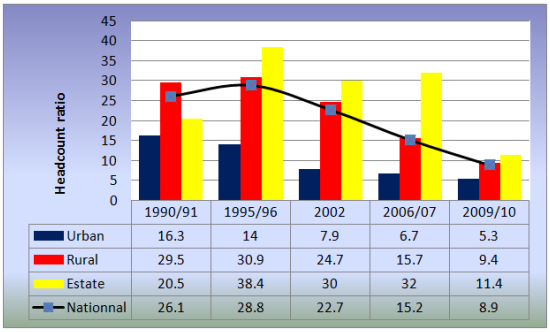
A recent study (World Bank, 2007) on poverty in Sri Lanka generalised its findings indicating that poverty is strongly associated with attributes of individuals/ households such as educational attainment, employment status, and family size. Further, this report explains that larger households, especially those with children are more likely to be poor whereas households with a member working abroad have a significantly lower likelihood of being poor. It has been identified that after individual differences are accounted for, the likelihood of being poor also depends on a range of spatial factors, such as poor regional growth and employment opportunities, and the availability of infrastructure, such as roads and electricity. However, still there is no appropriate attempt to identify the changes of poverty determinants over time in Sri Lanka and this study aims to fill this gap.

4. Poverty Trends in Sri Lanka

Sri Lanka is an island-nation state in the Indian Ocean with a land area of 6.55 million hectares and a middle income developing economy with a GDP per capita of US$ 2836 and GNP per capita of US$ 2804 by 2011 (Central Bank of Sri Lanka, 2012) .

Since the majority of the poor in Sri Lanka lives in rural areas agriculture remains the main source of income of them. Latest statistics in Sri Lanka indicated, rural population in Sri Lanka accounts 16.3 million (72%) out of total population of 20.3 million and 84% of total poor reported from the rural sector (DCS, 2011). Although, each Sri Lankan successive government put the welfare programs to top priority and improved other aspect of the economy over the time, poverty and inequality[5] remain as the main problems in Sri Lanka.

Reducing poverty is a difficult and complex challenge for any developing country like Sri Lanka. However, said welfare programs placed Sri Lanka a relatively high emphasis on basic human needs, promoting food security and employment, access to health facilities, basic education etc. This has resulted in significant achievements of some areas of human welfare in the country relative to other developing countries (Amarasinghe, 2005).



	1990/91	1995/96	2002	2006/07	2009/10
Urban	16.3	14	7.9	6.7	5.3
Rural	29.5	30.9	24.7	15.7	9.4
Estate	20.5	38.4	30	32	11.4
Nationnal	26.1	28.8	22.7	15.2	8.9

Source: Department of Census and Statistics, Sri Lanka, Various HIES reports 1990-2010

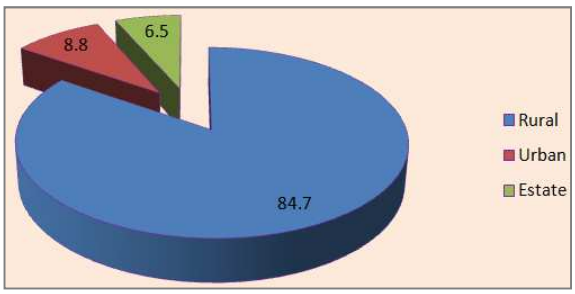
Figure 1. *Poverty trends in Sri Lanka since 1990 to 2010*

[2] Official poverty line for Sri Lanka (national and sub -national levels) has been constructed in 2002 for the first time by Department of Census and Statistics and will be updated for every year (Nanayakkara, 2006).

[3] I will not be including all the explanatory variables proposed for the study here due to data shortage. More meaningful variables will be added to the final report with full data set.

[4] see www.ips.lk and www.cepa.lk for further details please.

[5] As an example Sri Lanka reduces unemployment up to 5.8 by 2009 (Central Bank of Sri Lanka, 2009).



