ISSN 1518-3548

BANCO CENTRAL DO BRASIL

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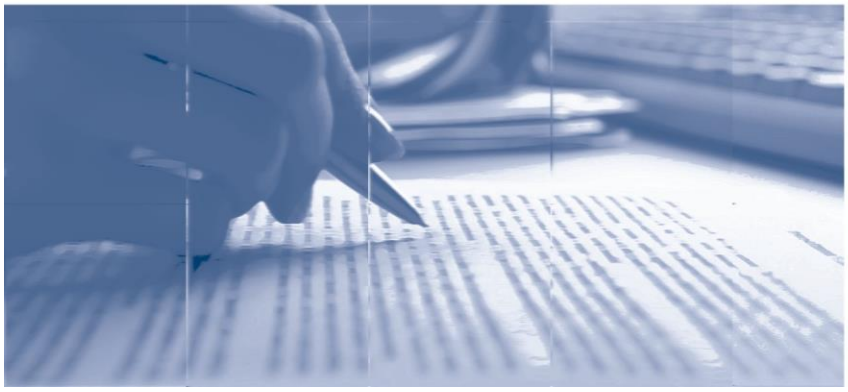
Andre de Queiroz Brunelli

March, 2015

Working Papers



381

ISSN 1518-3548
CGC 00.038.166/0001-05

Working Paper Series	Brasília	n. 381	March	2015	p. 1-34

Working Paper Series

Edited by Research Department (Depep) – E-mail: workingpaper@bcb.gov.br

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Demand for Services Rendered to Families in Brazil in the 2000's: An Empirical Analysis of Consumer Patterns and Social Expansion*

Andre de Queiroz Brunelli**

Abstract

This paper aims at investigating the structural relation between patterns of services consumption and income. We focus on how patterns of services consumption adjust to different levels of income by using the perspective of social expansion as a narrative approach for the Brazilian case in the last decade. We present evidence of nonlinearity in the relation between services consumption and income by using data of the last two versions (2002-2003 and 2008-2009) of the POF-IBGE. The main conclusion follows. Although the population rise of the middle class was remarkably larger than the increase of the richest class, total expenditure and its share on services of the richest class was sufficiently large for this class to outweigh the middle class in accounting for the growth of families' total expenditure on services. Thus, a policy implication arises. If one assume that Brazil is able to keep in a similar developing path that was experienced in the past decade, which combines expansion of the middle class and the richest class, then unless there are systematic increases in productivity stemming especially from the tradable sector, demand for services rendered to families is likely to be a source of persistent pressures on consumer inflation. The results additionally suggest that, other things equal, demand pressures will stem in special from *personal services* and *transportation* since consumption of these IPCA clusters has the particular feature of combining both a high share of total services consumption and a high sensitivity to income rises of Brazilian households in the period.

Keywords: Consumer demand; services consumption; social expansion
JEL Classification: D12; E31; C31

* The author thanks the staff of the Economic Consultancy – Chairman's Office, Fabio Jose Ferreira da Silva – Economic Department – and anonymous referees for helpful comments. Special thanks are due to Matheus Stivali – IPEA – for giving a valuable help with the POF database.
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1. Introduction

The Brazilian economy has experienced in the past decade structural changes and a rise of relative prices in favor of non-tradables activities, especially in the services sector. As a consequence, both the weight and the level of inflation of services prices that comprise de Brazilian consumer price index – IPCA – increased considerably (BCB, 2011a; BCB, 2011b; BCB, 2013).

Although this stylized fact seems challenging for economic policy, there is a lack of applied literature in Brazil up this time about the determinants of supply and demand of the services inflation. One exception is Santos (2014). The author stresses the sub-sectorial heterogeneity of the services inflation dynamics by doing a broad analysis of demand determinants and, especially, cost determinants of services inflation.

The contribution of this paper is to take a step back from the analysis of the links between services inflation and its determinants. In particular, we investigate the structural relation between patterns of services consumption and income. Therefore, we stand at the demand side of the services inflation analysis. However, we do not intend to investigate the determinants of services demand. Instead, we focus on how patterns of services consumption adjust to different levels of income by using the perspective of social expansion as a narrative approach for the Brazilian case in the last decade.

For this purpose, the data are drawn from the last two versions of the Family Budget Survey (POF) of the Brazilian Institute of Geography and Statistics (IBGE) – a household level data of families' budget and expenditures for the whole country in the years 2002-2003 and 2008-2009. Since our intent is to contribute to services inflation analysis, we define expenditures on services by including exactly the same basket of services comprised by services inflation that follows the current classification of the Central Bank of Brazil (BCB) since 2012 (BCB, 2011c).

Despite data limitation with respect to availability of price levels of goods and services and also the low frequency in which the POF is carried, the results raised are consistent with international literature. Clark (1951) argues that demand for services is non-homothetic: the expenditure share of services rises with income. Mazzorali and Ragusa (2013) present evidence consistent with Clark's view. They study, particularly, the provision increase of non-tradable time-intensive services – such as food preparation

and cleaning – in the US and show evidence that consumption of home services is responsive to income increases among higher wage-income groups.

Furthermore, consistently with Clark's view, we argue that demand for services is relatively income elastic. We show that between 2003 and 2009 (the last two versions of the POF), while per capita income increased especially among groups of lower income, the shape of the distribution of tradable goods consumption in the aggregate level virtually did not change with respect to per capita income. However, the distribution of services consumption became less unequal, which suggests that families in the left tail of the income distribution adjusted their consumption patterns to increased income.

We also assume that demand for services is relatively price inelastic, once we are not able to develop a complete (well-specified) demand system due to data limitation. Thus, we will not capture ideally how household characteristics interact with both income and price effects. However, that assumption might be weakened by the extensive literature that has arisen since Baumol (1967), which shows plenty of evidence that demand for task-intensive work – services in particular – is relatively price inelastic (Autor and Dorn, 2013).

In his seminal paper, Baumol (1967) argues that growing expenditures on services reflects unbalanced growth: because relative prices of technologically lagging activities (e.g., haircuts and educational courses) necessarily rise over time, an increasing share of societal income must be expended on these activities to maintain balanced consumption. As a corollary, demand for these activities is relatively price inelastic – otherwise expenditure would fall as relative prices rose.

All these considerations are references for other results that were raised. For example, we estimate Engels curves for services demand. Despite the limitations mentioned and under reasonable assumptions, the overall results are in line with prominent studies on this topic. In estimating the Engels curves, we consider an extension of the linear (Deaton and Muellbauer, 1980) and quadratic (Blundell et al.,1993) "almost ideal demand system" estimated on British data. Consumer demand patterns typically found in micro data sets vary considerably with different levels of income. Thus, we allow for nonlinear log-income terms in the expenditure-share equation, which as we shall see, represents the observed behavior in the POF survey

data quite adequately. This means that the relation between services consumption and income in Brazil is clearly nonlinear, which is consistent with the literature.

This stylized fact is important because the main result of this study stems from it. By considering the remarkable social expansion between 2003 and 2009, we follow Neri (2010) to define four economic classes ordered by real per capita income from the poorest to the richest families (E, D, C – middle class – and A/B – richest class). During this period, we see that population of both the richest class and especially the middle class grew at the expense of the decline of the poorest classes, E and D. The richest class increased by around 9 million people, while the middle class rose by approximately 42 million people. Although the population growth of the middle class was more than four times the one of the richest class (larger extensive margin of consumption), the average expenditure share on services of the richest class was considerably higher relative to middle class (larger intensive margin of consumption). Interestingly, it was sufficiently large for the richest class to outweigh the middle class in accounting for the rise of families' total expenditure on services in this period.

The results additionally state that *food away from household*, *housing charges*, *personal services* and *transportation* were the IPCA services clusters with the largest shares (weights) in families' total expenditure on services. Moreover, the parameters estimated on POF's data can be used to evaluate income elasticities across IPCA clusters (and its sub-items) and also across each economic class. To this respect, we argue that *personal services* and *transportation* not only stood out as shares in families' total expenditure on services, but they were also one of the most income elastic IPCA clusters in overall Brazilian society. It suggests, other things being equal, that the continuity of a similar pattern of social expansion that Brazil experienced in the past decade will imply demand pressures stemming especially from these groups.

In this regard, first, consider this structural nonlinearity between services consumption and income. Moreover, Baumol (1967) argues that in most of the services rendered to families there are only sporadic increases in productivity since inherent in technological structure of these activities are forces working almost unavoidably for progressive and cumulative increases in the real costs incurred in supplying them. In addition, conceive a hypothesis that Brazil is able to keep in a developing path that combines economic growth and social expansion. That is, both the middle class and the richest class – the economic classes that have expanded and whose expenditure shares

on services are relatively larger – are able to expand further. Thus, unless there are systematic increases in productivity especially in activities that are allowed by its technologically progressive structure (usually in the tradable sector) so that, innovations, capital accumulation and economies of large scale can offset this secular trend of cost increases in non-tradable activities; demand for services rendered to families is likely to be a source of persistent pressure on consumer inflation.

Besides this introduction, this paper is organized as follows: section 2 presents the data description. Section 3 discusses the results and section 4 presents the concluding remarks.

2. Data Description

In this study we draw data from the last two versions of the Family Budget Survey (POF) of the Brazilian Institute of Geography and Statistics (IBGE) – a household level data of families' budget and expenditure for the whole country in the years 2002-2003 and 2008-2009.

We use this data to characterize patterns of services consumption of families in Brazil in this period. Since our intent is to contribute to services inflation analysis, we define expenditure on services by including exactly the same basket of services comprised by services inflation that follows the current classification of the BCB in 2012. Furthermore, we focus specifically on how patterns of services consumption adjust to different levels of income. Thus, we use the perspective of social expansion as a narrative approach for characterizing the developments on families' (households')[2] services consumption and income in the Brazilian case.

With respect to the classification of the BCB, we pick services from the POF following the set of records of goods and services for each survey (2002-2003 and 2008-2009). Then, we cluster these services among the 66 sub-items[3] of the IPCA comprised in the basket of the BCB classification of services inflation in 2012.[4] Therefore, it includes only services freely traded (does not include supervised services). We opted for this year's classification because it is the current one and also for

[2] We take families and households as synonyms for convenience. See footnote 8.
[3] Sub-items are the smallest type of classification within the IPCA basket of goods and services.
[4] Table A1 in the appendix shows the distribution of the services that we consider in both POF surveys (2002-2003 and 2008-2009) among 66 sub-items of the IPCA comprised in the basket of the BCB classification of services inflation in 2012.

comparability, since the basket that defines the BCB series of services inflation has changed over time (BCB, 2011c).[5]

In addition, we choose to allocate these 66 sub-items within nine clusters of services for the assessment of the shares in total expenditure on services and income elasticities. As Table 1 exhibits, these clusters are labeled as the nine official sub-groups[6] that originally contain these sub-items, according to the IPCA structure: *food away from household*, *housing charges*, *repair and maintenance*, *transportation*, *health services*, *personal services*, *recreation*, *educational courses* and *communication*.[7] Therefore, this clustering is an attempt to make the reference to services inflation easier and also to illustrate the diversity of services consumed by Brazilian households.

