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Leon Podkaminer

Why Are Goods Cheaper in Rich Countries? Beyond the Balassa-Samuelson Effect



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Leon Podkaminer

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Abstract

Relative to consumer services, consumer goods tend to be cheaper in richer European countries. This tendency, customarily explained in terms of cost developments and/or foreign-trade considerations, can be a reflection of a demand-side regularity. An econometrically specified cross-country demand system indicates that goods are 'necessities' while services are 'luxuries'. Relative price of goods responds negatively to the rising supply of goods and positively to the rising supply of services, with the former response being much stronger. If the supply of both items were to rise at the same speed, the relative price of goods would have to fall.

Keywords: *relative prices, Balassa-Samuelson Effect, Engel Law, Almost Ideal Demand System, international consumption comparisons, structural change*

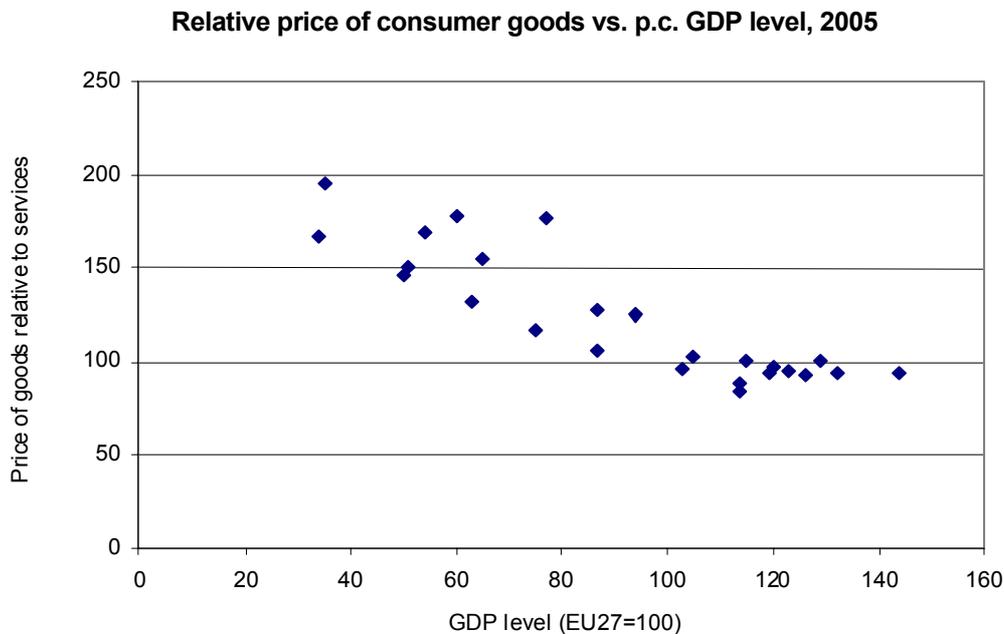
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Why are goods cheaper in rich countries? Beyond the Balassa-Samuelson effect

1 Introduction

Relative to consumer services, consumer goods in rich countries tend to be cheaper than in poor countries. This statement is borne out by any number of comparative, cross-country statistics on price and consumption structures. A typical relationship between real GDP per capita (in terms of purchasing power parities) and the relative price of consumer goods (defined as the ratio of the purchasing power parities for consumer goods to the purchasing power parities for consumer services) is shown by the scatter diagram in Figure 1

Figure 1



Source: ECP August 2009. Relative price for EU-27 = 100.

The regularity illustrated by Figure 1 is commonly linked to the tendencies believed to be inherent in production. Differences in relative prices are to reflect in one way or other the differences in relative costs or productivity levels, supposedly varying with income. More specifically, the economics profession seems quite satisfied with a general explanation (sometimes assuming quite elaborate forms) which rationalises the Regularity along the 'differences-in-productivity' lines - through the reference to the intuitions expressed very long ago by Balassa and Samuelson. (The regularity connecting the GDP level to the

* The author is grateful to R. Stehrer and K. Laski (both wiiw) for valuable comments.

relative price of goods of the type represented by the scatter diagram in Figure 1 will be referred to as 'the Regularity'.)

Specifically, the Balassa-Samuelson Effect (BSE) alleges that services are increasingly more costly to produce than tradable goods (or that labour productivity tends to rise faster in the production of goods than in service sectors).¹ Connecting the Regularity to BSE is conceptually unsatisfactory – at least to the present author (Podkaminer, 2003). For the BSE to operate, even in theory, one must postulate quite heroic assumptions – often of the 'knife-edge' type (with infinitesimal changes in the assumed parameters resulting in the breakdown of the desired model properties). To list just a few such assumptions, the BSE obtains provided there are no intermediate inputs (in particular, production of services, or goods does away with any input of goods or services respectively); either sector's technology is a constant-returns-to-scale Cobb-Douglas defined over homogenous labour and capital; the Law of One Price prevails internationally (with respect to goods and also with respect to the returns to capital); domestically the Law of One Wage prevails; in addition labour in the goods' sector receives wages equal marginal productivity in that sector; only neutral technical change (assumed to be more pronounced in the goods' sector) is considered. Apart from being theoretically questionable in their own right (e.g. because of the unreflective reliance on the 'surrogate production functions'), these assumptions are unlikely to be ever met in reality, even approximately.²

