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# The behaviour of household food consumption expenditure in Sri Lanka (2006–2016): An APE approach in urban, rural, and estate sectors

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## Abstract

The Average Propensity to Expend (APE) is one of the tools to analyse a household's food consumption expenditure behaviour. The objective of the study is to find out urban, rural and estate sector household's food expenditure patterns using the APE method. For that micro data gathered from HIES in 2006/07, 2009/10, 2012/13 and 2016. The study area was selected as Badulla, Kandy, Nuwara-Eliya and Ratnapura districts which consist of all three sectors in each district and comprise a minimum of 5% of the population in each sector. Totally 13881 samples consisting of urban 2010, rural 8508 and estate 3363 were selected. Ten major food groups of 112 food items and monthly household total expenditure and monthly household food group expenditure data were used for analysis. Results showed that APE on rice, wheat, pulses, egg and milk foods was relatively high in the estate sector; bread, meat and fish were relatively more APE in the urban sector and APE on vegetables and coconut was relatively higher in the rural sector. Relatively more APE variation observed in the estate sector implies that estate sector households were more responsive to income increases.

**Keywords:** APE Approach, Expenditure Pattern, Double log Linear Regression

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## Introduction

The Average Propensity to Expend (APE) can be referred to as the percentage of income spent on goods and services by an individual. It is arrived at by dividing the total amount spent on household consumption expenditure by the total disposable income. An increase in the APE denotes a high demand for goods and services. An increase or decrease in the APE also determines the propensity to save. The opposite of the APE is the Average Propensity to Save (APS). A tendency of incremental savings harms the APE. High-income households have less APS. However, in the case of a fresh earner, an increase in income has an incremental effect on the APE. Low-income families have a higher propensity to spend. They tend to spend most of their monthly earnings on essential goods and services. The APE and the savings ratio are expressed as a percentage of the total disposable income. Consumer spending helps in boosting the economy. When there is a high demand for the supply of goods, more goods are purchased, more people are employed, and more businesses are open. When people tend to save, it can negatively affect the economy as people purchase fewer goods and services. It indicates that there is a low demand for goods and services, resulting in fewer jobs, and increased business closures. Ideally, the sum of the APE and the APS is equivalent to one. Because households use all income for either saving or consumption. Contrary to the APE, the APS is calculated as the percentage of total income used for saving rather than spending on goods and services. The APE could also be calculated by subtracting the APS from 1. The APS is also known as the savings ratio, and it is usually expressed as a percentage of total household disposable income (income minus taxes).

Human life is ultimately nourished and sustained by food consumption. During the last few decades, world food consumption has changed in different quantities. Food consumption contributes to human development when it enlarges the capabilities and enriches the lives of people. An analysis of household food consumption patterns has become topical due to the impact of household decisions on economic development and policy planning purposes (Deaton et al., 1989). Many studies have been undertaken over the last two decades and from them, much has been learnt in both developed and developing countries (Thomas, 1990). Many approaches have been used to measure food consumption pattern analysis. An Average Propensity to Expend (APE) is one of the tools to determine food consumption patterns.

The Average Propensity to Expenditure (APE) can often be considered more suitable than the Average Propensity to Consume (APC), depending on the analytical context. First, APE provides a broader measure of household behavior as it includes both consumption and non-consumption expenditures, such as spending on education, health, housing, and durable goods, whereas APC focuses only on consumption spending and often excludes investment-type expenditures by households. Therefore, APE offers a more comprehensive picture of how total income is utilized. Second, it reflects real expenditure patterns. In many developing countries, including Sri Lanka, households allocate a significant portion of their income to semi-durable and durable goods, loan repayments, and social obligations, which are not always strictly categorized as consumption. Consequently, APE captures actual economic behavior more accurately than APC. Third, APE is useful for welfare and policy analysis, as policymakers often examine total expenditure behavior to assess living standards and aggregate demand rather than focusing solely on consumption. It is thus more relevant for macroeconomic policy, particularly in studies of income distribution, poverty, and expenditure elasticity. Fourth, APE is more compatible with household survey data.

Empirical surveys such as the Household Income and Expenditure Survey (HIES) generally collect information on total household expenditure rather than only consumption, making APE a more practical and consistent measure. Finally, APE captures economic development effects more effectively. As income increases, the share of income devoted to consumption typically declines (as suggested by Engel's Law), while spending on education, transport, durable goods, and recreation rises. By encompassing these elements, APE better reflects structural changes in household behavior associated with economic development. Hence, the APE is more appropriate than the APC as it provides a broader, more realistic, and policy-relevant understanding of household spending behavior, especially in developing economies where non-consumption expenditures represent a significant share of total outlays.

Expenditure share can be analysed in terms of the proportion of expenditure for a specific purpose or commodity within the total consumption expenditure. On the other hand, it is also possible to analyse the consumption expenditure for a particular commodity as the ratio of household income, which is the approach to be followed in the present study. The most important factor influencing consumption expenditure is income. APE is one of the important indices for macroeconomic policy in the context that household consumption is one of the driving forces of economic growth, thus economic growth is largely dependent on APE (Kim & Rho, 2017). On the other hand, if APE (the share of food expenditure within the disposable income) is high, it means that households spend relatively more on food, thus policy interest in food prices such as price stabilization receives more attention (Lee et al. 2007; Lee et al. 2016). Therefore, APE has become an important index for the government's food policy. Lin et al. 2023 aimed to measure the impact of education, health, housing, dependence and income growth on the APE of urban Chinese households by income level. They used quantile regression for analysis. Results showed that health harms the APE and that education and dependence have a positive relation.

Baldacci et al. (2010) indicated that the government's social spending had a non-linear impact on household savings, and governmental spending on health care had the largest negative impact on household savings. The effects of government social spending on education could only be observed when the "individual social spending" is considered separately. In that sense, expenditure on education might have a different relationship with the APE. On the other hand, Rehman et al. (2011) employ a micro-econometric method to study the socioeconomic and demographic factors influencing household savings of various income groups. They concluded that education, children's educational expenditure, family size, liabilities and the value of a house are reducing factors for household savings. In the study of Abid and Afridi (2010), they also found the same evidence that education is inversely related to savings. From this point of view, the household expenditures on education are dependent on savings, and this result compresses other expenditures in the household resulting in the decrease of APC.