IPCA Cluster	Distribution of IPCA Sub-items
Food away from Household	*Meal, Snack, Breakfast, Soda and Mineral Water, Coffee, Beer, Other Alcoholic Beverages, Candies*
Housing Charges	*Residential Rental, Condo Fee, Services of Domicile Change*
Repair and Maintenance	*Workmanship, Refrigerator Repair, TV Repair, Stereo Repair, Washer Machine Repair, Upholster Reform*
Transportation	*Airfare, School Transportation, Voluntary Vehicule Insurance, Automobile Repair, Parking Fee, Grasing and Washing, Vehicule Paint, Car Rental*
Health Services	*Medical Treatment, Dentist, Physiotherapist, Psychologist, Laboratory Examination, Hospitalization and Surgery, Imaging Examination*
Personal Services	*Seamstress, Manicure, Hairdresser, Domestic Servant, Hair Removal, Dispatcher, Banking Service, Class Council*
Recreation	*Cinema, Match Ticket, Club, Pet Treatment, Movie (DVD) Rental, Nightclub and Disco, Motel, Hotel, Tour, Printing and Copy*
Educational Courses	*Child Care Center, Nursery Education, Basic Education, High School, Higher Education, Postgraduate, Photocopy, Preparatory Course, Technical Course, Language Course, Computer Course, Physical Activities*
Communication	*Cell Phone Charges, Internet Access, Cell Phone with Internet - Package, Pay TV with Internet*

Table 1: Distribution of services-related IPCA Sub-items within Nine IPCA Clusters – IBGE

[5] For example, the sub-items *food away from household*, *cell phone charges* and *airfare* were not included in the basket of the BCB classification of services inflation up to December 2011.
[6] The classification of goods and services in the IPCA basket is defined as follows (from the lowest level to the highest level): sub-items, items, subgroups and groups.
[7] Therefore, the list of sub-items included in each IPCA cluster is not exhaustive by definition.

In regard to the characterization of social expansion, we follow Neri (2010) by defining four economic classes ordered by real per capita household income (E, D, C – middle class – and A/B – richest class). Neri (2010) defines the purchase power of each class in a reference year by using per capita income (at 2009 prices - average real per capita household income from all sources[8]). Thus, per capita income is almost flat, apart from the fact that the purchase power of each economic class is adjusted by a measure of relative price dynamics according to the households' access to tradable goods, public services, housing charges conditions and some other observable characteristics.

The point is that the author uses another household level data of the IBGE – the National Household Sample Survey (PNAD). Thus, we need some approximation strategy in relation to the surveyed income in the POF. To this respect, Paes de Barros et al. (2007) point out that income (from all sources) of the PNAD survey in 2003 underestimates the same concept of income in the POF survey in 2002-2003 by around 45% in the first income decile and nearly uniformly by 25% in the other income deciles.

Economic Class	PNAD 2003			PNAD 2009			POF 2002-2003		POF 2008-2009	
	(Neri, 2010)		Simulated Per capita Income (At 2009 prices-in R$)	(Neri, 2010)		Simulated Per capita Income (At 2009 prices-in R$)				
	Population (%)	Per capita Income (At 2009 prices-in R$)		Population (%)	Per capita Income (At 2009 prices-in R$)		Population (%)	Per capita Income (At 2009 prices-in R$)	Population (%)	Per capita Income (At 2009 prices-in R$)
E	28.1	76.5	107.1	15.3	75.8	106.1	32.6	101.7	18.5	124.6
D	26.7	204.4	255.4	23.6	208.6	260.8	26.3	250	18.0	259.1
C	37.6	555.5	694.4	50.4	578.6	723.3	33.6	669.2	52.2	688.5
A/B	7.6	2,542.6	3,178.3	10.6	2,615.1	3,268.8	7.6	3,222.8	11.4	3,220.0
Total	100	477.9	597.4	100	630.3	787.8	100	567.5	100	794.8

Table 2: Distribution of Population and Per Capita Income within Economic Classes – 2003, 2009 – Brazil – PNAD and POF (IBGE).

[8] We use a similar concept of income in the POF survey. Instead of using monetary income, we use total income, which includes all sources of earnings. Moreover, we use the family (unit of consumption) as the basic unit of reference for budget analysis, which is similar to the household definition in the PNAD. By definition, a unit of consumption comprises residents that share food and housing charges expenditures. A household is an independent and separated dwelling. Although it is not very frequent, there can be contiguous households in a site that share food and housing charges expenditures.

Therefore, our rough strategy of approximation between POF and PNAD apply the above mentioned factors of underestimation[9] in Paes de Barros et al. (2007) on the average of real per capita household income in each economic class in Neri (2010) that uses PNAD data. Then, we use this simulated (per capita) income variable to define the economic classes both in the 2002-2003[10] and 2008-2009[11] POF surveys. Table 2 compares per capita income (monthly average) and population distribution by economic classes in Neri (2010) and by using our strategy of approximation.

Note that the definition of economic classes is not a central objective in this study. Instead, we use the social expansion perspective in order to stress the structural relation between consumption patterns of services and income in the Brazilian case. Thus, we judge the figures of our approximation strategy as reasonable in the sense that we believe any eventual measurement error in our definition of economic classes relative to Neri's would not be large enough to alter the generality of the core conclusions raised in this study.

3. Patterns of Services Consumption and Social Expansion in Brazil

In this section we document the results by using the POF data. First, we show evidence that services demand in the country rises with income and how it frames the relevance of the middle class and, especially, the richest class for the increase of services demand in the period. Subsequently, we document the shares (weights) of services clusters in total family's expenditure and evaluate income elasticities. By these

[9] This application is weighted proportionally by income deciles. According to available data in Neri (2010), class E accounted for 28.1% of total population in 2003, while it accounted for 15.3% of total population in 2009.

[10] For comparison between the 2002-2003 and 2008-2009 POF Surveys, income and expenditure figures of POF 2002-2003 were corrected to the reference date of POF 2008-2009, taking the accumulated IPCA which was 39.37%, according to the POF Methodology. For further details, see: ftp://ftp.ibge.gov.br/Orcamentos_Familiares/Pesquisa_de_Orcamentos_Familiares_2008_2009/Perfil_das_Despesas_no_Brasil/POF2008_2009_perfil.pdf.

[11] We assume that the analysis in Paes de Barros et al. (2007), which uses data in 2003, applies to data in 2009. In this year, data seem to fit quite reasonably by using the authors' factors of underestimation, except for class E. It seems that the income underestimation of PNAD with respect to POF is higher in 2009 than in 2003 for the poorer percentiles. Thus, we apply a higher factor for class E (around 64%) in order to have better approach to Neri (2010) for all classes. This fact seems to reflect the inequality decrease, which might be better captured by the POF survey as income is better measured in the poorer tail of income distribution. However, since robustness of income distribution is not in this study's scope, we have left a more accurate analysis on this topic as an extension.

means, we can point out which types of services accounted for (and might account for) the rise of services demand.

3.1. The Outlines of the Macroeconomic Background

The Brazilian economy has undergone important macro and microeconomic reforms over the past two decades.[12] Prices were stabilized, the economy was opened up to foreign trade and investment, and a macroeconomic policy framework based on inflation targeting, floating exchange rates and fiscal responsibility was established. After decades of vulnerability to external shocks, Brazil built up a robust foreign liquidity buffer as the result of a policy of foreign reserve accumulation. Microeconomic reforms were implemented, such as, for example, new bankruptcy legislation and credit market reforms including the creation of new credit instruments and reduction of legal risks.

Brazil has also made considerable progress in reducing poverty and inequality over the last decade. Targeted antipoverty programs have been implemented, along with policies that increased purchasing power of the minimum wage in real terms and expanded the social safety net. In addition, access to educational courses has improved substantially. Investment in educational courses has fuelled a relatively fast expansion in mean years of schooling.[13]

Another development that is worth mentioning is demographics. Brazil is approaching the final stage of its first demographic dividend, since it is projected to taper off by mid-2020's. As a result, first, all else being equal, per capita income grows more rapidly during this time when the working age population temporarily grows faster than the dependent population – youth and elderly.[14] Second, it is likely to have strengthened the fall in the actual and natural unemployment rate during the past decade as the age structure of the labor force has shifted towards groups with relatively lower unemployment rates and away from groups with persistently large unemployment rates – young workers (Barbosa Filho and Pessôa, 2011; Brunelli, 2014). Third, demography

[12] See, for example, Bonelli (2010).
[13] According to the United Nations Human Development Report 2014, the mean years of schooling in Brazil increased from 5.6 in 2000 to 7.2 in 2012.
[14] See Eggleston and Fuchs (2012).

also plays a role in educational improvements, as smaller families are associated with greater human capital investment in children and young adults.[15]

In the meantime, Brazil has come across a favorable international scenario. Non-tradables benefited from exchange rate appreciation due to increasing commodity prices and high global liquidity. This trend increased the demand for housing and services, especially those that are relatively intensive in low-skilled labor. Thus, the interaction between labor supply and demand trends for qualification has resulted in a tighter labor market for low-skilled workers.[16] Consequently, although wage premia for higher levels of educational attainment remain relatively high, they have fallen continuously.

As a consequence, the unemployment rate declined considerably during the 2000's and is currently at historic lows. Moreover, wage developments have specially favored less skilled workers, many of which had difficulty finding steady employment previously. It was strengthened by an increase in the share of formal jobs, at the expense of informal jobs.

In short, greater demand for low-skilled labor, wider access to education and targeted antipoverty programs, implications of the demographic transition and also a favorable international scenario help explain how Brazil was able to reconcile economic growth and lower inequality in the past decade,[17] as earnings increased relatively more in the left tail of the wage distribution.

3.2. Income and Patterns of Services Consumption

3.2.1. An Initial Motivation: Income and Consumption of Services and Goods

Over the past decade Brazil indeed experienced economic growth with decreasing inequality, according to the POF surveys. Between 2003 and 2009, per capita income raised by about 20% in real terms. Furthermore, it favored especially the left tail of the wage distribution, since the Gini index fell by approximately 4 p.p.[18]

[15] Lee and Mason (2010).
[16] See Pauli et al. (2012).
[17] Lustig et al. (2013).
[18] The concept of per capita income, to be precise, is per capita household income from all sources. The Gini index declined from 0.595 to 0.558 from 2003 to 2009. It was computed at the percentiles of household per capita income.

