WPS7446

Policy Research Working Paper 7446

Understanding Poverty Reduction in Sri Lanka

Evidence from 2002 to 2012/13

Lidia Ceriani
Gabriela Inchauste
Sergio Olivieri

WORLD BANK GROUP
Poverty Global Practice Group
October 2015

Policy Research Working Paper 7446

Abstract

This paper quantifies the contributions to poverty reduction observed in Sri Lanka between 2002 and 2012/13. The methods adopted for the analysis generate entire counterfactual distributions to account for the contributions of demographics, labor, and non-labor incomes in explaining poverty reduction. The findings show that the most important contributor to poverty reduction was growth in labor income, stemming from an increase in the returns to salaried nonfarm workers and higher returns to self-employed farm workers. Although some of this increase in earnings may point to improvements in productivity, defined as higher units of output per worker, some of it may simply reflect increases in food and commodity prices, which have increased the marginal revenue product of labor. To the extent that there have been no increases in the volumes being produced, the observed changes in poverty are vulnerable to reversals if commodity prices were to decline significantly. Finally, although private transfers (domestic and foreign) helped to reduce poverty over the period, public transfers were not as effective. In particular, the reduction in the real value of transfers of the Samurdhi program during 2002 to 2012/13 slowed down poverty reduction.

This paper is a product of the Poverty Global Practice Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at ginchauste@worldbank.org.

Understanding Poverty Reduction in Sri Lanka: Evidence from 2002 to 2012/13

Lidia Ceriani[*]
Gabriela Inchauste[*]
Sergio Olivieri[*]

Keywords: poverty, micro-decompositions, micro-simulations, Sri Lanka.
JEL Codes: Q15; I24; J30.

[*] We thank Shivapragasam Shivakumaran for excellent research assistance, and Tara Vishwanath, David Newhouse, and Charles Undeland for useful comments and suggestions.

1. Introduction

Beginning with the peace agreement in 2002, Sri Lanka experienced strong growth throughout the decade, with only some decline during the international financial crisis. This growth was accompanied by significant poverty reduction, reflecting growth in consumption, particularly at the bottom of the distribution. However, economic growth was not the only factor that changed over the course of the decade in Sri Lanka. For instance, there was a shift in the demographic structure following the conflict, with an increase in the number of young adults moving into the labor force, but also a slight increase in the number of children. In addition, there were policy changes over the size of pubic transfers to the poor, as well as increases in remittances which could have also had an impact on poverty. Moreover, it is unclear how the transmission channels between growth and household welfare played out, and how heterogeneous these impacts were across the distribution. For instance, we know this was a period in which there were modest gains in education, and shifts away from agriculture and into nonfarm employment, both of which could have influenced the welfare of the poor.

The objective of this paper is to quantify, based on a series of counterfactual simulations, the contributions of different factors towards poverty reduction in Sri Lanka over the last decade. In contrast to methods that focus on aggregate summary statistics, the methods adopted in this paper generate entire counterfactual distributions, allowing us to decompose the contributions of changes in different sources of income and in individual and household characteristics to the observed distributional changes. Although these decompositions do not allow identification of causal effects, they are useful as a diagnostic that can help focus attention on the elements that are quantitatively more important in describing changes in poverty.[1] For instance, to the extent that growth in real wages of farm workers was a main contributor to poverty reduction, it would be important to understand whether this was due to productivity increases, or if this is simply a result of higher commodity and relative food prices, which could just as easily fall over time, thus reversing their impact on the poor.

In particular, we implement a micro-decomposition approach which adapts the Bourguignon, Ferreira, and Lustig (2005) methodology to further distinguish between distributional changes on account of changes in endowments or/and returns to those endowments, changes in occupational choice, changes in geographical, age, and gender structure of the population, along with the non-labor dimensions mentioned above. This paper contributes with an innovative extension of the decomposition methodology implemented in the literature (Bourguignon, Ferreira and Lustig (2005), Bourguignon, Ferreira and Leite (2008) and Inchauste et al. (2014)) tailored for the Sri Lanka case.

The remainder of the paper is organized as follows. Section 2 briefly discusses the data used for the analysis. Section 3 describes the evolution of poverty and economic growth in Sri Lanka between 2002 and 2013 and the hypothetical sources that may explain the observed distributional changes over the period. Section 4 presents the model of consumption and earnings, using an underlying labor model to further distinguish why labor incomes grew. Section 5 presents and discusses the results. Section 6 concludes.

2. Data

We use the 2002 and 2012/13 rounds of the Sri Lanka Household Income and Expenditure Survey (HIES) conducted by the Department of Census and Statistics (DCS) under the National Household Sample Survey Program.[2] The HIES is a year-long sample survey which is conducted in 12 consecutive monthly rounds

[1] Similar analysis in Bangladesh led to additional work on food price and wage increases. See World Bank, 2013.
2 We also use the 2006/07 and 2009/10 rounds in two tables, Table 1 and Table 3.

and an island-wide representative sample of equal size is enumerated in each monthly round to capture seasonal and regional variations of income, expenditure and consumption patterns.

HIES 2002 was conducted during the period of January 2002 to December 2002 covering seven provinces excluding Northern and Eastern Provinces due to ongoing conflicts. HIES 2012/13 was conducted during the period of twelve survey months from July of the first year to June of the second one and is the first survey to cover all 25 districts in the country following conflict. To ensure comparability, we restrict our analysis only to the seven provinces (consisting of 17 districts) covered in the HIES 2002.[3]

Due to changes in the questionnaire over the period taken into account, we homogenize the consumption and income aggregates used in the analysis. This exercise guarantees the maximum degree of comparability between the two survey years, at the expenses of comparability with the official DCS estimates. In particular, we exclude from the consumption aggregate durable goods, other expenses not strictly referable to consumption (such as insurance, or income taxes) and other ad hoc and rarely incurred expenses. Moreover, we do not include in the income aggregate cash receipts from loans, sale of assets, and withdrawal from savings, repayment received from loans given, and receipts with regards to death/birth/marriage, compensation and gain from lottery, since these sources of income are not recorded in 2002. Further details are discussed in Annex 1.

3. Country context

Following the 2002 ceasefire, Sri Lanka experienced a period of strong economic growth averaging 6 percent a year. After a moderate deceleration during the international financial crisis (Figure 1A), growth rebounded at an average of 7.5 percent per year between 2010 and 2013. This strong economic growth coincided with a strong decline in poverty.

Between 2002 and 2012/13, the headcount poverty rate fell from 22.7 percent to 6.1 percent (Figure 1B), using comparable regions and comparable consumption aggregates, reflecting strong positive growth in consumption. In particular, growth for the bottom of the distribution has been high and has exceeded average growth for the distribution as a whole (Figure 2).

What accounts for the decline in poverty? A useful tool to answer this question is the Datt and Ravallion (1992) decomposition, which splits the change in poverty into a distribution-neutral growth effect and a redistributive effect. We decompose the change in poverty for comparable regions in Sri Lanka, and find that indeed growth played the most important role in reducing poverty in 2002-2012/13. Applying Shapely values[4] to the decomposition, we find similar results irrespective of the poverty line used. For instance, using the national poverty line, redistribution alone would have increased poverty by 63 percent (Figure 3), but the effect of growth more than compensated for this.

These results are in line with other countries experiencing large declines in poverty over the past decade. Inchauste et all (2014) estimate the Datt-Ravallion decomposition for a set of 21 countries that exhibited a substantial declines in poverty, defined as an average reduction in poverty of 1 percentage point per year

[3] Annex 1 has a detailed description of the survey and the construction of the income and expenditure variables used in this paper.

[4] The standard Datt-Ravallion decomposition includes a residual and the results can vary depending on what is taken as the base year of analysis. However, if one performs the Datt-Ravallion decomposition in both directions and takes the average, the residual vanishes and path dependence is eliminated as proposed by Shorrocks (1999) based on the Shapley (1953) value.

or more,[5] using comparable consumption or income data in the decade 2000 to 2010. For this set of countries, growth explains most of the observed reduction in poverty for 17 of the 21 countries. Redistribution was found to be more important only in the cases of Argentina, Mongolia, Paraguay and the Philippines.

While these estimates of the reduced-form relationship between economic growth, inequality and poverty have been useful to identify empirical regularities, they are unable to make explicit the links between growth and poverty reduction (Ferreira, 2012). In particular, we would like to capture the heterogeneity of impacts throughout the distribution, and be able to account for the contributions that demographics, sectorial, occupational and other labor and non-labor dimensions had in reducing poverty.[6] For this, we propose a micro-decomposition method, which generate entire counterfactual distributions, allowing us to decompose the contributions of changes in different sources of income and in individual and household characteristics to the observed distributional changes.

Several potential factors may have contributed to poverty reduction experienced in Sri Lanka over the first decade of the XXI century. We look at each in turn. First, Sri Lanka is in the final stages of its demographic transition, as lower fertility rates over the last two decades have meant that there is a relatively large share of the population who is at working age. Although population growth has recently increased following the end of hostilities, the overall trend has been an increase in the share of adults per household and therefore lower dependency rates (Figure 4 and Table 1), which should lead to an increase in household incomes, and therefore a decline in poverty.

However, despite the increase in the working-age population, there has also been a decline in the share of employed adults per household for most of the decade. What was the net effect on employment? Between 2002 and 2009/10 the net effect of these forces was a decline in the share of employed adults (Table 1), mostly on account of fewer working women (partly due to lower labor force participation), and an increase in the share of elderly per household (Table 1). However, between 2009/10 and 2012/13 both male and female employment started growing again, leading to an increase in the share of employed adults per household, thus returning to about the same levels observed in 2002, at about 41 percent.

In addition to demographic characteristics of the household and changes in employment patterns, growth in earnings can be an important source of poverty reduction. Figure 5 shows growth in total incomes by percentiles of per capita income. The curve is mainly flat around the mean growth rate, with the income of those at the bottom of the distribution growing slightly slower than the incomes of the non-poor.

Since growth in labor incomes was more or less flat across the distribution, with the income of those at the very bottom of the distribution (the bottom 5 percent) growing faster than average, one can conclude that the slower growth of those at the bottom of the total income distribution (Figure 5) was mostly on account of a slower growth in non-labor incomes for the very poor.

[5] Note that Latin American countries typically measure poverty using household income, while most other countries around the world use a consumption aggregate.

[6] Panel data that can track the life and labor histories of households over time can be used to answer questions about economic mobility and poverty dynamics. However, panels are often not available with the frequency required. Moreover, panel data are often not representative of the population as a whole; and if they initially are, it is unlikely that over the course of a decade the panel would remain representative of the population. Alternative methods using repeated cross sections have been used. One approach is to construct pseudo panels, which can delve into some issues of economic mobility (Lanjouw et al., 2011). However, these models are often troubled by their lack of precision and the fact that they often do not measure the contributions of different factors to poverty reduction.

Moreover, when we rank individuals by per capita expenditure, we find that there was substantial growth in average farm and non-farm incomes of the poor. Although non-farm income growth was higher for the poorer deciles, than for the richer deciles, the rates of growth in farm incomes were much higher, with growth of more than 200 percent over the period across the consumption per capita distribution. For instance, average self-employed farm income for the poorest deciles almost tripled between 2002 and 2012/13 (Table 2). [7]

In addition to increases in earnings, there were also changes in non-labor incomes that could have contributed to poverty reduction. One common hypothesis is that higher remittances could account for the large decline in poverty. As shown in Figure 6, remittances grew up until 2012, while subsidies and public transfers have declined over the course of the decade.

However, as shown in Figure 7, panel A, the bulk of remittances is received by the top of the distribution, and although these transfers have increased in real terms over the last decade, they are unlikely to be the main force for poverty reduction, as they account for less than 2 percent of total income of the bottom 40 percent (Figure 7, panel B).

In contrast, the bulk of Samurdhi is received by the bottom of the distribution, but these transfers have been falling both in real terms and as a share of total income over the course of the decade (see Figure 8).

Finally, changes in consumption patterns could also make a difference. As shown in Figure 9, the consumption-to-income ratio decreased for the bottom of the distribution. This could reflect increase in savings, but is also likely affected by measurement errors.

4. The decomposition method

Following Bourguignon, Ferreira, and Leite (2008), the proposed methodology rests on the typical economic assumption that agents seek to maximize their utility subject to budget constraints. In particular, we consider the Roy (1951) model of choice to model individuals' educational levels, the individual's sector of activity, and the individual choice of occupational status. The approach postulates a model in which characteristics such as age, gender, and geographical location are taken as given and determined outside the model, while education, occupational type, sectoral composition, and earnings are determined within the model. These models are set up sequentially, so that changes in education have an impact on sectoral and activity choice (Figure 10). All of these, in turn have an impact on earnings.

This paper contributes with an innovative extension of the decomposition methodology implemented in the literature (Bourguignon, Ferreira and Lustig (2005), Bourguignon, Ferreira and Leite (2008) and Inchauste et al. (2014)) tailored for the Sri Lanka case. In particular, as shown in Figure 10, it models the farm sector at the individual level allowing individuals to move in and out of this sector. The decomposition approach is divided into two major steps: the estimation and the decomposition, which are discussed, in turn, below.

4.1. Estimation

First of all, the method estimates for each year a set of models to simulate the educational choice, the choice of employment sector and activity, as well as household income and consumption. The parameter estimates of each of these models are used to simulate the education, employment and activity structure of the

[7] Similar analysis was done using the median of each decile, with similar results. See Table **2**

population in 2012/13 using 2002 data and vice versa. The ability to do this is needed later to perform the decompositions. These models are discussed in turn.

4.1.1. Educational Choice

First, the allocation of individuals across educational levels is estimated with a standard multinomial logit model as a function of age, gender, area, and region. This is done for all working-age individuals following a Roy (1951) model of choice where individuals choose their level of education in order to maximize their utility. The allocation of individuals across levels of education is estimated with a multinomial logit model (McFadden 1974a, 1974b), specified as follows:

$$I_{hi}^{s} = 1 \text{ if } Z_{hi}\,\Psi^{s} + v_i^{s} > Max\left(0, Z_{hi}\,\Psi^{j} + v_i^{j}\right), j = 1, \dots, J, \forall j \neq s \qquad (9)$$
$$I_{hi}^{s} = 0 \text{ for all } s = 1, \dots, J \text{ if } Z_{hi}\,\Psi^{s} + v_i^{s} \leq 0 \text{ for all } s = 1, \dots, J$$

where Z_{hi} is a vector of characteristics specific to individual i and household h, Ψ^{s} are vectors of coefficients for educational levels j, and v_i^{s} are random variables identically and independently distributed across individuals and activities according to the law of extreme values. Within a discrete utility-maximizing framework, $Z_{hi}\,\Psi^{s} + v_i^{s}$ is interpreted as the utility associated with educational level s, with v_i^{s} being the unobserved utility determinants of educational level s and the utility of no education being arbitrarily set to 0.

We estimate the conditional distributions of levels of education for each survey year based on age group, gender, region, area, and ethnicity. This is estimated separately for household heads and other members within the working age population. Table A3.1 reports the results of these estimates for heads of household and other household members for 2002 and 2012/13. Despite relatively low R squares, simulations using these regressions do a fairly good job in replicating the educational structure of the workforce in 2012/13 using 2002 data and 2012/13 coefficients (Table A3.4).

4.1.2. Choice of Sector and Activity

The second element in the model is the allocation of individuals across activities. In particular, following Roy (1951), individuals choose the sector and type of activity they are engaged in to maximize their utility. As above, this is estimated with a multinomial logit, where the choice of activity j={salaried nonfarm, salaried farm, nonfarm self-employed, farm self-employed, not employed} is modeled as a function of age, gender, ethnicity, area, region, educational attainment, marital status, the number of young children. Tables A3.2 report the results of these estimates for heads of household and other household members for 2002 and 2012/13. Again, despite relatively low R squares, the simulations using these regressions do a fairly good job in replicating the activity structure of the workforce in 2012/13 using 2002 data and 2012/13 coefficients (Table A3.4). Note that since the choice of sector and activity depend on the level of education of individuals, any simulated change in education will imply a change in the activity composition of the workforce.

4.1.3. Household Income

The third step is to estimate household income using individual wage equations for salaried workers, and household net revenue functions for households with self-employed workers. Total household income can be written as:

$$Y_h = \left[y_h^{NFw} + y_h^{Fw} + \pi_h^{NFse} + \pi_h^{Fse} + \pi_h^{Mse} + y_h^{NL}\right] \quad (10)$$

where Y_h is household income per capita, y_h^{NFw} and y_h^{Fw} are total incomes from household salaried nonfarm and farm work, respectively, π_h^{NFse}, π_h^{Fse} and π_h^{Mse} are the nonfarm, farm, and mixed farm/nonfarm household net revenue. Finally, y_h^{NL} is household non-labor income.

Salaried employment is modeled at the individual level, where we model heterogeneity in individual earnings in each activity j by a log-linear Mincer model:

$$\log(y_{hi}^j) = QX_{hi}\,\Omega^j + \varepsilon_{hi}^j \quad (11)$$

for $i = 1, \ldots, n_h$ and for j={salaried nonfarm, salaried farm}. Q_{hi} is a vector of individual characteristics, which include those determined outside the model, such as gender, area, and region (which we call Z_{hi}), as well as those determined within the model, including education and activity (which we call X_{hi}). Ω^j is a vector of coefficients and ε_{hi}^j a random variable assumed to be distributed identically and independently across individuals, according to the standard normal law.[8]

Individual earnings equations for farm and non-farm workers are estimated separately for household heads and other members. The set of characteristics considered in the specification include age, gender, ethnicity, and education. In both cases, changes in income (y_{hi}^j) could be due to changes in observable endowments (X_{hi}) or changes in the returns to those endowments (Ω^j). However, they could also occur due to changes in unobservables that are captured in the residual term. In order to capture these changes, we rely on the assumption that the residual terms are drawn from a standard normal distribution.