Ceritoglu (2017) also examines the relationship between house prices and household consumption in Turkey, their finding suggests that house price changes have a positive and significant effect on the growth of cohort consumption. Also in the study of Alp and Seven (2019), they explore the issue of household final consumption in Turkey, consistent with Ceritoglu (2017), their finding reveals that housing wealth is positively associated with consumption. Shen (2018) stated that the increase and decrease of consumption propensity coexist for groups of different wealth levels. The APC tends to increase for households with more than one unit of houses, and management levels or owners of corporations as compared with households of non-

homeownership or wage level groups, especially as the economic growth and the housing prices accelerated in recent years. To cope with the decline in consumption and house prices, the Department of Treasury upgraded the risk level of local government debts to risk-free from its original 20% to stimulate economic growth through fiscal tools (Tsai, 2018).

The consumption of food items in any household is generally the function of the income of the household, prices of commodities, taste of the consumer and other factors. The consumption function establishes a relationship between consumption and real disposable income of the consumer treating other factors constant (Capps, 1982; Ahamad et al., 2015). APE measures the proportion of income that households desire to spend on any food item. Households living in sectors make expenditures on different commodities to attain utility and satisfaction. The expenditure on food commodities is most important in household behaviour as food is a basic nutritional ingredient for every human being. Therefore, the objective of the study is to examine monthly household food expenditure behaviour in urban, rural and estate sectors in Sri Lanka by using Average Propensity to Expend method.

The APE method, though useful in depicting the general relationship between total expenditure and income, has several limitations. First, it provides only an average ratio and fails to capture the behavioral responses of households to changes in income, unlike marginal measures. Second, the use of aggregate data introduces aggregation bias, masking variations across income groups and expenditure patterns. Moreover, the assumption of a linear relationship between expenditure and income is unrealistic, as expenditure typically rises less than proportionately with income. The method is also highly sensitive to income measurement errors, particularly in contexts where informal income sources are prevalent. In addition, since APE includes non-consumption expenditures such as housing, health, and durables, it blurs the distinction between consumption and investment, complicating interpretation. Being a static measure, it cannot account for temporal or structural changes in spending behavior, and it has limited usefulness for policy formulation or forecasting. Finally, cross-country or inter-sectoral comparisons using APE may be misleading due to differences in price levels, cultural habits, and purchasing power.

## Methodology

This study was conducted based on publicly available secondary data from the Household Income and Expenditure Survey (HIES) conducted by the Department of Census and Statistics, Sri Lanka. For that, HIES of 2006/7, 2009/10, 2012/13 and 2016 data were used in this study. The details of the data collection for the survey are as follows. The sample design of the survey was a two-stage stratified random sampling of Neymann allocation from Urban, Rural and Estate sectors. Microdata was collected at the field in twelve consecutive monthly rounds to capture seasonal variations in income, expenditure and consumption of household's weekly records. A standard structured questionnaire was used to collect data for the survey through direct interviews. The survey questionnaire was further expanded beyond the collection of demographic, income, and expenditure information. Seven additional sections were introduced to capture a broad range of household characteristics, enabling a more comprehensive assessment of the living standards of the households.

In this study, a household was used as the sample unit and the district was selected as the study area. The study area was chosen based on two conditions. First, it consists of all three sectors in each district; second, each district comprises a minimum of 5% of the population in each sector. Accordingly, Badulla, Kandy, Nuwara-Eliya and Ratnapura districts were selected as the study areas in this study.

The surveyed sample households selected for this study were Badulla - 2998; Kandy - 4378; Nuwara Eliya - 2878 and Ratnapura - 3627 districts. Totally 13881 households were selected as samples for this study. Table 1 shows the distribution of the sample by sector. It explains that the given four HIES consist of 2010, 8508 and 3363 households selected in urban, rural and estate sectors respectively shown in Table 2.

**Table 1.** Number of Survey Sampled Households by Districts

HIES Survey Year	Number of households surveyed				Total
	Badulla District	Kandy District	Nuwara-Eliya District	Ratnapura District	
2016	762	1315	813	1042	3932
2012/13	731	983	791	825	3330
2009/10	743	1010	615	871	3239
2006/07	762	1070	659	889	3380
<b>Total Households</b>	<b>2998</b>	<b>4378</b>	<b>2878</b>	<b>3627</b>	<b>13881</b>

Source: HIES Reports in 2006/07, 2009/10, 2012/13 and 2016

**Table 2.** Number of Survey-Sampled Households by Sectors

HIES Survey Year	Number of households surveyed			Total
	Urban	Rural	Estate	
2016	323	2883	726	3932
2012/13	615	1830	885	3330
2009/10	509	1849	881	3239
2006/07	563	1946	871	3380
<b>Total Households</b>	<b>2010</b>	<b>8508</b>	<b>3363</b>	<b>13881</b>

Source: HIES Reports in 2006/07, 2009/10, 2012/13 and 2016

One hundred twelve (112) food items listed in the food category of household expenditure were aggregated to provide monthly food expenditures on ten food groups separately. The main types of food groups used in this study were Rice, Wheat flour, Bread, Pulses, Vegetables, Meat, Fish, Egg, Coconut and Milk & Milk Products. Each food group consisted of food items listed in the HIES given below;

- 1) Rice: White Kekulu Normal, White Kekulu Samba, Red Kekulu Normal, Red Kekulu Samba, Samba, Nadu Red, Nadu White, Basmathi and Other Rice
- 2) Wheat flour: Wheat Flour
- 3) Bread: Normal Bread
- 4) Pulses: Gram Dhal, Masoor Dhal, Watana Dhal, Green Gram, Gram, Red Cowpea, White Cowpea, Soya, Soya Meet, Other Pulses

