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## Consumption Economies of Scale, Household Headship and Poverty: Evidence from Sri Lanka

*Maneka Jayasinghe, Christine Smith, Andreas Chai and Shyama Ratnasiri*

### ABSTRACT

*The idea that female and female-headed households disproportionately represent the poor, and that they experience a higher incidence of poverty than male and male-headed households, has been discussed widely in the literature on gender and poverty, particularly in the context of developing countries. Nevertheless, important questions remain unexplored. For example, how does the gender of the headship affect household ability to reap the benefits of consumption economies of scale (CSE)? And how do these differences in CSE, based on the gender of the household head, change the poverty status in male-headed and female-headed households? This study, using Household Income and Expenditure survey 2009/10 data for Sri Lanka, attempts to uncover the differences in CSE associated with the gender of household headship. We use an Engel equivalence scale approach for this purpose. This analysis sheds new light on the existing debate on poverty and household headship in a different lens. Our results indicate that female-headed households enjoy greater CSE than their male-headed counterparts. However, we find that the poverty rate among the female-headed households are higher than that of their male-headed counterparts, even after CSE are allowed for.*

**Keywords:** *Female headship, equivalence scales, consumption economies of scale, poverty rates*

**JEL Classification:** D10, D12

### 1 INTRODUCTION

Female-headed households have received much attention in the literature on poverty and headship, as they are believed to be highly disadvantaged compared to male-headed households. There has been an increasing trend in the prevalence of households headed by females around the world. This is due to various socio-demographic reasons such as gender-selective migration, gender differences in life expectancy, and conflicts and wars (Visaria 1980, Chant and Campling 1997). An important implication of these changing patterns in household headship is that they are also associated with changes in household size and composition. For example, research suggests that female-headed households appear to be smaller than male-headed households and that female household headship is associated with higher dependency ratio (i.e., the presence of a greater number of dependents – both young and old – with fewer adult earners) (Chant and Campling 1997, Silva 2003, Chant 2004). These changes have brought about some serious consequences relating to the welfare of these female-headed households.

As far back as 1895, scholars such as Ernst Engel realised that one cannot simply compare incomes across households if their size and composition are different. This is because larger households tend to be better off than smaller households, if the economies of scale in

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consumption (CSE) associated with large families are taken into consideration when assessing poverty (Engel 1857). CSE are defined as the reduction in the cost per-person to maintain the same material welfare as the household size increases, enabling larger households to attain a relatively higher per-capita standard of living than that of smaller households (Lanjouw and Ravallion 1995). These CSE may generate from the sharing of household goods, bulk purchases and increasing returns to scale in home production (Nelson 1988).

Therefore, if the gender of the head of the household associated with specific household size and compositional differences, we believe that the magnitude of CSE realised by a particular household is also likely to be influenced by these compositional and size differences based on the gender of the household head. Traditional approaches to poverty measurements that employ a per-capita method do not provide avenues to incorporate the effects of the differences in household size associated with the gender of household headship when estimating poverty measures and comparing poverty levels across male- and female-headed households. The failure to consider the differences in CSE in large and small households often results in an underestimation of the incidence of poverty among the female-headed households, which are typically smaller than those of their male-headed counterparts (Bongaarts 2001). An identification of the variation of CSE based on the gender of the household, therefore, enhances the precise identification of the poor and the most vulnerable groups in a country by enabling a more accurate comparison of poverty across households with different sizes and compositions, emerging from the differences in the gender of the household headship.

Gender of the household headship may, on the other hand, play a significant role in determining the level of CSE, particularly those of food (FCSE) for a given household size. This phenomenon may be associated with gender roles in performing household tasks. Women have been traditionally playing an important role in household food supply compared to men. In conventional societies, adult women appear to impart traditional knowledge and customs about the management of household food supply to younger females than to younger males. Such knowledge may act as an expedient to better manage household food supply and thereby reap higher FCSE in female-headed households, particularly in the absence of a male breadwinner to support the household. These higher FCSE that are likely to be observed in female-headed households may make them better off than their male-headed counterparts, in some aspects.