Table A3.5 reports the results of these regressions for farm and nonfarm salaried household heads and other members. Note that there is an increase in the returns to education for non-farm heads between 2002 and 2012/13.

Self-employed income is modeled as the net revenue at the household level:

$$\log \pi_h^{se} = W_h\,\Omega^{se} + \varepsilon_h^{se} \quad (12)$$

where $W_h = (K_h, X_h)$ include endowments and household characteristics, including the maximum educational attainment in the household, household size, region and area, whether the head is female, ethnicity, and whether the household owns land. As before, Ω^{se} are vectors of coefficients and ε_h^{se} are random variables distributed as a standard normal.

Table A3.6 reports the results of these regressions for households with nonfarm self-employed incomes only, farm incomes only, and a mix of farm and nonfarm self-employed activities. Some of the results that are important to note are the large increase in the constant term for farm and mixed households. In addition, there was a decline in the returns to each additional household member in farm households between 2002 and 2012/13. There was a decline in the returns to education for farm households, and an increase in these returns for non-farm households. Finally, there was an increase in the returns to living away from Colombo between 2002 and 2012/13.

[8] Note that earnings may be underestimated to the extent that individuals select out of the labor force because their reservation wage is lower than their market wage (Heckman, 1979). Although this is a well-known bias, we do not attempt to correct for it given the complexity of the decompositions that follow.

Finally, the conditional distribution of non-labor income is estimated non-parametrically, both as a total as well as by their different components such as remittances, public transfers and other private transfers. For this purpose, we create cells of household heads with the same level of education, gender and region (urban-rural). Inside of each cell we create quantiles of non-labor income, to which we then ascribe the mean value of each non-labor income component in each quantile/cell in period s, to its counterpart in period t.

4.1.4. Consumption

The fourth step in the exercise involves linking consumption to income. Since household welfare is typically measured by consumption expenditures, we can write:

$$C_h = \frac{\vartheta_h}{n}\left[y_h^{NFw} + y_h^{Fw} + \pi_h^{NFse} + \pi_h^{Fse} + \pi_h^{Mse} + y_h^{NL}\right] \quad (13)$$

where C_h is household consumption per capita, n is the number of household members, and ϑ_h is the consumption-to-income ratio.

4.2. Decomposition

Equations (9) – (13) fully characterize the underlying reduced-form models that will allow for the micro-decompositions. Next, there are two important steps. The first is the construction of counterfactual distributions for changes in each element. In other words, coefficients from previous step regressions are used to simulate counterfactual distributions by changing one variable at a time and by observing the effect of each change on the distribution. For instance, since we estimate the returns to education in two periods, we can take the estimated parameters in the first period (t0) and evaluate the earnings equations with the levels of education of the second period (t1). This generates counterfactual earnings at the individual level, which can then be aggregated to get the corresponding household income using equation (10), which can then be used to get a counterfactual level of consumption according to (13), and therefore a counterfactual poverty rate. By changing one parameter at a time or one characteristic at a time, we obtain multiple counterfactual distributions and poverty rates. The methodology for estimating each counterfactual distribution and the associated counterfactual poverty rate is detailed in Annex 2.

Finally, the counterfactual poverty rates are compared to the observed poverty rates in order to quantify the impact of each element on poverty reduction. Since applying the first period parameters to the last period data will yield results that are different from applying the last period parameter to the first period data, the counterfactuals are calculated in both directions for every pair of years and the average counterfactual is reported. We estimate the contributions of each factor since the parameter estimates are obtained by changing one element at a time, while leaving all other elements constant. We call these the marginal contributions.

However, given that changes in multiple factors could have interaction effects, we also calculate the cumulative effect of these decompositions. To do so, we follow the methodology proposed by Bourguignon, Ferreira and Leite (2008) and begin by sequentially calculating the effects on poverty of changes in the characteristics of the population, starting from the characteristics that are most exogenous. We being with age and gender, followed by changes in geographical characteristics, and then calculate the impact of educational, occupational, and sectoral changes in the structure of the population.

It is important to point out some caveats in this approach. First, these decompositions do not allow identification of causal effects, but are nevertheless useful to focus attention on the elements that are

quantitatively more important in describing changes in poverty. Moreover, as recognized in the literature (Bourguignon, Ferreira and Lustig, 2005), these decompositions are path dependent, and as such, sensitive to the order in which the variables are simulated. The best-known way remedy to path dependence is to calculate the decomposition across all possible paths and then take the average. These are also known as the Shapley-Shorrocks estimates of each component. In this case, given the complexity of the model and multiplicity of paths, the estimation of the Shapley-Shorrocks estimates is computationally too demanding.

Finally, note that the counterfactual distributions on which these decompositions rely suffer from equilibrium inconsistency. Since we are modifying only one element at a time, the counterfactuals are not the result of an economic equilibrium, but rather a statistical exercise in which we assume that we can modify only one factor at a time and keep everything else constant.

5. Results

As mentioned above, we decompose how changes in endowments or characteristics as well as returns to those endowments contributed to poverty reduction. We find that most of the decline in poverty in Sri Lanka over the decade 2002-2012/13 was due to the increase in the returns to self-employed farm workers and salaried nonfarm workers. This was mostly driven by an increase in the real earnings of these workers, rather than an improvement in their human capital characteristics.

Table 4 presents the decomposition results when we take into account interactions between factors (cumulative contributions) and when we look at one factor at the time (marginal contributions). The top panel in Table 4 shows the percentage point change in poverty on account of each factor, while the bottom panel shows these changes as a share of total poverty reduction. Although the marginal results are slightly different in magnitude, the overall messages are the same. The largest contributors to poverty reduction were changes in the returns to salaried non-farm workers (contributing about 28 percent of the observed reduction in poverty), and changes in the returns to self-employed farm workers (contributing 20.4 percent of the observed reduction in poverty). Note that net changes in occupational status did not have a significant impact on poverty, possibly because reductions in poverty on account of movements from farm to nonfarm work were offset by lower employment, as seen earlier.

Given their relative importance, why did the returns to salaried non-farm and self-employed farm workers increase? In fact, the net effect of changes in returns shown in Table 4 reflect changes in prices that the labor market assigns to each characteristic. For example, the price the labor market assigns for each additional level of education, or for living in a particular region in the country all make up a part of this net effect.

Table **5** presents a break-up of these changes in returns. The results show that for salaried workers in non-farm activities, most of the increase in returns has to do with a large increase in the constant, which measures average real non-farm wages holding everything else constant. This increase could be due to either higher productivity, or higher relative prices, or a combination of both. The finding of sustained increase in real wages over the decade is in line with results from alternate surveys conducted by the Central Bank, which show a sharp increase in services and government real wages in from 2002 to 2013, and in industry real wages in 2013 (Figure 11**Error! Reference source not found.**). In addition to an average increase in real wages, returns to salaried non-farm workers increased due to an increase of returns to experience, which accounts for more than 2 percentage point reduction in poverty. Finally, note that returns to education actually declined for salaried non-farm workers, leading to an increase in poverty when everything else is held constant. In other words, higher levels of education obtained a lower wage premium in 2012/13 when compared to 2002.

The constant term is also the most important factor in explaining the change in returns for self-employed and salaried farm workers (see

Table 5). This is potentially linked to the growing average real wages in agriculture which, after a fall from 2002 to 2009, reached a 30 percent increase between 2009 and 2012, as found by an alternate survey conducted by the Central Bank (see Figure 11, panel A).

The problem with the finding of having most of the reduction in poverty being explained by the growth in average real wages is that it is very difficult to separate how much of this increase reflects improvements in productivity (measured as units produced per worker), and how much was simply due to a food price or commodity boom that led to the value of the same bundle of goods to grow. Indeed, value added per worker increased more in the services and industry sectors than in agriculture (Figure 12, panel A), while the intersectoral shift in employment away from agriculture and into industry and services also played a role in increasing value added per worker (Figure 12, panel B).[9] What the decomposition analysis seems to suggest is that this increase in value added per worker was reflected in higher real wages, which in turn was the main source of poverty reduction over the 2002-2012/13 period. However, to the extent that these measures do not reflect an increase in actual units of production per worker but rather an increase in the value of production, they may be easily reversible should commodity prices fall going forward.

In addition to changes in returns, other contributors to poverty reduction in Sri Lanka between 2002 and 2012/13 were demographic, and international remittances, each contributing 9.6 percent of the observed reduction in poverty. However, international remittances were increasingly more important in the 2009/10-2012/13 period than they were earlier in the decade, reflecting the fact that they made up an increasing share of incomes of the poor, even though it is still true that most remittances are concentrated in the top of the distribution (Figure 7). Similarly, the role of transfers in kind fell during the 2009/10-2012/13 period, possibly as a consequence of the end of hostilities and the closure of camps for internally displaced persons. Note that pensions contributed very marginally to poverty reduction (only about 1.6 percent of the observed reduction in poverty). This is no surprise given that most workers receiving pensions are public employees, who are generally not poor.

Most disappointingly, as mentioned earlier, Samurdhi/food stamps did not contribute to poverty reduction. Indeed, due to the downsizing of Samurdhi and its problems in targeting the poor (Figure 8, panel B), we find that if the Samurdhi program had remained unchanged from 2002 to 2012/13, poverty would have been 1.6 percentage points lower, leading to almost a 10 percent greater reduction in poverty (Table 4 and Figure 12). Most alarmingly, this was especially important for the extreme poor, those furthest away from the poverty line, as reflected in the poverty gap and the severity of poverty (Table 4). Indeed the decline in the severity of poverty would have been 25 percent greater had the real value of Samurdhi remained unchanged between 2002 and 2012/13.

Improvements in education of the workforce contributed about 9 percent to the decline in poverty, a higher contribution than those observed in Bangladesh (6 percent) and Peru (4 percent), but still less than in Thailand (14 percent) (see, Inchauste et al, 2013). However, the returns to education declined for all types of workers with the exception of self-employed non-farm workers, either because the supply of more educated workers outstripped the demand, or more likely because the demand for the kinds of workers that are available does not meet existing needs. The net impact of these opposing forces is a positive impact of higher levels of education on poverty.

Finally, while the decomposition approach shows that labor income was the most important contributor to poverty reduction, non-labor incomes were important contributors to the decline in the poverty gap and the

[9] The findings in Bangladesh led to additional work which found that exogenous price increases, and not necessarily an increase in labor productivity (measured in physical terms), allowed agricultural workers to experience an increase in wages (World Bank, 2013).

severity of poverty (Table 4). Non-labor income as a whole accounts for a total of 16 percent of the reduction in the poverty headcount and poverty gap, but accounts for 34 percent of the reduction in the severity of poverty.

The result that most of the decline in poverty was due to the increases in the returns to individual characteristics is similar to decompositions performed for other countries that have experienced important reductions in poverty. As shown in Table 4, the result on the returns to non-farm workers in Sri Lanka (accounting for 28 percent of the observed reduction in poverty) is comparable to estimates obtained for Bangladesh (26 percent) and Peru (22 percent).[10] Similarly, the results on the returns to self-employed farm workers in Sri Lanka (accounting for 20 percent of the observed reduction in poverty) is comparable to the estimates obtained for Peru (22 percent) and Thailand (25 percent), but lower than the estimates obtained for Bangladesh (78 percent).

6. Conclusions

This paper has sought to account for the contributions of different factors to the very sharp reduction in monetary poverty that occurred in Sri Lanka over the last decade. We find that poverty reduction was mainly due to growth rather than redistribution over the 2002 –2012/13 period. How was growth reflected in the distribution of welfare? Our results show that the most important contributor to poverty reduction observed in Sri Lanka over the last decade has been growth in labor income, in line with the results obtained for similar work undertaken for other countries.

One important finding is that labor income growth amounted to about 60 percent of the reduction in poverty in the South Asian countries: Bangladesh, Nepal and Sri Lanka (when measured by the US$ 1.25 a-day-poverty line). This contribution from labor income to poverty reduction is higher than what was observed for countries in Latin America, Eastern Europe, and some of the East Asian counties. However, while employment growth contributed to poverty reduction in Bangladesh and Nepal, it did not do in Sri Lanka.

Although the observed increase in the education and experience of the workforce contributed to poverty reduction, most of the improvement in labor incomes of the poor was on account of higher returns to self-employed farm workers and salaried nonfarm workers. Increases in returns for self-employed farmers are accounted for by changes in the constant, pointing to higher real wages. To the extent that growth in real wages of self-employed farm workers has accounted for poverty reduction, it would be important to understand whether this was due to productivity increases (measured as units of production per worker), or if this is simply a result of higher relative commodity prices, which could just as easily fall over time, thus reversing their impact on the poor.

What the decomposition analysis seems to suggest is that observed increases in value added per worker trickled down as higher real wages, which in turn was the main source of poverty reduction over the 2002-2012/13 period. However, if actual units of production per worker did not increase, these may be easily reversed should commodity prices fall over the medium to long term.

Finally, we find that increases in non-labor income were important contributors to poverty reduction, but their combined effect was somewhat smaller than the contribution of the increase in earnings. In particular, the results show a relatively small contribution of remittances to poverty reduction, as most remittances benefit higher income households. Nevertheless, non-labor income components, particularly private

[10] Note that the modeling approach for Bangladesh, Peru and Thailand was slightly different. See Inchauste et al (2013)

transfers, had a strong effect on reducing the gap and the severity of poverty: although they are not strong enough to lift the poor above the poverty line, remittances and domestic transfers did have an impact in closing the poverty shortfalls and reducing inequality among the poor. Finally, we find that the decline in the real value of the Samurdhi/food stamp program and its poor targeting actually worked against poverty reduction.

References

Azevedo, J., Inchauste, G. Olivieri, S., Saavedra, J., and H. Winkler. 2013. "Is labor income responsible for poverty reduction? A decomposition approach" World Bank Policy Research Working Paper No. 6414.

Barros, Ricardo Paes, Mirela de Carvalho, Samuel Franco, and Rosane Mendoça. 2006. "Uma Análise das Principais Causas da Queda Recente na Desigualdade de Renda Brasileira." In: Revista Econômica 8 (1): 117–147. Rio de Janeiro: Universidade Federal Fluminense. http://www.uff.br/revistaeconomica/V8N1/RICARDO.PDF

Blinder, Alan S. 1973. "Wage Discrimination: Reduced Form and Structural Estimates." The Journal of Human Resources 8 (4): 436–55.

Bourguignon, François, Francisco H. G. Ferreira and Nora Lustig. 2005. The Microeconomics of Income Distribution Dynamics in East Asia and Latin America. Washington, DC: World Bank.

Bourguignon, François, Francisco H. G. Ferreira, and Phillippe G. Leite. 2008. "Beyond Oaxaca-Blinder: Accounting for Differences in Household Income Distributions." Journal of Economic Inequality 6 (2): 117–48.

Central Bank of Sri Lanka. 2007Annual Report. Available at: http://www.cbsl.gov.lk/pics_n_docs/10_pub/_docs/efr/annual_report/Ar2007/content.htm

Central Bank of Sri Lanka. 2008Annual Report. Available at: http://www.cbsl.gov.lk/htm/english/10_pub/p_1.html

Central Bank of Sri Lanka. 2012 Annual Report. Available at: http://www.cbsl.gov.lk/htm/english/10_pub/p_1.html

Datt, Gaurav, and Martin Ravallion. 1992. Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s. Journal of Development Economics, 38: 275–296.

Essama-Nssah, B. 2012. "Identification of Sources of Variation in Poverty Outcomes", World Bank Policy Research Working Papers, No. 5954.

Ferreira, Francisco H. G. 2012. "Distributions in Motion: Economic Growth, Inequality, and Poverty Dynamics." In The Oxford Handbook of the Economics of Poverty, edited by Philip N. Jefferson, 427–62. New York: Oxford University Press.

Fortin, Nicole, Thomas Lemieux, and Sergio Firpo. 2011. "Decomposition Methods in Economics." In Handbook of Labor Economics, Vol. 4A, edited by Ashenfelter Orley and Card David, 1–102. Amsterdam: North-Holland.

Heckman, James J. 1979. "Sample Selection Bias as a Specification Error." Econometrica 47 (1): 153–61.

Inchauste, G. Olivieri, S., Saavedra, J., and H. Winkler. 2013. "What is Behind the Decline in Poverty Since 2000? Evidence from Bangladesh, Peru and Thailand" World Bank Policy Research Working Paper No. 6199.

Inchauste, G. Azevedo, J.P, Essama-Nssah, B., Olivieri, S., Van Nguyen, T., Saavedra-Chanduvi, .J and H. Winkler. 2014. "Understanding Changes in Poverty" Directions in Development, Poverty.

Juhn, Chinhui, Kevin M. Murphy, and Pierce Brooks. 1993. "Wage Inequality and the Rise of Returns to Skill." Journal of Political Economy 101 (3): 410–42.

Lanjouw, Luoto, and David McKenzie. 2011. "Using Repeated Cross-Sections to Explore Movements into and out of Poverty" World Bank Policy Research Working Paper No. 5550.

Oaxaca, Ronald L. 1973. "Male-Female Wage Differentials in Urban Labor Markets." International Economic Review 14 (3): 693–709.

Ravallion, Martin. 2001. "Growth, Inequality and Poverty: Looking Beyond Averages." World Development 29 (11): 1803–15.