As a result, consumer patterns adjusted. Figure 1 illustrates it by showing the concentration curve for expenditure on goods and services in the POF surveys of 2002-2003 and 2008-2009. As the concentration curves suggest, consumption of goods is less concentrated relative to consumption of services. Interestingly, the distribution of goods[19] consumption did not change in response to the fact that families became richer in the period, since the concentration curves virtually did not shift.

Differently, consumer patterns of services adjust to higher incomes. The concentration curve for expenditure on services shifted up in 2009. Therefore, consumption of services became more widespread, especially among families that lie between percentiles 30 and 90. This evidence is consistent with Clark (1951), which states that demand for services is non-homothetic. That is, in the consumer problem, in which the utility function is optimized subject to a budget constraint, the share of services demanded depends not only on relative prices, but also depends on income. Thus, equivalently, the expenditure share of services rises with income.

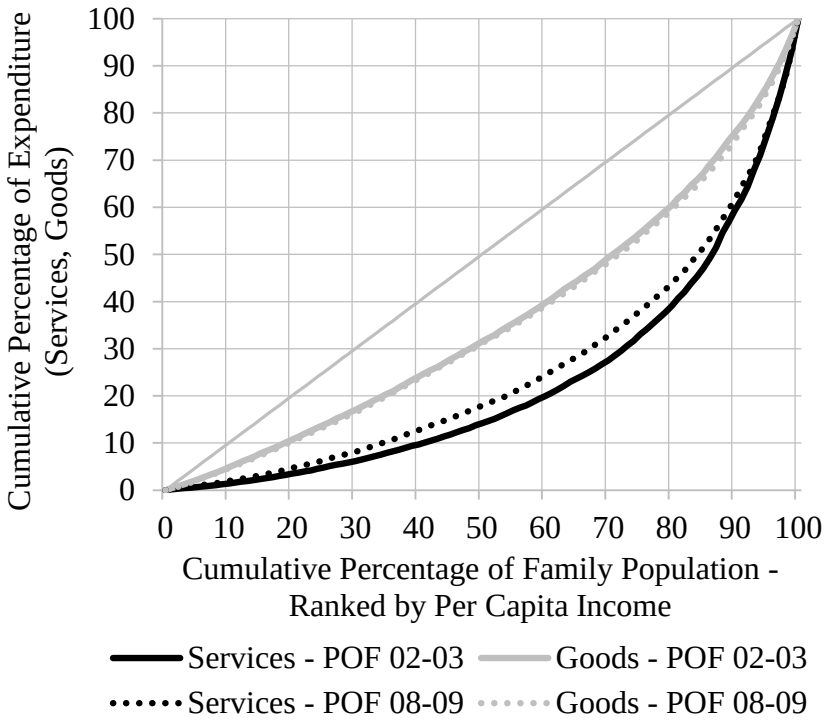

Figure 1: Concentration Curves for Expenditures on Services and Goods – 2002-2003 and 2008-2009 – Brazil – POF (IBGE).

[19] The definition of goods includes: food in the household, cleaning products, furniture and household ware, appliances, clothing and automobile purchase.

An additional way of illustrating that expenditure share of services rises with income is by doing a specification approach to household preferences in the next subsection.

3.2.2. The Specification of Household Preferences over Services Consumption

A complete demand system is an attempt to characterize preferences of families (households) regarding the consumption of goods or services. In a period t, a family f makes decisions on how much to consume of a good or service depending on the relative prices of goods and services and household income. These choices are generally conditioned on a set of variables, **z**, that includes various household characteristics and the consumption levels of a second group of possible less flexible demands.[20]

The family may wish to save or to borrow in period t and this determines how much expenditure to allocate to current consumption of goods and services. Total expenditure allocated to goods and services in t is the first stage in two-stage allocation process, as pointed out by Blundell et al (1993). Therefore, if utility is weakly separable across time then the within-period preferences, h, can be determined without reference to prices and incomes outside the period (Blundell and Walker, 1986). Letting $q_{i,t}^f$ represent consumption of a good or service i; x_t^f is total income – each variable defined at period t and for family f – and $\mathbf{p}_t$ is the n-vector of period-t prices, it follows that:

$$p_{i,t}q_{i,t}^f = h_i\left(\mathbf{p}_t, x_t^f, \mathbf{z}_t^f\right) \quad (1)$$

In this study, we specifically analyze household choices over consumption of services. Due to data limitation with respect to availability of price levels of goods and services and also the low frequency in which the POF is carried, we propose an initial approach to households' preferences. We aggregate data on services consumption by using the definition described in section 2 and ordered it across one hundred observations of per capita household income[21] that represent income percentiles. Therefore, to describe household preferences we abstract from most differences in $\mathbf{z}_t^f$,

[20] See Blundell et al. (1993).
[21] We define income as the average per capita household income from all sources.

except the implicit control over the number of people in each family (household), by definition of per capita income that we consider.

Furthermore, we suppose that relative prices are flat. Thus, household choices over expenditure allocation on service can be interpreted as dependent on income and prior to substitution effects. To this respect, two comments that might lessen this hypothesis. First, the applied literature points out that services, especially the intensive-task ones (most of our sample), are relatively price inelastic (Clark, 1951; Baumol, 1967; Mazzorali And Ragusa, 2013; Autor and Dorn, 2013). For example, Blundell et al. (1993) estimate, with British data, that uncompensated own-price elasticity of services is -0.725, while uncompensated cross-price elasticity of services with other goods (food, alcohol, fuel and clothing) are in a range between -0.084 (alcohol) and -0.372 (clothing).[22]

Second, specifically with respect to Brazil between 2003 and 2009, although relative prices of services rose, the weight of services prices that comprise the Brazilian consumer price index also increased (BCB, 2011a; BCB, 2013), which is by definition, consistent to POF data on household's expenditure. In fact, according to POF surveys, the weighted average of services share in total expenditure rose by 1.2 p.p[23] between 2003 and 2009. Therefore, if one consider that during this period real wages rose considerably (Brunelli, 2014; BCB 2011b), then any potential negative effect on services demand[24] that arise from the increase of relative prices of services was not enough to offset the positive effect stemming from the increased income[25]. This stylized fact is consistent with the literature and suggest that the bias over the estimation of the share of expenditures and income elasticities due to this misspecification might not be large.

We must also point out that, in the calculation of income elasticity at a more disaggregated level in each of the nine IPCA clusters and further in each of the 66 services sub-items, we assume that utility is weakly separable across services and goods. In particular, the category of services consumed by families is weakly separable from the other goods. That is, the definition of the share of each IPCA cluster and also of each sub-item is related to total expenditure on services.

[22] These estimations are computed by GMM. They also document OLS compensated own-elasticity for services: -0.667.
[23] From 17.5% to 18.7% of total expenditure.
[24] By considering that services do not violates the law of demand – ordinary service (good).
[25] We show in subsection 3.2.4 that services are a luxury.

Additionally, it is important to mention that since we deal with an incomplete demand system that does not evaluate price effects; we implicitly suppose that usual conditions in agents' utility optimization are satisfied. As such, integrability conditions of demand theory, in particular, a negative semidefinite Slutzky matrix – adherence to concavity – is not too much at odds with the observed data.

In a nutshell, this study assumes that the decisions of households with respect to how much to allocate their spending on services depends primarily on income and the size of the family. This means that we assume flat relative prices, adherence to concavity is satisfied and utility is weakly separable across time and across services and goods. Thus, by setting z_t^f the number of people in family f and by defining $b_l\left(x_t^f\right)$ as known polynomials in household total income, we write the share of expenditure on services (in total expenditure), in period t for family f as:

$$S_{i,t}^f = h_i\left(\bar{\mathbf{p}}_t, b_l\left(x_t^f\right), \mathrm{z}_t^f\right) \tag{2}$$

where i stands for services henceforward.

To illustrate the share of expenditure on services more explicitly, consider the following cubic extension of Blundell et al. (1993) "Quadratic Almost Ideal Demand System", which, as we shall see, represents the income-expenditure relation in our POF data quite reasonably. In this model, the b_l's are simply polynomial logarithmic terms so that (2) represents an Engel curve. It may be written as:

$$S_{i,t}^c = \sum_{k=0}^{3} \Theta_{k,t} (\ln w_t^c)^k + \varepsilon_t \tag{3}$$

where we define $w_t^c \equiv \sum_{f|c=c_0} \mu_t^f \left(\frac{x_t^f}{\mathrm{z}_t^f}\right)$ as the weighted average of per capita household income from all sources by percentile $c = c_0$ at time t, such that μ_t^f is the sample weight of family f in the POF survey. In addition, $\Theta_{k=0,t}$ is a constant and $\Theta_{k>0,t}$ are the coefficients on the polynomial logarithmic terms in w_t^c and ε_t is an error term. Thus, $S_{i,t}^c$ may be defined as the weighted average of the expenditure share of services of the percentile c of per capita household income.

A simple check for functional-form misspecification involves introducing a cubic term in $\ln w^c$ in the quadratic model as shows equation 3. A standard t test reported in Table 3 shows that the constant and the linear term are not statistically significant in the quadratic model. The cubic model confirms that this extra nonlinearity is needed, as all terms both by using POF 2002-2003 and POF 2008-2009 data are statistically significant. Moreover, the cubic model seems to reasonably represent the observed behavior in the Brazilian data since it has a better fit to POF data, as attested by the adjusted R^2. Hence, the cubic model is the most parsimonious specification for $S_{i,t}^c$ in which all terms are statistically significant and better fits POF data in comparison to the quadratic model. The test *F* of joint significance of the linear, quadratic and cubic $\ln w^c$ terms, on the other hand, displays the distance the data stand from homotheticity or unitary income elasticity in which expenditure-share of services would be independent of total outlay.

POF 2002-2003			POF 2008-2009		
Explanatory Variable	Quadratic	Cubic	Explanatory Variable	Quadratic	Cubic
C	4.35 [1.29]	71.97 [5.82]***	C	-0.92 [-0.24]	34.62 [1.86]*
$\ln w_t$	-1.17 [-1.01]	-37.49 [-5.74]***	$\ln w_t$	1.38 [1.15]	-15.8 [-1.78]*
$(\ln w_t)^2$	0.45 [4.6]***	6.77 [6.02]***	$(\ln w_t)^2$	0.18 [1.98]*	2.9 [2.08]**
$(\ln w_t)^3$	-	-0.36 [-5.63]***	$(\ln w_t)^3$	-	-0.14 [-1.95]*
Observations	98	98	Observations	98	98
R^2	0.915	0.936	R^2	0.916	0.920
Adjusted R^2	0.913	0.934	Adjusted R^2	0.914	0.917
F -Statistic	508.6	459.3	F -Statistic	520.7	358.7

Note: t-statistic in brackets. [.]***, [.]** and [.]* denote 1%, 5% and 10% marginal significance level, respectively.