The most common way to control for the influence of CSE on the measurement and comparison of household poverty is by using equivalence scales. Among various approaches to estimate equivalence scales, the Engel (1857) method, which is based on the idea that two households with identical foodshares are equally well off, has been widely used in the literature. This study uses an adaptation of the Engel (1857) approach to construct equivalence scales to investigate the CSE.

For the empirical analysis, we have chosen Sri Lanka as a case study for two reasons. Firstly, there is a high incidence of female-headed households in Sri Lanka. About one in four households in the country is headed by females, leading Sri Lanka to be the country with the highest proportion of female-headed households in South Asia (De Silva 2005). The political unrest in the south of the country in the early 1980s, and the 30 years long civil war originating in the north and east have resulted in a significant number of households emerging as female-headed households due to widowhood. The international out-migration of the male-head for economic reasons has also partly contributed to an increased proportion

of female-headed households in Sri Lanka (Ruwanpura and Humphries 2004). Secondly, the highest percentage of female-headed households (27 per cent) is seen in the urban sector, where the traditional social networking system is less likely to be present. This situation, coupled with lower income levels, may make urban-living female-headed households more vulnerable than their rural-living counterparts that may receive traditional knowledge on food supply management from their adult relatives. These two conditions may have a significant impact on the overall measures of FCSE adjusted poverty among the male- and female-headed households.

This paper represents an exploratory study undertaken with two objectives: 1) to examine how the gender of the head of the household affects FCSE, in particular, whether female-headed households enjoy greater FCSE; and 2) to explore how these differences in FCSE, based on the gender of the household head, impact on household poverty status. The empirical investigation of this study uses self-reported headship, and hence consists of both *de jure* and *de facto* female-headed households. The remainder of the paper is organised as follows. Section 2 presents a concise literature review on the link between household headship, poverty and CSE. Section 3 discusses the methodology adopted in this study, while Section 4 describes the data used when applying this methodology. Section 5 presents the empirical results and a discussion of their implications, while Section 6 provides some concluding remarks.

## **2 LITERATURE REVIEW**

In the literature on poverty and headship, female-headed households have been regarded to be highly disadvantaged compared to male-headed households. The loss of the male breadwinner, for whatever reason, such as death and divorce of the male breadwinner, forces females to be the head of the household, bearing the dual responsibility of performing household work and childcare demands, and serving as the economic provider of the household. Female household heads, particularly those who are living in rural areas, appear to be in a disadvantageous position in performing these tasks relative to their male counterparts because of lower earnings, limited access to remunerative jobs, and less access to resources such as land, credits, and technology (Buvinić and Gupta 1997). These deprivations adversely affect not only the female head of the household but are also transferred to the next generation through their dependent children.<sup>14</sup>

A considerable number of studies, both in the context of developed and developing countries, have investigated whether households headed by females are poorer than those headed by males. Buvinić and Gupta (1997), for example, reviewed 61 studies, covering countries in Africa, Asia, and Latin America and the Caribbean, on the association between female headship and poverty. They showed that 38 of the 61 studies, based on a variety of poverty measurements (such as total or per-capita household income and expenditure, income per-equivalent adult, and access to services and ownership of land assets) underpin the argument that female-headed households are overrepresented among the poor. On the other hand, Quisumbing et al. (2001) conclude that out of 10 developing countries, only 2 countries (Ghana and Bangladesh) show that female-headed households tend to be poorer than male-headed households.<sup>15</sup> Furthermore, Lampietti and Stalker (2000), reviewed 58 World Bank

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<sup>14</sup> For a detailed discussion on the underlying factors why more females and female-headed households suffer from poverty than male-headed households, refer Chant (2003, 2004, 2011); Buvinić and Gupta (1997).

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Poverty Assessments that were carried out since 1998 and concluded that 43 per cent of female-headed households are poorer than male-headed.