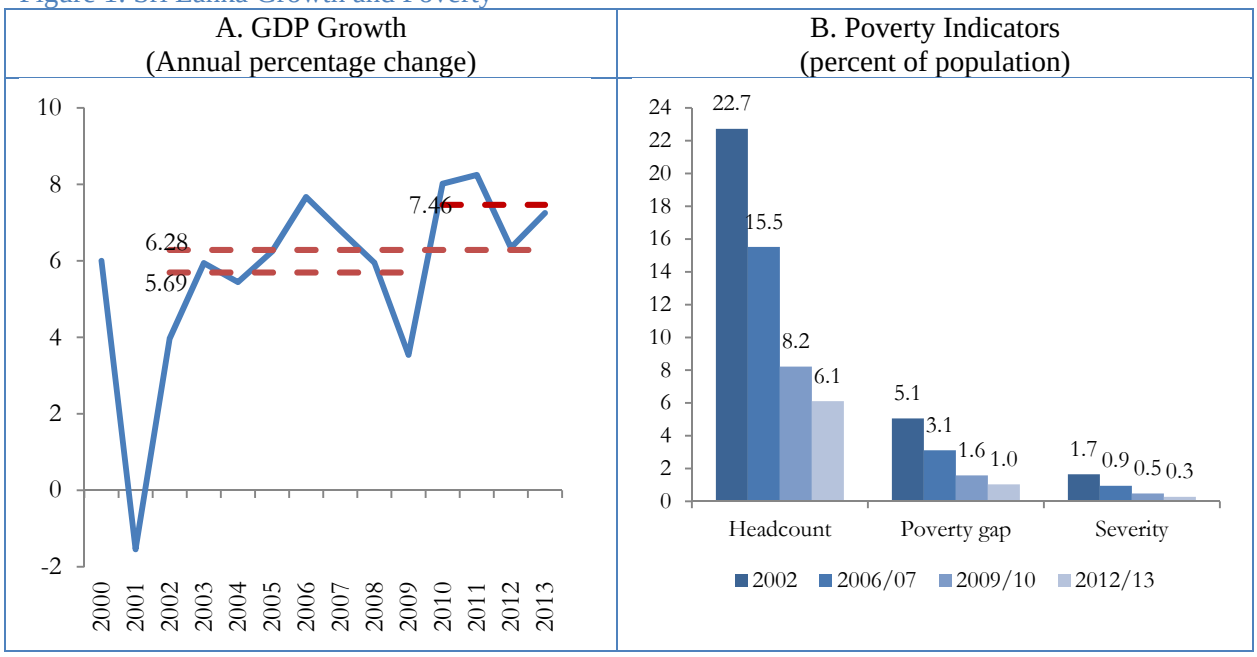
Roy, A. 1951. "Some Thoughts on the Distribution of Earnings." Oxford Economic Papers 3 (2): 135–46.

Shorrocks A.F. 1999. Decomposition Procedures for Distributional Analysis: A Unified Framework Based on Shapley Value. University of Essex and Institute for Fiscal Studies. Mimeo.

Shapley, L. 1953. “A value for n-person games.” In,Contributions to the Theory of Games, ed. H. W. Kuhn and A. W. Tucker 2. Princeton, N.J.: Princeton University Press.
Tinbergen, Jan. 1975. Income Differences: Recent Research. Amsterdam: North-Holland.
World Bank (2013),”Bangladesh-Poverty Assessment: Assessing a Decade of progress in Reducing Poverty 2000-2010” Bangladesh Development Series Paper No.31. The World Bank: Washington DC.

List of Figures

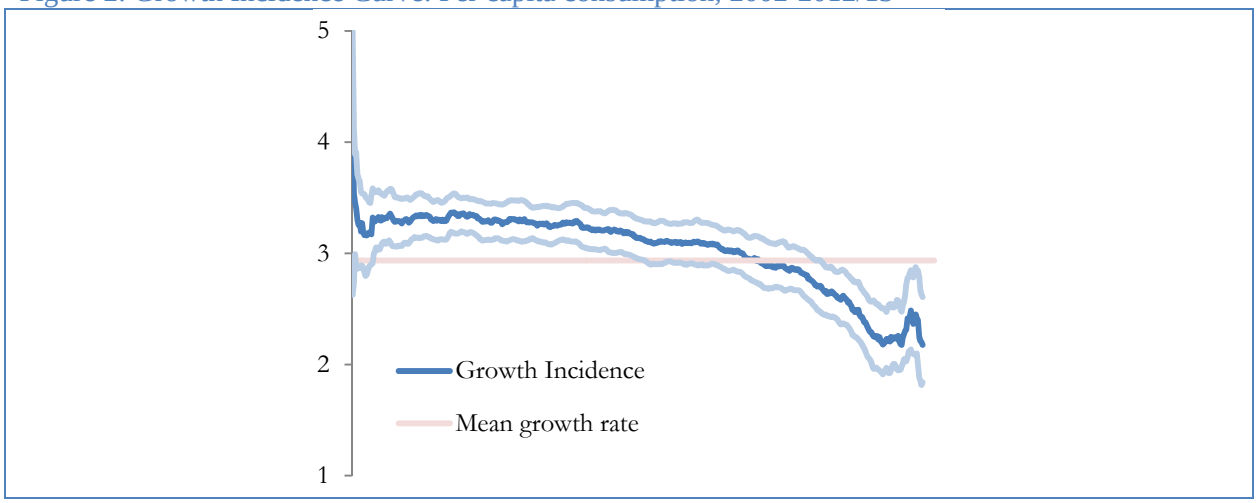
Figure 1: Sri Lanka Growth and Poverty



Source: World Development Indicators

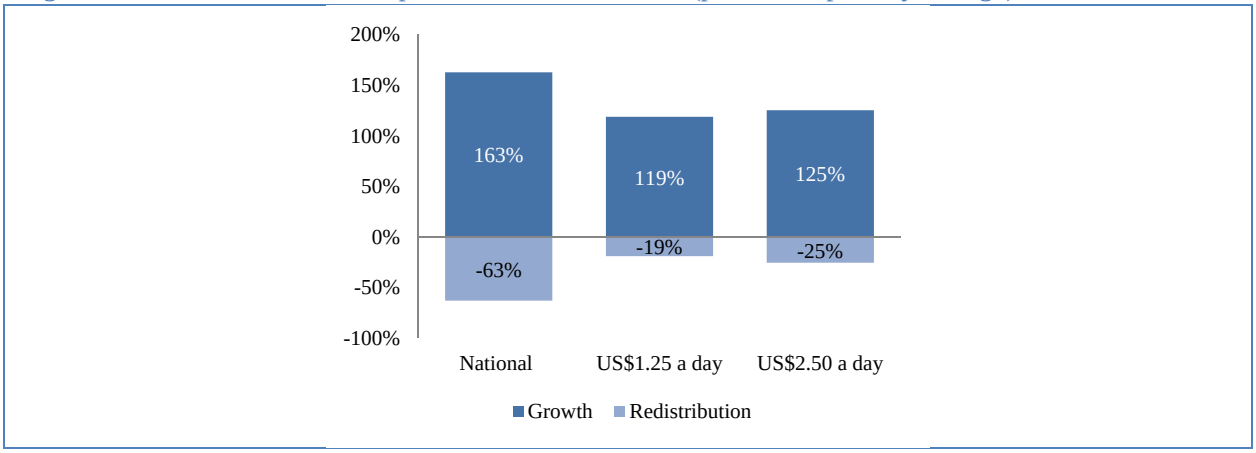
Source: Own estimates based on HIES 2002, 2006/7, 2009/10 and 2012/13.
Note: Comparable regions and comparable consumption aggregate

Figure 2: Growth Incidence Curve: Per capita consumption, 2002-2012/13



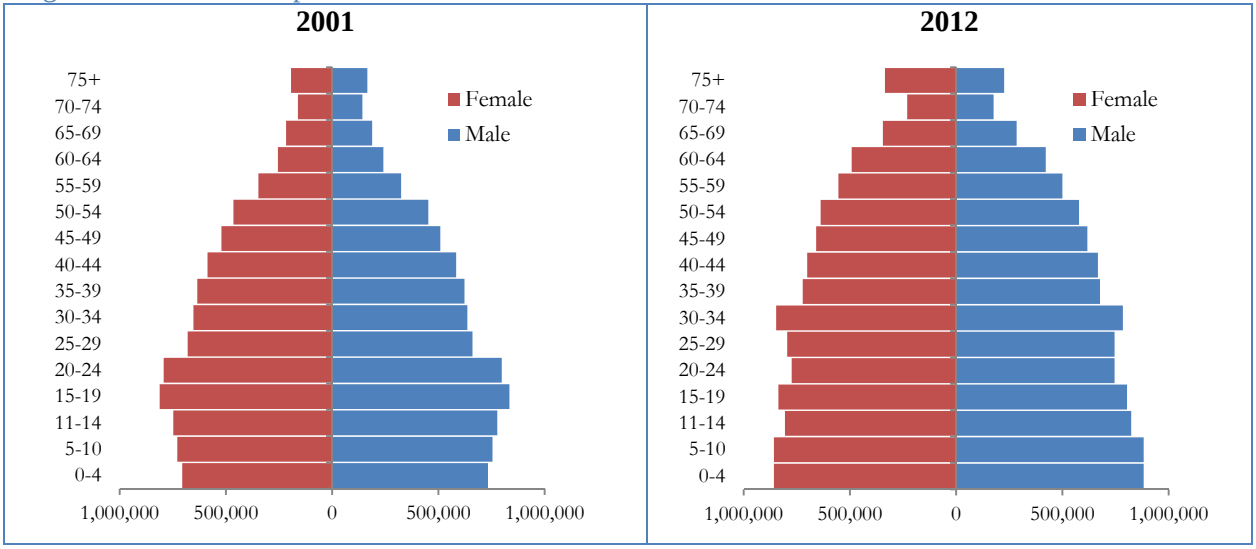
Source: Own estimates based on HIES 2002 and 2012/13.
Notes: Comparable regions and comparable consumption aggregate.

Figure 3: Datt-Ravallion Decompositions, 2002-2012/13 (percent of poverty change)



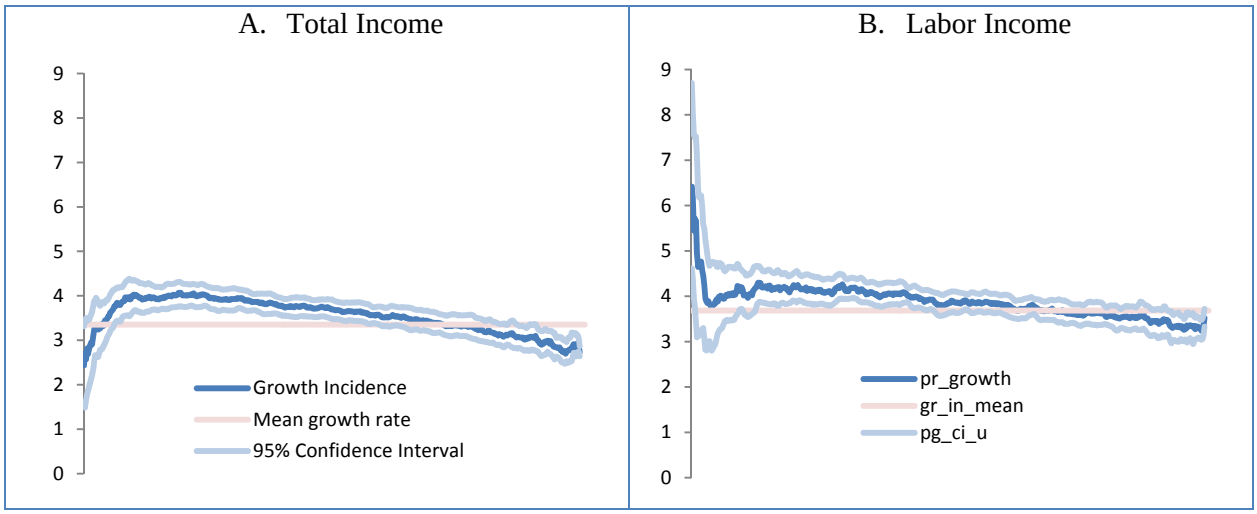
Source: Own estimates based on comparable regions in HIES 2002, 2009/10 and 2012/13.

Figure 4: Sri Lanka. Population Structure



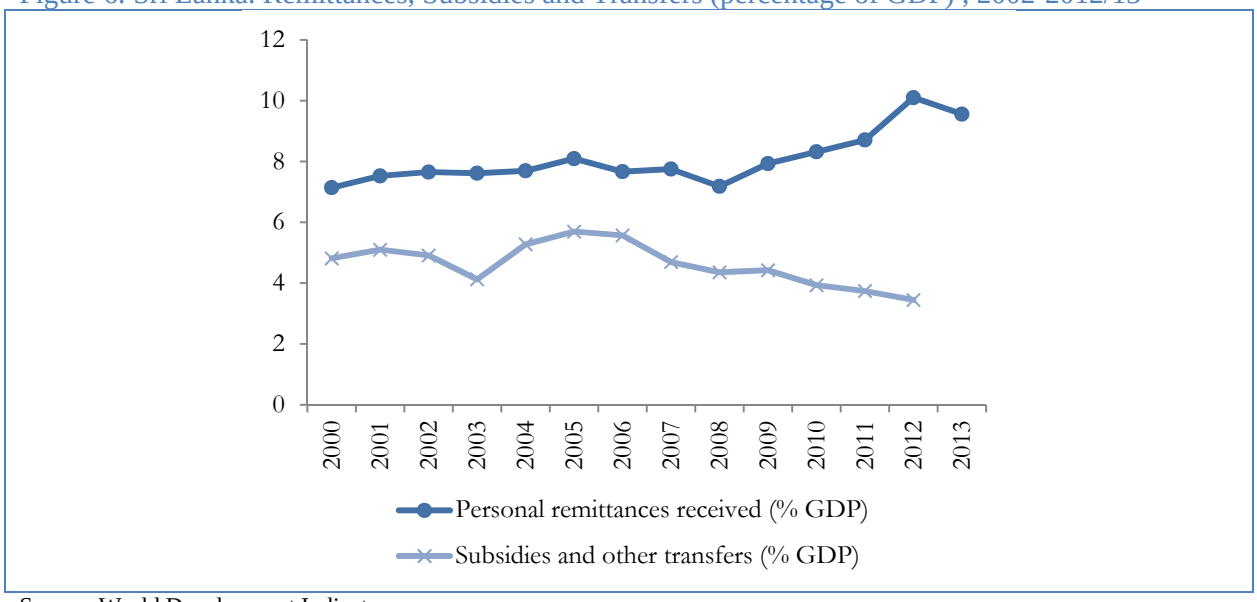
Source: Sri Lanka Department of Census and Statistics. Census of Population and Housing 2001 and 2012 provisional results based on 5% sample.
Note: 2001 and 2012 are the last two years of Census available.

Figure 5: Growth Incidence Curve: Income per capita, 2002-2012/13



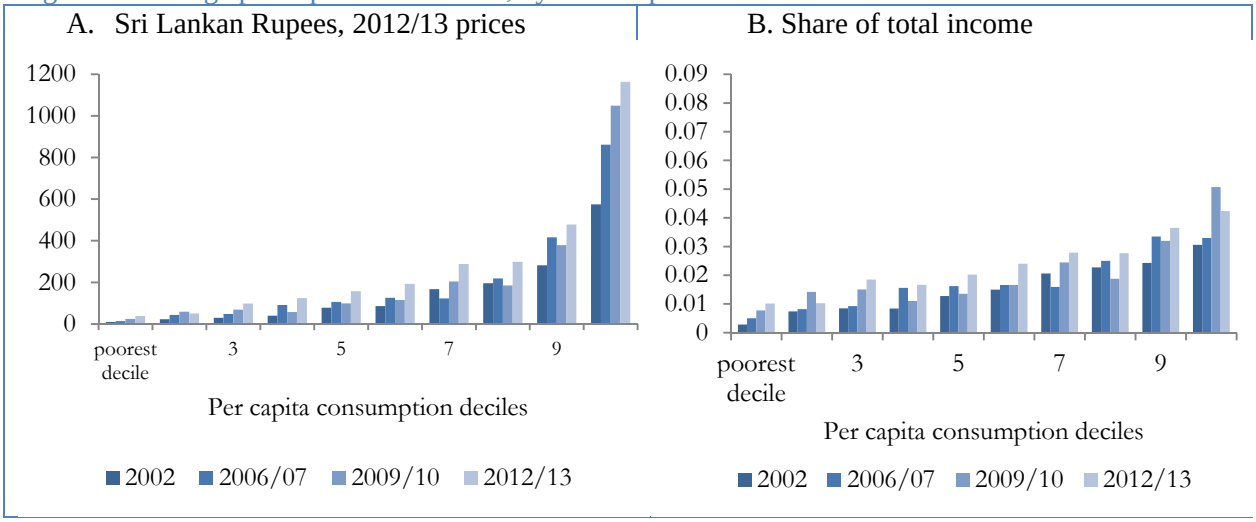
Source: Own estimates based on HIES 2002, 2009/10 and 2012/13, annualized growth.