- 5) Vegetables: Ash Plantain, Brinjal, Ladies Fingers, Bitter Gourd, Thuba Karivila, Long Beans, Snake Gourd, Ridge Gourd, Pumpkin, Beans, Carrot, Beetroot, Cabbage, Cauliflower, Tomatoes, Leeks, Knol Khol, Capsicum, Winged Bean, Radish, Drumstick, Cucumber, Cooking Melon, Ash Pumpkin, Wild Eggplant, Plate Brush, Kohila Yams, Lotus Stem, Plantain Flower, Ambarella, Raw Mango, Raw Cashew Nuts, Mushroom, Immature Jack, Other Vegetables, Mukunuwanna, Gotukola, Kankun, Kathurumurunga, Spinach, Thampala, Sarana, Kohila Leaves, Onion Leaves, Cabbage Leaves, Other Leaves, Jack & Jack Seed, Bread Fruit, Potatoes, Sweet Potato, Mannioc, Kiriala, Innala, Other Yams
- 6) Meat: Chicken, Beef, Mutton, Pork
- 7) Fish: Balaya, Seer, Shark, Paraw, Thalapath, Tuna (Kelawalla), Mullet, Other Large Fish, Sprats, Hurulla, Karalla / Katuwalla, Kumbala / Angila, Salaya / Sudaya, Other Small Fish, Lula, Theppli / Telapiya / Korali, Catla / Rohu, Other Fresh Water Fish
- 8) Egg: Hen Eggs
- 9) Coconut: Coconut Nuts
- 10) Milk & Milk Products: Cow Milk, Goat Milk, Sterilized Milk, Curd, Yoghurt, Condensed Milk, Milk Powder, Infant Milk Powder, Butter, Margarine, Cheese, Milk Packets, Other Liquid Milk

Monthly household data utilized in this study were total food expenditure, and expenditure on each food group. The Ordinary Least Square (OLS) technique and STATA 15 were used to analyze data.

### **Food Expenditure Share (FES)**

The food expenditure share (FES) by households is an indicator that measures the percentage of a household's total consumption expenditure that goes towards food. It's a way to assess a household's economic vulnerability without needing to compare it to a poverty line or minimum expenditure basket. The higher the FES, the more vulnerable the household is to food insecurity. It provides an understanding of how much of a household budget is used for food. The household share of food expenditure (as a proxy for income) is an indicator of household food security, especially helpful in understanding the impact of food price fluctuations on the quality and quantity of household food consumption.

### **Average Propensity to Expend (APE)**

In Keynes's theory, he conjectured three ideas: The first important idea is the MPE which means the amount consumed out of an additional dollar of income, so the MPE should be between 0 and 1. The second conjecture is the consumption ratio to disposable income, which could be called APE. Keynes thought the APE would fall when the disposable income rises, so the rich people would save more percentage of their income than the poor people. At the last, in Keynes's view, income is the main determinant of consumption and the interest rate is not an important factor.

APE measures the proportion of income that households desire to spend on any item, which can be defined as  $\frac{x}{y} = \text{APE}$ . Where  $x$  is the monthly household total expenditure on rice (LKR),  $y$  is the



monthly household total income (LKR). It measures the slope of the radian from the origin to the appropriate point on the consumption function. The proportion of total income that a household desires to expend on food is a simple and dimensionless measure that is easily computed and well understood.

Hence, it can be recommended as a measure of welfare. The proportion of income on any item is used as the basis of the cost-of-living index. It is well suited for comparisons of households across regions (Prais & Houthakker, 1971; Visaria, 1981; Deaton, 1988), with household heads in different occupations and over time (Case & Deaton, 2015; Douglas, 2015).

Engel hypothesized that APE can serve as a good measure of the material standard of living of a population. APE behaviour can be used to test Engels' law. If the APE curve has a negative slope food is a necessity for all income groups. APE can be derived from linear double log Equation (1) is given below.

In this study, we used total expenditure as a proxy for income as an explanatory variable because income data generally suffer from measurement errors and may also include a transitory component of income (Burney & Khan, 1991) and the expenditures mostly reflect the permanent income of the households.

$$\ln RE = \beta_0 + \beta_1 \ln TI + u \quad (1)$$

$$\text{Average Propensity to Expend} = \frac{RE}{TI} \quad (2)$$

Where:

$RE$  – Household monthly rice expenditure (LKR)

$TI$  – Household monthly total income (LKR)

$\beta_1$  are the unknown parameters to be estimated and  $u$  is the stochastic error term.

## Results and Discussion

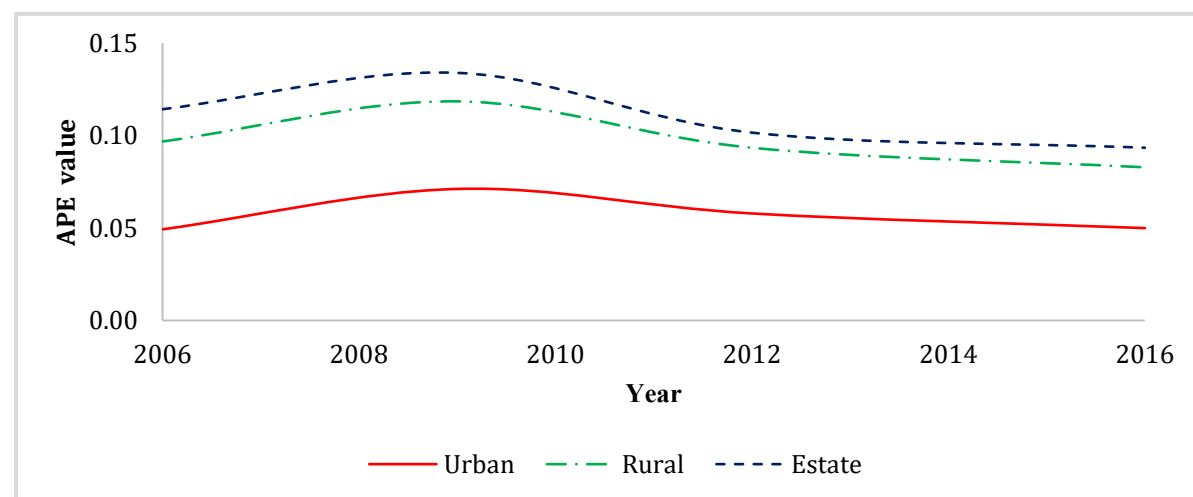
Household food expenditure share of ten types of food groups of urban, rural and estate sectors are estimated separately in 2006/7, 2009/10, 2012/13 and 2016 periods and given in Table 3. According to that, rice had the highest food share (0.124) in the estate sector and egg had the lowest food share (0.004) in the urban sector among the ten food groups.