As identified in the literature, the measurement and comparison of welfare and poverty among the households headed by females and males poses an important conceptual challenge that require serious consideration. This challenge is associated with the differences in household size and composition based on the gender of the head of the household. Several studies confirm that the average size of female-headed households is substantially smaller than that of male-headed (Bongaarts 2001, Krishnan and Horrell 2007). This is because female heads rarely live with a spouse while a majority of male heads live with their wives. Female-headed households appear to have household compositions that are substantially different from male-headed ones have. For example, female-headed households tend to have a higher child dependency ratio than male-headed have. That is, they tend to have a higher ratio of non-workers to workers (Kossoudji and Mueller 1983, Buvinić and Gupta 1997, Quisumbing et al. 2001). Female-headed households with extended families or maternal parents tend to show a higher elderly dependency ratio (Chant 2011).

Household size and composition play a vital role in measuring and comparing poverty across households (Lanjouw and Ravallion 1995, Deaton and Paxson 1998). Traditional poverty measures based on per-capita terms do not make allowances for these household size and compositional differences. For example, large households enjoy higher CSE through sharing of household goods, taking advantages of bulk purchases, and increasing returns to scale in home production. Under the traditional approach, the poverty levels in smaller households such as female-headed households might be underestimated (Quisumbing et al. 2001). On the other hand, the per-capita based methods may overestimate poverty in female-headed households with more children whose consumption needs are less than adults. This is because per-capita approaches assign an equal allocation of resources for adults and children, although the latter have lesser needs, particularly food, than those of adults. The literature shows that female-headed households reflect a higher incidence of poverty when the necessary adjustments are made to allow for the impact of possible CSE. For example, Drèze and Srinivasan (1997) and Van de Walle (2013) showed that although no significant differences in poverty status among the male-headed and female-headed were found under per-capita poverty measures, the incidence of poverty among female-headed households disproportionately increased once the possibilities for CSE were allowed for. This was found to be especially true in the case of single widows and widows living with children, who were more inclined to live in small households. All of these studies investigate the aggregate effects of CSE in the measurement of poverty.

However, an interesting aspect to consider here is that how these CSE differs across gender of the household headship at a given household size. That is, for example, whether two-adult female-headed households experience higher CSE than two-adult male-headed household or *vice versa*. This is important because at a given household size, food consumption behaviours may be different depending on the gender of the head of the household. Such an investigation of CSE in relation to the gender of the head of the household has been received a minimal attention in the literature and therefore, no direct evidence available in the existing literature. However, some evidence on the possible reason for female's to achieve higher FCSE can be drawn from the literature on gender roles in performing household tasks and gender roles in enhancing food security.

Traditionally, women have been responsible in household activities; mainly in performing household food supply related tasks than men (Greenstein 2000). In particular, women have

been playing a vital role in food processing, preparation and storing and also passing on this knowledge to the next generation, especially to daughters (Van der Lippe and Siegers 1994). These traditional knowledge include preserving vegetables, fruits and milk, in times of abundance, for the use during scarce time through various indigenous food preservation methods such as drying or fermentation. The use of wild food such as fruits, nuts and leaves to support household food supply is also common in traditional societies. Such food provides economical and nutritious food for the family throughout the year; hence appears to play a major role in food security, particularly in rural societies (Ibnouf 2012, Kalansooriya and Chandrakumara 2014). Studies have also found that poorer rural female-headed households provide more nutritional food for their children than those headed by men (Kennedy and Peters, 1992). One possible reason for this may be that due to traditional gender norms, women may have inherited more knowledge on indigenous food processing and preserving methods and thereby may better manage household food supply than men do. Furthermore, rural women may demonstrate greater indigenous knowledge about food processing and preserving than the urban women due to the close social networking system on these practices in the rural areas. This implies that women, particularly those who are in the rural areas are more likely to utilise available resources more wisely and thereby improve the nutritional status of the family members (Kennedy and Peters, 1992; Kalansooriya and Chandrakumara, 2014). This, in turn, is expected to deliver greater FCSE among these female-headed households. On the other hand, women, particularly those in urban areas, with poor social networking system on traditional practices, and men, in general, who lack such knowledge about traditional food management skills may not be able to reap such benefits. The following section presents the empirical methodology adopted to investigate whether female-headed households, particularly those who are located in rural areas, enjoy higher FCSE and to investigate the overall effect of such FCSE, based on the gender of the head of the household, on poverty measures.