Figure 6: Sri Lanka. Remittances, Subsidies and Transfers (percentage of GDP) , 2002-2012/13



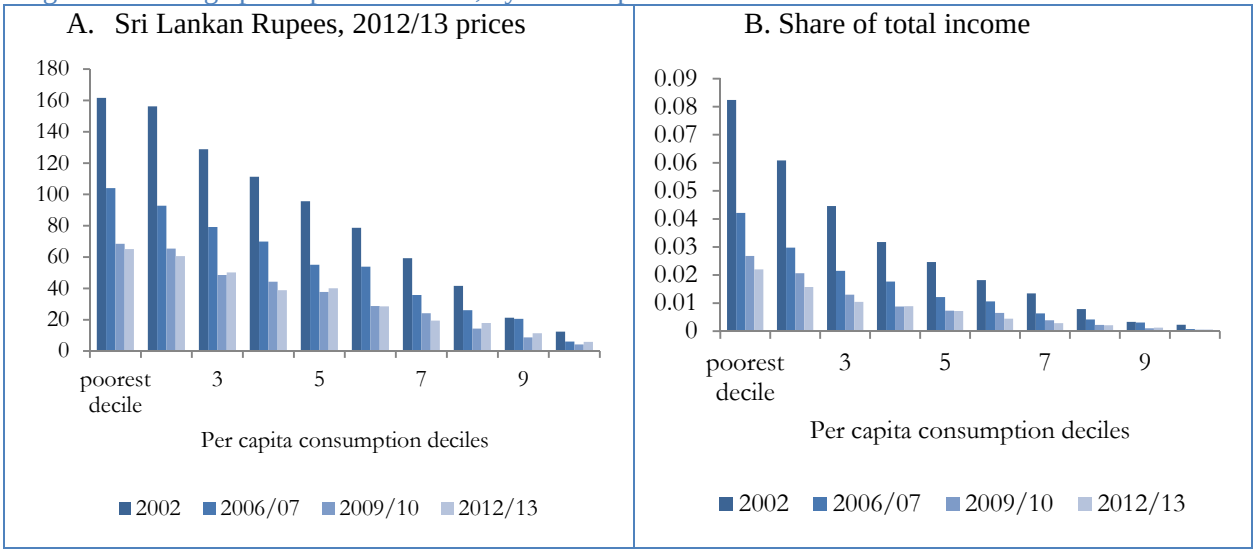
Source: World Development Indicators.

Figure 7: Average per capita Remittances, by consumption deciles



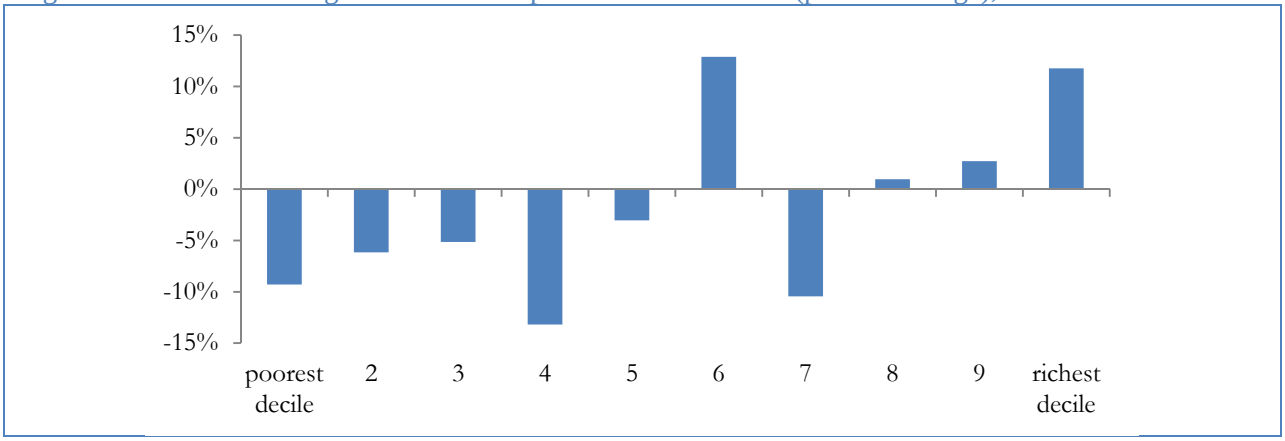
Source: Own estimates based on HIES

Figure 8: Average per capita Samurdhi, by consumption deciles



Source: Own estimates based on HIES
Note: Total net income after any tax and transfers

Figure 9: Sri Lanka. Change in the Consumption to Income Ratio (percent change), 2002-2012/13



Source: Own estimates based on HIES.

Figure 10: Micro-decomposition Modeling Approach for Sri Lanka

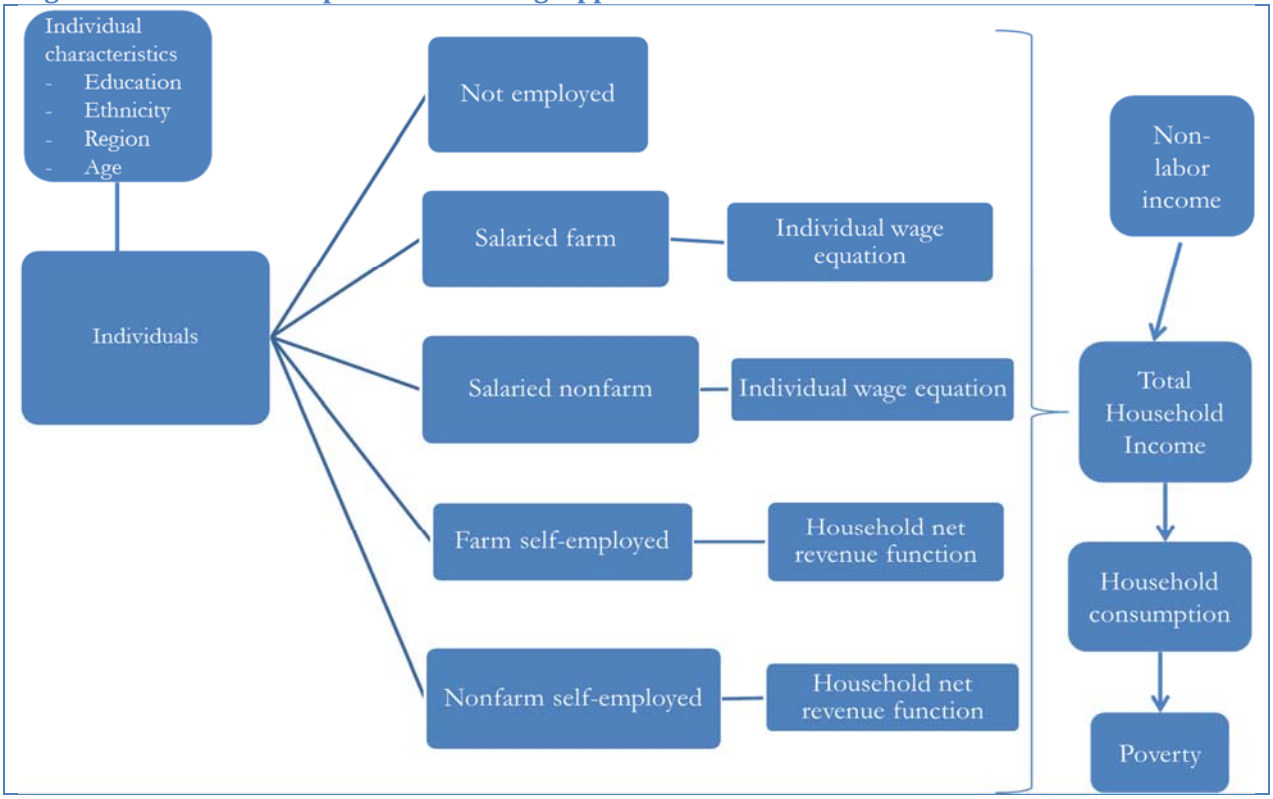
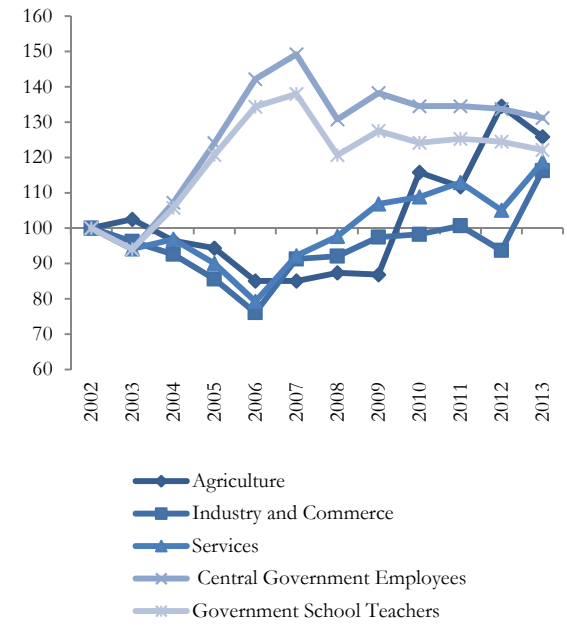
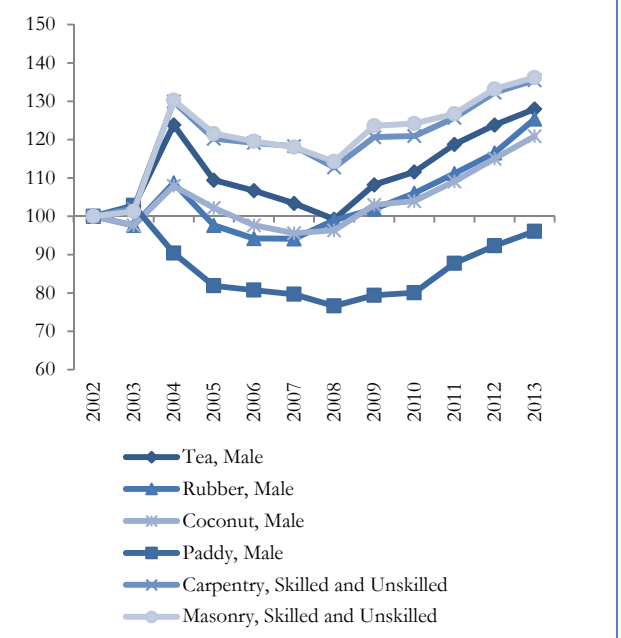


Figure 11: Formal and Informal Sector Wages (Index, 2002=100)

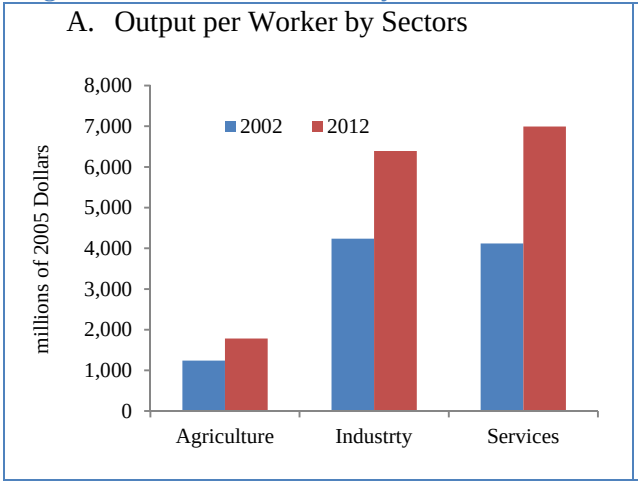


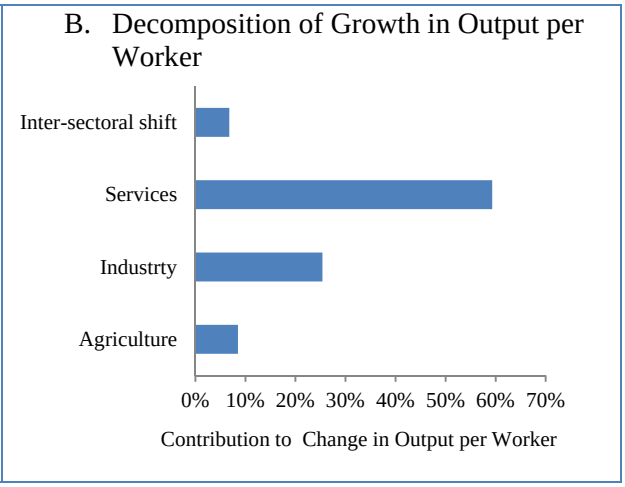
Source: Own construction based on Central Bank of Sri Lanka, Annual Reports: 2007, 2008, 2009, 2012, 2013. The Index numbers are calculated on fixed weights based on the numbers employed as at 31 December 1978. The wage rates used in the calculation of Index Numbers are minimum wages for different trades fixed by the Wages Boards



Source: Central Bank of Sri Lanka. Annual Report Statistical Appendix, 2007, 2008, 2009, 2012, 2013. Wage information represents payment in cash without meals. Based on monthly wages from 90 data collection centers under the CWDCS until 2009 and 102 data collection centers under the CWDCS beginning in 2010.

Figure 12: Sectoral Productivity in Sri Lanka, 2002-2012





Source: Own estimates using WDI, DCS Labor Force Surveys. Decompositions done using JoGGS decomposition method (see World Bank, 2010) and growth accounting framework following Duma, 2007.

List of Tables

Table 1: Sri Lanka. Characteristics of the Population and the Labor Force

	2002	2006/07	2009/10	2012/13	2002-2012/13
Urban	13.42	14.46	13.69	17.41	29.75
Rural	80.63	79.86	80.65	77.24	-4.20
Estate	5.95	5.68	5.66	5.35	-10.09
Average household size	4.19	4.06	3.98	3.86	-7.96
Share of children (age<15) in the household	22.94	22.23	21.99	21.82	-4.87
Share of adults (age15+) in the household	77.06	77.77	78.01	78.18	1.45
Share of elderly (age 65+) in the household	8.33	9.49	10.16	11.27	35.36
Gender (pop 15+)					
Female	51.74	52.87	53.48	54.11	4.59
Male	48.26	47.13	46.52	45.89	-4.92
Age structure (pop 15+)					
15-29	35.77	32.14	30.28	27.90	-22.00
30-49	37.59	37.02	37.01	36.99	-1.59
50-64	17.54	20.60	21.70	23.04	31.30
65+	9.09	10.25	11.00	12.07	32.76
Labor Force Participation rate (pop 15+)					
All	62.08	57.66	57.07	54.26	-12.59
Women	45.22	37.99	37.95	34.89	-22.85
Men	80.14	79.72	79.06	77.10	-3.80
Share of Employed Individuals (pop 15+)					
All	52.19	50.85	49.67	51.25	-1.80
Women	34.84	31.17	30.29	32.53	-6.63
Men	70.80	72.91	71.94	73.33	3.58
Share of Unemployed Individuals (pop 15+)					
All	9.88	6.82	7.42	3.01	-69.56
Women	10.38	6.82	7.67	2.37	-77.21
Men	9.35	6.81	7.12	3.77	-59.70
Education levels (pop 15+)					
None or Incomplete primary	17.27	16.45	14.01	13.18	-23.68
Complete primary	23.59	22.25	20.78	18.85	-20.12
Complete lower secondary	29.96	29.13	32.07	32.50	8.46
Complete senior secondary (O/L)	17.74	18.86	18.50	19.44	9.57
Complete collegiate	9.48	10.93	11.66	12.88	35.87
Post Secondary	1.96	2.32	2.65	3.13	60.05
Type of Settlement (pop 15+)					
Urban	13.78	14.66	13.88	17.79	29.10
Rural	80.44	79.96	80.78	77.27	-3.94
Estate	5.78	5.38	5.33	4.94	-14.59
Labor Relation (pop 15+)					
Salaried farm	6.5	5.4	4.7	4.8	-26.49
Salaried non farm	24.6	25.0	24.1	24.7	0.29
Self-employed farm	11.6	8.2	9.1	8.5	-26.73
Self-employed non farm	6.9	8.6	8.3	8.8	27.68
Unpaid	2.8	3.7	3.5	4.6	65.69
Not employed	47.8	49.2	50.3	48.8	1.97

Source: Own estimations based on HIES 2002, 2006, 2009 and 2012/13

Table 2: Incomes by deciles of per capita expenditure

EMPLOYEES: Non-farm income per capita

		2002			2012/13			% Total Growth 2002-2012/13	
		Mean	Std	Median	Mean	Std	Median	Mean	Median
Deciles of per capita expenditure (comparable consumption)	poorest decile	1870.7	1090.6	1692.1	3509.3	2030.3	3171.0	0.9	0.9
	2	2414.8	1220.3	2221.1	4093.4	2885.5	3601.4	0.7	0.6
	3	2755.1	1736.5	2476.3	4706.8	2646.3	4329.2	0.7	0.7
	4	3198.6	1723.5	2910.4	5186.7	3639.0	4658.0	0.6	0.6
	5	3591.2	1883.7	3340.5	5520.0	3387.3	4957.0	0.5	0.5
	6	4045.5	2139.6	3712.3	6109.3	4028.9	5258.3	0.5	0.4
	7	5000.9	3012.3	4421.3	6702.0	3704.8	6020.4	0.3	0.4
	8	5788.7	3795.7	4998.3	7967.6	5594.2	6914.5	0.4	0.4
	9	7102.6	4355.4	6052.2	9740.4	6084.0	8424.6	0.4	0.4
	richest decile	11645.2	10647.0	9354.2	16634.5	14611.0	13354.4	0.4	0.4

Source: Own estimates using HIES 2002 and 2012/13.

SELF-EMPLOYED: Farm income per capita

		2002			2012/13			% Total Growth 2002-2012/13	
		Mean	Std	Median	Mean	Std	Median	Mean	Median
Deciles of per capita expenditure (comparable consumption)	poorest decile	611.3	1578.0	225.0	2416.9	7902.1	942.7	3.0	3.2
	2	912.4	2206.3	407.1	2599.1	5567.9	1100.4	1.8	1.7
	3	1082.2	2076.8	540.2	2713.4	5617.5	1058.4	1.5	1.0
	4	1230.9	2321.3	552.7	4353.6	10768.1	1604.4	2.5	1.9
	5	1696.7	4195.1	688.2	4824.2	14241.9	1444.9	1.8	1.1
	6	1619.0	2821.1	786.3	3797.3	8277.2	1413.1	1.3	0.8
	7	1916.0	4247.7	764.1	4470.3	10219.6	1654.5	1.3	1.2
	8	1701.9	2929.8	649.8	6195.6	41473.3	1867.4	2.6	1.9
	9	2669.0	5947.6	829.1	6447.4	18983.0	1789.7	1.4	1.2
	richest decile	4549.0	26316.6	1248.9	13477.1	45274.0	2950.8	2.0	1.4

Source: Own estimates using HIES 2002 and 2012/13.