Table 3: Regressions on the Expenditure Share of Services (in Total Expenditure) – 2002-2003 and 2008-2009 – Brazil – POF (IBGE).

For the estimation we use OLS. We also selected out the tails of the income distribution. In particular, we looked at the sample distribution of the logarithm of

income and discarded the observations in the bottom and top 1 percent. This selection (based on an econometrically exogenous variable) is meant to remove the possibility that small outliers in the income distribution are responsible for the nonlinearity in the expenditure-share equation.

3.2.3. Services Expenditure and Social Expansion

An alternative way of showing that expenditure share of services rises with income is graphically depicted by Figure 2. It has two graphs – one for each of the POF surveys and plots 100 observations representing the expenditure share of services (in total expenditure) of each percentile of family population ordered by per capita income and also plots the cubic model curve. Moreover, it splits population into four economic classes that follows the definitions in section 2.[26]

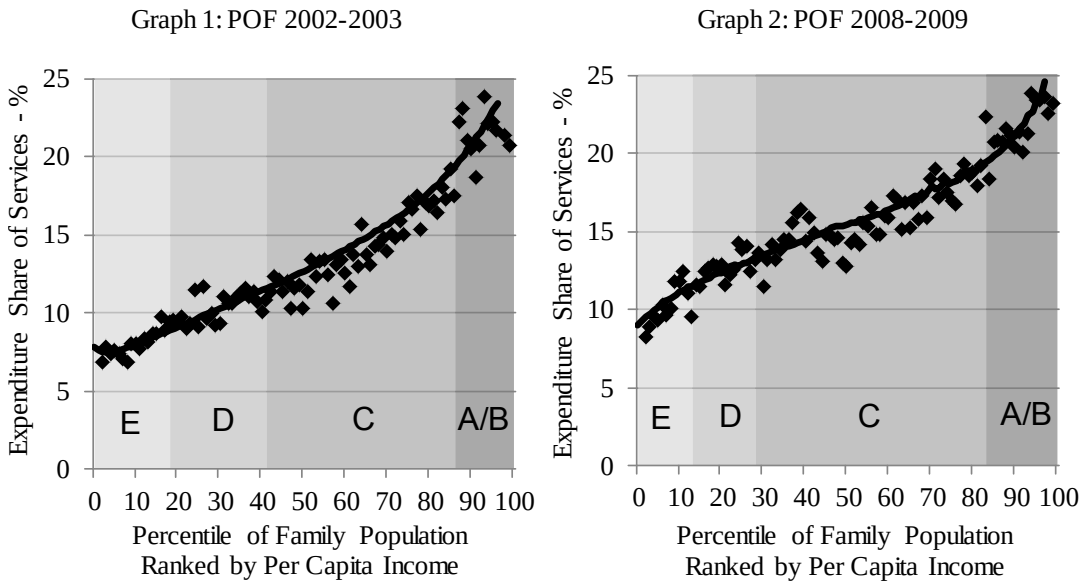

Figure 2: Expenditure Shares of Services and the Cubic Model Curve by Income Percentiles of Family Population and Economic Classes – 2002-2003 and 2008-2009 – Brazil – POF (IBGE).

First, we note that the richest class and, especially the middle class, rose to the detriment of the reduction of poorer classes (E and D) between 2003 and 2009. Second, the graphs depict clearly the nonlinearity between the expenditure share of services and

[26] See section 2 and Table 2 for details on Neri's definition of economic classes and also on our approximation strategy on this definition by using the POF survey.

income. Furthermore, it shows that the expenditure share of an average family of class C rises remarkably if this family ascends to an average family of class A/B, as suggests the steeper slope of the cubic model curve in class A/B in the graphs.

This stylized fact is central since it frames how services expenditure evolves by considering the social expansion observed in Brazil. The following arguments illustrate it. Define total population in class $g = g_0$ at time $t = \{2003,2009\}$ to be:

$$L_t^g \equiv \sum\nolimits_{f|g=g_0} L_t^f \tag{4}$$

It then immediately follows that $L_t \equiv \sum_g L_t^g$ is total population. To this respect, Table 2 shows the size of each economic class in this period. Total population in the country amounted to around 171 million people in 2003 and approximately 190 million people in 2009. While both classes E and D declined, the richest class rose by around 9 million people (67%) and the middle class registered a remarkable increase of 42 million people (73%).

Although the population rise of the middle class (in absolute terms) was much more pronounced in relation to the increase of the richest class, interestingly, the contribution of the richest class to the growth of total expenditure on services between 2003 and 2009 was greater than the contribution of the middle class. This result can be made precise by formalizing the definition of this contribution. First, let the weighted average of expenditure on services at time t of class $g = g_0$ to be represented by:

$$E_{i,t}^g \equiv \sum\nolimits_{f|g=g_0} \mu_t^f \, E_{i,t}^f \tag{5}$$

Hence, it is straightforward that $E_t^g \equiv \sum_i E_{i,t}^g$ is the average of total expenditure of class g[27]. In addition, by definition, it follows that the share of expenditure on services of class g is:

[27] Additionally, the average of total expenditure in overall Brazilian society is $E_t \equiv \sum_g E_t^g$ and $E_{i,t} \equiv \sum_g E_{i,t}^g$ is the average of expenditure on services in overall Brazilian society.

$$S_{i,t}^{g} \equiv \frac{E_{i,t}^{g}}{\mathrm{E}_{t}^{g}} \tag{6}$$

where it is straightaway ensuing that $S_{i,t} \equiv \left(\frac{E_{i,t}}{E_t}\right)$ is the share of expenditure on services in overall Brazilian society.

Thus, the contribution of class g to the growth of total expenditure on services between t and $t-1$ is simply:

$$M_{i,t}^{g} = \frac{E_{i,t}^{g} - E_{i,t-1}^{g}}{E_{t}^{g} - E_{t-1}^{g}} \tag{7}$$

Basically two factors explain that, at first glance, counterintuitive result. First, as shows Table 4, the average of total expenditure of the richest class was more than three times the one of the middle class. In addition, the richest class allocates a larger share to expenditure on services from this higher level of total expenditure – this share level is about 30% larger than the one of the middle class.

Economic Class	POF 2002-2003 (A)			POF 2008-2009 (B)			(B) - (A)
	L_t^g [1]	E_t^g [2]	$S_{i,t}^g$ [3]	L_t^g [1]	E_t^g [2]	$S_{i,t}^g$ [3]	$M_{i,t}^g$ [3]
E	55.7	746.4	9.0	35.1	824.8	12.1	1.8
D	45.0	1,042.8	11.1	34.2	1,157.3	13.5	-0.4
C	57.4	1,986.6	16.2	99.3	2,120.1	17.2	45.2
A/B	12.9	6,655.5	21.7	21.6	6,937.6	21.5	53.4
	L_t [1]	E_t [2]	$S_{i,t}$ [3]	L_t [1]	E_t [2]	$S_{i,t}$ [3]	$M_{i,t}$ [3]
Brazil	171.0	2,476.1	17.5	190.0	2,626.3	18.7	100

1/ In million people.
2/ In R$ - at 2009 prices (average per month).
3/ In %.

Table 4: Population, Total Expenditure, Expenditure Share of Services (in Total Expenditure) and Contribution of Economic Classes to the Growth of Total Expenditure on Services – 2002-2003 and 2008-2009 – Brazil – POF (IBGE).

Therefore, although the population rise of the middle class (in absolute terms) was much larger than the increase of the richest class, it was not sufficiently large to outweigh the rise of expenditure on services of the richest class between 2003 and 2009. Hence, the contribution of the richest class to the growth of total expenditure on services in real terms[28] between 2003 and 2009 was 53.4%, while the contribution of the middle class was 45.2%. The contribution of the poorer classes was negligible.

3.2.4. Expenditure Shares and Income Elasticities

As we noticed in the previous subsection, the middle class and especially the richest class empirically accounted for the bulk of the growth of total expenditure on services between 2003 and 2009. Moreover, we are concerned about the way the relation between consumer patterns and income frame how services demand evolve, conditional on social expansion continuity, and therefore might translate into inflation pressures in the long run. For this reason, we focus exclusively on the middle class and the richest class[29] – the economic classes that have expanded – and use data of the 2008-2009 POF survey.

Table 5 exhibits the average shares (weights) in families' total expenditure on services of the IPCA clusters in the entire Brazilian society[30] and both in the middle class and in the richest class. Lets $E_{i,t}^{g} \equiv \sum_j E_{i,j,t}^{g}$ to be the average of expenditure on services at time t of class g, where j stands for the IPCA clusters. Then we write the share of expenditure on IPCA cluster j (in total expenditure on services) of class g as:

[28] For the real growth of total expenditure on services between 2002-2003 and 2008-2009 surveys we apply the accumulated IPCA described in the footnote 10. We also apply other two types of accumulated IPCA. One specifically for the basket of services considered in this study and another that differentiate the weights of each sub-item in the basket across economic classes in the two surveys. We apply the same methodology of the official IPCA, which updates the weights by relative inflation. Both attempts do not change significantly the results on $M_{i,t}^{g}$ in table 4.

[29] See Tables A.2 and A.3 in the appendix for a complete report on expenditure share and income elasticities that includes classes E and D.

[30] "Total" in Table 5, Table 6 and in Tables A.2-A.5 in the appendix stands for the entire (overall) Brazilian society.

$$s_{i,j,t}^{g} \equiv \frac{E_{i,j,t}^{g}}{\mathrm{E}_{i,t}^{g}} \qquad (7)^{31}$$

Hence, it follows that $s_{i,j,t} \equiv \left(\frac{\sum_g E_{i,j,t}^{g}}{\sum_g \mathrm{E}_{i,t}^{g}}\right)$ is the share of expenditure on IPCA cluster *j* in overall Brazilian society.