### 3 METHODOLOGY

#### 3.1 Estimating Engel curves and equivalence scales

As noted in above, this study uses Engel equivalence scales approach to analyse the differences in CSE based on the gender of the household headship. This section provides a brief description of the estimation procedure of Engel equivalence scales.<sup>15</sup> The estimation of Engel equivalence scales involves two steps. The first step involves estimation of the Engel curves. As this study focuses on FCSE, the Engel curve for food, taking the expenditure share on food and beverages as the dependent variable, is estimated. The specification of the Engel curve, with two demographic characteristics (adults and children), to estimate income-dependent equivalence scales, is as follows:

$$(1) \quad w_f = \beta_0 + \beta_1 \ln \frac{x}{n} + \beta_2 \left( \ln \frac{x}{n} \right)^2 + \gamma_1 n_a + \gamma_2 n_c + \gamma_3 n_a n_c$$

where  $w_f$  refers to expenditure share on food,  $n$  to household size,  $n_a$  to number of adults and  $n_c$  to number of children in the household. The variable  $x$  is the household expenditure,  $\ln \frac{x}{n}$  is the logarithm of per-capita expenditure (PCE) and  $\left( \ln \frac{x}{n} \right)^2$  is the square of the logarithm of PCE. Following Deaton and Muellbauer (1986) we use a simple logarithmic

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<sup>15</sup> For a detailed description on the estimation of Engel equivalence scales using Sri Lankan data refer Jayasinghe et al. (2016)

transformation of per-capita income (PCI) for two reasons. Firstly, the problem of heteroskedasticity commonly encountered with cross-sectional data can be reduced via such a transformation. Secondly, this form of transformation reduces non-linearity in the data. In this study, we use PCE as a proxy for PCI due to the enhanced reliability of expenditure data.<sup>16</sup> Here, in this case, another variable has been added to the model (i.e.  $n_a n_c$ ), which is an interaction term of  $n_a$  and  $n_c$ , that estimates the joint effect of adults and children on foodshare. This is because in households which have both adults and children, their joint effect on the expenditure share on food may be different to the individual effect of adults and children on the expenditure share on food. Accordingly,  $\beta_0, \beta_1, \beta_2, \gamma_1, \gamma_2$  and  $\gamma_3$  are the parameters to be estimated.

In the second step, the estimated coefficients of the quadratic Engel curves are used to construct income-dependent equivalence scales. Following Deaton (1981) and Lelli (2005), an analytical solution can be derived using a basic mathematical approach to solve quadratic equations, as follows. A two-adult and no-children household, (2,0) is taken as the reference household, hence  $n^r = 2$ .

Consider the budget share on food in household  $h$  is

$$(2) \quad w_f^h = \beta_0 + \beta_1 \ln\left(\frac{x^h}{n^h}\right) + \beta_2 \left(\ln\frac{x^h}{n^h}\right)^2 + \gamma_1 n_a + \gamma_2 n_c + \gamma_3 n_a n_c$$

and the budget share on food in the reference household  $r$  is

$$(3) \quad w_f^r = \beta_0 + \beta_1 \ln\left(\frac{x^r}{n^r}\right) + \beta_2 \left(\ln\frac{x^r}{n^r}\right)^2 + 2\gamma_1$$

Based on the Engel assumption that  $w^h = w^r$ , equation (2) and (3) can be used to derive a quadratic equation as follows:

$$(4) \quad x^h = n^h \exp\left(\frac{-\beta_1 \pm \sqrt{\beta_1^2 - 4\beta_2 C}}{2\beta_2}\right)$$

where  $C = \gamma_1 n_a + \gamma_2 n_c + \gamma_3 n_a n_c - \beta_2 \left(\ln\frac{x^r}{2}\right)^2 - \beta_1 \ln\left(\frac{x^r}{2}\right) - 2\gamma_1$

Equation (4) gives two roots for  $x^h$  for any given  $n^h, n_a^h$  and  $n_c^h$ . From the two possible solutions for  $x^h$ , the larger value of  $x^h$  corresponds to the relevant part (or downward sloping side) of the Engel curve. An equivalence scale is the ratio between  $x^h$  and  $x^r$ , such that dividing  $x^h$  by the initially selected  $x^r$  yields the equivalence scale. Note that this ratio between  $x^h$  and  $x^r$  depends not only on  $n^h, n_a^h$  and  $n_c^h$ , but also on the income of the reference household,  $x^r$ .<sup>17</sup> This is a natural result of the quadratic specification, with its implication that the costs imposed by household size are not proportionately the same at all levels of incomes.