TRANSFERS IN-KIND per capita

		2002			2012/13			% Total Growth 2002-2012/13	
		Mean	Std	Median	Mean	Std	Median	Mean	Median
Deciles of per capita expenditure (comparable	poorest decile	412.0	682.0	205.7	571.5	371.4	495.7	0.4	1.4
	2	513.3	817.3	282.9	758.2	438.6	687.0	0.5	1.4
	3	542.8	766.8	331.6	916.9	555.6	832.1	0.7	1.5
	4	626.8	798.5	420.4	1082.1	604.8	992.2	0.7	1.4
	5	827.7	1131.1	525.3	1232.6	728.0	1130.7	0.5	1.2
	6	901.1	1156.1	618.8	1397.7	834.4	1287.7	0.6	1.1
	7	1115.7	1398.5	821.9	1698.1	972.9	1583.4	0.5	0.9
	8	1416.1	1822.8	1116.9	2054.3	1291.9	1858.0	0.5	0.7
	9	1919.7	3340.7	1502.1	2642.5	1746.1	2329.9	0.4	0.6
	richest decile	4469.3	7369.0	3004.2	4990.5	5690.3	3723.8	0.1	0.2

Source: Own estimates using HIES 2002 and 2012/13.

EMPLOYEES: Farm income per capita

		2002			2012/13			% Total Growth 2002-2012/13	
		Mean	Std	Median	Mean	Std	Median	Mean	Median
Deciles of per capita expenditure (comparable consumption aggregate)	poorest decile	1850.3	1134.1	1658.2	3220.2	1853.2	2950.1	0.7	0.8
	2	2191.9	1416.1	1998.2	3617.0	2014.9	3361.4	0.7	0.7
	3	2519.1	1402.9	2338.2	4289.9	3818.5	3603.8	0.7	0.5
	4	2912.2	1755.9	2572.2	4277.9	2457.1	3668.1	0.5	0.4
	5	3172.8	1835.9	2807.0	4612.1	2784.0	4184.9	0.5	0.5
	6	3462.4	2164.0	2893.8	5332.3	4125.1	4589.5	0.5	0.6
	7	3968.9	2439.6	3518.2	5559.7	3362.3	5175.6	0.4	0.5
	8	4406.3	2691.6	3752.9	6138.6	3590.1	5428.3	0.4	0.4
	9	6095.1	4811.4	5116.8	8006.0	6660.0	6205.7	0.3	0.2
	richest decile	8090.8	6434.5	6754.9	11070.7	9939.9	8658.4	0.4	0.3

Source: Own estimates using HIES 2002 and 2012/13.

Table 3: Sri Lanka. Characteristics of the Employed Population

	2002	2006/07	2009/10	2012/13	% Change 2002-2012/13
Labor relation					
Salaried farm	12.4	10.6	9.6	9.3	-25.1
Salaried nonfarm	47.1	49.2	48.6	48.1	2.1
Self-employed farm	22.2	16.2	18.3	16.5	-25.4
Self-employed nonfarm	13.2	16.8	16.7	17.1	30.0
Unpaid	5.3	7.4	7.0	8.9	68.7
Economic Sector					
Agriculture	39.8	32.2	33.2	32.6	-18.3
Industry	19.5	24.8	23.2	25.6	31.4
Services	40.7	42.9	43.7	41.8	2.8
Type of Settlement					
Urban	11.6	12.9	12.1	15.9	37.3
Rural	81.5	80.9	81.5	78.4	-3.7
Estate	7.0	6.3	6.4	5.7	-18.4
Ethnicity					
Sinhala	84.9	85.3	84.4	85.6	0.7
Sri Lanka Tamil	4.5	4.4	5.0	3.5	-21.3
Indian Tamil	5.3	5.3	4.6	5.2	-1.9
Sri Lanka Moors	4.9	4.8	5.7	5.3	9.3
Other ethnicities	0.4	0.3	0.3	0.3	-8.9
Age structure					
15-29	25.7	23.5	21.0	19.6	-24.0
30-49	49.5	48.4	48.9	48.3	-2.3
50-64	19.6	22.8	24.6	26.0	32.6
65+	5.1	5.3	5.5	6.1	18.0
Gender					
Female	34.5	32.4	32.6	34.3	-0.6
Male	65.5	67.6	67.4	65.7	0.3
Districts					
Colombo	11.9	12.6	12.4	12.3	2.9
Gampaha	12.9	12.9	13.0	12.4	-4.0
Kalutara	6.4	6.6	6.5	7.0	9.8
Kandy	7.0	7.0	6.9	7.0	0.1
Matale	3.0	2.7	2.8	2.8	-6.7
Nuwara Eliya	4.7	4.6	4.4	4.2	-11.6
Galle	5.8	6.0	5.8	6.0	2.7
Matara	4.7	4.8	4.5	4.6	-2.3
Hambantota	3.0	3.1	3.3	3.5	17.9
Kurunegala	9.8	9.7	9.2	9.6	-1.8
Puttalam	3.9	4.3	4.3	4.3	8.7
Anuradhapura	5.4	5.2	5.3	5.1	-5.0
Polonnaruwa	1.8	2.1	2.1	2.0	13.2
Badulla	5.9	4.9	5.1	4.8	-18.6
Monaragala	2.6	2.5	2.7	2.6	-0.3
Ratnapura	6.5	6.4	6.9	7.0	7.4
Kegalle	4.6	4.8	5.0	4.8	4.7

Source: Own estimates using HIES 2002, 2006/07, 2009/10 and 2012/13.

Table 4: Contributions to Poverty Reduction, 2002-2012/13 (share of poverty reduction)

	Cumulative Effects			Marginal Effects		
	Headcount	Gap	Severity	Headcount	Gap	Severity
Percentage Point Change						
Age, gender, ethnicity, region	-1.59	-0.41	-0.14	-1.59	-0.41	-0.14
Education	-1.45	-0.37	-0.14	-1.69	-0.43	-0.15
Occupation	-0.11	0.16	0.16	-0.12	0.25	0.22
Returns Salaried farm	-1.87	-0.61	-0.25	-2.54	-0.72	-0.26
Returns Salaried non- farm	-4.64	-1.13	-0.40	-5.72	-1.37	-0.47
Returns Self-employed farm	-3.39	-1.07	-0.49	-4.01	-1.15	-0.48
Returns Self-employed non- farm	-0.65	-0.13	-0.05	-0.76	-0.14	-0.04
Returns Self-employed mix	-0.21	-0.06	-0.03	-0.27	-0.05	-0.02
Residuals	0.11	0.05	0.03	0.47	0.05	0.01
Non Labor	-2.61	-0.88	-0.46			
-Pension	*-0.26*	*-0.01*	*0.02*	*-1.00*	*-0.15*	*-0.02*
-Relief	*0.36*	*0.05*	*0.00*	*-0.03*	*0.03*	*0.01*
-Rents	*-0.38*	*-0.12*	*-0.06*	*-0.51*	*-0.12*	*-0.04*
-Samur	*1.59*	*0.62*	*0.34*	*1.30*	*0.55*	*0.28*
-Dividends	*-1.25*	*-0.51*	*-0.27*	*0.04*	*0.01*	*0.01*
-Other	*0.82*	*0.46*	*0.29*	*0.03*	*0.20*	*0.19*
-International remittances	*-1.59*	*-0.76*	*-0.47*	*-1.12*	*-0.28*	*-0.13*
-Domestic transfers	*-0.77*	*-0.34*	*-0.22*	*-2.15*	*-0.67*	*-0.33*
-Transfers in kind	*-1.13*	*-0.27*	*-0.09*	*-3.70*	*-0.61*	*-0.09*
Consumption- Income ratio	3.36	0.69	0.13	-1.51	0.07	0.22
Total Explained	-13.05	-3.77	-1.63	-24.91	-4.95	-1.22
Total Change	-16.63	-3.98	-1.34	-16.63	-3.98	-1.34
Unexplained	-3.58	-0.21	0.29	8.28	0.96	-0.12
Percent of Total Change in Poverty Indicator						
Age, gender, ethnicity, region	9.6%	10.3%	10.3%	9.6%	10.3%	10.3%
Education	8.7%	9.2%	10.3%	10.2%	10.7%	11.5%
Occupation	0.7%	-4.1%	-11.6%	0.7%	-6.3%	-16.7%
Returns Salaried farm	11.2%	15.4%	18.7%	15.3%	18.2%	19.7%
Returns Salaried non- farm	27.9%	28.4%	29.9%	34.4%	34.5%	34.7%
Returns Self-employed farm	20.4%	27.0%	36.6%	24.1%	28.9%	35.7%
Returns Self-employed non- farm	3.9%	3.3%	3.5%	4.6%	3.5%	2.9%
Returns Self-employed mix	1.2%	1.5%	1.9%	1.6%	1.4%	1.3%
Residuals	-0.7%	-1.2%	-2.2%	-2.8%	-1.4%	-0.9%
Non Labor	15.7%	22.2%	34.2%			
-Pensions	*1.6%*	*0.3%*	*-1.2%*	*6.0%*	*3.8%*	*1.4%*
-Relief	*-2.2%*	*-1.3%*	*-0.3%*	*0.2%*	*-0.7%*	*-1.0%*
-Rents	*2.3%*	*2.9%*	*4.3%*	*3.1%*	*2.9%*	*3.1%*
-Samur	*-9.6%*	*-15.5%*	*-25.4%*	*-7.8%*	*-13.8%*	*-20.9%*
-Dividends	*7.5%*	*12.8%*	*20.3%*	*-0.2%*	*-0.2%*	*-0.8%*
-Other	*-4.9%*	*-11.5%*	*-21.8%*	*-0.2%*	*-5.1%*	*-14.1%*
-International remittances	*9.6%*	*19.2%*	*35.0%*	*6.8%*	*7.1%*	*9.5%*
-Domestic transfers	*4.7%*	*8.5%*	*16.3%*	*12.9%*	*16.7%*	*24.9%*
-Transfers in kind	*6.8%*	*6.8%*	*7.0%*	*22.3%*	*15.4%*	*7.0%*
Consumption- Income ratio	-20.2%	-17.2%	-9.7%	9.1%	-1.7%	-16.5%
Total Explained	78.5%	94.7%	122.0%	149.8%	124.2%	91.0%
Total Change	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Unexplained	21.5%	5.3%	-22.0%	-49.8%	-24.2%	9.0%

Source: Own estimations based on HIES 2002-2012/13

Table 5: Marginal Contributions to Poverty Reduction: Changes in Returns, 2002-2012/13

		Percentage Points Change			Percent of Total Change		
		Head Count	Gap	Severity	Head Count	Gap	Severity
Salaried Workers	**Returns Salaried Farm**						
	-Education	0.29	0.06	0.02	-1.7%	-1.6%	-1.7%
	-Experience	1.26	0.45	0.20	-7.6%	-11.4%	-14.9%
	-Gender	0.21	0.05	0.02	-1.3%	-1.3%	-1.4%
	-Area	0.02	0.00	0.00	-0.1%	-0.1%	0.0%
	-Region	-0.76	-0.22	-0.08	4.6%	5.4%	6.0%
	-Ethnicity	0.69	0.17	0.06	-4.1%	-4.2%	-4.7%
	-Others (constant)	-4.07	-1.13	-0.42	24.5%	28.4%	31.3%
	Returns Salaried Non-Farm						
	-Education	0.69	0.18	0.06	-4.2%	-4.4%	-4.3%
	-Experience	-2.38	-0.57	-0.20	14.3%	14.4%	14.9%
	-Gender	0.29	0.08	0.02	-1.7%	-1.9%	-1.8%
	-Area	0.00	0.00	0.00	0.0%	0.0%	0.0%
	-Region	-0.81	-0.21	-0.08	4.9%	5.2%	5.7%
	-Ethnicity	-0.01	0.00	0.00	0.1%	-0.1%	-0.1%
	-Others (constant)	-3.63	-0.86	-0.29	21.9%	21.6%	21.7%
Self-Employment	**Returns Self-employed Farm**						
	-Education	1.26	0.32	0.11	-7.6%	-8.1%	-8.2%
	-Experience	3.08	1.07	0.45	-18.5%	-26.8%	-33.8%
	-Gender	0.03	0.01	0.00	-0.2%	-0.2%	-0.2%
	-Area	-0.01	0.00	0.00	0.0%	-0.1%	-0.1%
	-Region	1.10	0.32	0.12	-6.6%	-8.1%	-9.3%
	-Ethnicity	-0.09	-0.02	-0.01	0.5%	0.5%	0.5%
	-Land	0.46	0.18	0.08	-2.8%	-4.6%	-6.1%
	-Household size	0.72	0.17	0.06	-4.3%	-4.2%	-4.2%
	-Others (constant)	-6.89	-2.42	-1.19	41.4%	60.7%	88.9%
	Returns Self-employed Non-Farm						
	-Education	-0.33	-0.06	-0.02	2.0%	1.6%	1.4%
	-Experience	0.35	0.08	0.03	-2.1%	-2.0%	-2.0%
	-Gender	-0.05	0.00	0.00	0.3%	0.1%	0.0%
	-Area	0.01	0.01	0.00	-0.1%	-0.1%	-0.2%
	-Region	-0.38	-0.06	-0.02	2.3%	1.4%	1.2%
	-Ethnicity	0.06	0.01	0.01	-0.3%	-0.4%	-0.4%
	-Land	0.00	0.00	0.00	0.0%	0.0%	0.0%
	-Household size	0.15	0.03	0.01	-0.9%	-0.9%	-0.9%
	-Others (constant)	-0.64	-0.13	-0.04	3.9%	3.4%	3.0%
	Returns Self-employed Mix						
	-Education	0.17	0.04	0.01	-1.0%	-1.1%	-1.0%
	-Experience	0.73	0.31	0.15	-4.4%	-7.7%	-11.1%
	-Gender	-0.04	0.00	0.00	0.2%	0.0%	-0.1%
	-Area	0.00	0.01	0.00	0.0%	-0.1%	-0.2%
	-Region	0.36	0.13	0.06	-2.2%	-3.2%	-4.3%
	-Ethnicity	-0.03	0.00	0.00	0.2%	0.1%	0.0%
	-Land	0.02	0.01	0.00	-0.1%	-0.3%	-0.3%
	-Household size	0.11	0.03	0.01	-0.7%	-0.7%	-0.7%
	-Others (constant)	-0.95	-0.34	-0.18	5.7%	8.6%	13.4%

Source: Own estimations based on HIES 2002-2012/13

Annex 1: Data

The Sri Lanka Household Income and Expenditure Survey (HIES) is conducted by the Department of Census and Statistics (DCS) under the National Household Sample Survey Program. The HIES is a year-long sample survey which is conducted in 12 consecutive monthly rounds and an island wide representative sample of equal size is enumerated in each monthly round to capture seasonal and regional variations of income, expenditure and consumption patterns. The HIES series which started in 1980 was conducted once in every five years until 2006/07 and thereafter, as rapidly changing economic conditions demanded far more frequent monitoring of income and expenditure patterns in the country, HIES is conducted once every three years. We use the HIES 2002, HIES 2009/10 and HIES 2012/13 rounds for this paper. Generally the HIES surveys a sample of 25,000 housing units throughout the country to facilitate the information be given at district level. A two stage stratified random sample design was used in the survey. Urban, Rural and Estate sectors of the district are the domains for stratification. The sample frame is the lists of buildings that were prepared for the Census of Population and Housing 2001.

Comparability of HIES 2002, HIES 2009/10 and HIES 2012/13:

Coverage

HIES 2002 was conducted during the period of January 2002 to December 2002 covering seven provinces excluding Northern and Eastern Provinces due to conflicts in those two provinces. Around 20,100 housing units were planned to survey and 16,924 households were completely responded. The HIES 2009/10 was planned to have a sample of 23,631 housing units which excluded Mannar, Kilinochchi and Mullaithivu districts due to massive mine clearance and resettlement activities existed in most of the areas. HIES 2009/10 and HIES 2012/13 were conducted during the period of twelve survey months from July of the first year to June of the second one. In HIES 2009/10 the Vavuniya district in the Northern province and the entire Eastern province survey was limited to 10 months starting from September 2009 to June 2010 and the Jaffna district was further delayed till December 2009. All together 19,958 households were completely enumerated. HIES 2012/13 is the first one to cover all 25 districts in the country, surveying 20,540 households.

Table A1.1: Missing districts in the Sri Lanka Household Income and Expenditure Survey

Province	District	2002	2006/07	2009/10
Western	Colombo			
	Gampaha			
	Kalutara			
Central	Kandy			
	Matale			
	Nuwara Eliya			
Southern	Galle			
	Matara			
	Hambantota			
Northern	Jaffna	missing	missing	
	Mannar	missing	missing	missing
	Vavuniya	missing	missing	
	Mullaitivu	missing	missing	missing
	Kilinochchi	missing	missing	missing
Eastern	Batiacaloa	missing		
	Ampara	missing		
	Trincomalee	missing	missing	
North-Western	Kurunegala			
	Puttalam			
North-Central	Anuradhapura			
	Polonnaruwa			
Uva	Badulla			
	Monaragala			
Sabaragamuwa	Ratnapura			
	Kegalle			

For the sake of comparison, only the seven provinces consisting of 17 districts covered in HIES 2002 are considered in the analysis.