Of course this is not the place to reiterate rigorously the reasons why the BSE need not obtain in reality and thus cannot be categorically invoked to explain why the Regularity obtains in reality. One reason for our referring to BSE is that as long as it is generally accepted, the more adequate explanations do not have the chance to be seriously discussed. Moreover, BSE has influenced some practical policy considerations. BSE has been invoked – too often in fact - to justify propositions about the links between real and nominal convergence in lower-income countries, about inflation and the pace of real convergence, or on the desirability of a switchover to the euro. To the present author these propositions are of questionable theoretical validity and could even suggest harmful economic policy prescriptions (Podkaminer 2008, 2010).

The principal aim of this paper is to propose a positive alternative explanation for the Regularity. That explanation rests on the maintained hypothesis that consumer services are 'luxuries' while consumer goods are 'necessities'. This hypothesis was expounded and

¹ The original (informal) statement of BSE is in Balassa (1964) and Samuelson (1964). A 'modern', apparently rigorous, formulation of BSE, initiated in De Gregorio, Giovannini and Wolf (1994) has since been repeated in literally hundreds of articles, working papers, research memoranda and the like.

² Significantly, extensive econometric studies are not supportive of the hypothesis on the empirical adequacy of BSE. Summarizing many years of econometric research on BSE (also one's own), Égert (2007, p. 1) finds it proper to make the following statement: '*...our estimation results provide the obituary notice for the Balassa-Samuelson effect*'. To the present author this does not come as a surprise.

provisionally tested in Podkaminer (1999). In Podkaminer (2004) a question related to the one asked now was answered: 'why is *food* cheaper in rich countries?' The answer was that neither cost, nor foreign trade, nor other supply-side factors could be really responsible. But the universal (Engel Law) regularity, with food's being a necessity, could.

Section 2 sketches the approach followed and briefly discusses the data. Section 3 describes the outcomes of estimation of a cross-country Almost Ideal Demand System for the years 1999-2008. In Section 4 the derived income elasticity of demand for goods and services are assessed. Section 5 considers the demand-supply interactions likely to be determining the Regularity. Section 6 concludes, briefly returning to the discussion of some of the issues (the role of differential cost developments) that are customarily invoked while discussing the Regularity.

2 Distinguishing consumer goods and services in the data available from the Eurostat's European Comparison Project

Learning about the demand elasticity magnitudes requires some applied work on demand formation patterns – in this case making a distinction between consumer goods and consumer services. This sounds quite straightforward, but in actual fact is not. Because the focus is on revealing the effects of rising income on the price elasticity magnitudes, the data for separate countries are by and large hardly useful. The cross-section data (e.g. from the national family budget surveys for specific years) normally display large variation in the income levels – but very little, if any, diversity in the data on prices facing groups of households. Estimations using such data cannot say much that is too reliable about elasticity magnitudes (though of course they can be highly informative about the Engel curves, or responses of demands to varying levels of income). The situation is slightly better when longer national (average) time series on prices and income are available. However, even in that case one typically observes rather low variation in both the observed income levels and the relative prices. (At an average real GDP growth rate of about 2 percent or less per year observed in the developed countries the variation in the income levels over time is surely not impressive, especially as the inflation levels are as low as to moderate the changes in the observed relative prices). Of course, it is possible to pool the cross-section (e.g. family budget) data for many (consecutive) years to arrive at samples that display sufficient variation in both prices and income levels. Studies using such pooled samples, rather infrequently reported in the recent literature, seek to assess the patterns of the demand formation at the separate national levels. Pooling the cross-section data for consecutive years is troublesome even for single countries as it necessitates much work on proper deflating of real quantities and prices for different years. The problems arising when attempting to pool the data for different countries would have been incomparably more difficult as one would have to find the ways to consistently link the prices and real quantities consumed across national borders.

Fortunately, there is an alternative approach, pioneered and developed (as much else in applied economics) by the late Professor Henri Theil. This approach proposes to examine the patterns of universal demand formation via the estimation of cross-country systems of demand functions – with the cross-section data on quantities and prices taken from the international comparison projects.³ The data available from such projects typically display large cross-country variations in both income levels and the price relativities. Of course, the diversity in the cross-section data available from the comparison projects (and the internal consistency of that data and its cross-country comparability) comes at a cost. One must accept the fact that the comparison projects produce the final results on purchasing power parities and the ‘real’ quantities consumed only upon the application of very complex and labour-intensive methods of gathering and processing national data - and upon the application of rather elaborate computational algorithms (not entirely free of some subjective judgements). The projects’ methods of collecting and processing information do not cease to be debated (and occasionally revised). None the less, the reliance on the data eventually generated by the comparison projects for the specific goal of estimating the cross-country systems of the demand function does not seem to be any less acceptable than any other type of reliance on that data. Of course this tacitly assumes (1) a belief into the objective existence of some patterns of consumer demand formation that are worthy of being qualitatively examined; (2) a belief that the patterns in question are fairly universal over time and space. The latter belief has a long tradition in the applied consumer economics (see Houthakker 1957), the former seems to constitute an article of faith (a priori accepted by some members of the economics guild, while a priori rejected by others).