The highest food expenditure share was observed in bread, meat and fish in the urban sector while vegetables and coconut food groups in the rural sector and rice, wheat flour, pulses, egg and milk food groups in the estate sector. The APE for ten food groups is estimated separately for all three sectors and explained graphically below.

**Table 3.** Food Expenditure Share by Sectors

Food Groups	Urban				Rural				Estate			
	2006/7	2009/10	2012/13	2016	2006/7	2009/10	2012/13	2016	2006/7	2009/10	2012/13	2016
Rice	0.049	0.071	0.057	0.049	0.097	0.118	0.093	0.082	0.124	0.113	0.101	0.093
Wheat flour	0.007	0.010	0.007	0.004	0.008	0.009	0.007	0.004	0.058	0.054	0.050	0.035
Bread	0.021	0.023	0.013	0.011	0.014	0.012	0.010	0.009	0.014	0.012	0.011	0.009
Pulses	0.016	0.022	0.016	0.016	0.023	0.026	0.022	0.021	0.030	0.034	0.029	0.030
Vegetables	0.038	0.038	0.044	0.039	0.068	0.063	0.067	0.061	0.069	0.063	0.061	0.059
Meat	0.019	0.022	0.018	0.019	0.010	0.011	0.011	0.014	0.013	0.012	0.019	0.020
Fish	0.020	0.020	0.022	0.017	0.012	0.015	0.014	0.015	0.009	0.011	0.009	0.009
Egg	0.004	0.005	0.005	0.004	0.005	0.004	0.005	0.005	0.006	0.005	0.006	0.008
Coconut	0.019	0.021	0.023	0.022	0.033	0.033	0.034	0.032	0.030	0.030	0.032	0.031
Milk	0.042	0.042	0.041	0.032	0.038	0.035	0.041	0.035	0.046	0.037	0.045	0.042

Source: Author's calculations

**Average Propensity to Expend for Rice****Figure 1.** Average Propensity to Expend for Rice

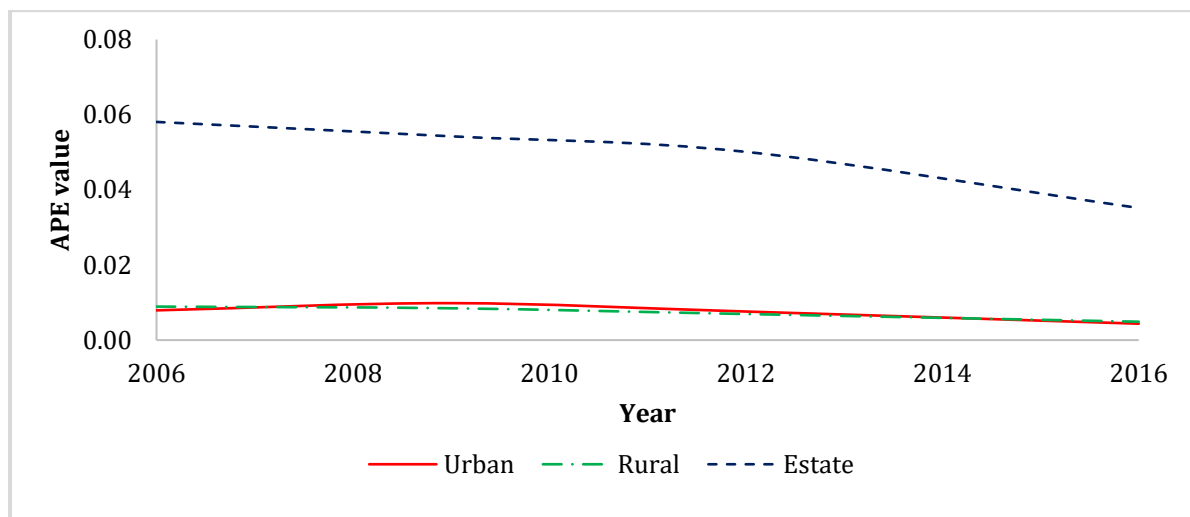
Source: Author's calculations



The estimated values of APE for rice (Figure 1) depict a marginal increase up to 2009 after that marginal decrease to reach the earlier level in all three sectors. There is a similar trend in APE for rice in all three sectors. The size of the APE ranges between 0.05 - 0.07, 0.08 - 0.12, and 0.09 - 0.13 in urban, rural and estate sectors, respectively. APE for rice is relatively higher in the estate sector than in the other two sectors. This is due to the food expenditure share on rice being relatively high in the estate sector (see Table 3). Further, the estate sector households spend an average of a larger share of their income on rice than rural and urban sector households, as their monthly income is relatively low.

### Average Propensity to Expend for Wheat Flour

The estimated APE for wheat flour shows a marginally decreasing trend in the estate sector and an almost constant trend in urban and rural sectors. The size of the APE ranges between 0.004 - 0.010 in the urban, 0.005 - 0.009 in the rural, and 0.035 - 0.058 in the estate sectors. The APE for wheat flour is averagely higher in the estate sector than in the other two sectors as they consumed more wheat flour in their food expenditure share (see Table 3). So, households that consume wheat flour are very responsive to income changes in the estate sector.