Questionnaire

The survey schedule was designed to collect data at household level and separate schedules are used for each household identified according to the definition of the Household within the housing units selected for the survey. In HIES 2002, the survey schedule consists of three main sections, namely, *Demographic*, *Expenditure* and *Income* section. The demographic characteristics and usual activities of the inmates belonging to the household were reported in the demographic section of the schedule. The expenditure section has two sub sections to report food and non-food consumption data separately. Expenditure incurred by boarders and servants on their own decisions were recorded in a sub section under the expenditure section. The income section has seven sub sections categorized according to the main sources of income. HIES 2009/10 questionnaire further improved by introducing a *School Education* section for persons aged 5-19, a *Health* section, an *Inventory of durable goods* and household *Debts, Access to facilities, Housing Information, Agriculture holdings and Livestock.* Compared to HIES 2002 there are some changes in HIES 2009/10 and HIES 2012/13 questionnaire with regards sections focused in this paper such as demographic information, consumption and income and only comparable variables are used in this analysis, as explained in the following sections.

Consumption aggregate

For the sake of reaching the maximum comparability across years, in all analysis concerning the poverty decomposition, we modified the official consumption aggregate constructed by DCS, by excluding durables goods (codes 3300s), other expenses not strictly referable to consumption (such as insurance, or income taxes, codes 3400s) and other ad hoc and rarely incurred expenses (codes 3500s). Moreover, we excluded few items due to changes in the questionnaire (additional items and items for which the reference period was changed). Monthly temporal price differences over the survey period are not considered and only spatial price differences are adjusted as DCS did for the official consumption aggregate used to measure poverty.

The Poverty Line

The national poverty line in Sri Lanka has been set to 1,423 Rs in 2002, by using the Cost of Basic Needs approach based on 2030 Kilocalories per capita per day, and it has been then updated monthly using the Colombo Consumer Price Index (ccpi). It is worth noticing that the base year for computation of the ccpi has changed three times over the period 2002 – 2012/13. The initial poverty line of 1423 Rs in 2002 prices has been updated to 2006/07 prices for the official DCS poverty report by using the ccpi 1952-base, which led to a poverty line of 2,233 Rs in 2006/07 prices (DCS, 2008). In more recent publications, instead, the DCS has used for 2006/07 the poverty line of 2,142 Rs, obtained by inflating the 2002 poverty line with ccpi 2002-base. For the 2009/10 survey, the original poverty line has been updated by using the ccpi 2002-base, leading to a poverty line of 2,142 Rs in 2009/10 prices. Finally, the base year for ccpi calculation was changed from 2002 to 2006/07 since June 2011.11 To date (November 14th 2014), there is no official poverty line published for the entire survey year 2012/13. Nevertheless, by applying the twelve months (from July 2011 to June 2012) average of the ccpi 2006/07-base to poverty line as expressed in 2006/07 prices, we obtain 3,624 Rs, which we consider the official poverty line for 2012/13.

Table Table A1.2 summarizes the history of the official poverty lines, underlying the discrepancies due to the change in base year for the computation of the ccpi.

Table A1.2: Poverty Line, 2002-2014, Rs per person per month

Period	Official Line[12]	Base Year 1952	Base Year 2002	Base Year 2006/07
2002	1,423	-	-	-
2006/07	2,142	$1{,}423*\frac{\frac{1}{12}\sum_{i=July_{52}^{06}}^{Jun_{52}^{07}} ccpi_i}{\frac{1}{12}\sum_{i=Jan_{52}^{02}}^{Dec_{52}^{02}} ccpi_i} = 2{,}233$	$1{,}423*\frac{1}{12}\sum_{i=Jul_{02}^{06}}^{Jun_{02}^{07}} ccpi_i = 2{,}142$	-
2009/10	3,028	-	$1{,}423*\frac{1}{12}\sum_{i=Jul_{02}^{09}}^{Jun_{02}^{10}} ccpi_i = 3{,}028$	$2142*\frac{1}{12}\sum_{i=Jul_{0607}^{09}}^{Jun_{0607}^{10}} ccpi_i = 2{,}955$
2012/13	-	-	-	$2142*\frac{1}{12}\sum_{i=Jul_{0607}^{12}}^{Jun_{0607}^{13}} ccpi_i = 3{,}624$

Source: Official Line: 2002, 2006/07 and from 2013 Oct, http://www.statistics.gov.lk/poverty/monthly_poverty/index.htm; 2006/07 DCS (2011, p.1). Colombo Consumer Price Index (ccpi): http://www.statistics.gov.lk/page.asp?page=Inflation%20and%20Prices

[11] http://www.statistics.gov.lk/poverty/monthly_poverty/index.htm

[12] This is the official poverty line as published by the Department of Census and Statistics, Sri Lanka, the 7th October 2014. Note that for the poverty numbers published in the official report based on 2006/07 survey (http://www.statistics.gov.lk/poverty/PovertyIndicators.pdf), the poverty line used is 2,233 Rs, which is obtained by inflating 2001/02 poverty line to 2006/07 prices using the ccpi index 1952 base.

In all analysis concerning the poverty decomposition, we modified the poverty line in order to get the same poverty level in 2012/13 using the modified consumption aggregate. The modified poverty line is 3,480 Rs in 2012/13 prices.

For international comparison, the World Bank sets the poverty line to 1.25$, 2.50$ or 4.00$ (2005 Purchasing Power Parity terms) per day. In all figures where we show international comparisons, we used the international poverty lines expressed in Rupees by applying the ppp conversion factor for private consumption.13 Table A1.3 shows the conversion from Rupees to International 2005$ ppp.

Table A1.3: National and International Poverty Lines, Rupees 2012/13 prices and International $2005ppp

	Rupees 2012/13 Prices	International $ 2005ppp
National Poverty Line	3,624.44	1.50
International Poverty Line	3,028.88	1.25
	6,057.75	2.50
	9,692.40	4.00

Source: DCS and our elaboration for the National Poverty Line, our elaboration on *povcalnet* for the ppp conversion factor, which is 40.039 in 2005.

Employment data

Sri Lanka HIES uses the concept of usual status/usual activity to capture employment information without any particular reference period. As it was based on responses of the respondent and not further probed, it is observed some of the household members receiving labour income are recorded as not employed. This may be due to part time employees and since employment status in HIES depends on perception.

Since our analysis depends on consumption, employment and income, the employment status was edited and alternative concept is used. A person is treated as employed if reported as employed in demographic section or income from employment is greater than zero in the income section. Employment status was not exactly comparable in 2009/10 and 2012/13 surveys with 2002 survey as unpaid family workers were not separately identified in HIES 2002. Hence unpaid family workers are identify for HIES 2002 by considering employment and income data. A person is treated as unpaid worker in 2002 if the person is reported as employed in the demographic section and there is no income for that person in the income section.

Main industry of the employed person such as agriculture, manufacturing and service sectors are also not exactly comparable in 2002 and 2009/10 or 2012/13 surveys. In HIES 2002, industry of the wage income was separately recorded along with wage income and income from self-employed were separately captured by major industries such Agriculture, Mining & Quarrying, Manufacturing, Construction, Trade, Transport, Hotels and restaurants and Other services. In HIES 2009/10 and 2012/13, on the other hand, main industry of the occupation was recorded in the demographic section and industry of the wage income was not separately recorded. Industry for self-employment categories was collected as in HIES 2002.

Considering the above limitation for identifying industry when more than one employment source was recorded for an individual, the major income generating industry is considered as main industry of the employed individual.

[13] The ppp conversion factor gives the amount of local currency in current prices which buys the same amount of goods that 1$ would have bought in 2005.

Household main activity out of wage, self-employed farm and self-employed nonfarm and similarly by industry such as agriculture, manufacturing and service are determined by the source of major income generation by the household.

Income data

Income was collected separately for each Income Receiver and separately by source of income. Wage income, Agricultural self-employment income, Non Agricultural self-employment income and other transfers were recorded in separate schedules with the identification of household. In HIES 2009/10 and 2012/13, additional cash receipts from loan taken, sale of assets, and withdrawal from savings, repayment received from loan given, and receipts with regards to death/birth/marriage, compensation and gain from lottery were collected under income section. Incomes from these sources are not considered as income as these are not income by concept and these were not collected in HIES 2002. Other cash transfers such as Pension, Disability/relief payment, Rent from properties, Samurdhi welfare transfer, dividends/interests, not specified other income and remittances from local and abroad were considered as income and treated as non-labor income.

Monthly wage income includes wage/salary, tips/overtime payment received during the reference month and average amount for a month from bonus and any arrears received during 12 months period.

Monthly agricultural self-employed income is constructed by considering average monthly net revenue which is equal to total value of output less input cost for both surveys. Self-employed farm income is recorded separately for seasonal and non-seasonal crops in both surveys. At the individual level if the total net revenue is negative figure, income of the individual is treated as zero. Similarly, monthly nonfarm self-employed income is estimated by deducting monthly input cost from monthly total value of output for both surveys by type of major industries coded. At the individual level if the total net revenue is negative figure, income of the individual is treated as zero.

In addition to above four categories; wage, self-employed farm, self-employed nonfarm, and non-labor income is collected for each income receiver, income received from kind/free which are recorded in expenditure schedules and imputed value of own house are considered as income received in kind (non-labor) and distributed in per capita terms to all household members. Excluded from the in kind category are all items received in kind corresponding to the same codes excluded from the consumption aggregate, as well as all items belonging to the merceological category cereals and pulses, to minimize the possibility of double counting (as we cannot discriminate between home production and items received as a gift). Total income from all household members is treated as household income.

Similar to the consumption aggregate, income is also adjusted for spatial price variation and not adjusted for monthly price variation during the survey period. Spatial price variation was adjusted using district poverty lines published by DCS.

Prices

All monetary values are expressed in 2012/13 prices. To avoid inconsistencies due to the changes in base year for the consumer price index (as mentioned above), all monetary values for 2001/02, 2006/07 and 2009/10 are adjusted by the factor 1.025. This factor is the ratio between 3,028 (2002's poverty line inflated to 2009/10 prices using ccpi base 2002) and 2,955 (2002's poverty line inflated to 2009/10 prices using ccpi base 2006/07). Moreover, all monetary values for the survey year 2006/07 are additionally adjusted by the factor 1.042, which is the ratio between 2,233 (2002's poverty line inflated to 2006/07 prices using ccpi base-1952) and 2,142 (2002's poverty line inflated to 2006/07 prices using ccpi base-2002).

Annex 2: Decomposing changes in poverty

After all reduced-form models has been estimated for years *t* and *s*, we decompose the distributional changes by substituting each of the parameters estimated for one year with the parameters of the other year and then formulating the appropriate counterfactual distribution of income and consumption. Specifically, from equation (5) above, we estimate the components of household income for time *t* and *s*:

Which for simplicity we express as:

$$\log(y_h)^t = f(w(\hat{\Omega}_w^t, Z_{hi}^t, H_{hi}^t, \hat{\varepsilon}_{hi}^t), O(\hat{\Psi}^t, Z_{hi}^t, X2_{hi}^t, \hat{v}_{hi}^t), se(\hat{\Omega}_{se}^t, W_h^t, H_h^t, \hat{\varepsilon}_h^t), \hat{y}_h^{NL}|^t) \qquad (14)$$

where:

$w(\cdot)$ = salaried earning equations and $\hat{\Omega}_w^t$ refers to the set of estimated parameters;

Z_{hi}^t: are exogenous variables such as age, gender, ethnicity, region, and area that are used for the earnings and choice models estimated at the individual level;

$H(X_{hi}^t, \hat{\theta}_{hi}^t, \hat{\phi}_{hi}^t)$ = the underlying models for the activity and educational structure, where the X_{hi}^t is a vector of endogenous variables including activity ($X1_{hi}^t$) and education ($X2_{hi}^t$) which are estimated at the individual level and then used in the activity choice model, with $\widehat{\theta 1}_{hi}^t$ and $\widehat{\theta 2}_{hi}^t$ being the respective set of estimated parameters;

$O(\cdot)$ = activity choice equations and $\hat{\Psi}^t$ refers to the set of estimated parameters;

$se(\cdot)$ = net revenue equations for households with self-employed workers and $\hat{\Omega}_{se}^t$ are the set of estimated parameters;

W_h^t: are exogenous variables such as age, gender, ethnicity, region, and area for the net revenue model estimated at the household level;

$\hat{\varepsilon}_{hi}^t, \hat{\varepsilon}_h^t, \hat{v}_{hi}^t, \hat{\phi}_{hi}^t$ = error terms for earning equations for non-farm and farm sector, occupational choice and endogenous variables: education structure and economic sector;

$y_h^{NL}|^t$ = non-labor income.

From here, we can perform marginal decompositions which consist of changing one component at a time, keeping everything else constant. After describing how this is done for each element, we briefly discuss the cumulative approach, which changes each additional component and adds to the total effect until all components are accounted for. It is important to note that all decompositions are performed considering *s* as the initial year and then considering *t* as the initial year. The average of these decompositions is the final result reported in the analysis.[14]

Changes in poverty due to changes in demographics

The first decomposition consists of altering the joint distribution of exogenous household characteristics such as age, gender, region and area of each individual in the household. Since these variables do not depend on any other variables in the model, one can think of this as the simulation that assumes the greatest degree of exogeneity. The simulation is performed simply by recalibrating the population of one year by the weights corresponding to the joint distribution of these attributes in the target year. In other words, the demographic characteristics of year t are weighted in such a way that their structure replicates the demographic characteristics of year *s*. For example, if the share of women in year *s* is higher than in year t, then the weights in year t are modified so that in the simulation they replicate the structure observed in year *s*.

[14] Bear in mind that this does not solve all path-dependence problems. Shapley values are necessary to estimate in order to tackle this difficulty.

Since demographic variables are determinants of the activity, sector, and educational choice models, then the reweighted structure of these variables have direct and indirect effects on household income. The indirect effects are calculated by substituting the reweighted demographic variables into the estimated multinomial logit equations to forecast a counterfactual activity, sector, and educational composition of the workforce. These new sectors, educational levels, and activities are then fed into the estimated earnings equations, along with the direct effect of changes in the demographic variables.

Given this new counterfactual distribution of consumption, any new distributional statistic can be computed. In this case, since we are interested in the contributions to poverty reduction, we apply the poverty line for period t and calculate the counterfactual headcount poverty rate. The contribution of changes in demographics to the observed change in poverty will be the difference between the poverty rate for year *t* and the counterfactual.

Changes in poverty due to changes in the structure of activity

Next, in order to account for changes in the structure of activity, the coefficients of the activity, multinomial logit model for year *t* are replaced with those of year *s*. As a result, individuals are reallocated into different activities to conform to the structure observed in year *s*. In order to allow for individuals to change activities in the simulation, we must estimate the residual terms of the multinomial logit model (v_i^s) in equation (1), which are unobserved. These residuals must be drawn from an extreme value distribution in a way that is consistent with observed choices. In contrast to previous papers, we use the analytical solution to this problem derived by Train and Wilson (2008).

With the new simulated structure of activity in year t, labor income is projected using the estimated earnings equations for year t and the residuals drawn from a standard normal distribution. This can then be transformed to a new distribution of consumption using equation (6) above, where the consumption-to-income ratio is kept constant. This counterfactual distribution of consumption can be compared to the actual distribution in (8). We calculate the counterfactual poverty rate and take the difference from the poverty rate found in period *t* to obtain the contribution to poverty reduction.

Changes in poverty due to changes in education

In order to account for changes in poverty due to changes in education, the process is slightly more complicated since education affects both the occupational structure as well as earnings. As a result, we substitute the parameters for the educational choice equation estimated in time s, $\widehat{\theta 2}_{hi}^{s}$, with those estimated for time t, $\widehat{\theta 2}_{hi}^{t}$, in the H function. As before, in order to allow for individuals to change educational levels in the simulation, the residual terms in the educational multinomial logit model are taken from an extreme value distribution. Since education has effects on the choice of activity, the composition of activity across the distribution needs to be simulated. The resulting new distribution of activities is then introduced into the earnings functions, along with the new educational structure, to obtain the counterfactual distribution of income. This can then be transformed to a new distribution of consumption using equation (6) as before, and then compare it to the actual distribution in (8). The contribution of the change in education structure to the change in poverty between t and s can be estimated by the difference between poverty indices of actual (equation (8)) and counterfactual distribution (equation (12)).

The difference between the distributions generated by changing demographics, the structure of education, sectors and activities and the actual set of incomes of period *t* is comparable to the *endowment effect* in the standard Oaxaca (1973) and Blinder (1973) decomposition. This difference is that in each case, a new counterfactual distribution is generated, and as a result we can look at the contributions to any distributional summary statistic, including changes in poverty.

Changes in poverty due to changes in the returns to endowments

In addition to changes in the distribution due to changes in endowments, it is possible that poverty rates changed as a result of changes in market conditions which led to changes in the returns to existing endowments. For instance, it is likely that higher educational attainment would lead to higher incomes and therefore lower poverty. However, if the supply of educated workers outpaces the demand for such workers, then it is likely that the returns to higher education will fall as the premium for having higher levels of education falls. This idea is often associated with Tinbergen's (1975) "race" between technological progress –which he saw as raising the demand for skills—and the expansion of formal education—which raises the supply of skills (Ferreira, 2012).