We can note that especially *food away from household* (26% - likely reflecting the unemployment rate decline and an additional option of leisure as families become richer) and also *housing charges*, *personal services* and *transportation* were the IPCA clusters with the largest shares in families' total expenditure on services and this also applies to the middle class and to the richest class. Among these IPCA clusters, respectively, the sub-items *meal*, *residential rental*, *domestic servant* and *automobile repair* stood out. Particularly with respect to *personal services*, Table A.2 in the appendix shows that the share of *domestic servant* more than double by comparing an average family of the middle class and of the richest class. This reflects the importance of this service for the richest class, which is consistent with the results in Mazzorali and Ragusa (2013) using US data.

	Total		Class C		Class A/B	
Ranking	IPCA Cluster	$s_{i,j,t}$	IPCA Cluster	$s_{i,j,t}^{g}$	IPCA Cluster	$s_{i,j,t}^{g}$
1	Food away from Household	26.0	Food away from Household	29.1	Food away from Household	21.5
2	Housing Charges	17.5	Housing Charges	17.9	Housing Charges	16.2
3	Personal Services	13.8	Transportation	12.1	Personal Services	16.2
4	Transportation	12.2	Personal Services	12.1	Transportation	12.8
5	Educational Courses	10.1	Communication	9.6	Educational Courses	12.1
6	Communication	9.3	Educational Courses	9.1	Communication	9.2
7	Recreation	5.2	Health Services	5.4	Recreation	6.9
8	Health Services	5.1	Recreation	3.8	Health Services	4.6
9	Repair and Maintenance	0.7	Repair and Maintenance	0.9	Repair and Maintenance	0.5
Total		100		100		100

Table 5: Expenditure Share (in Total Expenditure on Services) of IPCA Clusters across Economic Classes – 2008-2009 – Brazil – POF (IBGE).

[31] We distinguish lower case *s* (expenditure share of IPCA services cluster *j* in total expenditure on services) from uppercase *S* (expenditure share of services in total expenditure) in the previous subsection.

Table 5 also shows, as expected, that especially the expenditure-share on *food away from household,* but also expenditure-shares on *repair and maintenance, housing charges* and *health services* decrease with income (across economic classes), which is consistent with the income elasticity report that follows.

To this respect, we document income elasticities computed at the average share of services (in total expenditure) in Brazil as a whole and in the middle and the richest classes. Thus, the income elasticity of services at time t of class g follows in the context of the cubic model estimated in equation 3. However, $\widehat{\Theta}_{k,t}$ are evaluated at the weighted average of per capita household income from all sources by class g[32]:

$$\mathrm{H}_{i,t}^{g} = \frac{1}{S_{i,t}^{g}}\left(\sum_{k=1}^{3} \widehat{\Theta}_{k,t}\, k\left(\ln w_t^{g}\right)^{k-1}\right) + 1 \qquad (8)^{33}$$

Furthermore, in subsection 3.2.2 we assume that utility is weakly separable across services and goods. In particular, the category of services consumed by families is weakly separable from the other goods. That is, the definition of the share of each IPCA cluster and also of each sub-item is related to total expenditure on services, as we also point out in the beginning of this subsection. Thus, similarly to the Engel curve estimated in equation 3, we regress the share of each IPCA cluster on the weighted average of per capita household income from all sources by percentile c.

$$s_{i,j,t}^{c} = \sum_{k=0}^{3} \theta_{j,k,t} (\ln w_t^{c})^{k} + \varepsilon_t \qquad (9)$$

where $\theta_{j,k>0,t}$ are the coefficients on the polynomial logarithmic terms in w_t^c in the estimation of each IPCA cluster j.

Thus, in the context of the model estimated in equation 9, we define the income elasticities of the IPCA cluster j computed at the average shares of class g as follows:

[32] Instead of being evaluated at percentile c.

[33] It immediately follows that $\mathrm{H}_{i,t} \equiv \frac{1}{\mathrm{S}_{i,t}}\left(\sum_{k=1}^{3} \widehat{\Theta}_{k,t} k (\ln w_t^{c})^{k-1}\right) + 1$ is the income elasticity of services in the entire Brazilian society.

$$\eta_{i,j,t}^{g} = \frac{1}{s_{i,j,t}^{g}}\left(\sum_{k=1}^{3}\hat{\theta}_{j,k,t}\,k\left(\ln w_t^{g}\right)^{k-1}\right)+1 \qquad (10)^{34}$$

Examination of the parameter estimates for the expenditure-share models reveals some general patterns. First, Table 6 shows that services are a luxury[35], as documents the income elasticity of services in the entire Brazilian society, ($H_{i,t}$)[36]. Moreover, the level of the income elasticity of services declines across economic classes (from middle class to the richest class), as shows $H_{i,t}^{g}$. Second, *personal services*, *recreation*, *transportation*, *educational courses* and *communication* are luxuries, whereas, *health services*, *repair and maintenance*, *housing charges*, and *food away from household* are necessities[37].

	Total		Class C		Class A/B	
Ranking	IPCA Cluster	$\eta_{i,j,t}$	IPCA Cluster	$\eta_{i,j,t}^{g}$	IPCA Cluster	$\eta_{i,j,t}^{g}$
1	Personal Services	1.2643	Recreation	1.3273	Recreation	1.4202
2	Recreation	1.2399	Personal Services	1.3012	Personal Services	1.1769
3	Transportation	1.1937	Transportation	1.1950	Housing Charges	1.0096
4	Educational Courses	1.0012	Educational Courses	1.0014	Educational Courses	1.0010
5	Communication	1.0003	Communication	1.0003	Communication	1.0003
6	Health Services	0.9013	Repair and Maintenance	0.9081	Transportation	0.9492
7	Repair and Maintenance	0.8904	Health Services	0.9078	Food away from Household	0.8430
8	Housing Charges	0.7852	Housing Charges	0.7888	Health Services	0.8086
9	Food away from Household	0.6839	Food away from Household	0.7170	Repair and Maintenance	0.3576
		$H_{i,t}$		$H_{i,t}^{g}$		$H_{i,t}^{g}$
	Services - Total	1.2225	Services - Total	1.2413	Services - Total	1.1756

Table 6: Income Elasticity of IPCA Clusters of Services and Total Services across Economic Classes – 2008-2009 – Brazil – POF (IBGE).

[34] It also straight follows that $\eta_{i,j,t} \equiv \frac{1}{s_{i,j,t}}\left(\sum_{k=1}^{3}\hat{\theta}_{j,k,t}k(\ln w_t^{c})^{k-1}\right)+1$ is the income elasticity of the IPCA group *j* in the entire Brazilian society.

[35] A luxury is a good or a service whose demand increases (declines) more than proportionally in response to income rises (reductions). That is, income elasticity of a good or service is greater than 1.

[36] The level of the income elasticity of services in the entire Brazilian society, ($H_{i,t}$), is quite similar to the one estimated by Blundell et al. (1993) on British data by using OLS: 1.207.

[37] A necessity is a good or a service whose demand increases (declines) less than proportionally in response to income rises (reductions). That is, income elasticity of a good or service is greater than zero and less than 1.

Therefore, *personal services* and *transportation* not only stood out as shares in households' total expenditure on services, but they were also one of the most income elastic IPCA clusters that were computed at the average share of services in the overall Brazilian society. Particularly in the case of *transportation*, an interesting result is the income elasticity reversal that reflects changes in the perception of need at different income levels. That is, *transportation* is perceived to be a luxury for the middle class and a necessity for the richest class. As Table A.3 in the appendix reports, while all sub-items that comprise *transportation* are luxuries for the middle class, many of them are necessities for the richest class[38].

With respect to *personal services,* it is the most income elastic IPCA cluster in the overall Brazilian society and the second largest among both the middle class and the richest class. However, aggregate analysis might obliterate genuine changes in the perception of need at the sub-item level. Table A.3 also shows that, for example, whereas the sub-item *banking services*, which is one of the components of *personal services,* is perceived to be a necessity for the richest class, it is a luxury for the middle class.

4. Conclusion

This paper investigates the structural relation between patterns of services consumption and income. We focus on how patterns of services consumption adjust to different levels of income by using the perspective of social expansion as a narrative approach for the Brazilian case in the last decade.

We present evidence of nonlinearity in the relation between services consumption and income by using data of the last two versions (2002-2003 and 2008-2009) of the POF-IBGE.

The social expansion has been generally spread as primarily a middle class expansion. However, in the specific case of consumption of services, this argument is not accurate. We argue that, on the one hand, the middle class has a larger extensive margin of consumption as this class grew by about 42 million and reached almost 100

[38] However, note that for example, *airfare* is the sub-item that exhibits the largest income elasticity among all 66 sub-items in the richest class.

million people – approximately five fold the growth and the level of the richest class (in absolute terms). One the other hand, the richest class has the largest intensive margin of consumption since this class has the greatest share of expenditure on services (in total expenditure).

Interestingly, although the population rise of the middle class was remarkably larger than the increase of the richest class, total expenditure and its share on services of the richest class was sufficiently large for this class to outweigh the middle class in accounting for the rise of families' total expenditure on services in this period.

Thus, a policy implication arises from this conclusion. First, consider Baumol (1967), which argues that in most of the services rendered to families there are only sporadic increases in productivity due to its technologically lagging structure that imply cumulative increases in the real costs incurred in supplying them. Second, conceive a hypothesis that Brazil is able to keep in a developing path that combines economic growth and social expansion. That is, both the middle class and the richest class – the economic classes that have expanded and whose expenditure shares on services are relatively larger – are able to expand further. Thus, unless there are systematic increases in productivity especially in activities that are allowed by its technologically progressive structure (usually in the tradable sector) so that it can offset this secular trend of cost increases in non-tradable activities; demand for services rendered to families is likely to be a source of persistent consumer inflation pressures.

Note that this is not to be mistaken as an unconditional prediction. Instead, we first consider the technologically lagging structure of the services sector and the relation between patterns of services consumption and income. Then, conditional on a similar pattern of social expansion that Brazil experienced in the past decade, which combines not only expansion of the middle class but also expansion of the richest class, we argue that demand for services is likely to be a source of persistent pressures on consumer inflation. This suggest that, if Brazil becomes largely a middle class country, the sources of services demand pressures will not be completely solved while there are families ascending to the richest class. Therefore, systematic increases in productivity especially from the tradable sector are indeed necessary in order to offset the secular trend of cost increases in the services sector.

The results additionally suggest that, other things being equal, the continuity of social expansion will imply demand pressures stemming especially from *personal*

services and *transportation* since consumption of these IPCA clusters has the particular feature of combining both a high share of total services consumption and a high sensitivity to income rises of households in overall Brazilian society in the period.

Although the results are consistent with the literature, it is worth mentioning that they should be considered with caution due to data limitation and its initial approach to household's demand in the country. We have left as an extension an exhaustive exploration of the way that household characteristics interact with income and demand patterns. The only characteristic we consider is the size of the family. Household characteristics may enter in popular forms of Engel Curves and demand systems in a variety of different ways. The exact specification of which is primarily an empirical issue. For example, consumption of a specific sub-item can be better identified whether the head of family works in the formal job market or whether there are children in the family.