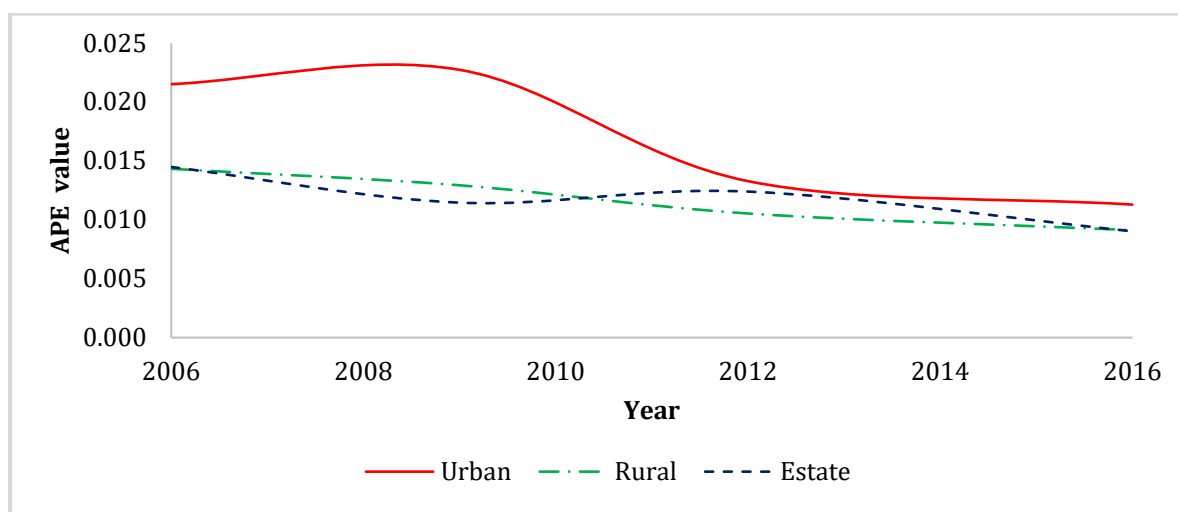


**Figure 2.** Average Propensity to Expend for Wheat Flour

Source: Author's calculations

### Average Propensity to Expend for Bread

The estimated value of APE for bread is marginally higher from 2006 to 2009 in the urban sector than rural and estate sectors (Figure 3). This is due to the high expenditure share of bread (see Table 3) which contributed to a greater quantity of bread consumption. There was a significant decrease in APE up to 2012 in the urban sector due to the decreasing food expenditure share, leading to less quantity consumption. Then, it marginally decreased to 2016 due to decreasing expenditure share, leading to a rapid increase in monthly income in the urban sector.

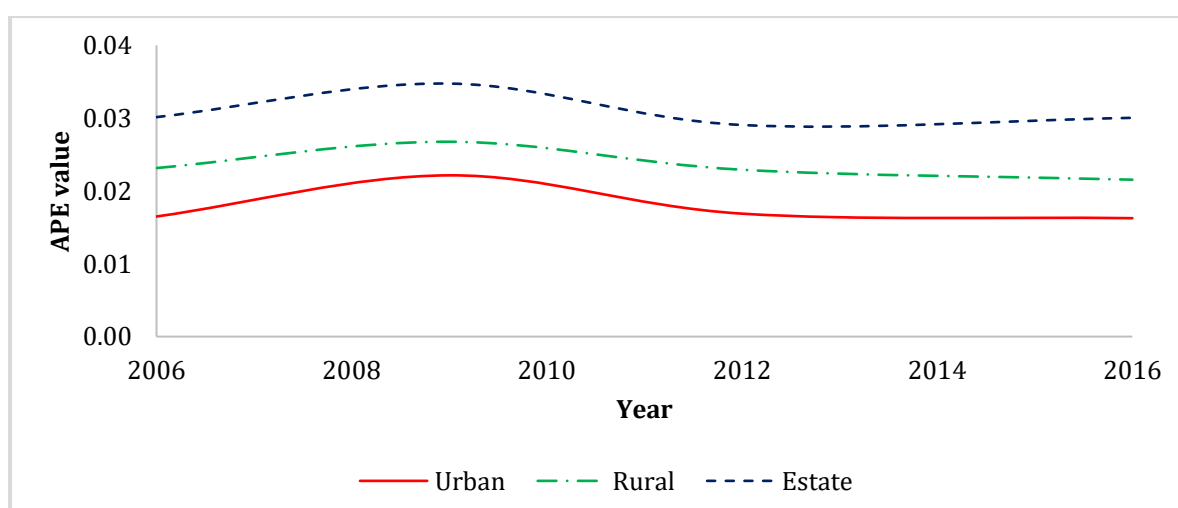


**Figure 3.** Average Propensity to Expend for Bread

Source: Author's calculations

Likewise, APE in the estate sector marginally reduced in 2009 due to low food expenditure share due to the low quantity of bread consumed. Then, it marginally increased to 2013 for a high expenditure share. After that, it marginally decreased due to low food expenditure share. APE in the rural sector has marginally decreased due to a decrease in food expenditure share. The size of the APE ranges from 0.011 - 0.023 in the urban and 0.009 - 0.014 both in the rural and estate sectors. APE for bread value in the urban sector is relatively higher than the other two sectors because of the higher food expenditure share (see Table 3). This means that urban sector households spend an average of more of their income on bread than households in other sectors. The APE on bread behaviour is relatively more regular in the rural sector while flexible in urban and estate sectors.