This paper works with a subset of the country data available (as of August 2009) from Eurostat’s European Comparison Project (ECP henceforth). ECP supplies a wealth of information on purchasing power parities and ‘real’ (PPP-adjusted) quantities for almost all European countries (currently excluding however the post-Soviet countries other than the three Baltic states), Japan and the USA for the consecutive years 1999 through 2008. (Earlier editions of the ECP were released less frequently, in principle every three years. The country coverage of the earlier editions changed over time. The 1996 ECP was the most extensive, with a wealth of information on all post-Soviet republics and even Mongolia). For some time now, the true core of ECP has been restricted to the EU-27 countries. The results for all non-EU countries that are also reported can serve primarily for making some rough auxiliary comparisons with the ‘average EU’ levels. As such the data for non-EU-27 countries will not be accounted for in this paper. There are many reasons for making that exclusion, starting with purely technical concerns (e.g. about the extent and strength of coordination and supervision of the work of national statistical offices and the

³ The foundations of the approach were laid out in Theil and Suhm (1981). See also Theil and Clements (1987), Fiebig, Seale and Theil (1988), Clements and Selvanathan (1994). The present author adhered to the approach – starting with Podkaminer, Finke and Theil (1984) through Podkaminer (1999, 2004).

resultant reliability of data for the non-EU countries⁴), to the more substantive ones (e.g. the fact that the final ECP parity estimates are derived differently for the EU-27 and the remaining countries⁵).

Because of the anomalous price/income conditions obtaining in Luxembourg, that country is not accounted for in further analyses. Luxembourg's very high income level happens to be combined with the relative price (goods/services) that is not much different from that recorded in that country's much less affluent neighbours. Luxembourg does not conform to the Regularity. This anomaly can be explained by the country's tiny size and location between neighbours characterized by much lower income levels. Prices of goods and services, including housing rents, recorded in Luxembourg cannot diverge radically from those prevailing in towns or shopping centres located a few miles away – just across the (nearby) borders. The Law of One Price does seem to work in this rather unique instance – also as far as consumer services are concerned.

The opposite irregularity (comparatively high relative prices of services at a relatively low income level) could be detected in some smaller countries highly dependent on income from foreign tourism (e.g. Cyprus, or Malta). Making proper adjustments to neutralise the effects of foreign consumption (and of domestic nationals' consuming abroad) is advisable – and proves necessary anyway. As it happens, at present the ECP reports the purchasing power parities and nominal, as well as 'real' (PPP-adjusted), quantities of consumer goods and services. The problem is that for most countries the aggregates for the two consumer items (goods and services), differ appreciably from the reported information on the '*national household final consumption expenditure*'. Just to illustrate this point, consider the 'raw' ECP data for Germany and Spain in, let us say, 2005. The nominal German p.c. expenditures on the consumption of consumer goods and services equalled 7809 and 7440 euro respectively (15249 euro in total) - while the p.c. nominal household final consumption was as much as 15593 euro. The opposite situation was reported for Spain, where the nominal p.c. expenditures on consumption of consumer goods and services were 5427 and 7132 euro respectively (12559 euro in total) - while the nominal p.c. household final consumption reportedly equalled only 11935 euro. The discrepancies are attributable primarily to the households' consumption realised abroad (in the German case), or to foreigners' consumption (in the Spanish case). Earlier Eurostat reports contained all information (nominal and real quantities as well as purchasing power parities)

⁴ In the case of Japan, the USA and some other non-EU (European) countries the ECP does not report data on consumption of goods as distinguished from consumption of services.

⁵ Generally speaking, the final ECP results for the EU members are generated via a multilateral aggregation scheme (essentially the so called EKS) which accounts for (i.e. properly averages) all binary price/quantity comparisons for the whole set of the EU-27 countries. This helps to make the final ECP results satisfy some desirable cross-country consistency postulates (transitivity, absence of the Gerschenkron Effect). The results for the non-EU countries are not similarly averaged through the EKS procedures but calculated via separate, single, bilateral 'bridges'. The chances are much greater that the final results for non-EU violate the consistency postulates vs. other countries, including some EU member states.

pertaining to the item called '*net purchases abroad*'. That item tightly corresponded to the discrepancies between the household final consumption expenditure and the sum of the consumer goods and services (see e.g. Eurostat/OECD, 2004). Eurostat no longer reports the '*net purchases abroad*', but leaves the discrepancies without further comment. Whatever the nature of the discrepancies in question, it is quite obvious that they have to be consistently removed from the ECP data – if that is to be used for the estimation of the conventional households' demand formation patterns.