Another issue relates to the occurrence of zero expenditures in the POF records. For the commodity groups we consider, these will most likely correspond to purchase infrequency. The problem of infrequent expenditures has its major effect on some sub-item in the poorest economic classes. It means that the theoretical concept of "consumption" differs from its measured counterpart "expenditure". As this discrepancy affects both the dependent variable and the income variable, ordinary least-squares (OLS) estimates of the share equations are biased and then we decide not to report income elasticities of some sub-items in Table A.5 in the appendix when this applies. However, instrumental-variable (IV) estimation (or more generally generalized method of moments [GMM] once heteroscedasticity is allowed for) permitting all terms in income to be endogenous removes this measurement error problem.

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Appendix

Appendix A: Distribution of POF Services within IPCA Sub-items

Sub-item code (IPCA)	Sub-item (IPCA)	Service Code (POF 2002-2003)	Service Code (POF 2008-2009)
1201001	*Meal*	24001, 24041, 24042, 24055, 24051, 24052, 41006, 48044, 49026	24001, 24035, 24036, 24038, 24040, 24054, 24055, 24056, 24057, 24058, 24113, 41006, 48033, 49026
1201003	*Snack*	24037, 24053, 24004, 24007, 24015, 24018, 24050, 24022, 24047, 24048, 24028, 24029, 24049	24041, 24059, 24004, 24007, 24015, 24018, 24019, 24020, 24022, 24026, 24027, 24028, 24029, 24030
1201005	*Breakfast*	24056, 24003, 24002	24042, 24003, 24016, 24034
1201007	*Soda and Mineral Water*	24006, 24059, 24044, 24046, 24045, 24060	24006, 24017, 24023, 24025, 24050, 24051, 24052, 24053, 24089, 24090, 24091, 24092, 24129, 24130, 24131, 24132, 24133, 24134, 24135, 24139
1201009	*Coffee*	24005	24005, 24064
1201048	*Beer*	24010, 24012	24010, 24012, 24136, 24137
1201051	*Other Alcoholic Beverages*	24009, 24011	24009, 24011, 24046,24047, 24048, 24049, 24067,
1201061	*Candies*	24008	24008, 24043,24044, 24045
2101001	*Residential Rental*	10005, 10010, 10016, 10018	10001, 10003, 10006, 10008
2101002	*Condo Fee*	10012, 10019	10004, 10009
2101012	*Services of Domicile Change*	12004, 47013	12004, 47023
2103042	*Workmanship*	8013	08013
3301002	*Refrigerator Repair*	09022	09030, 09033
3301006	*T.V Repair*	09025	09036, 09039
3301009	*Stereo Repair*	09028	09042, 09045
3301015	*Washer Machine Repair*	09034	09054
3301022	*Upholster Reform*	9001	09001
5101010	*Airfare*	23031, 41003	23022, 41003
5101026	*School Transportation*	49009	49009
5102005	*Voluntary Vehicule Insurance*	50006	50006
5102011	*Automobile Repair*	23019, 43002, 43003, 43004, 43007, 43011, 43013, 43019, 43027, 43029, 43035, 43012, 43006	23019, 43002, 43003, 43004, 43007, 43011, 43012, 43013, 43019, 43027, 43029, 43035, 43040, 43042
5102013	*Parking Fee*	23008, 41009, 50007	23008, 41009, 47027, 50007
5102019	*Grasing and Washing*	43001	43001
5102037	*Vehicule Paint*	43005, 43008, 43017	43005, 43008, 43017
5102051	*Car Rental*	41010, 50008	41010, 50008
6201002	*Medical Treatment*	42038, 42039, 42040, 42041,42042, 42043,42044, 42045,42046, 42047, 42048, 42049, 42050, 42030	42009, 42010, 42011, 42012
6201003	*Dentist*	42003, 42004	42023, 42024
6201007	*Physiotherapist*	42052	42031
6201010	*Psychologist*	42051	42030
6202003	*Laboratory Examination*	42008	42013
6202004	*Hospitalization and Surgery*	42005, 42006	42005, 42006
6202006	*Imaging Examination*	42007, 42009, 42021	42014, 42015, 42016, 42018, 42019, 42017, 42043,
7101001	*Seamstress*	31017	31017
7101005	*Manicure*	31003	31003
7101009	*Hairdresser*	31001, 31002, 31043, 31044, 31048	31001, 31002, 31042, 31043, 31047
7101010	*Domestic Servant*	19001, 19002, 19003	19001, 19002, 19003
7101014	*Hair Removal*	31008	31008
7101036	*Dispatcher*	44003	44003
7101076	*Banking Service*	44051, 44052, 44053, 44054, 44055, 44056, 44057, 44058, 44059, 44060, 44062	44022, 44023, 44024,44025, 44026, 44027, 44028, 44029, 44030, 44031, 44032, 44036, 44033, 44038, 44042, 44047
7101090	*Class Council*	48001	48001
7201001	*Cinema*	28001, 28018, 28036	28001, 41026
7201003	*Match Tickets*	28003, 28004	28003, 28004, 41033
7201006	*Club*	28005	28005
7201018	*Pet Treatment*	16040, 19027	16018, 16019, 16024, 16025, 16026, 16027
7201052	*Movie (DVD) Rental*	13017, 28026	13017, 28026
7201054	*Nightclub and Disco*	28020	28020
7201068	*Motel*	28025	28025
7201090	*Hotel*	28050, 41007	28050, 41007
7201095	*Tour*	41008, 41017, 49016	41008, 41017, 41040, 41041, 41042, 49016
7203003	*Printing and Copy*	28008	28008
8101001	*Child Care Center*	49011	49011
8101002	*Nursery Education*	49001	49001
8101003	*Basic Education*	49031	49031
8101004	*High School*	49032	49032
8101005	*Higher Education*	49033	49033
8101006	*Postgraduate*	49059, 49022, 49041	49015, 49022, 49041
8103002	*Photocopy*	32006	32006
8104001	*Preparatory Course*	49040	49076, 49088, 49089
8104002	*Technical Course*	49052	49075
8104003	*Language Course*	49044	49044
8104004	*Computer Course*	49039	49039
8104006	*Physical Activities*	49034, 49035, 49036, 49037, 49058	49034, 49040, 49035, 49036, 49037, 49058, 49059, 49060, 49061, 49062, 49063, 49064
9101008	*Cell Phone Charges*	28055	28023, 28024
9101018	*Internet Access*	07016	06005
9101021	*Cell Phone with Internet - Package*	-	06008, 06009
9101022	*Pay TV with Internet*	-	06010

Figure A.1: Distribution of POF Services within IPCA Sub-items in the Basket of Services Inflation that Follows BCB Classification in 2012 – IBGE