We estimate the Engel curve specification in equation (1) for female-headed and male-headed households separately, at the national level, with the view of testing for the differences in food consumption scale economies associated with the gender of the household head. We

<sup>16</sup> As noted by Summers (1959), the Engel curve, when modelled on household expenditure, may suffer from endogeneity. To allow for possible effects of endogeneity, following Banks et al. (1997) we used log per-capita income and its square as instrumental variables for log of per-capita expenditure and its square during the actual estimation.

<sup>17</sup> During the actual estimation, household expenditure of top (richest) and bottom (poorest) expenditure deciles and mean expenditure were considered as  $x^r$  to estimate income-dependent equivalence scales.

also perform bootstrapping with 1000 replicates to estimate standard errors associated with our equivalence scales. In this study, we consider that all of the adults in the households have identical tastes, irrespective of their gender and age.

### 3.2 Estimation of the Percentage of Households Below Poverty Line

The poverty comparisons between male and female headed households are often made based on PCE, ignoring the effects of CSE on poverty measures. Therefore, a valid comparison, to highlight effects of CSE on poverty measures would be, between poverty rates under the per-capita expenditure (PCE) and those under expenditure per adult equivalent (EPEA), which is based on self-estimated equivalence scales. For this analysis, the percentage of households whose PCE and EPEA falls below the official poverty line is obtained. The official poverty line in Sri Lanka for the period of 2009/10 is Rs.3,028 real total expenditure per person (Department of Census and Statistics 2011b).<sup>18</sup> While the PCE is obtained by dividing total household expenditure by household size, the EPEA is obtained by dividing the total household expenditure by the respective equivalence scales for male- and female-headed households, estimated at the mean expenditure. The equivalence scales used in this exercise are estimated using the equation

$$(5) \quad x^h = n^h \exp\left(\frac{-\beta_1 \pm \sqrt{\beta_1^2 - 4\beta_2 C}}{2\beta_2}\right)$$

where  $C = \gamma_1 n_a + \gamma_2 n_c + \gamma_3 n_a n_c - \beta_2 \left(\ln \frac{x^r}{1}\right)^2 - \beta_1 \ln \left(\frac{x^r}{1}\right) - \gamma_1$

This is a slightly modified version of equation (4) presented above, where the two-adult household was the reference household. In this case, however, the one-adult household is taken as the reference household, instead of the two-adult household, and hence  $n^r = 1$ . This way, the equivalence scale in the one-adult household takes the value 1, which allows determination of the additional cost associated with changing household sizes.

## 4 DATA

The analysis in this study is based on the 2009/10 Household Income and Expenditure Survey (HIES) conducted by the Department of Census and Statistics (DCS) in Sri Lanka. The HIES provides data on both food and beverage, and non-food expenditures of households. Expenditure on food and beverages (hereafter referred to as expenditure on food) covers 18 sub-categories.<sup>19</sup> The imputed value of home production for own consumption and freely received food items is also added to expenditure on food where applicable. Expenditure on non-food items covers 10 additional sub-categories<sup>20</sup>. The total expenditure in this study consists of both food and non-food expenditure, excluding the expenditure of alcohol.

<sup>18</sup> The annual average exchange rate of the US\$ was 113 SLR (Central Bank of Sri Lanka 2013).

<sup>19</sup> These categories comprise cereal, prepared food, pulses, vegetables, yams, meat, fish, dried fish, eggs, coconuts, condiments, other foods, milk & milk products, fats & oils, sugar, fruits, confectionery and non-alcoholic beverages (Department of Census and Statistics 2011a).