The way to get rid of the discrepancies followed in work underlying the results reported in this paper is based on two assumptions and one postulate. First, it is assumed that in each country instance the discrepancies (in volumes, values and the purchasing power parities) referred to above reflect net purchases abroad. Second, it is assumed that the purchases in question target only the consumer services. In other words it is assumed that while abroad, the tourists buy only services. The households in the tourism-importing countries (such as Germany) are thus assumed to consume more of services than reported by the ECP for Germany (and as much goods as reported). Conversely, households in the tourism-dependent countries are assumed to consume less of services than reported by ECP for their countries – and an unchanged quantity of goods. Secondly, it is assumed that while the purchasing power parities of the consumer goods are equal to the purchasing power parities of the households' final consumption expenditure *on goods*, the purchasing power parities of households' final consumption of services remain to be assessed. (In other words the foreigners buy, or nationals sell, services that can be different – in terms of their purchasing power parities - from the services they purchase as households domestically). Thirdly, it is postulated that the *real* quantities of services actually entering households' final consumption expenditure (and the corresponding services' purchasing power parities) must be consistent with the overall purchasing power parities for the household final consumption expenditure. (The latter are of course reported by ECP).

The arithmetic of the adjustments to the ECP data that would meet the third postulate literally is rather demanding as it would require the application of the computationally very demanding Eltetö-Köves-Szulc (EKS) algorithm. A somewhat lighter approach was taken instead. Because a number of sensitivity test suggest that the eventual biases are very low, the approach seems quite reliable, at least in the concrete context considered.

Specifically, for each of the 26 countries considered (and any year from 1999 through 2008) the *calculated (or adjusted) purchasing power parity of consumer services included in the aggregate household final consumption expenditure* (PPP_s) solves the following equation:

$$PPP_h = (Las \cdot Paa)^{1/2} \tag{1}$$

where PPP_h is the (reported) purchasing power parity of household final consumption expenditure and Las , Paa are the binary Laspeyres and Paasche indices for PPP_h defined as follows:

$$Las = PPP_g \cdot W_{EU} + PPP_s \cdot (1 - W_{EU}) \quad Paa = (W/PPP_g + (1 - W)/PPP_s)^{-1}$$

where W is the share of expenditure on goods in household final consumption. This is equal $PPP_g \cdot X_g / PPP_h \cdot X_h$ with PPP_g being the purchasing power parity of consumer goods, X_g the real volume of consumer goods (reported), X_h is the real volume of household final consumption (reported), and W_{EU} is the share of expenditure on goods in household final consumption for the entire EU-27 (this is easily calculated).

Equation (1), which is of course the formula for the binary Fisher PPP_h vs. the average for the EU-27, is quadratic in the single unknown PPP_s . This equation has two solutions of which only the positive one (existing and unique in each and any case) is meaningful. To arrive at the fully multilateral PPPs one would have to replicate the EKS procedure. This would first involve solving, for each country in each year, 26 equations of the type (1) – modifying them suitably (e.g. substituting EU-wide goods' shares W_{EU} with the shares recorded in each of the 26 partner countries) and then properly averaging the resultant 26 solutions for each country in each year. That would be a gargantuan effort. Instead equation (1) was specified and solved, for each year and the randomly selected samples of the 26 countries five times only - each time substituting the data for the EU-27 averages with the data for Germany, France, the UK, Italy and Spain. On account of their population numbers and the levels of real consumption these countries would dominate the eventual fully multilateral PPP_s anyway. Not surprisingly, the binary PPP_s derived that way do not diverge perceptibly from the ones calculated from (1). (The latter PPP_s are of course closest to the Germany-based solutions to (1)). This justifies assuming the PPP_s solving Eq. (1) as acceptable proxies to the fully multilateral purchasing power parities.

Table 1 shows the solutions to Eq. (1) for Spain and Germany in 2005. Also, it reports the p.c. real quantity of services attributed to household final consumption expenditure (X_s). The latter is calculated as

$$(PPP_h \cdot X_h - PPP_g \cdot X_g) / PPP_s.$$

As can be seen, the corrections in the magnitudes of PPP for services are quite small (0.922 instead of 0.926 for Spain and 1.028 instead of 1.033 in Germany). None the less making these corrections was worth its while because they also helped elicit estimates of the real volumes of services included in the household final consumption expenditure. These estimates, absent in the original ECP data altogether, are surely more likely to represent the 'truth' than the 'raw' data on consumption of services. Notice that while the ECP real value of consumption of services *in* Spain is much larger than *in* Germany (7700

and 7200 euros respectively), this is no longer the case with the real X_s volumes (Spain's households' consumption of services is much smaller than Germany's – as it in all probability ought to be).