Source: Department of Census and Statistics, Sri Lanka,

Figure 2. *Contribution to poverty (%) by sector in Sri Lanka-2010*

However, the latest Household Income and Expenditure Survey 2009/10 indicates that poverty headcount ratio has been dropped tremendously to a single digit; 8.9 per cent (Figure 1). As the Figure 1 demonstrates, poverty has been declining over time in Sri Lanka in terms of the proportion of the population who are below the poverty line. Although, the heterogeneity of poverty levels in Sri Lanka which differs widely between sectors since 1990/91, it has reduced significantly by 2010. The fact that nearly 84.7 per cent (Figure 2) of the total poor belong to the rural sector indicates that rural poverty in Sri Lanka is alarming.

5. Determinants of Household Poverty in Sri Lanka: 1990-2010

Table 2. *The determinants of household poverty in Sri Lanka: 1990-2010*

Poverty determinants	**1990/91**	**1995/6**	**2006/7**	**2009/10**
Household Head:				
Age	-0.001 (14.00)**	-0.003 (21.15)**	-0.000 (2.50)*	-0.000 (1.99)*
Employed in government sector	-0.069 (12.99)**	-0.053 (5.82)**	-0.039 (7.91)**	-0.035 (10.05)**
Employed in private sector	0.085 (17.92)**	0.165 (29.51)**	0.041 (13.85)**	0.037 (13.93)**
Self-employed	-0.023 (6.11)**	0.051 (9.96)**	0.007 (2.31)*	0.007 (2.74)**
Engaged Non-agriculture job	-0.017 (4.85)**	-0.085 (18.57)**	-0.014 (5.90)**	-0.025 (12.42)**
Education(number of years)	-0.015 (35.89)**	-0.029 (50.42)**	-0.011 (36.78)**	-0.002 (8.16)**
Ethnicity(Non-Sinhalese=1)	-0.020 (4.92)**	-0.063 (10.62)**	-0.043 (17.09)**	0.006 (3.02)**
Household Demography :				
Spouse employed	-0.012 (3.80)**	-0.012 (2.80)**	0.008 (3.31)**	-0.002 (0.84)
Female-headed Household	0.033 (4.23)**	0.033 (5.91)**	0.021 (7.10)**	0.018 (7.80)**
Average education of other members(No of years)	-0.024 (37.29)**	-0.041 (47.23)**	-0.017 (36.11)**	-0.006 (14.44)**
Household size	0.038 (60.10)**	0.066 (65.73)**	0.026 (49.13)**	0.019 (45.47)**
Female adult ratio	-0.039 (2.78)**	-0.095 (6.46)**	-0.015 (1.62)	-0.048 (6.85)**
Dependency ratio	0.126 (17.56)**	0.191 (17.20)**	0.027 (4.95)**	0.037 (7.69)**
Remittance:				
Local Remittance	-0.008 (0.96)	-0.192 (21.70)**	-0.032 (7.88)**	-0.013 (3.88)**
Foreign Remittance	-0.087 (13.44)**	-0.085 (8.54)**	-0.050 (12.32)**	-0.044 (16.15)**
Region:				
Rural	0.067 (20.75)**	0.235 (45.06)**	0.076 (28.98)**	-0.015 (4.89)**
Estate	-0.069 (9.98)**	0.155 (16.74)**	0.154 (26.25)**	
Urban				-0.051 (18.54)**
Observations	89967	88935	75822	79585

Source: Author calculations using HIES data, Sri Lanka.
Note: Dependent variable: expenditure per capita per month is used to form the dummy variable (poor =1). Robust z statistics in parentheses * significant at 5%; ** significant at 1%

The above mentioned variables were fitted into probit regression models to examine the poverty determinants of past two decades in Sri Lanka as a whole and specially in the rural sector. Table 2 demonstrates the results of the

probit regression (marginal effects) for the poverty determinants, and the changes of them in whole Sri Lanka from 1990 to 2010. Almost all the independent variables are statistically significant in the models and are economically meaningful.