<sup>20</sup> These categories comprise housing & household services, fuel & lighting, personal care, health care, transport, communication, recreation, education, clothing & footwear and other ad hoc expenditure. Certain non-food expenditure items include some imputed expenditure elements (e.g. the rental value of owner-occupied housing and the value of free housing, particularly in the estate sector) (Department of Census and Statistics 2011a).



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Additionally, we have adjusted for possible district level price variability of food expenditures using a spatial price index (SPI) for 2009/10 calculated by the DCS<sup>21</sup>, and therefore, the dependence of equivalence scales on prices will henceforth be dropped (Department of Census and Statistics 2011b).

**Tab.1** - Summary statistics for households with male and female

	Male headed	Female headed
<b>Panel A: demographic characteristics</b>		
<b>Number of observations</b>	14,402	4,417
<b>Age of head</b>	49.51	53.76
<b>Household size</b>	4.41	3.99
<b>Dependency ratio*</b>	0.38	0.43
<b>Share of 65+ in the households</b>	0.11	0.21
<b>Share of 0-17 in the households</b>	0.26	0.22
<b>Panel B: household consumption</b>		
<b>Food expenditure share</b>	0.54	0.54
<b>Total household expenditure</b>	28,150	24,956
<b>Per-capita total expenditure</b>	6,953	7,064
<b>Monthly Per adult equivalent total expenditure</b>	9,324	9,578

*Note: The dependency ratio is the ratio between dependents (children aged 0-17, and the elderly aged 65+) and the number of people of working age (aged 18-64).*

*Household expenditure data is given in Sri Lankan Rupees.*

*Source: Author's calculations based on Department of Census and Statistics (2011a)*

Table 1 provides summary statistics for households with male and female heads, at the national level and at the sectoral level. Panel A presents demographic characteristics of the households while, Panel B provides statistics on household consumption. At the national level, about 23 per cent of the households are female-headed, while the highest percentage of female heads (27 per cent) live in the urban sector. Female heads in our dataset are on average older than male heads. The size of female-headed households is smaller than that of male-headed with relatively higher dependency ratio. In this study, we define the dependency ratio as the ratio of dependents (children aged 0-17, and the elderly aged 65+) to the number of people of working age (between 18-64). It appears to have higher old-age dependents in female-headed households compared to those of their male counterparts. Panel B of Table 1 show the food expenditure shares of female-headed households are slightly higher than those of their male counterparts, at the sectoral level, while the shares are identical at the national level. In terms of per-capita and per adult equivalent total expenditure, there are no notable and systematic differences based on the gender of the household head. Nevertheless, the total household expenditure in female-headed households are consistently smaller than those of male-headed households.

<sup>21</sup> Ideally, non-food expenditures also should be adjusted for district level price differences. However, due to unavailability of district or sector specific price indexes for non-food expenditures, we use the national average price for non-food items in this study.

## 5 RESULTS AND DISCUSSIONS

### 5.1 Food consumption economies of scale

Table 2 presents the parameter estimates of the Engel curve for food, for male and female-headed households, at the national. The R-squared values of 50 and 46 per cent indicate that the estimated food Engel curves fit reasonably well to our cross-sectional Sri Lankan data. According to Engel's law, which suggests that the expenditure share on food declines with household income, we expected the  $\beta_1$  and  $\beta_2$  coefficients, in our regression estimates, to be negative. However, the  $\beta_1$  coefficients the estimated models are positive and are accompanied by negative  $\beta_2$  coefficient. This indicates that the foodshare increases with PCI at a decreasing rate. The negative and significant coefficients relating to the number of adults ( $\gamma_1$ ) and number of children ( $\gamma_2$ ) implies that when the household size increases by one adult (or child), the foodshare declines. This inverse relationship is in accordance with our expectations as this implies that due to food consumption scale economies, an additional adult (or child) adds less than double to food expenditure. Due to higher food needs of adults than those of children, the decline in foodshare at the presence of an additional adult is smaller than that of an additional child. The consistently smaller  $\gamma_1$  coefficient than that of  $\gamma_2$  reflects these differences in consumption needs of the adults and children. The interaction term between the number of adults and the number of children ( $\gamma_3$ ) denotes a negative joint impact on the food expenditure share. This observation is also in line with our expectations, due to food consumption scale economies.