Table 1

PPP_s solving Eq. (1) and other items for Spain and Germany in 2005

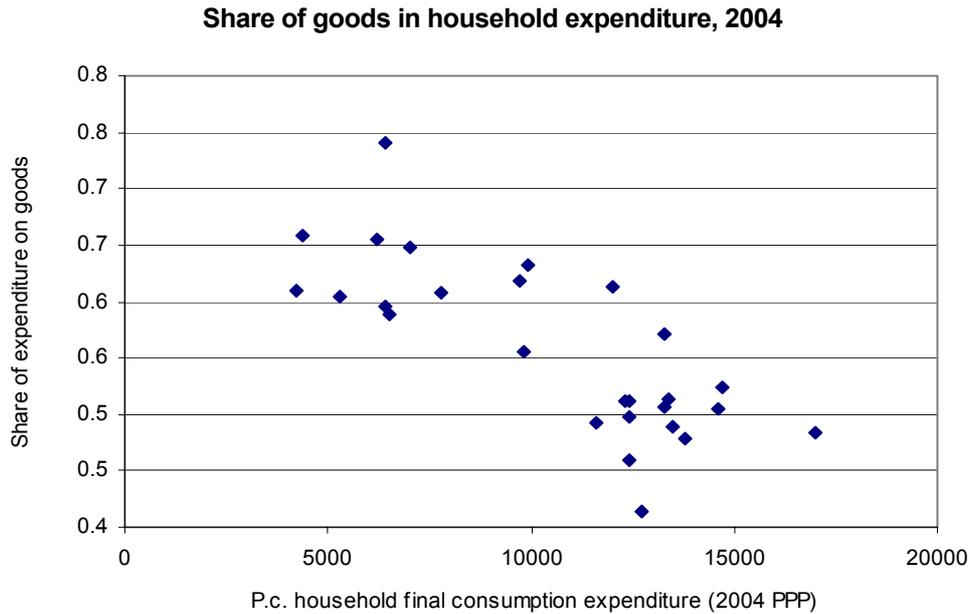
	Spain	Germany
PPP household final consumption expenditure (PPP _n)	0.91105	1.03267
P.c. real value of household final consumption expenditure (X_n)	13100	15100
P.c. household final consumption expenditure PPP _n * X_n	11934.8	15593.3
PPP consumer goods (PPP _g)	0.88972	1.04124
P.c. real quantity of consumer goods (X_g)	6100	7500
P.c. nominal expenditure on consumption goods PPP _g * X_g	5427.3	7809.3
PPP consumer services	0.92625	1.03331
P.c. real quantity of consumer services	7700	7200
P.c. nominal expenditure on consumption services	7132.1	7439.8
P.c. total nominal expenditures on consumption goods and services	12559.4	15249.1
PPP consumer services in household final consumption expenditure PPP _s	0.92179	1.02849
P.c. real quantity of consumer services in household final consumption X_s	7059.6	7568.4
P.c. nominal expenditure on services in household final consumption PPP _s * X_s	6507.5	7784.0

3 An AI demand system fits the ECP data remarkably well

With the data on consumption of and purchasing power parities for services made consistent with the data on household final consumption expenditure it is possible to engage into the estimation of the cross-country system of demand function. The first step to make⁶ is to decide on the functional form of (or a family of such forms). Taking that decision is facilitated by the visual inspection of the data. First, let us have a look at the typical scatter diagram showing the share of goods in household final expenditure vs. the volume of household final consumption expenditure in 2004 – see Figure 2. (The scatter diagrams showing the same two variables for other years have precisely the same character.)

⁶ Sometimes it is suggested that the proper econometric estimation could be proceeded by the non-parametric testing to check whether the data at hand satisfy the axioms of revealed preference (i.e. are compatible with the budget-constrained maximisation of some well-behaved utility function). This is the postulate originating with Professor Samuelson (1938) which has been given some operational significance (see e.g. Varian, 2006 for a recent exposition and literature survey). The problem with the revealed preference tests is that the actual data on consumption and prices almost never pass them. This might be attributed to all kinds of 'measurement or aggregation errors' contaminating the data. The ECP data studied in this paper is no exception to this rule.