### Average Propensity to Expend for Pulses



**Figure 4.** Average Propensity to Expend for Pulses

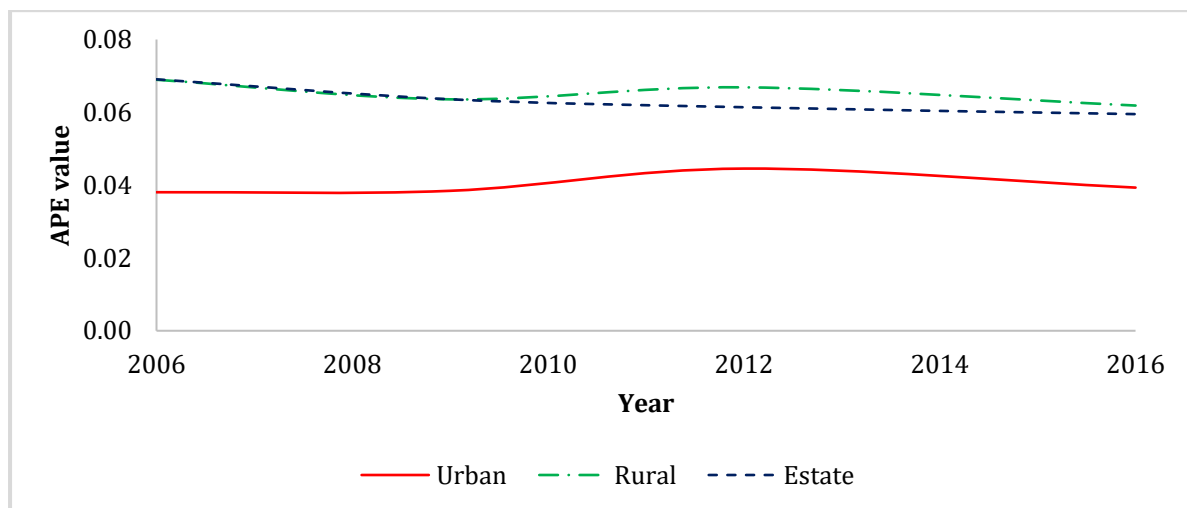
Source: Author's calculations

The APE for pulses given in Figure 4 depicts that APE on pulses marginally increased up to 2009, then marginally decreased, and reached an earlier level in all sectors. All three sector's patterns are parallel to each other. The value of APE for pulses ranges for urban, rural, and estate sectors

are 0.016 - 0.022, 0.022 - 0.027, and 0.029 - 0.035, respectively. APE for pulses value in the estate sector is higher than in other sectors due to the high food expenditure share (see Table 3). This means that estate sector households spent an average of more of their income on pulse than households in urban and rural sectors. So, estate sector households are very responsive to their income changes. The pattern of APE for pulse is relatively more identical in all three sectors.

### Average Propensity to Expend for Vegetable

The APE for vegetables shows changing patterns in urban and rural sectors while marginally decreasing in the estate sector. It marginally increased from 2009 to 2012, then it marginally reduced in urban and rural sectors due to food expenditure share behaviour. The APE values range for urban, estate, and rural sectors are 0.038 - 0.045, 0.060 - 0.069, and 0.062 - 0.069, respectively. APE for vegetables in the rural sector is relatively more than in other sectors due to the high food expenditure share. This means that rural households spend an average of more of their income on vegetables than other sectors. So, vegetable consumers in the estate sector are very responsive to income changes. The APE for vegetable behaviour was relatively regular in the estate sector while irregular in urban and rural sectors.

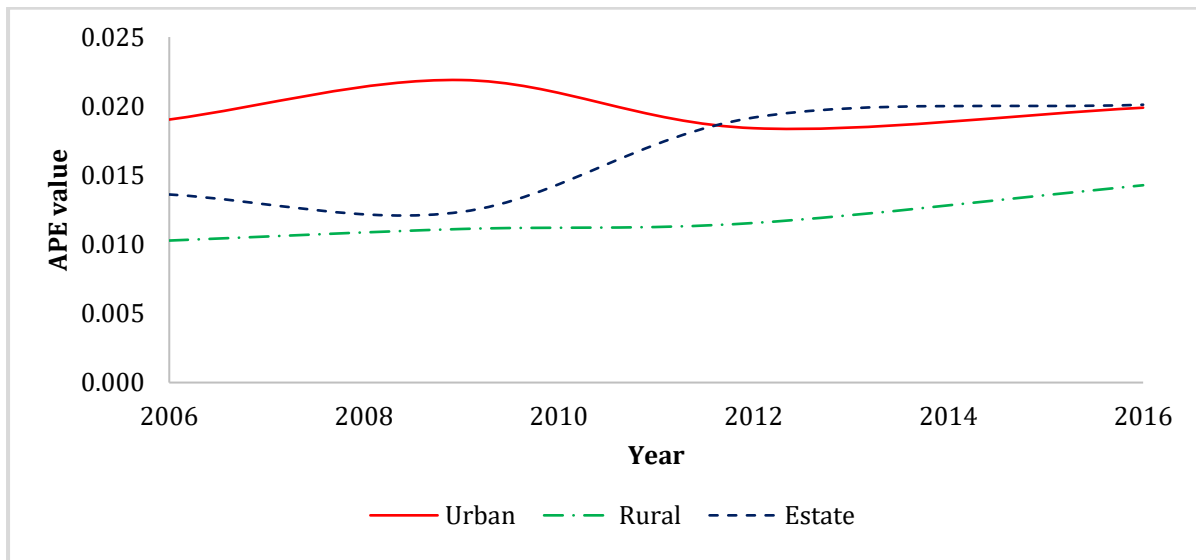


**Figure 5.** Average Propensity to Expend for Vegetable

Source: Author's calculations

### Average Propensity to Expend for Meat

The APE ranges from 0.018 - 0.022 in the urban sector, 0.012 - 0.020 in the estate sector and 0.010 - 0.014 in the rural sector (Figure 6). The APE for meat value in the urban sector is relatively higher than in other sectors since meat has a higher food expenditure share. The APE for meat marginally decreased from 2009 to 2012 due to the reduction of food expenditure share of household income in the urban sector. Similarly, due to increasing food expenditure share, which led to increased meat consumption quantity, it rapidly increased from 2009 in the estate sector (see Table 3). The urban sector meat-consuming households are very responsive to changes in income. The APE for meat behaviour was relatively regular in the rural sector while irregular in urban and estate sectors. The APE in the estate sector has exceeded that of the urban sector since 2012 because estate households consume more meat.