Panel A and B of Table 3 reports the marginal equivalence scales for male and female-headed households at the national level. The equivalence scales measure the cost of an additional household member (in this study, an adult), taking the possibility to share goods within the household into consideration, the higher equivalence scales the lower the economies of scale in consumption. The marginal equivalence scale refers to the change in the cost of remaining at the same standard of living, measured in terms of food consumption, when household size increases by one adult. In the household size column, the left hand side and right hand side figures indicate the number of adults and children, respectively. In Panel A, the marginal equivalence scale of 0.30 for 2,0-3,0 household type in 1<sup>st</sup> income quartile implies when household size increases from 2,0-3,0, the 3,0 household requires 30 per cent additional income to remain in the same standard of living they enjoyed when they had only two adults (2,0) in the household.

The estimated marginal equivalence scales show that those for female-headed households are consistently smaller than those of the male-headed households. These results indicate that the cost of an additional adult, in terms of expenditure on food, in female-headed household is smaller than that of their male-headed counterparts, suggesting that, at a given household size, female-headed households achieve greater FCSE. This observation is in line with the existing literature, as discussed in Section 2, that female household heads possess better household food management skills received via learning-by doing through their mothers.

**Tab.2** - Regression estimates for Engel curves for food by gender of the head of the household

	<b>Male-headed</b>	<b>Female-headed</b>
$(\beta_0)$ Constant	0.499 (0.004)	0.591 (0.035)
$(\beta_1)$ $\ln \frac{x}{n}$	0.247 (0.000)	0.214 (0.001)
$(\beta_2)$ $(\ln \frac{x}{n})^2$	-0.026 (0.000)	-0.024 (0.000)
$(\gamma_1)$ $n_a$	-0.0314 (0.000)	-0.035 (0.000)
$(\gamma_2)$ $n_c$	-0.037 (0.000)	-0.043 (0.000)
$(\gamma_3)$ $n_a n_c$	0.007 (0.000)	0.008 (0.000)
<b>Number of observations</b>	14,402	4,417
<b>Root MSE</b>	0.118	0.124
<b>R-squared</b>	0.499	0.460

*Note: Dependent variable is the expenditure share on food for male- and female-headed households, respectively. p-values are given in parenthesis.*

*Source: Author's compilation based on Department of Census and Statistics (2011a)*

A range of factors could explain the differences in equivalence scales and the resulting FCSE in male-headed and female-headed households. These factors are linked with gender of the household headship-based differences in household characteristics and food consumption behaviours. One possible reason for higher FCSE enjoyed by female-headed households is the lower income levels associated with such households compared to male-headed households. This observation is in line with the literature that reveal that lower household income is associated with higher consumption economies of scale (Jayasinghe et al. 2016).

Another important reason for higher FCSE among female-headed households, as observed in this study, may be linked to gender-based social and cultural norms that are embedded in traditional societies. In many societies women play an important role in household food supply as food producers, processors, preparers, and food providers for the family (Kennedy and Peters 1992, Greenstein 2000, Quisumbing et al. 2001, Ibnouf 2012). The cultural setting in Sri Lanka has also been constructed in such a way that women play the key role in domestic food supply. As such, they have been traditionally responsible in ensuring the availability and access to food, and the utilisation of available food wisely. Usually, mothers impart this traditional knowledge about effective management of food supply on to their daughters. While farming and food production have been the main responsibility of men, with some assistance provided by women, the availability of food for the consumption of family members has been mainly regarded as women's work. A study conducted in Sri Lanka by Kalansooriya and Chandrakumara (2014) revealed that the majority of the women in the sample used some kind of food preserving method to ensure the availability of food during scarce times. Women usually stockpile additional food during the peak availability season and when they are cheaper, and preserve them in the form of drying vegetables, yams, and fish, and preparing pickles and chutney for later use. Adult females in the family have traditionally passed on such knowledge to young female members. Results of that study also

showed that about 84 per cent of the female household heads in the sample, in rural areas, paid greater attention to preparing every meal at home for their family members to avoid the consumption of food prepared outside. Such practices among the female household heads, particularly in the face of lower income levels and fewer or no support from a male partner, may contribute towards the higher FCSE in households headed by females.