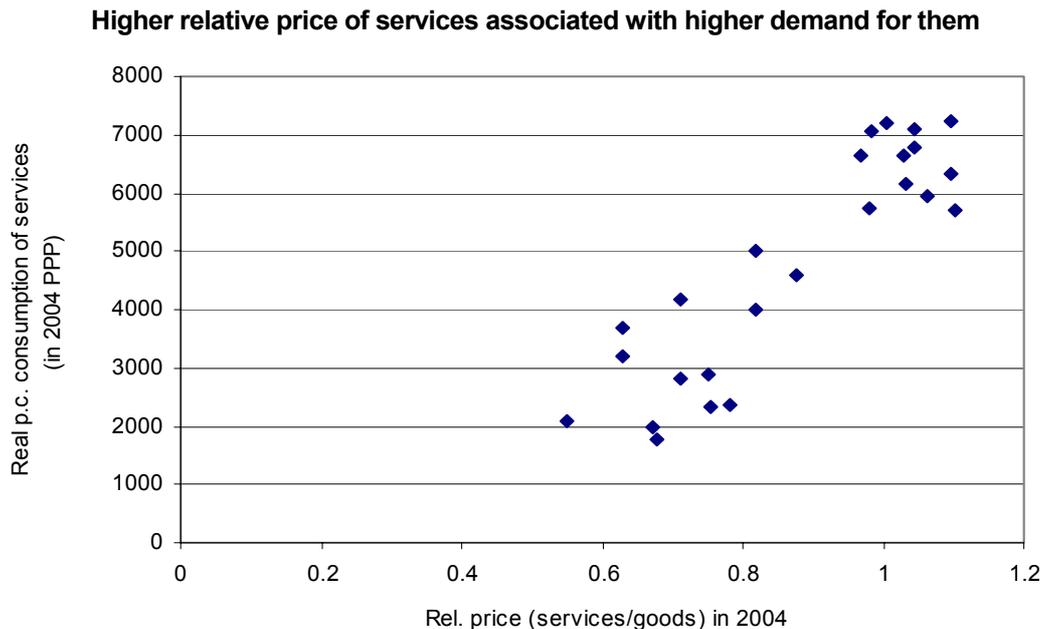
Figure 2



Source: ECP, August 2009.

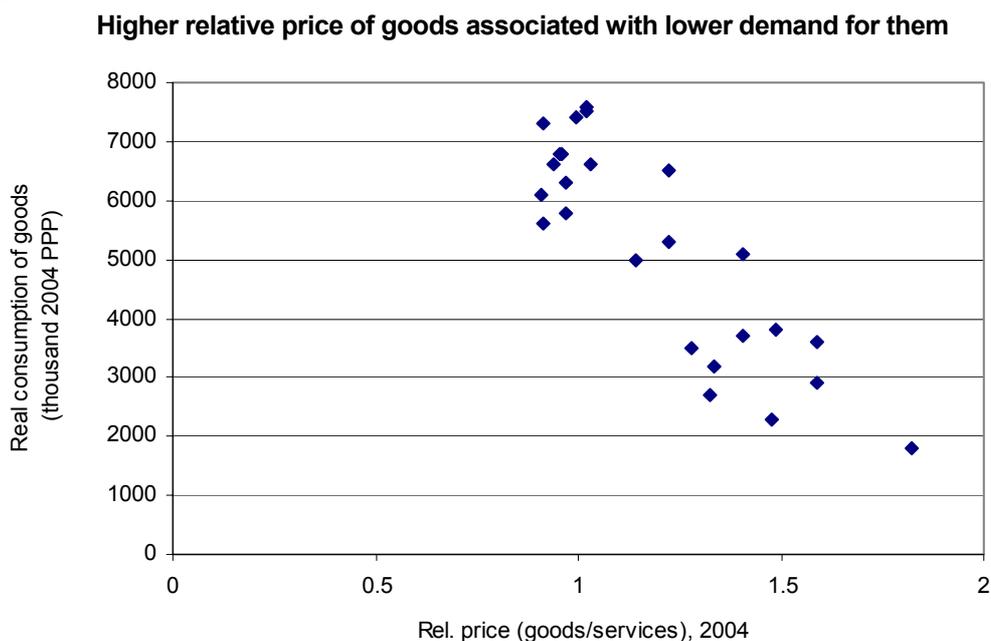
As can be seen, the ECP data indicates the presence of an Engel-type effect: the share of goods in household expenditure falls with income. This suggests, heuristically at least, that goods are necessities – and services are luxuries. This impression can be further reinforced by the scatter diagrams showing the volume of household consumption of services vs. the relative price of services (in terms of prices of goods). Figure 3 gives an example of such a diagram, again for 2004 (the scatter diagrams for all other years look very similarly).

Figure 3



As can be seen, the demand for services appears to be rising with its relative price. Of course this is not because the consumer service aggregate is necessarily a Giffen good, but because the relative price of services is positively (and strongly) correlated with the real income (in the context considered the real income is represented by the p.c. real household final consumption expenditure). The correct interpretation of Figure 3 may be that one sees the effect of an 'hidden' variable: i.e. rising level of real income. This effect appears to outweigh the (possibly negative) effect of the services becoming more expensive as income rises. The scatter diagrams showing consumption of goods vs. the relative price of goods does not suggest any irregularity. These diagrams show a tight negative association between these two variables – higher relative price of goods associated with lower demand for goods (see Figure 4). Of course this may reflect the 'natural law of demand' expected to operate with respect to 'normal goods'. But, since the relative price of goods is negatively (and strongly) correlated with real income (high relative price of goods is a sign of low income level), strong demand for goods at a relatively low level of their prices may also mask the goods' being necessities or even inferior (as defined in the demand theory).

Figure 4



To disentangle the effects of prices and income from the data that suggest the existence of Engel effects one usually postulates the estimation of the so called flexible demand systems. One such widely used system is the Almost Ideal Demand System (AIDS) introduced by Deaton and Muellbauer (1980). AIDS shows a clear affinity with the classical Working (1943) model, some affinity to the Theil model (Theil and Suhm 1981, Theil and Clements 1987) and other popular flexible functional systems. AIDS has given rise to innumerable variants (notably the Quadratic AIDS) which introduce various refinements

and generalisations (if not necessarily improvements), blend the basic AIDS with various other demand systems, nest them into more general systems etc⁷.

Having extensively experimented – with rather moderate success - with the estimation of some popular alternatives to, and extension of, AIDS (including a Quadratic AIDS) a simplified version of the classical AIDS was eventually selected for the final estimation.