In order to account for the contributions to poverty reduction on account of changes in the returns to endowments we simulate the counterfactual household income distribution by substituting the estimated returns to individual and household characteristics ($\widehat{\Omega}$) computed for period *s* into the earnings of every household at time *t*, holding everything else constant. This simulation yields the earnings of each household in the sample if the returns to each observed characteristics had been those observed at time *s* rather than the actual returns observed at time *t*, keeping everything else constant.[15] The contribution to the overall change in the distribution assigned to a change in returns between periods *t* and *s* can be obtained by comparing (8) with (13). The difference between this simulated distribution of household incomes and the actual distribution is equivalent to the *price effect* in the standard Oaxaca (1973) and Blinder (1973) decomposition.

Changes due to unobservable factors

Note that up to this point we have accounted for changes in the distribution for factors that are observable. However, it is likely that there are factors that cannot be observed at the household and individual levels, but nevertheless have impacts on the distribution of consumption and therefor affect changes in poverty. Although we cannot completely capture these effects, we can simulate the effect of changes in the residuals in the earnings equations. [16] To do so, we rescale the estimated residuals of the earning and net revenue equations for non-farm and farm workers of time *t* by the ratio of their standard deviations. The contribution to the change in poverty assigned to a change in unobservable factors can be obtained by calculating the poverty rate for the counterfactual distribution generated by (14) with the original poverty rate.

Changes in poverty due to changes in non-labor income

In order to account for changes in non-labor income, the nonparametric technique first described in in the simple approach above can be used. To do so, cells of household heads with the same level of education, gender and region (urban-rural) must be created. Then, quantiles of non-labor income must be created for each cell. The counterfactual distribution of non-labor income in year *t* is estimated by assigning the mean value of non-labor income of quantile q in cell c in year *s*, to the same quantile and cell in year *t*. In other words, we ranked the two distributions by per capita household non-labor income and if *q* was the rank of household with income y_h^{NL} at time *t*, we replace it with the non-labor income of the household with the same rank at time *s*. As before, we can compare with the actual distribution described in equation (8), calculate poverty indices and obtain the contribution of non-labor income to poverty change between years *t* and *s*.

Changes in poverty due to changes in the consumption-income ratio

Finally, it is important to note that each of the counterfactual distributions simulated so far assume that the consumption-to-income ratio in period *t* remains constant. However, in practice this ratio could change both due to changes in the savings rate of households, as well as the result of changes in measurement error. In

[15] The returns to the unobserved characteristics behind the residual term $\hat{\varepsilon}^t$ are assumed to be unchanged.
[16] The estimated error terms for the multinomial logit models are not rescaled.

order to account for changes in the consumption-income ratio, the nonparametric technique described above can be used. In particular, cells of household heads with the same level of education, gender and region (urban-rural) must be created. Then, quantiles of consumption must be created for each cell. The counterfactual distribution of the consumption-to-income ratio in year *t* is estimated by assigning the mean value of this ratio for quantile q in cell c in year *s* to the same quantile and cell in year *t*. In other words, we ranked the two distributions by consumption and if q was the rank of household with consumption-to-income ratio at time *t*, ϑ_h^t we replace it with the consumption-to-income ratio of the household with the same rank at time *s*, which creates a counterfactual distribution from which a new poverty rate can be calculated and compared to the poverty rate obtained in period t.

The Cumulative decomposition technique

All of the decompositions described above can be done on their own, holding everything else constant. We refer to the results from that analysis as the marginal effects. However, as mentioned before, all of these changes are likely to occur over the course of a decade. Moreover, the interaction effects between these elements could be important in accounting for the changes in poverty. For instance, changes in the educational composition could reinforce changes in the sectoral composition of employment. Therefore it is important to take account of these potential interactions.

The cumulative decomposition technique allows us to account for these interactions by calculating each effect successively and cumulating into counterfactuals that contain the cumulative effects of multiple changes. We attribute all of the additional contribution to poverty change to each specific factor being added. However, it is important to note that the magnitude of the contribution will depend on the path chosen for the decomposition.[17] Since calculating Shapley values is beyond the scope of this chapter, given the large number of factors, we use theory to better inform the path to be adopted. In particular, we follow Bourguignon, Ferreira and Leite (2008) by first calculating the effects of changes in the characteristics of the population, beginning with the most exogenous variables such as age, gender, region and area, followed by changes in the sector, education, and activity structure of the population. With these results we then calculate changes in farm and non-farm earnings due to changes in the returns to these characteristics, followed by changes in non-labor incomes, and finally changes in the consumption-to-income ratio.

[17] Given the large number of factors, calculating Shapley values from *t* to *s* and vice versa is beyond the scope of this paper.

Table A3.1: Sri Lanka. Multinomial Logit: Educational Choice

	Head of household (age >=15)						Other household members (age >= 15)					
	2002			2013			2002			2013		
	Prim comp low secon	Passed OL	Passed AL	Prim comp low secon	Passed OL	Passed AL	Prim comp low secon	Passed OL	Passed AL	Prim comp low secon	Passed OL	Passed AL
Age 25-34	-0.588***	-0.259	0.166	-0.616**	-0.540	-0.0831	-1.078***	-1.265***	-0.605***	-1.189***	-1.676***	-0.811***
	(0.189)	(0.250)	(0.324)	(0.285)	(0.331)	(0.377)	(0.0616)	(0.0681)	(0.0710)	(0.100)	(0.104)	(0.105)
Age 35-44	-0.802***	-0.366	0.0535	-1.468***	-1.220***	-0.656*	-1.630***	-1.841***	-1.583***	-2.069***	-2.717***	-2.139***
	(0.184)	(0.243)	(0.318)	(0.277)	(0.321)	(0.368)	(0.0622)	(0.0704)	(0.0766)	(0.0979)	(0.104)	(0.105)
Age 45-54	-0.865***	-0.329	-0.304	-1.955***	-1.779***	-1.329***	-1.873***	-2.364***	-2.447***	-2.789***	-3.589***	-3.229***
	(0.184)	(0.242)	(0.319)	(0.275)	(0.319)	(0.367)	(0.0657)	(0.0780)	(0.0904)	(0.0952)	(0.103)	(0.107)
Age 55-64	-1.146***	-0.540**	-0.590*	-1.978***	-1.767***	-1.529***	-2.400***	-2.948***	-2.951***	-2.995***	-3.963***	-4.063***
	(0.187)	(0.247)	(0.325)	(0.276)	(0.321)	(0.369)	(0.0822)	(0.105)	(0.125)	(0.0988)	(0.111)	(0.122)
Age 65-99	-1.775***	-1.658***	-1.844***	-2.713***	-2.451***	-2.539***	-3.147***	-4.034***	-4.979***	-3.913***	-4.893***	-5.341***
	(0.186)	(0.249)	(0.330)	(0.275)	(0.321)	(0.371)	(0.0724)	(0.108)	(0.185)	(0.0971)	(0.112)	(0.134)
Female	-0.545***	-0.634***	-0.759***	-0.417***	-0.557***	-0.497***	-0.261***	-0.131**	0.142**	-0.127**	0.0676	0.393***
	(0.0502)	(0.0728)	(0.0948)	(0.0488)	(0.0665)	(0.0747)	(0.0472)	(0.0535)	(0.0593)	(0.0561)	(0.0618)	(0.0650)
Urban	0.440***	0.771***	1.254***	0.586***	0.815***	1.543***	0.460***	0.703***	1.150***	0.686***	0.904***	1.269***
	(0.0769)	(0.0902)	(0.0977)	(0.0638)	(0.0756)	(0.0770)	(0.0630)	(0.0702)	(0.0731)	(0.0599)	(0.0656)	(0.0673)
South	-0.921***	-1.246***	-1.342***	-0.594***	-0.824***	-0.878***	-0.572***	-0.777***	-0.751***	-0.517***	-0.759***	-0.815***
	(0.0757)	(0.0991)	(0.118)	(0.0678)	(0.0851)	(0.0943)	(0.0640)	(0.0738)	(0.0795)	(0.0658)	(0.0737)	(0.0763)
Center	-0.859***	-1.048***	-1.017***	-0.293***	-0.478***	-0.254**	-0.612***	-0.750***	-0.704***	-0.259***	-0.461***	-0.398***
	(0.0723)	(0.0917)	(0.105)	(0.0797)	(0.104)	(0.110)	(0.0600)	(0.0691)	(0.0749)	(0.0739)	(0.0849)	(0.0878)
nwp	-0.736***	-1.046***	-1.163***	-0.359***	-0.791***	-0.581***	-0.576***	-0.781***	-0.774***	-0.404***	-0.704***	-0.790***
	(0.0794)	(0.104)	(0.125)	(0.0826)	(0.109)	(0.116)	(0.0686)	(0.0792)	(0.0870)	(0.0791)	(0.0895)	(0.0942)
ncp	-0.855***	-1.155***	-1.695***	-0.458***	-0.887***	-1.192***	-0.755***	-1.127***	-1.498***	-0.667***	-1.145***	-1.471***
	(0.0957)	(0.131)	(0.178)	(0.0924)	(0.124)	(0.153)	(0.0858)	(0.101)	(0.118)	(0.0906)	(0.105)	(0.114)
uva	-1.234***	-1.519***	-1.425***	-0.725***	-1.312***	-1.105***	-1.081***	-1.224***	-1.293***	-0.656***	-1.251***	-1.424***
	(0.0851)	(0.124)	(0.150)	(0.0884)	(0.128)	(0.141)	(0.0740)	(0.0892)	(0.101)	(0.0852)	(0.102)	(0.109)
sab	-0.949***	-1.385***	-1.533***	-0.285***	-0.740***	-0.799***	-0.647***	-0.927***	-1.015***	-0.428***	-0.694***	-0.812***
	(0.0777)	(0.108)	(0.133)	(0.0860)	(0.116)	(0.137)	(0.0661)	(0.0773)	(0.0864)	(0.0801)	(0.0924)	(0.0981)
hd_agri_alt	-0.243***	-0.667***	-1.235***	-0.445***	-0.913***	-1.279***	-0.227***	-0.386***	-0.388***	-0.307***	-0.602***	-0.634***
	(0.0465)	(0.0693)	(0.0983)	(0.0497)	(0.0713)	(0.0937)	(0.0408)	(0.0494)	(0.0551)	(0.0469)	(0.0555)	(0.0595)
Sri Lanka Tamil	-0.907***	-1.192***	-1.298***	-0.898***	-1.357***	-1.513***	-1.430***	-1.838***	-2.230***	-1.049***	-1.654***	-1.841***
	(0.108)	(0.148)	(0.166)	(0.0710)	(0.0927)	(0.103)	(0.0802)	(0.100)	(0.111)	(0.0663)	(0.0762)	(0.0805)
Indian Tamil	-0.519***	-1.960***	-2.189***	-1.107***	-2.109***	-2.545***	-1.183***	-2.033***	-2.854***	-1.586***	-2.659***	-3.180***
	(0.0948)	(0.249)	(0.294)	(0.0880)	(0.177)	(0.220)	(0.0731)	(0.116)	(0.162)	(0.0787)	(0.112)	(0.138)
Sri Lanka Moors	-0.347***	-0.718***	-1.074***	-0.745***	-1.630***	-1.317***	-0.610***	-1.025***	-1.453***	-1.045***	-1.677***	-2.011***
	(0.0909)	(0.124)	(0.151)	(0.0757)	(0.115)	(0.113)	(0.0708)	(0.0850)	(0.0985)	(0.0699)	(0.0815)	(0.0904)
Constant	2.792***	1.409***	0.796**	3.669***	2.636***	1.815***	3.620***	2.890***	2.068***	4.487***	4.275***	3.502***
	(0.187)	(0.244)	(0.319)	(0.277)	(0.320)	(0.366)	(0.0720)	(0.0777)	(0.0842)	(0.0993)	(0.103)	(0.106)
Observations	16,923	16,923	16,923	19,655	19,655	19,655	35,738	35,738	35,738	37,117	37,117	37,117
Pseudo R-squared	0.0713	0.0713	0.0713	0.0720	0.0720	0.0720	0.0870	0.0870	0.0870	0.105	0.105	0.105

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3.2: Sri Lanka. Multinomial Logit: Activity Choice for household heads

	2002				2013			
	Paid Employee		Self-Employed		Paid Employee		Self-Employed	
	Agri	Non-Farm	Agri	Non-Farm	Agri	Non-Farm	Agri	Non-Farm
Completed primary & lower secondary	-0.604***	-0.0636	-0.0588	0.357***	-0.668***	0.271***	-0.0336	0.523***
	(0.0882)	(0.0754)	(0.0693)	(0.0927)	(0.0858)	(0.0773)	(0.0721)	(0.0909)
Passed O/L	-1.656***	0.145	-0.192**	0.473***	-2.048***	0.0608	-0.461***	0.408***
	(0.172)	(0.0954)	(0.0974)	(0.114)	(0.161)	(0.0930)	(0.0957)	(0.107)
Passed A/L or higher	-1.843***	0.719***	-0.353**	0.598***	-1.908***	0.813***	-0.452***	0.497***
	(0.252)	(0.121)	(0.139)	(0.142)	(0.214)	(0.101)	(0.121)	(0.119)
Age	0.163***	0.139***	0.0751***	0.0729***	0.200***	0.226***	0.129***	0.178***
	(0.0250)	(0.0187)	(0.0146)	(0.0193)	(0.0206)	(0.0151)	(0.0143)	(0.0170)
Age squared	-0.00265***	-0.00244***	-0.00105***	-0.00147***	-0.00275***	-0.00321***	-0.00149***	-0.00240***
	(0.000259)	(0.000190)	(0.000133)	(0.000193)	(0.000209)	(0.000154)	(0.000133)	(0.000170)
Urban	-1.815***	-0.320***	-1.851***	-0.117	-1.282***	-0.103*	-1.681***	0.196***
	(0.173)	(0.0757)	(0.117)	(0.0843)	(0.111)	(0.0611)	(0.0924)	(0.0656)
South	1.480***	-0.103	1.095***	0.151	1.088***	0.00682	0.956***	0.195**
	(0.144)	(0.0993)	(0.0997)	(0.113)	(0.111)	(0.0808)	(0.0866)	(0.0888)
Center	0.932***	-0.104	0.824***	-0.0839	0.242*	-0.141	0.821***	0.0379
	(0.134)	(0.0846)	(0.0924)	(0.0987)	(0.128)	(0.0915)	(0.0982)	(0.101)
nwp	0.930***	0.0776	1.108***	0.190*	0.407***	0.00855	0.997***	0.278***
	(0.151)	(0.0995)	(0.102)	(0.115)	(0.138)	(0.0956)	(0.102)	(0.105)
ncp	0.904***	-0.630***	1.299***	-0.355**	0.346**	-0.415***	1.270***	-0.236*
	(0.174)	(0.126)	(0.119)	(0.150)	(0.160)	(0.110)	(0.106)	(0.124)
uva	1.438***	-0.282**	1.790***	0.0267	0.294**	-0.321***	1.352***	-0.152
	(0.160)	(0.124)	(0.121)	(0.146)	(0.144)	(0.107)	(0.105)	(0.129)
sab	0.818***	-0.165	0.720***	-0.113	1.098***	0.101	1.073***	0.293**
	(0.151)	(0.103)	(0.105)	(0.121)	(0.135)	(0.110)	(0.112)	(0.121)
Female	-1.982***	-1.077***	-0.868**	-1.391***	-0.795	-0.952***	-0.835**	-0.308
	(0.540)	(0.346)	(0.368)	(0.469)	(0.519)	(0.338)	(0.402)	(0.400)
Married	-0.0459	0.606**	0.182	0.624**	0.454	0.599**	0.655**	0.987***
	(0.330)	(0.256)	(0.271)	(0.305)	(0.316)	(0.234)	(0.268)	(0.283)
Married female	0.436	-1.398***	-0.134	-0.578	-1.218**	-1.757***	-0.915**	-2.023***
	(0.549)	(0.354)	(0.373)	(0.478)	(0.528)	(0.346)	(0.407)	(0.408)
Number of children age<=6	-0.105*	-0.139***	-0.106**	-0.0968*	-0.195***	-0.215***	-0.171***	-0.151***
	(0.0583)	(0.0441)	(0.0465)	(0.0509)	(0.0517)	(0.0388)	(0.0446)	(0.0435)
Sri Lanka Tamil	1.188***	-0.551***	-1.024***	-0.500***	0.640***	-0.429***	-0.528***	-0.394***
	(0.154)	(0.134)	(0.195)	(0.160)	(0.104)	(0.0802)	(0.103)	(0.0917)
Indian Tamil	1.385***	-0.670***	-1.474***	-1.221***	1.588***	-0.212*	-1.354***	-0.667***
	(0.150)	(0.159)	(0.190)	(0.223)	(0.133)	(0.126)	(0.160)	(0.167)
Sri Lanka Moors	-0.386**	-0.606***	-1.312***	0.191*	0.167	-0.580***	-1.246***	-0.0745
	(0.172)	(0.109)	(0.148)	(0.110)	(0.118)	(0.0870)	(0.129)	(0.0901)
Constant	-1.625**	0.276	-0.893*	-0.335	-3.264***	-2.365***	-2.993***	-3.566***
	(0.652)	(0.508)	(0.474)	(0.552)	(0.593)	(0.428)	(0.462)	(0.491)
Observations	16,924	16,924	16,924	16,924	19,656	19,656	19,656	19,656
Pseudo R-squared	0.203	0.203	0.203	0.203	0.203	0.203	0.203	0.203

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A3.3: Sri Lanka. Multinomial Logit: Activity Choice for other household members