**Tab.3** - Marginal equivalence scales for food

<b>Marginal Equivalence Scales for Food</b>			
<b>Household size</b>	<b>Panel A: male-headed Households</b>		
	1st quartile	Sample mean	3rd quartile
	Rs.16, 120	Rs.28, 150	Rs.34, 651
<b>1,0-2,0</b>	0.43 (0.005)	0.43 (0.004)	0.44 (0.001)
<b>2,0-3,0</b>	0.3 (0.003)	0.32 (0.001)	0.33 (0.002)
<b>3,0-4,0</b>	0.19 (0.020)	0.23 (0.004)	0.24 (0.003)
<b>4,0-5,0</b>	0.11 (0.010)	0.15 (0.004)	0.16 (0.004)
	<b>Panel B: female-headed households</b>		
	1st quartile	Sample mean	3rd quartile
	Rs.13, 606	Rs.24, 955	Rs. 30, 875
<b>1,0-2,0</b>	0.42 (0.010)	0.41 (0.020)	0.42 (0.003)
<b>2,0-3,0</b>	0.29 (0.004)	0.27 (0.003)	0.29 (0.010)
<b>3,0-4,0</b>	0.18 (0.004)	0.15 (0.002)	0.18 (0.001)
<b>4,0-5,0</b>	0.09 (0.011)	0.05 (0.005)	0.1 (0.010)

*Note: Bootstrapped standard errors are given in parenthesis.*

*Source: Author's compilation based on Department of Census and Statistics (2011a)*

## 5.2 Poverty Estimates by Gender of the Head of the Household

Table 5 provides the percentage of poor households, separately for male and female-headed households, under the conventional per-capita expenditure (PCE) approach and the alternative expenditure per equivalent adult (EPEA) approach. This exercise allows an examination of the effects of FCSE on poverty associated with household headship in the context of Sri Lanka

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**Tab.5** - Percentage of poor households under per-capita income and expenditure per equivalent adult, by gender of the head of the household

	Male-headed			Female-headed		
	PCE	EPEA	Change the percentage of poor households	PCE	EPEA	Change the percentage of poor households
National	12.48 (0.003)	3.08 (0.002)	9.4	12.63 (0.006)	3.05 (0.003)	9.58
Urban	4.38 (0.004)	1.08 (0.004)	3.3	5.97 (0.008)	1.52 (0.005)	4.45
Rural	13.17 (0.004)	3.49 (0.002)	9.68	12.8 (0.007)	2.63 (0.003)	10.17
Estate	22.88 (0.015)	6.91 (0.008)	15.97	30.89 (0.030)	8.43 (0.018)	22.46

*Note: Standard errors are given in parenthesis. The percentage of poor households was calculated using the national poverty line set of Rs. 3,028.*

*Source: Author's compilation based on Department of Census and Statistics (2011a)*

## 6 CONCLUSIONS

This study investigated whether the gender of the head of the household affects the level of FCSE achieved by households and examined the effect of such differences in FCSE on poverty measurements. For that purpose, this study considered a broader definition of female-headed households. The results indicated that the female-headship is associated with higher FCSE at the national.

One possible reason for higher FCSE observed among the female-headed households is that their income levels are lower than their male-headed counterparts. In addition to that, women's knowledge on indigenous food preparation and preservation methods, usually received from their mothers, may allow them an effective utilisation of food resources. This may play a significant role in lowering the cost of food consumption in female-headed households, particularly those that are in the rural areas. The results the poverty levels reveal that poverty head count ratio in both male-headed and female-headed households decline after necessary adjustments for FCSE are allowed for. By incorporating the concept of CSE, this study provides some interesting insights into the widespread discussion on household headship and poverty, taken from a different perspective.

As a future research direction, it would also be useful to explore the impact of different categories of female headship (e.g. widowed, divorced or temporally separated from the out-migrated male partner) on FCSE and their poverty status. Such an analysis could provide insights into sectoral and income level differences as well as to the types of social networks that could be facilitated by public authorities to better address the poverty being experienced by many female-headed households.

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