Arithmetically, the simplified AIDS for the two-commodity economy is compactly represented by two demand equations:

$$\begin{aligned} X_g &= (M/p_g)[\alpha_g + \beta_g(\log (M/M^\circ) - P)] \\ &\text{and} \\ X_s &= (M/p_s) [\alpha_s + \beta_s(\log (M/M^\circ) - P)] \end{aligned} \quad (2)$$

X_g and X_s are real quantities of household-consumed goods and services respectively, M is the nominal p.c. household expenditure, M° is the scaling constant identified – in our case – with the average real (which by construction is equal to the nominal) household expenditure for the entire EU-27, p_g and p_s are the purchasing power parities (playing here the role of prices) for consumer goods and services respectively, P is the overall (Richard Stone's) price deflator defined as

$$P = \alpha_g \log(p_g) + \alpha_s \log(p_s)$$

Finally, α_g , α_s , β_g , β_s are the parameters to estimate.

Ideally, the econometrically derived estimates for the parameters α , β should be statistically significant (or otherwise be dropped from the above formulae). Moreover, it is highly desirable that the 'fit' for either equation is possibly tight. However, the satisfaction of these (and other usual statistical criteria) is often considered insufficient. The parameter estimates are also expected to satisfy, even if only in statistical terms, the additional criteria derived from the 'pure theory of consumer behaviour under budget constraint', i.e. the adding-up requirement; the homogeneity of degree zero and the Slutsky symmetry. In our case the theory-derived requirements are satisfied provided $\alpha_g + \alpha_s = 1$ and $\beta_g = -\beta_s$.

Quite often the econometric practice is to reduce the number of parameters to estimate by *imposing* some restrictions on the parameters and thereby getting rid of some of them (as well as of one equation which then becomes superfluous). In our case, it would be possible to eliminate two out of the four parameters to be estimated (from either of the equations). However, a better practice seems to involve separate estimation of all the parameters from

⁷ The Quadratic AIDS (Banks, Blundell and Lewbel, 1997) intends to capture the demand patterns at finer levels of commodity aggregation. The disaggregate household survey data sometimes suggest the existence of hump-shaped Engel curves. Such curves seem to characterise some specific commodities (e.g. clothing and alcohol).

either equation and then checking whether the estimates satisfy (reasonably) the constraints derived from the 'pure theory'. In our case this practice has worked very well. Parameter estimates derived, via nonlinear ordinary least squares method, from one equation are consistent with the estimates derived from the other equation. Moreover, the adding-up and symmetry conditions are satisfied. The Wald tests on the mutual consistency of the two sets of estimates, and on the satisfaction of the additional restrictions, are passed with flying colours.⁸

The final estimates for the parameters derived from the equations for goods α_g , β_g are shown in Table 2. (The α_s parameter for services equals $1 - \alpha_g$ and β_s equals $-\beta_g$.)

Table 2

Estimates of α_g , β_g for the years 1999 through 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
α_g	0.5439	0.5405	0.5347	0.5284	0.5249	0.5208	0.5200	0.5171	0.5180	0.5180
Stand. error	0.0080	0.0076	0.0076	0.0079	0.0078	0.0088	0.0078	0.0076	0.0081	0.0087
β_g	-0.1454	-0.1423	-0.1519	-0.1535	-0.1599	-0.1576	-0.1812	-0.1884	-0.2034	-0.1947
Stand. error	0.0317	0.0297	0.0300	0.0314	0.032	0.0359	0.0326	0.0328	0.0358	0.0387
Adj. R-sq.	0.9613	0.9650	0.9601	0.9525	0.9492	0.9334	0.9413	0.9364	0.9175	0.9009

Source: Own calculations. β_g for 1999, 2000, 2002 and 2004 are significant at 0.0002 level, all other estimates are significant at the 0.0000 level.

The fact that β_g is consistently (over time) and significantly (in statistical terms) negative indicates that consumer goods display the Engel-type effect commonly ascribed to foodstuffs. In each year the share of goods in household expenditure tends to fall with total (price-deflated) expenditure:

$$p_g X_g / M = \alpha_g + \beta_g (\log (M/M^0) - P) \quad (3)$$

The constant α_g appears to be contracting over time while the negative Engel coefficient β_g tends to rise in absolute terms. Four comments are now in order on the revealed tendencies of the parameters to evolve over time.