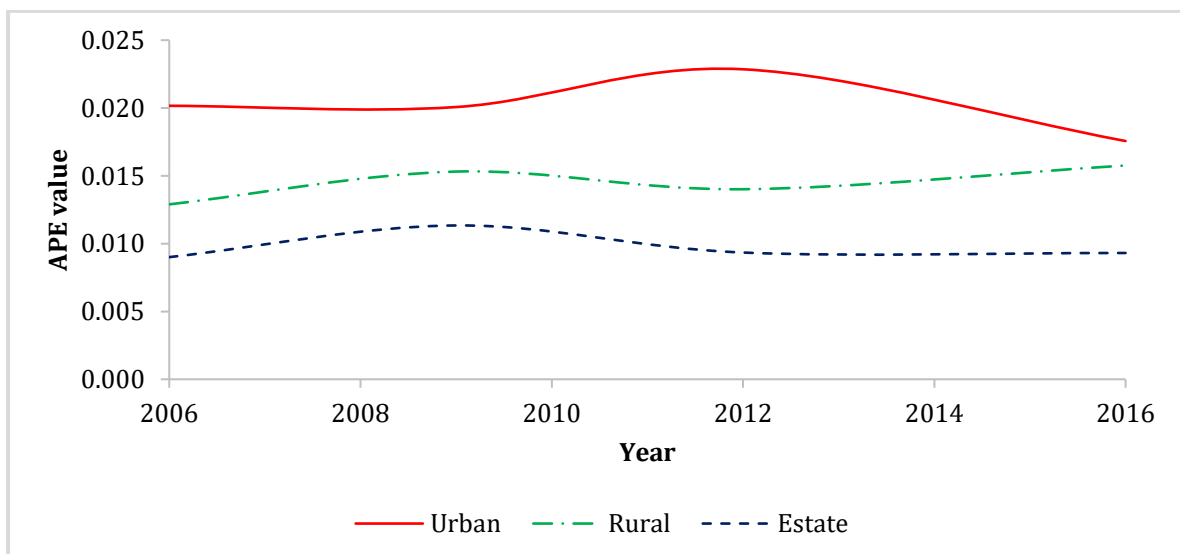


**Figure 6.** Average Propensity to Expend for Meat

Source: Author's calculations

### Average Propensity to Expend for Fish

The results of the Average Propensity to Expend for fish depict that the patterns fluctuate in all sectors. The APE range values for urban, rural, and estate sectors are 0.018 - 0.023, 0.013 - 0.016 and 0.009 - 0.011, respectively. APE for fish has been rapidly decreasing since 2012 due to increasing monthly income in the urban sector. APE for fish value in the urban sector is averagely higher than that of other sectors since it has a high food expenditure share. This means that urban sector households spend an average of more of their income on fish than households in other sectors. So, urban sector fish consumers are very responsive to their income changes. The APE for fish behaviour is relatively more regular in rural and estate sectors while uneven in the urban sector.

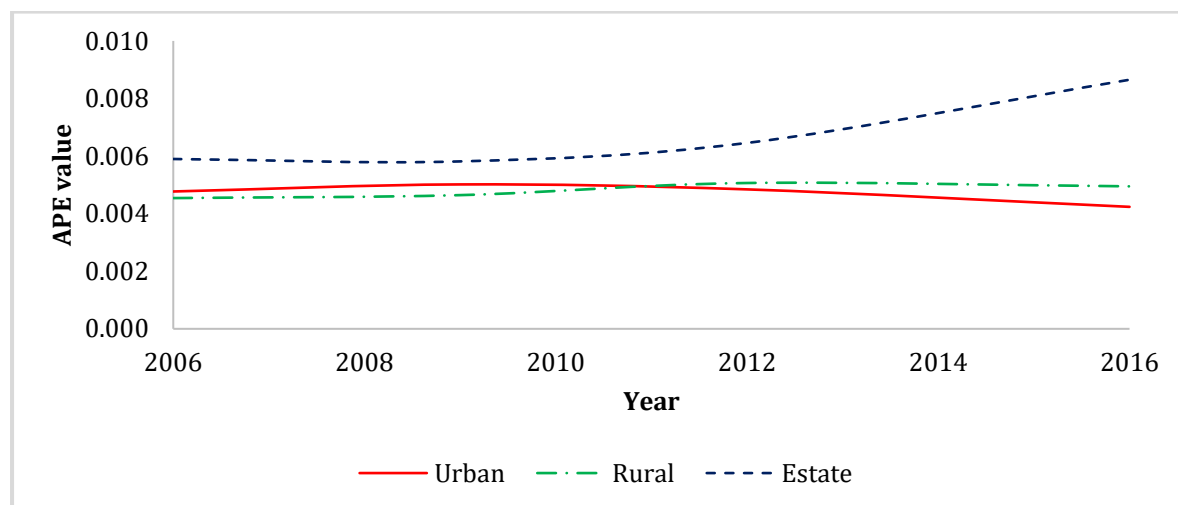


**Figure 7.** Average Propensity to Expend for Fish

Source: Author's calculations

## Average Propensity to Expend for Eggs

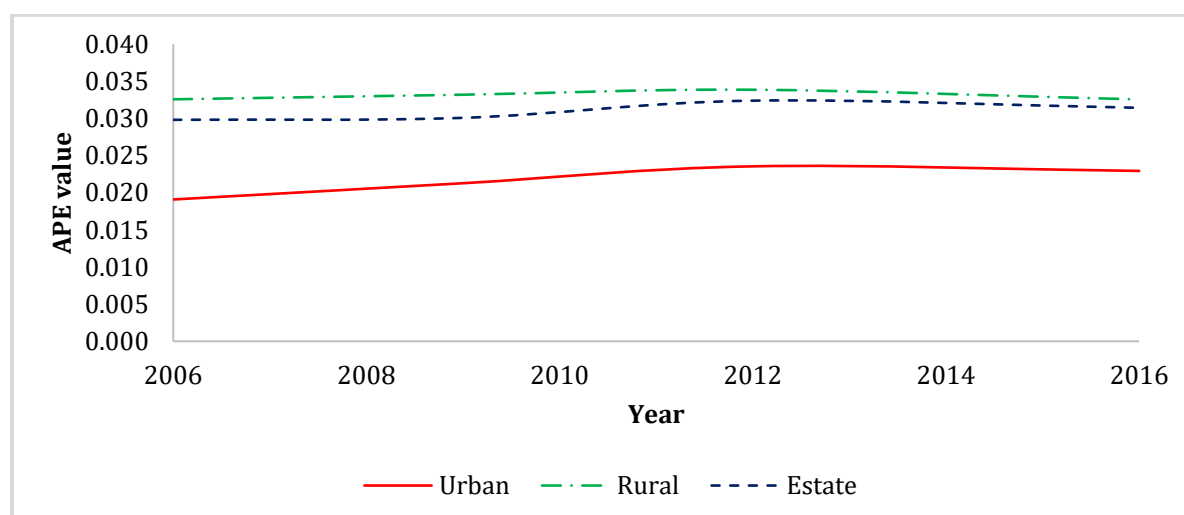
The APE for eggs ranges in rural, and estate sectors are 0.004 - 0.005 in urban, 0.004 - 0.005 in rural, and 0.006 - 0.009 in the estate sector (Figure 8). The APE for eggs marginally increased from 2010 in the estate sector due to increased food expenditure share, leading to increased consumption quantity. On average, APE for egg value in the estate sector is higher than in other sectors due to the high food expenditure share. This means that estate sector households spend relatively more of their income on eggs than other sectors. The APE for egg behaviour is relatively more regular in the estate and urban sectors, while it is flexible in the rural sector.