The results indicate that any additional year of education of the head of the household and of the other members of the household had a greater impact on poverty reduction in early survey periods compared to 2010. Previous literature in Sri Lanka has also shown that a household is significantly less likely to be poor when the head of the household has more than 12 years of school education or above(World Bank, 2007)[6]. Himaz and Athurupana (2011) have also demonstrated that the incremental value to household welfare indicated that a distinct jump for an extra year of education at the levels where the national exams are completed reduces poverty. Therefore, it can be concluded that education variables are significant in the model and that education causes to reduce the likelihood of being poor, indicating that it is a strong poverty determinant in Sri Lanka.

Local remittance variable is insignificant only in 1990/91 and spouse employed variable is insignificant only in 2009/10. However, the structural beta changes can be seen clearly over the years regarding both positive and negative correlates. Also, the changes of the direction of impact of the determinants (sign of the variables) can be examined over the years. Among all these poverty determinants, foreign remittance is the most influential factor for reducing poverty in Sri Lanka within last two decades. Nevertheless, the magnitude of this factor has declined over the years.

Similarly, age of the head of the household, education level of the head of the household, where the head is employed in a public sector job, employed in the non-agriculture sector, or the spouse is employed, and the female adult ratio of the household and local remittance also negatively correlate with household poverty in Sri Lanka. In contrast, the dependency ratio, female headed households, head is employed in the private sector or being self-employed and household size are the factors which are positively correlated with household poverty in Sri Lanka within last two decades. Considering geographical variables, both rural and estate sector households are more likely to be poor in Sri Lanka relative to the urban sector households over the years. This is because the regional disparities in terms of economic as well as social factors are high in Sri Lanka and thus, the location of the household partially determines poverty. Estimates from the model demonstrate that female-headed households are more likely to be poor in Sri Lanka, *ceteris paribus,* though its impact on poverty is diminishing over time. De Silva (2008) indicated that age of the head of the household has negligible positive effect on the household being poor, while the probit estimates indicate a very small negative relationship between the age of the household head and household poverty for all the years as expected. However, age of the head of the household is statistically significant though it is not a strong poverty determinant in Sri Lanka.

All the children under 15 who are in schooling and over sixty elderly people are included in the dependency ratio variable. The estimated coefficients show the positive relationship between the dependency ratio and the probability of a household being poor. Therefore, it can be concluded that a higher dependency ratio leads to higher household poverty in Sri Lanka.

6. The Determinants of Household Poverty in the Rural Sector Sri Lanka: 1990-2010

Table 3. *The determinants of household poverty in rural sector 1990-2010*

Poverty determinants	Rural Sector			
	1990/91	1995/6	2006/7	2009/10
Household Head :				
Age	-0.002 (13.62)**	-0.004 (18.71)**	0 (3.81)**	0 -1.4
Employed in government sector	-0.092 (10.70)**	-0.05 (4.33)**	-0.048 (6.45)**	-0.023 (4.11)**
Employed in private sector	0.102 (14.95)**	0.223 (31.79)**	0.078 (16.05)**	0.056 (14.97)**
Self-employed	-0.028 5.27)**	0.067 (11.00)**	0.014 (3.48)**	0.013 (3.70)**
Engaged in Non-agricultural job	-0.023 (4.81)**	-0.104 (19.22)**	-0.032 (9.69)**	-0.039 (14.51)**
Education(number of years)	-0.015 (24.30)**	-0.03 (43.85)**	-0.013 (30.44)**	-0.003 (8.35)**
Ethnicity (non-Sinhalese =1)	-0.022 (2.75)**	-0.072 (8.56)**	-0.063 (17.80)**	0.009 (2.99)**
Household demography :				
Spouse employed	-0.008 -1.8	0.004 -0.88	0.019 (5.90)**	0.003 -1.24
Female-headed household	0.044 (3.89)**	0.043 (6.36)**	0.021 (5.15)**	0.026 (7.16)**
Average education of other members(No of years)	-0.026 (27.77)**	-0.042 (40.39)**	-0.021 (32.15)**	-0.006 (10.87)**
Household size	0.054 (51.58)**	0.075 (56.58)**	0.03 (36.52)**	0.022 (34.56)**
Female adult ratio	-0.025 -1.26	-0.099 (5.66)**	-0.015 -1.19	-0.042 (4.40)**
Dependency ratio	0.146 (13.92)**	0.189 (14.24)**	0.031 (4.23)**	0.044 (6.57)**
Remittance:				
Local Remittance	0.015 -1.24	-0.198 (17.32)**	-0.028 (5.05)**	-0.008 -1.66
Foreign Remittance	-0.11 (9.36)**	-0.101 (8.52)**	-0.06 (10.20)**	-0.047 (12.22)**
Observations	52701	62798	48677	50650