Appendix B: Expenditure Share of IPCA Sub-items

	Total		Classe E		Classe D		Classe C		Classe A/B	
Ranking	IPCA Sub-item	$s_{i,j,t}$	IPCA Sub-item	$s^{g}_{i,j,t}$	IPCA Sub-item	$s^{g}_{i,j,t}$	IPCA Sub-item	$s^{g}_{i,j,t}$	IPCA Sub-item	$s^{g}_{i,j,t}$
1	Meal	17.02	Residential Rental	20.96	Meal	19.08	Meal	17.82	Meal	16.05
2	Residential Rental	9.90	Meal	17.15	Residential Rental	17.34	Residential Rental	12.11	Domestic Servant	9.88
3	Automobile Repair	7.90	Snack	9.73	Snack	8.91	Automobile Repair	9.14	Condo Fee	6.94
4	Domestic Servant	6.63	Cell Phone Charges	6.94	Automobile Repair	7.17	Cell Phone Charges	5.91	Automobile Repair	6.93
5	Cell Phone Charges	5.45	Automobile Repair	6.15	Cell Phone Charges	6.91	Snack	5.54	Residential Rental	6.54
6	Snack	4.47	Hairdresser	5.48	Hairdresser	5.04	Higher Education	4.19	Cell Phone Charges	4.80
7	Condo Fee	4.22	Workmanship	4.73	Workmanship	3.95	Domestic Servant	4.08	Higher Education	4.71
8	Higher Education	4.21	Beer	3.48	Beer	3.37	Hairdresser	3.97	Cell Phone with Internet - Package	3.21
9	Hairdresser	3.33	Candies	2.09	Soda and Mineral Water	1.93	Workmanship	3.79	Basic Education	2.82
10	Workmanship	3.26	Soda and Mineral Water	2.05	Candies	1.71	Cell Phone with Internet - Package	2.85	Snack	2.76
11	Cell Phone with Internet - Package	2.88	Medical Treatment	1.81	Medical Treatment	1.65	Banking Service	2.17	Workmanship	2.62
12	Basic Education	2.15	Laboratory Examination	1.44	Higher Education	1.44	Beer	2.14	Hairdresser	2.45
13	Banking Service	2.03	Other Alcoholic Beverages	1.26	Hospitalization and Surgery	1.32	Condo Fee	1.85	Voluntary Vehicule Insurance	2.35
14	Beer	1.73	Condo Fee	1.18	Imaging Examination	1.26	Basic Education	1.64	Banking Service	2.07
15	Voluntary Vehicule Insurance	1.47	Imaging Examination	1.05	Laboratory Examination	1.18	Medical Treatment	1.52	Tour	2.05
16	Dentist	1.38	Banking Service	0.82	Cell Phone with Internet - Package	1.10	Dentist	1.50	Airfare	1.43
17	Medical Treatment	1.21	Dentist	0.80	Banking Service	1.07	Soda and Mineral Water	1.41	Dentist	1.37
18	Tour	1.19	Cell Phone with Internet - Package	0.75	Vehicule Paint	0.96	Vehicule Paint	1.13	Hospitalization and Surgery	1.31
19	Hospitalization and Surgery	1.15	Breakfast	0.71	Basic Education	0.90	Manicure	1.08	Hotel	1.28
20	Vehicule Paint	1.09	TV Repair	0.68	Manicure	0.88	Hospitalization and Surgery	1.00	High School	1.12
21	Soda and Mineral Water	1.05	Basic Education	0.63	Domestic Servant	0.86	Candies	0.92	Postgraduate	1.12
22	Manicure	0.99	Manicure	0.61	Breakfast	0.81	Nightclub and Disco	0.84	Beer	1.09
23	Airfare	0.93	Domestic Servant	0.61	Dentist	0.81	Internet Access	0.79	Vehicule Paint	1.09
24	High School	0.91	Nightclub and Disco	0.60	Pet Treatment	0.80	High School	0.78	Internet Access	0.95
25	Hotel	0.84	Vehicule Paint	0.60	Other Alcoholic Beverages	0.74	Voluntary Vehicule Insurance	0.72	Manicure	0.94
26	Nightclub and Disco	0.83	Hospitalization and Surgery	0.53	Nightclub and Disco	0.67	Laboratory Examination	0.64	Nightclub and Disco	0.85
27	Internet Access	0.83	Coffee	0.49	Coffee	0.55	Imaging Examination	0.62	Medical Treatment	0.85
28	Candies	0.75	Higher Education	0.48	Condo Fee	0.52	Breakfast	0.60	Language Course	0.70
29	Postgraduate	0.72	Computer Course	0.48	Movie (DVD) Rental	0.51	Cinema	0.49	Club	0.67
30	Cinema	0.55	Refrigerator Repair	0.47	Computer Course	0.40	Airfare	0.48	Cinema	0.65
31	Pet Treatment	0.53	Movie (DVD) Rental	0.36	Airfare	0.40	Nursery Education	0.47	Pet Treatment	0.62
32	Laboratory Examination	0.52	Nursery Education	0.35	Nursery Education	0.39	Movie (DVD) Rental	0.44	Soda and Mineral Water	0.58
33	Nursery Education	0.51	High School	0.34	TV Repair	0.37	Hotel	0.44	Nursery Education	0.57
34	Language Course	0.49	Services of Domicile Change	0.33	Hotel	0.36	Tour	0.44	Physical Activities	0.48
35	Imaging Examination	0.46	Photocopy	0.33	Refrigerator Repair	0.32	School Transportation	0.42	Parking Fee	0.47
36	Breakfast	0.45	Seamstress	0.28	School Transportation	0.29	Pet Treatment	0.41	Candies	0.42
37	Club	0.44	Hotel	0.28	High School	0.29	Computer Course	0.39	Movie (DVD) Rental	0.35
38	Movie (DVD) Rental	0.40	Pet Treatment	0.26	Technical Course	0.29	Postgraduate	0.37	Psychologist	0.31
39	School Transportation	0.34	Internet Access	0.26	Seamstress	0.28	Coffee	0.37	Dispatcher	0.29
40	Coffee	0.31	Upholster Reform	0.24	Cinema	0.27	Language Course	0.33	Laboratory Examination	0.28
41	Physical Activities	0.30	Stereo Repair	0.21	Photocopy	0.27	Dispatcher	0.33	Physiotherapist	0.28
42	Dispatcher	0.30	Airfare	0.15	Dispatcher	0.24	Technical Course	0.31	School Transportation	0.28
43	Parking Fee	0.29	Technical Course	0.14	Postgraduate	0.24	Other Alcoholic Beverages	0.29	Upholster Reform	0.28
44	Other Alcoholic Beverages	0.27	Cinema	0.13	Internet Access	0.22	Club	0.26	Breakfast	0.27
45	Computer Course	0.26	Match Ticket	0.13	Services of Domicile Change	0.20	Upholster Reform	0.26	Coffee	0.22
46	Upholster Reform	0.26	School Transportation	0.12	Voluntary Vehicule Insurance	0.18	Photocopy	0.24	Pay TV with Internet	0.21
47	Technical Course	0.22	Postgraduate	0.12	Printing and Copy	0.16	TV Repair	0.24	Imaging Examination	0.20
48	Photocopy	0.21	Dispatcher	0.11	Match Ticket	0.15	Seamstress	0.20	Class Council	0.20
49	Seamstress	0.20	Child Care Center	0.11	Upholster Reform	0.14	Refrigerator Repair	0.20	Hair Removal	0.18
50	Psychologist	0.18	Voluntary Vehicule Insurance	0.11	Stereo Repair	0.13	Motel	0.19	Seamstress	0.18
51	TV Repair	0.17	Printing and Copy	0.10	Language Course	0.12	Services of Domicile Change	0.18	Match Ticket	0.17
52	Physiotherapist	0.16	Club	0.10	Physical Activities	0.11	Physical Activities	0.15	Photocopy	0.16
53	Class Council	0.16	Washer Machine Repair	0.10	Tour	0.10	Washer Machine Repair	0.14	Other Alcoholic Beverages	0.15
54	Motel	0.16	Class Council	0.09	Motel	0.09	Child Care Center	0.14	Motel	0.15
55	Services of Domicile Change	0.16	Car Rental	0.09	Club	0.09	Match Ticket	0.14	Child Care Center	0.13
56	Match Ticket	0.15	Language Course	0.09	Class Council	0.07	Printing and Copy	0.14	Technical Course	0.13
57	Refrigerator Repair	0.14	Tour	0.07	Physiotherapist	0.06	Class Council	0.13	Car Rental	0.13
58	Hair Removal	0.14	Hair Removal	0.05	Washer Machine Repair	0.06	Parking Fee	0.13	Services of Domicile Change	0.12
59	Pay TV with Internet	0.14	Parking Fee	0.04	Child Care Center	0.05	Hair Removal	0.11	Computer Course	0.12
60	Child Care Center	0.13	Motel	0.04	Grasing and Washing	0.05	Pay TV with Internet	0.09	Washer Machine Repair	0.10
61	Washer Machine Repair	0.12	Grasing and Washing	0.04	Hair Removal	0.05	Grasing and Washing	0.07	Printing and Copy	0.08
62	Printing and Copy	0.11	Preparatory Course	0.03	Car Rental	0.03	Psychologist	0.06	Grasing and Washing	0.07
63	Car Rental	0.09	Physical Activities	0.02	Pay TV with Internet	0.03	Stereo Repair	0.06	TV Repair	0.07
64	Grasing and Washing	0.07	Psychologist	0.02	Parking Fee	0.03	Physiotherapist	0.06	Refrigerator Repair	0.06
65	Stereo Repair	0.05	Pay TV with Internet	0.01	Psychologist	0.03	Car Rental	0.05	Preparatory Course	0.05
66	Preparatory Course	0.04	Physiotherapist	0.00	Preparatory Course	0.02	Preparatory Course	0.02	Stereo Repair	0.02

Table A.2: Expenditure Share (in Total Expenditure on Services) of IPCA Sub-items across Economic Classes – 2008-2009 – Brazil – POF (IBGE).