	2002					2013				
	Paid Employee		Self-Employed		Unpaid family workers	Paid Employee		Self-Employed		Unpaid family workers
	Agri	Non-Farm	Agri	Non-Farm		Agri	Non-Farm	Agri	Non-Farm	
Completed primary & lower secondary	-0.542***	0.182***	0.0893	0.487***	0.191**	-0.408***	0.549***	0.634***	0.838***	0.470***
	(0.0756)	(0.0629)	(0.0695)	(0.120)	(0.0952)	(0.0864)	(0.0752)	(0.121)	(0.124)	(0.0927)
Passed O/L	-1.721***	0.274***	-0.121	0.596***	-0.0191	-1.284***	0.692***	0.518***	0.973***	0.348***
	(0.161)	(0.0739)	(0.0958)	(0.136)	(0.126)	(0.165)	(0.0835)	(0.153)	(0.137)	(0.118)
Passed A/L or higher	-2.315***	1.024***	-0.509***	0.652***	-0.105	-1.225***	1.708***	0.429**	1.045***	0.602***
	(0.288)	(0.0783)	(0.132)	(0.153)	(0.152)	(0.219)	(0.0851)	(0.185)	(0.149)	(0.129)
Age	0.462***	0.464***	0.360***	0.474***	0.368***	0.430***	0.428***	0.379***	0.453***	0.346***
	(0.0148)	(0.00827)	(0.0124)	(0.0201)	(0.0139)	(0.0134)	(0.00805)	(0.0177)	(0.0147)	(0.0112)
Age squared	-0.00584***	-0.00590***	-0.00401***	-0.00564***	-0.00433***	-0.00505***	-0.00520***	-0.00396***	-0.00514***	-0.00376***
	(0.000208)	(0.000121)	(0.000150)	(0.000271)	(0.000194)	(0.000168)	(0.000107)	(0.000204)	(0.000186)	(0.000134)
Urban	-1.909***	-0.127***	-1.534***	0.0988	-0.267***	-1.072***	0.000944	-2.093***	0.128*	-0.613***
	(0.177)	(0.0464)	(0.136)	(0.0857)	(0.0964)	(0.130)	(0.0411)	(0.165)	(0.0675)	(0.0862)
South	1.594***	-0.577***	0.762***	-0.0216	0.332***	1.032***	-0.206***	0.843***	0.117	0.537***
	(0.131)	(0.0584)	(0.0949)	(0.104)	(0.107)	(0.119)	(0.0528)	(0.118)	(0.0835)	(0.0933)
Center	1.222***	-0.349***	0.740***	-0.0744	0.617***	0.429***	-0.151**	0.791***	-0.106	0.785***
	(0.128)	(0.0527)	(0.0926)	(0.0991)	(0.100)	(0.120)	(0.0629)	(0.138)	(0.103)	(0.101)
nwp	0.669***	-0.140**	0.743***	0.263**	0.569***	0.242	-0.135**	0.629***	0.218**	0.837***
	(0.153)	(0.0591)	(0.101)	(0.107)	(0.109)	(0.167)	(0.0659)	(0.146)	(0.103)	(0.101)
ncp	1.607***	-0.583***	1.952***	0.160	0.758***	0.838***	-0.391***	1.184***	-0.0609	1.260***
	(0.162)	(0.0887)	(0.102)	(0.150)	(0.136)	(0.172)	(0.0831)	(0.143)	(0.130)	(0.102)
uva	1.864***	-0.390***	2.312***	0.0840	1.252***	0.319**	-0.498***	1.565***	-0.260*	1.578***
	(0.137)	(0.0788)	(0.0954)	(0.152)	(0.113)	(0.139)	(0.0844)	(0.135)	(0.147)	(0.0984)
sab	0.876***	-0.295***	0.883***	-0.195	0.115	0.968***	-0.0677	0.907***	-0.00999	0.740***
	(0.140)	(0.0612)	(0.0944)	(0.119)	(0.115)	(0.126)	(0.0689)	(0.143)	(0.117)	(0.109)
Female	-0.906***	-0.781***	-1.291***	-1.847***	-0.922***	-1.630***	-0.863***	-1.955***	-1.924***	-1.472***
	(0.121)	(0.0514)	(0.133)	(0.148)	(0.100)	(0.163)	(0.0551)	(0.205)	(0.137)	(0.121)
Married	1.281***	1.202***	1.318***	1.245***	0.665***	1.249***	1.306***	1.410***	1.415***	0.456***
	(0.136)	(0.0769)	(0.123)	(0.119)	(0.130)	(0.142)	(0.0784)	(0.146)	(0.108)	(0.134)
Married female	-1.193***	-2.388***	-0.280*	-1.212***	-1.450***	-1.160***	-2.470***	-1.099***	-1.426***	-0.583***
	(0.165)	(0.0859)	(0.162)	(0.177)	(0.150)	(0.196)	(0.0864)	(0.228)	(0.160)	(0.160)
Number of children age<=6	-0.241***	-0.197***	-0.0284	-0.0809*	-0.149***	-0.236***	-0.314***	-0.200***	-0.182***	-0.307***
	(0.0467)	(0.0288)	(0.0386)	(0.0490)	(0.0513)	(0.0496)	(0.0285)	(0.0591)	(0.0409)	(0.0478)
Sri Lanka Tamil	1.990***	0.0246	-0.886***	-0.471**	0.136	0.907***	-0.259***	-0.600***	-0.342***	-0.564***
	(0.106)	(0.0836)	(0.221)	(0.185)	(0.162)	(0.107)	(0.0554)	(0.162)	(0.101)	(0.131)
Indian Tamil	2.361***	0.298***	-1.015***	-0.917***	-1.013***	2.311***	0.171*	-0.884***	-0.287*	-1.215***
	(0.0921)	(0.0947)	(0.168)	(0.295)	(0.214)	(0.101)	(0.0878)	(0.219)	(0.172)	(0.180)
Sri Lanka Moors	-0.565***	-0.704***	-1.025***	-0.210*	-0.547***	-0.713***	-0.809***	-1.824***	-0.225**	-0.841***
	(0.189)	(0.0735)	(0.140)	(0.110)	(0.143)	(0.167)	(0.0689)	(0.262)	(0.0961)	(0.132)
Head employed	-0.253***	-0.390***	-0.404***	-0.343***	0.767***	-0.00443	-0.330***	-0.651***	-0.282***	1.189***
	(0.0802)	(0.0436)	(0.0644)	(0.0774)	(0.102)	(0.0830)	(0.0414)	(0.0813)	(0.0649)	(0.101)

Head completed primary & lower secondary	-0.345***	-0.0854*	-0.244***	0.154*	-0.157**	-0.544***	-0.327***	-0.314***	-0.102	-0.364***
	(0.0684)	(0.0461)	(0.0594)	(0.0872)	(0.0749)	(0.0758)	(0.0477)	(0.0907)	(0.0783)	(0.0715)
Head passed O/L	-1.184***	-0.162**	-0.355***	-0.0194	-0.440***	-1.352***	-0.466***	-0.398***	-0.165	-0.435***
	(0.190)	(0.0631)	(0.0959)	(0.123)	(0.120)	(0.191)	(0.0644)	(0.141)	(0.105)	(0.104)
Head passed A/L or higher	-2.100***	0.139*	-0.333**	-0.0446	-0.0151	-2.026***	-0.249***	-0.587***	-0.584***	-0.993***
	(0.461)	(0.0748)	(0.136)	(0.160)	(0.143)	(0.358)	(0.0704)	(0.190)	(0.136)	(0.142)
Enrolled in school	-0.479***	-0.559***	-0.493***	-0.404***	-0.513***	-0.512***	-0.698***	-0.289***	-0.462***	-0.486***
	(0.0774)	(0.0405)	(0.0607)	(0.0761)	(0.0731)	(0.0846)	(0.0424)	(0.0907)	(0.0699)	(0.0673)
pens_d	-1.033***	-0.182***	-0.318***	-0.351**	-0.147	-1.167***	-0.225***	-0.886***	-0.373***	-0.437***
	(0.284)	(0.0695)	(0.122)	(0.154)	(0.138)	(0.314)	(0.0668)	(0.179)	(0.113)	(0.135)
Constant	-9.909***	-7.515***	-8.932***	-10.44***	-9.093***	-9.289***	-7.366***	-9.675***	-10.23***	-9.244***
	(0.273)	(0.139)	(0.219)	(0.349)	(0.245)	(0.270)	(0.148)	(0.346)	(0.283)	(0.224)
Observations	48,866	48,866	48,866	48,866	48,866	50,748	50,748	50,748	50,748	50,748
Pseudo R-squared	0.287	0.287	0.287	0.287	0.287	0.294	0.294	0.294	0.294	0.294

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3.4: Simulations

Household Head

	2002		2012/13	
	Actual	**Simulated**	**Actual**	**Simulated**
Education Structure				
Illiterate or Incomplete primary	23.76	23.78	17.99	17.51
Primary and low secondary	52.85	53.57	53.97	55.08
OL	14.60	14.20	15.74	15.40
AL	8.78	8.46	12.31	12.01
P-value of Pearson chi-square	*0.9984*		*0.9970*	
Occupation				
non-employed	20.91	20.86	33.57	31.82
Salaried farm	9.91	10.07	7.28	7.31
Salaried non-farm	34.89	34.61	30.97	31.79
Self-employed farm	20.84	20.53	13.04	13.14
Self-employed non farm	13.46	13.92	15.14	15.94
P-value of Pearson chi-square	*0.9999*		*0.9971*	

Other Members

	2002		2012/13	
	Actual	**Simulated**	**Actual**	**Simulated**
Education Structure				
Illiterate or Incomplete primary	24.61	24.77	22.78	23.28
Primary and low secondary	51.92	52.43	48.05	48.63
OL	14.14	13.84	15.88	15.50
AL	9.34	8.96	13.29	12.60
P-value of Pearson chi-square	*0.9988*		*0.9958*	
Occupation (pop 15+)				
non-employed	12.87	12.82	9.31	9.23
Salaried farm	50.98	51.85	56.96	56.89
Salaried non-farm	16.51	14.99	7.86	7.51
Self-employed farm	9.97	10.39	13.82	14.17
Self-employed non farm	9.68	9.94	12.04	12.19
P-value of Pearson chi-square	*0.9961*		*0.9999*	

Table A3.5: Sri Lanka. Earnings for Salaried Workers

	2002			2013		
	Only Non-Farm	Only Farm	Farm & Non-Farm	Only Non-Farm	Only Farm	Farm & Non-Farm
Age	-0.0111	0.0300***	-0.0129	-0.0110	0.00320	-0.0385
	(0.00989)	(0.0105)	(0.0200)	(0.00993)	(0.0126)	(0.0337)
Age squared	2.35e-05	-0.000275***	0.000105	2.38e-05	-9.22e-05	0.000240
	(9.57e-05)	(9.56e-05)	(0.000188)	(9.62e-05)	(0.000113)	(0.000317)
Household size	0.0895***	0.0700***	0.0437*	0.0911***	0.0574***	0.0165
	(0.0123)	(0.0150)	(0.0259)	(0.0110)	(0.0181)	(0.0406)
Max hhd education	0.254***	0.130***	0.178***	0.298***	0.0377	0.138**
	(0.0257)	(0.0292)	(0.0549)	(0.0220)	(0.0315)	(0.0695)
Urban	0.308***	0.204	0.421**	0.301***	0.266	-0.184
	(0.0528)	(0.164)	(0.179)	(0.0389)	(0.162)	(0.285)
South	-0.251***	0.618***	-0.115	-0.0874	0.378***	-0.298
	(0.0717)	(0.0894)	(0.141)	(0.0549)	(0.0882)	(0.195)
Center	-0.170***	-0.0294	-0.0771	-0.112*	-0.276**	-0.448**
	(0.0644)	(0.0910)	(0.188)	(0.0574)	(0.108)	(0.221)
NWP	-0.190***	0.347***	-0.206	0.0491	-0.202*	-0.616***
	(0.0698)	(0.0939)	(0.151)	(0.0675)	(0.105)	(0.198)
NCP	-0.0630	-0.283**	0.101	-0.115	-0.289***	-0.713***
	(0.0930)	(0.125)	(0.197)	(0.0769)	(0.0949)	(0.239)
Uva	-0.0186	0.0696	-0.198	0.137	0.125	-0.552*
	(0.111)	(0.0959)	(0.163)	(0.0886)	(0.0984)	(0.286)
Sab	-0.296***	0.0816	-0.312**	0.0794	0.171	-0.152
	(0.0831)	(0.0923)	(0.152)	(0.0679)	(0.109)	(0.269)
Female	-0.456***	-0.422***	-0.127	-0.427***	-0.456***	0.0871
	(0.0621)	(0.0544)	(0.131)	(0.0508)	(0.0681)	(0.173)
Sri Lanka Tamil	0.122	-0.423*	-0.379*	-0.0842	-0.165	-0.772***
	(0.105)	(0.223)	(0.214)	(0.0669)	(0.110)	(0.208)
Indian Tamil	-0.240	-0.390**	0.0395	-0.0370	-0.337*	0.879***
	(0.150)	(0.164)	(0.198)	(0.108)	(0.184)	(0.199)
Sri Lanka Moors	0.179***	-0.280*	0.154	-0.000101	0.0147	-0.154
	(0.0652)	(0.148)	(0.153)	(0.0552)	(0.170)	(0.494)
Seasonal crop land	0.172***	0.346***	0.109***	0.133***	0.146***	0.0335
	(0.0360)	(0.0298)	(0.0315)	(0.0252)	(0.0137)	(0.0230)
Land	0.106***	0.0227	0.0935***	0.174***	0.305***	0.106***
	(0.0230)	(0.0162)	(0.0190)	(0.0429)	(0.0683)	(0.0260)
Constant	8.991***	6.273***	9.445***	8.989***	8.462***	11.40***
	(0.254)	(0.294)	(0.548)	(0.257)	(0.352)	(0.840)
Observations	2,774	4,585	482	4,087	3,390	304
R-squared	0.166	0.180	0.185	0.159	0.193	0.183
Adj R-squared	0.161	0.177	0.155	0.156	0.188	0.135

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3.6: Net Revenue for Self Employed Households

	2002			2013		
	Only Non-Farm	Only Farm	Farm & Non-Farm	Only Non-Farm	Only Farm	Farm & Non-Farm
Age	-0.0103	0.0573***	-0.0158	-0.0178*	0.0364**	-0.000753
	(0.00997)	(0.0121)	(0.0204)	(0.0105)	(0.0149)	(0.0310)
Age squared	9.33e-06	-0.000477***	0.000141	9.91e-05	-0.000392***	-0.000201
	(9.69e-05)	(0.000109)	(0.000191)	(9.99e-05)	(0.000132)	(0.000292)
Household size	0.0920***	0.0923***	0.0490*	0.0763***	0.0559***	0.0768
	(0.0121)	(0.0188)	(0.0289)	(0.0116)	(0.0216)	(0.0498)
Max hhd education	0.257***	0.0859***	0.206***	0.291***	0.00532	0.160*
	(0.0253)	(0.0325)	(0.0580)	(0.0227)	(0.0349)	(0.0867)
Urban	0.338***	-0.154	0.425**	0.267***	0.403**	-0.267
	(0.0526)	(0.151)	(0.214)	(0.0420)	(0.195)	(0.268)
South	-0.303***	0.399***	-0.162	-0.133**	0.350***	-0.504**
	(0.0709)	(0.0987)	(0.150)	(0.0554)	(0.118)	(0.246)
Center	-0.176***	0.533***	-0.0385	-0.175***	0.278**	-0.490*
	(0.0648)	(0.105)	(0.200)	(0.0588)	(0.133)	(0.273)
NWP	-0.217***	0.575***	-0.112	0.0263	0.411***	-0.700***
	(0.0684)	(0.110)	(0.159)	(0.0691)	(0.122)	(0.246)
NCP	-0.0847	0.251	0.283	-0.0451	0.847***	-1.000***
	(0.0952)	(0.169)	(0.200)	(0.0798)	(0.145)	(0.323)
Uva	-0.0375	0.747***	-0.0625	0.0932	0.931***	-0.764***
	(0.113)	(0.118)	(0.171)	(0.0875)	(0.123)	(0.263)
Sab	-0.320***	0.0765	-0.241	-0.0136	0.171	-0.229
	(0.0810)	(0.0968)	(0.156)	(0.0679)	(0.132)	(0.348)
Female	-0.460***	-0.579***	-0.147	-0.326***	-0.261***	0.386*
	(0.0625)	(0.0636)	(0.146)	(0.0540)	(0.0842)	(0.214)
Sri Lanka Tamil	0.126	-0.605***	-0.890**	0.146	0.0545	-0.455*
	(0.105)	(0.215)	(0.384)	(0.114)	(0.311)	(0.241)
Indian Tamil	-0.225	-0.740***	0.123	-0.00835	-0.282	-0.582**
	(0.147)	(0.205)	(0.216)	(0.112)	(0.224)	(0.255)
Sri Lanka Moors	0.181***	-0.536***	0.178	0.0828	0.235	1.270***
	(0.0656)	(0.195)	(0.183)	(0.0590)	(0.168)	(0.298)
Seasonal crop land	0.188***	0.621***	0.141***	0.0858**	0.237***	0.152***
	(0.0358)	(0.0523)	(0.0327)	(0.0348)	(0.0270)	(0.0438)
Land	0.0631***	0.0159*	0.0371	0.138***	0.120***	0.0182
	(0.0139)	(0.00816)	(0.0250)	(0.0264)	(0.0172)	(0.0143)
Constant	8.937***	3.859***	9.155***	9.263***	6.190***	10.01***
	(0.256)	(0.334)	(0.564)	(0.270)	(0.422)	(0.820)
Observations	2,860	4,388	469	3,527	2,247	246
R-squared	0.175	0.329	0.159	0.141	0.277	0.211
Adj R-squared	0.170	0.326	0.128	0.137	0.271	0.153

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1