Note: Robust z statistics in parentheses * significant at 5%; ** significant at 1%
Source: Author's calculation using HIES data in 1990-2010

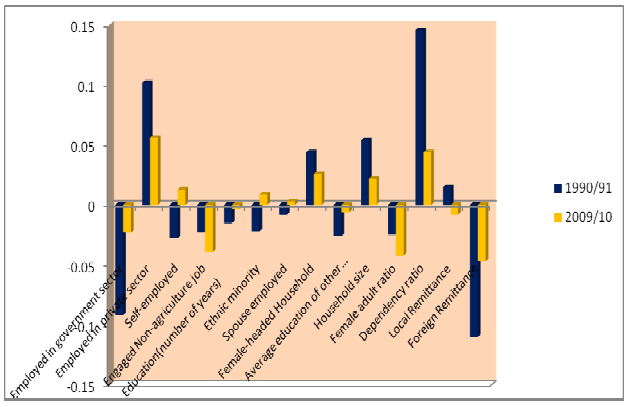
The estimates of the probit regression for the determinants of rural poverty in Sri Lanka (Table 3) depict

[6] This study has used 2002 HIES data for the calculations

that among all the factors affecting poverty, education of the head of the household, age of the household head, employment of the head in the public sector, employed in non-agriculture sector, spouse employed, higher female adult ratio and remittances are negatively correlated. Conversely, the poverty determinants of large household size, higher dependency ratio, female headed household and head employed in private sector or self-employed are positively correlated.

The households where the head is engaged in government or non-agricultural jobs are less likely to be poor in the rural sector while the households where the head is engaged in self-employment or employed in the private sector are more likely to be poor. Although, the local remittance variable is also not significant in 1990 and 2010, it is significant and shows a larger impact on poverty reduction and negative correlation in other survey periods. Although, the magnitude of the foreign remittance variable has declined over the years, it depicts a very strong negative correlation with poverty in the rural sector.

As a whole, almost all the coefficients (both positive and negative factors) show the declining trend except female adult ratio and head engaged in non-agricultural activities. Structural beta changes can be examined through the covariates of head engaged in self-employment, head belonging to ethnic minority, and receipt of local remittance within last two decades (Figure 3).



Source: Author calculations using HIES data

Figure 3. *Changes in poverty determinants in the rural sector:1990-2010*

7. Conclusion

This paper focused on changes of micro level poverty determinants of the rural sector in Sri Lanka over the years, from 1990 to 2010 as well as their behavior. The results depict that the major determinants of household poverty in Sri Lanka are human capital related factors which can be linked to the labor market. This is a common factor for each sector in Sri Lanka. Also it was revealed that increasing the level of education (number of years schooling) of the head of the household, and education of the other family members decrease household poverty in Sri Lanka[7] .

Another major observation of the paper is that the characteristics of the household head and the other family members, notably employment, gender, age of the head of the household and household size, dependency ratio, and receipt of remittances have significantly influenced household poverty in the rural sector Sri Lanka during the last two decades.

Nevertheless, the results indicated that despite reduction of poverty in Sri Lanka tremendously by 2010 (Figure 1), female headed households are more likely to be poor in whole Sri Lanka (Table 2). However, in the rural sector, female headed households are less likely to be poor (Table 3). The larger the household size, the likelihood of being poor is increased and the impact is greater in rural sector. It was observed that both international and internal remittances have contributed significantly to poverty reduction in Sri Lanka in all the years both in Sri Lanka in general and in the rural sector in particular.

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