Appendix C: Income Elasticity of IPCA Sub-items

	Total		Classe E		Classe D		Classe C		Classe A/B	
Ranking	IPCA Sub-item	$\eta_{i,j,t}$	IPCA Sub-item	$\eta^{g}_{i,j,t}$	IPCA Sub-item	$\eta^{g}_{i,j,t}$	IPCA Sub-item	$\eta^{g}_{i,j,t}$	IPCA Sub-item	$\eta^{g}_{i,j,t}$
1	Car Rental	1.7158	Physical Activities	-[1]	Domestic Servant	-[1]	Voluntary Vehicule Insurance	2.2380	Airfare	2.1464
2	Voluntary Vehicule Insurance	1.6832	Motel	-[1]	Internet Access	-[1]	Condo Fee	2.2031	Physiotherapist	1.9303
3	Airfare	1.6565	School Transportation	-[1]	Voluntary Vehicule Insurance	-[1]	Tour	2.1088	Psychologist	1.8487
4	Language Course	1.6325	Technical Course	2.3329	Higher Education	2.6014	Psychologist	2.0748	Physical Activities	1.7951
5	Domestic Servant	1.6196	Basic Education	2.0402	Language Course	2.3335	Parking Fee	2.0153	Tour	1.7939
6	Condo Fee	1.6192	Pay TV with Internet	1.9955	High School	2.2455	Airfare	1.9366	Parking Fee	1.7542
7	Higher Education	1.6025	Banking Service	1.9736	Child Care Center	2.2042	Domestic Servant	1.9330	Hotel	1.7394
8	High School	1.5720	Pet Treatment	1.9294	Cell Phone with Internet - Package	2.1848	Car Rental	1.9260	Pay TV with Internet	1.6439
9	Parking Fee	1.5601	Internet Access	1.8826	Parking Fee	2.0516	Language Course	1.9163	Condo Fee	1.6301
10	Tour	1.5371	Dispatcher	1.8587	Motel	2.0118	Postgraduate	1.8698	Club	1.6157
11	Psychologist	1.5249	Tour	1.7379	Washer Machine Repair	2.0026	High School	1.7227	Preparatory Course	1.5991
12	Postgraduate	1.5182	Club	1.6211	Tour	1.9339	Higher Education	1.6896	Voluntary Vehicule Insurance	1.5653
13	Pay TV with Internet	1.4979	Movie (DVD) Rental	1.5607	Club	1.9271	Pay TV with Internet	1.6832	Postgraduate	1.5623
14	Hair Removal	1.4824	Postgraduate	1.4918	Hair Removal	1.9124	Club	1.6822	Car Rental	1.4883
15	Club	1.4704	Vehicule Paint	1.4883	Condo Fee	1.8910	Hair Removal	1.5985	Domestic Servant	1.4691
16	Cell Phone with Internet - Package	1.4554	Cell Phone with Internet - Package	1.4875	Banking Service	1.7954	Hotel	1.5687	Class Council	1.4566
17	Hotel	1.4091	Nursery Education	1.4583	Pay TV with Internet	1.7942	Physical Activities	1.5559	Basic Education	1.3487
18	Internet Access	1.4064	Manicure	1.4406	Postgraduate	1.6159	Physiotherapist	1.5359	Match Ticket	1.3121
19	Preparatory Course	1.4005	Computer Course	1.3503	Basic Education	1.6120	Cell Phone with Internet - Package	1.5223	Pet Treatment	1.2933
20	Child Care Center	1.3989	Printing and Copy	1.3319	School Transportation	1.5673	Internet Access	1.4764	Language Course	1.2647
21	Physical Activities	1.3936	Breakfast	1.2571	Dentist	1.5218	Child Care Center	1.4644	Hair Removal	1.1864
22	Upholster Reform	1.3467	Grasing and Washing	1.2433	Dispatcher	1.4949	Preparatory Course	1.4509	Cinema	1.1398
23	Washer Machine Repair	1.3383	Coffee	1.2209	Technical Course	1.3456	Washer Machine Repair	1.3703	Other Alcoholic Beverages	1.1248
24	Physiotherapist	1.3305	Automobile Repair	1.2077	Nursery Education	1.3306	Basic Education	1.3572	Grasing and Washing	1.0952
25	Basic Education	1.2922	Meal	1.2068	Vehicule Paint	1.3270	Upholster Reform	1.3538	Seamstress	1.0058
26	Class Council	1.2829	Higher Education	1.1909	Manicure	1.3096	Dentist	1.2940	Meal	0.9987
27	Dentist	1.2697	Dentist	1.1707	Physical Activities	1.2702	Class Council	1.2912	Nursery Education	0.9409
28	Banking Service	1.2263	Medical Treatment	1.1047	Automobile Repair	1.2460	Banking Service	1.2680	Internet Access	0.9375
29	Nightclub and Disco	1.2251	Washer Machine Repair	1.1037	Nightclub and Disco	1.2026	Hospitalization and Surgery	1.2563	Upholster Reform	0.9291
30	Hospitalization and Surgery	1.1887	Parking Fee	1.0894	Grasing and Washing	1.1890	Nightclub and Disco	1.2548	Cell Phone Charges	0.8988
31	Dispatcher	1.1853	Cell Phone Charges	1.0876	Hospitalization and Surgery	1.1604	Dispatcher	1.2374	High School	0.8793
32	Vehicule Paint	1.1069	Beer	1.0705	Class Council	1.1600	Vehicule Paint	1.1571	Hospitalization and Surgery	0.8512
33	Grasing and Washing	1.1064	Hair Removal	1.0464	Movie (DVD) Rental	1.1320	School Transportation	1.1522	Cell Phone with Internet - Package	0.8194
34	Nursery Education	1.1004	Soda and Mineral Water	1.0367	Psychologist	1.1201	Nursery Education	1.1442	Nightclub and Disco	0.8150
35	Manicure	1.0877	Class Council	1.0306	Pet Treatment	1.0910	Motel	1.1370	Banking Service	0.8076
36	School Transportation	1.0842	Cinema	1.0210	Printing and Copy	1.0737	Manicure	1.1307	Dentist	0.7826
37	Cinema	1.0815	Workmanship	1.0130	Physiotherapist	1.0671	Grasing and Washing	1.1107	Movie (DVD) Rental	0.7557
38	Services of Domicile Change	1.0526	Child Care Center	1.0067	Hotel	1.0455	Automobile Repair	1.0945	Vehicule Paint	0.7160
39	Automobile Repair	1.0470	Match Ticket	1.0022	Cinema	1.0436	Cinema	1.0749	Coffee	0.7004
40	Match Ticket	1.0444	Hospitalization and Surgery	1.0001	Upholster Reform	1.0115	Services of Domicile Change	1.0134	Manicure	0.6995
41	Motel	1.0423	Hotel	0.9939	Meal	1.0098	Match Ticket	1.0067	Higher Education	0.6752
42	Pet Treatment	0.9877	Psychologist	0.8961	Airfare	0.9979	Pet Treatment	0.9625	Dispatcher	0.6185
43	Meal	0.8717	Seamstress	0.8623	Match Ticket	0.9439	Technical Course	0.8946	Photocopy	0.5826
44	Photocopy	0.8519	Nightclub and Disco	0.8593	Computer Course	0.9367	Meal	0.8806	Workmanship	0.5736
45	Movie (DVD) Rental	0.8091	Imaging Examination	0.8584	Cell Phone Charges	0.9325	Photocopy	0.8772	Residential Rental	0.5686
46	Seamstress	0.7829	Residential Rental	0.8368	Medical Treatment	0.9304	Movie (DVD) Rental	0.8645	Beer	0.5470
47	Cell Phone Charges	0.7783	Hairdresser	0.8368	Workmanship	0.9296	Printing and Copy	0.8591	Automobile Repair	0.5193
48	Printing and Copy	0.7569	Snack	0.8317	Breakfast	0.9187	Workmanship	0.8126	Hairdresser	0.5166
49	Workmanship	0.7557	Laboratory Examination	0.7976	Coffee	0.9048	Cell Phone Charges	0.7977	Snack	0.4877
50	TV Repair	0.7319	Refrigerator Repair	0.7567	Soda and Mineral Water	0.8366	Seamstress	0.7651	Services of Domicile Change	0.4248
51	Technical Course	0.7158	Photocopy	0.7131	Preparatory Course	0.8270	Hairdresser	0.7418	Candies	0.4074
52	Hairdresser	0.6846	High School	0.6485	Seamstress	0.8168	Medical Treatment	0.7206	Child Care Center	0.3822
53	Medical Treatment	0.6111	Preparatory Course	0.6406	Hairdresser	0.8142	TV Repair	0.7187	Laboratory Examination	0.3717
54	Stereo Repair	0.5785	Domestic Servant	0.5817	Beer	0.8072	Residential Rental	0.5612	Motel	0.3517
55	Residential Rental	0.4820	Candies	0.5753	Photocopy	0.8002	Coffee	0.5546	Medical Treatment	0.3516
56	Coffee	0.4589	Airfare	0.4725	Imaging Examination	0.7370	Breakfast	0.5533	School Transportation	0.3379
57	Breakfast	0.3763	Upholster Reform	0.4204	Residential Rental	0.7208	Soda and Mineral Water	0.5448	Breakfast	0.2588
58	Snack	0.3670	Other Alcoholic Beverages	0.3839	Snack	0.7106	Stereo Repair	0.5344	Printing and Copy	0.2467
59	Soda and Mineral Water	0.3625	Condo Fee	0.3638	Laboratory Examination	0.6502	Computer Course	0.4967	Washer Machine Repair	0.0693
60	Beer	0.3013	Language Course	0.3143	Refrigerator Repair	0.5767	Snack	0.4700	Soda and Mineral Water	0.0182
61	Candies	0.2695	Services of Domicile Change	0.1970	Candies	0.5343	Beer	0.4330	Imaging Examination	-0.0560
62	Laboratory Examination	0.1951	Stereo Repair	0.1081	Services of Domicile Change	0.4317	Candies	0.3462	Refrigerator Repair	-0.0717
63	Computer Course	0.1716	TV Repair	0.0240	Stereo Repair	0.2146	Refrigerator Repair	0.3332	Stereo Repair	-0.4185
64	Refrigerator Repair	0.1232	Physiotherapist	-[1]	Other Alcoholic Beverages	0.2139	Laboratory Examination	0.3196	Technical Course	-0.4703
65	Other Alcoholic Beverages	0.1014	Voluntary Vehicule Insurance	-[1]	TV Repair	0.1094	Imaging Examination	0.3079	Computer Course	-0.7289
66	Imaging Examination	0.0937	Car Rental	-[1]	Car Rental	-[1]	Other Alcoholic Beverages	-0.0415	TV Repair	-1.4197

1/ We do not compute income elasticities for sub-items that register purchase infrequency.

Table A.3: Income Elasticity of IPCA Sub-items across Economic Classes – 2008-2009 – Brazil – POF (IBGE).

Appendix D: Expenditure Share of IPCA Clusters

Ranking	Total		Class E		Classe D		Class C		Class A/B	
	IPCA Cluster	$s_{i,j,t}$	IPCA Cluster	$s^g_{i,j,t}$	IPCA Cluster	$s^g_{i,j,t}$	IPCA Cluster	$s^g_{i,j,t}$	IPCA Cluster	$s^g_{i,j,t}$
1	Food away from Household	26.0	Food away from Household	37.0	Food away from Household	37.1	Food away from Household	29.1	Food away from Household	21.5
2	Housing Charges	17.5	Housing Charges	27.2	Housing Charges	22.0	Housing Charges	17.9	Housing Charges	16.2
3	Personal Services	13.8	Personal Services	8.0	Transportation	9.1	Transportation	12.1	Personal Services	16.2
4	Transportation	12.2	Communication	8.0	Personal Services	8.5	Personal Services	12.1	Transportation	12.8
5	Educational Courses	10.1	Transportation	7.3	Communication	8.3	Communication	9.6	Educational Courses	12.1
6	Communication	9.3	Health Services	5.6	Health Services	6.3	Educational Courses	9.1	Communication	9.2
7	Recreation	5.2	Educational Courses	3.1	Educational Courses	4.5	Health Services	5.4	Recreation	6.9
8	Health Services	5.1	Recreation	2.1	Recreation	3.2	Recreation	3.8	Health Services	4.6
9	Repair and Maintenance	0.7	Repair and Maintenance	1.7	Repair and Maintenance	1.0	Repair and Maintenance	0.9	Repair and Maintenance	0.5
Total		100		100		100		100		100

Table A.4: Expenditure Share (in Total Expenditure on Services) of IPCA Clusters across Economic Classes – 2008-2009 – Brazil – POF (IBGE).

Appendix E: Income Elasticity of IPCA Sub-items

	Total		Class E		Class D		Class C		Class A/B	
Ranking	IPCA Cluster	$\eta_{i,j,t}$	IPCA Cluster	$\eta^{g}_{i,j,t}$	IPCA Cluster	$\eta^{g}_{i,j,t}$	IPCA Cluster	$\eta^{g}_{i,j,t}$	IPCA Cluster	$\eta^{g}_{i,j,t}$
1	Personal Services	1.2643	Recreation	1.3699	Transportation	1.2787	Recreation	1.3273	Recreation	1.4202
2	Recreation	1.2399	Transportation	1.2193	Personal Services	1.2415	Personal Services	1.3012	Personal Services	1.1769
3	Transportation	1.1937	Food away from Household	1.0247	Recreation	1.2276	Transportation	1.1950	Housing Charges	1.0096
4	Educational Courses	1.0012	Educational Courses	1.0040	Educational Courses	1.0027	Educational Courses	1.0014	Educational Courses	1.0010
5	Communication	1.0003	Communication	1.0004	Communication	1.0004	Communication	1.0003	Communication	1.0003
6	Health Services	0.9013	Personal Services	0.9958	Health Services	0.9651	Repair and Maintenance	0.9081	Transportation	0.9492
7	Repair and Maintenance	0.8904	Health Services	0.9910	Food away from Household	0.8707	Health Services	0.9078	Food away from Household	0.8430
8	Housing Charges	0.7852	Housing Charges	0.8380	Housing Charges	0.7832	Housing Charges	0.7888	Health Services	0.8086
9	Food away from Household	0.6839	Repair and Maintenance	0.3488	Repair and Maintenance	0.4941	Food away from Household	0.7170	Repair and Maintenance	0.3576
		$H_{i,t}$		$H^{g}_{i,t}$		$H^{g}_{i,t}$		$H^{g}_{i,t}$		$H^{g}_{i,t}$
	Services - Total	1.2225	Services - Total	1.2047	Services - Total	1.2536	Services - Total	1.2413	Services - Total	1.1756

Table A.5: Income Elasticity of IPCA Clusters across Economic Classes – 2008-2009 – Brazil – POF (IBGE).