**Figure 8.** Average Propensity to Expend for Eggs

Source: Author's calculations

## Average Propensity to Expend for Coconut



**Figure 9.** Average Propensity to Expend for Coconut

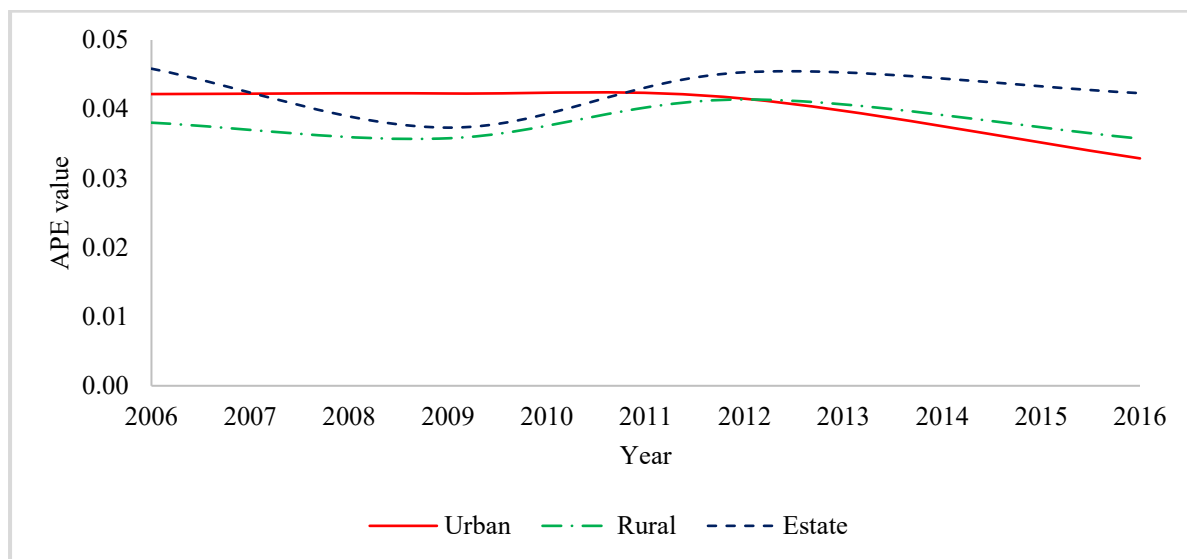
Source: Author's calculations

The estimated value of APE for coconuts shows a gradual increase in all three sectors (Figure 9). The APE ranges from 0.033 - 0.034, 0.030 - 0.032, and 0.019 - 0.024, in rural, estate, and urban

sectors respectively. The value of APE in the rural sector is relatively higher than that of other sectors due to the high food expenditure share. The APE on coconut behaviour is relatively steadier in all three sectors.

### Average Propensity to Expend for Milk and Milk Products

The APE for Milk and Milk Products depicts that the pattern is fluctuating in rural and estate sectors while decreasing in the urban sector (Figure 10). It declined from 2012 due to low food expenditure share in the urban sector. Further, it was very low in 2009 in the rural and estate sectors due to low food expenditure share. It has gradually decreased in rural and estate sectors since 2012.



**Figure 10.** Average Propensity to Expend for Milk and Milk Products

Source: Author's calculations

The APE ranges from 0.033 - 0.042, 0.036 - 0.041 and 0.037 - 0.046 for urban, rural and estate sectors respectively. The APE for milk and milk products in the estate sector is relatively higher than in other sectors. This means that households in the estate sector spent more of their income on milk and milk products than households in other sectors. The APE for milk behaviour was relatively more flexible in all three sectors. The pattern varies among the three sectors due to the changes in the expenditure share (see Table 3).

### Conclusions

The estate sector has a relatively higher APE for rice, wheat, pulses, eggs, and milk, as households in this sector spend a larger portion of their income on these food groups on average. Similarly, bread, meat, and fish show relatively higher APE in the urban sector, indicating that urban households allocate more of their income to these food groups. APE for vegetables and coconuts is relatively higher in the rural sector, reflecting higher expenditure on these food items by rural households. Rice, being a staple food in Sri Lanka, exhibits relatively higher APE across all sectors. Conversely, lower APE is observed for rice, pulses, vegetables, eggs, and coconuts in the urban sector, while the rural sector shows lower APE for wheat flour, bread, meat, and milk, with fish

being predominant in the estate sector. This suggests that households in the estate sector devoted a larger share of their income to milk and milk products than those in other sectors.

In general, relatively greater APE variation observed in the estate sector implies that households in this sector are highly responsive to changes in income. Additionally, APE behaviour was relatively more regular in the rural sector but more irregular in the urban and estate sectors. According to Deaton (1998), a smaller APE allocated to food could indicate a higher standard of living, suggesting that rural sector households, with the same food expenditure per household, enjoy relatively higher living standards than urban and estate sector households in Sri Lanka.

The APE method was identified as the most appropriate analytical approach for this study, as it effectively captures sectoral differences in household food expenditure shares. The estimated coefficients exhibit the expected signs and magnitudes, providing robust empirical support for Engel's law of food consumption across urban, rural, and estate sectors.

## Conflict of interest statement

The authors declare that they have no conflict of interest.

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