- First, it should be noticed that the parameter estimates for different years cannot be expected to be *precisely* the same. This follows from the fact that the results of ECP (or of any other international comparison project) for various years are in fact incomparable. Purchasing power parities and real quantities for a given year and

⁸ Quantities consumed and prices must be considered as jointly determined, meaning that the right-hand variables in (2) may be correlated with the error terms. However, additional General Method of Moments (GMM) estimations assuming p_g and p_s as instruments produced parameters and testing statistics differing very little from the ones obtained by means of OLS.

given country cannot be legitimately compared with the same items even for the same country – but a different year. The same incomparability principle applies to the measures of total real consumption (approximated by $\log(M/M^\circ)-P$). In particular, the average EU p.c. household consumption (M°) itself is a *nominal* magnitude. Because of that, the series of M° for the consecutive years reflects *also* the ongoing inflation. For example M° for 2003 is 11800 euro (at purchasing power parities of 2003) while M° for 2004 is 12300 euro (at purchasing power parities of 2004). The implied growth rate of the average p.c. household consumption is 4.24%. But this rate reflects both inflation and the structural change (in both prices and real quantities consumed). The price index P , calculated *separately* for each year, allows cross-country comparisons only. There is nothing in the definition, or construction, of P which would suggest it could be used to deflate the consumption values for different years – even for the same country.

- Second, even though one does not quite know how to relate the price indices P for consecutive years even at the overall EU level⁹, one may safely assume that in most member states (and at the EU level) the average p.c. *real* consumption kept growing (at least until 2007) – even if one does not know precisely how to measure that growth in PPP terms. Given this assumption, one should expect β_g to get larger in absolute terms over time (and/or α_g smaller). In other words, even if $(\log(M/M^\circ) - P)$ for a country happens to be the same in two years, its ‘true real’ value is likely to have been larger in the later year. Correspondingly, the goods’ share should be lower in the later year. In terms of the AIDS formula this implies a drift in the parameters: β_g becoming ‘more negative’ and/or α_g becoming smaller.
- Third, a large jump in the β_g estimates occurred only in 2005. This may be due to a pronounced change in the Eurostat methodology for the calculation of prices and volumes for education services (which constitute an important part of the service aggregate) which happened in 2005.
- Fourth, a ‘backward extrapolation’ of the parameter estimates from Table 2 may suggest that sometime in the past (i.e. at sufficiently low ranges of real incomes) β_g might have been close to zero – or perhaps even *positive*. The truly ideal (and not merely an *almost* ideal) demand system representing the patterns of demand formation over much wider ranges of real income than considered in the recent ECP projects might, after all, imply the existence of hump-shaped Engel curves. Quadratic demand systems (including quadratic AIDS) may perhaps be needed for an adequate representation of consumer preferences over broader ranges of incomes. For our (admittedly restricted) purposes a plain AIDS seems yet quite sufficient.

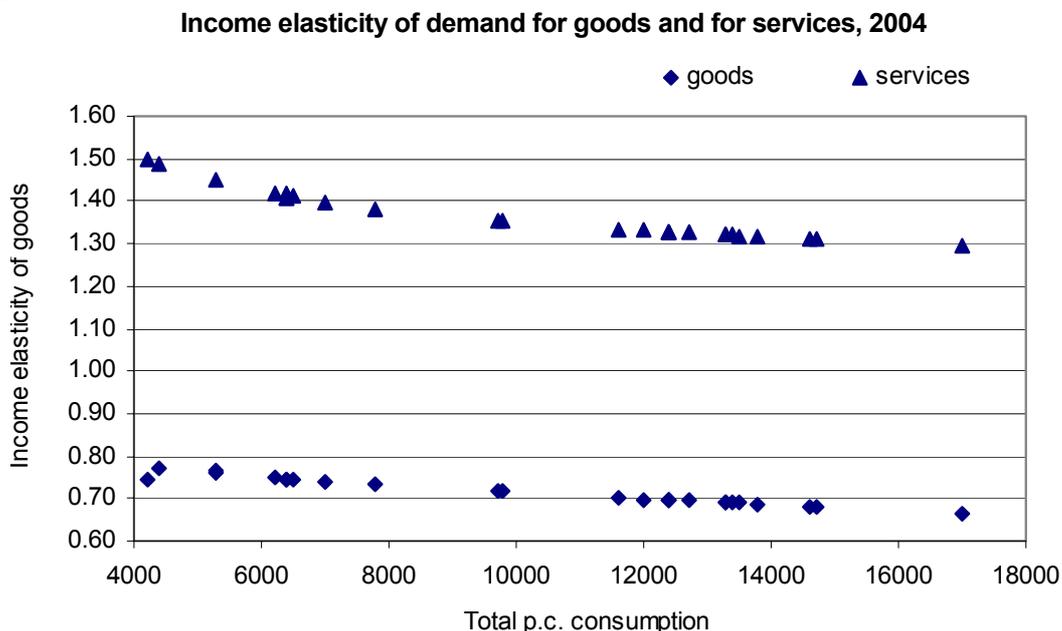
⁹ Because p_g and p_s for the whole EU are both 1 by construction, $\log(M/M^\circ)-P$ for the average EU inhabitant is 0 in any year. Correspondingly, X_g for that inhabitant is estimated as $\alpha_g M^\circ$.

4 Goods are necessities, services are luxuries

With the help of parameter estimates from Table 2 one can easily compute all customary income (i.e. total expenditure) demand elasticities for our two consumer aggregates, for each year and country considered. The computations can be done for either observed or 'theoretical' values of the consumption bundles. The latter values are determined via equation (2), specified with the parameters from Table 2. The outcomes of the elasticity computations suggest the same conclusions concerning the relationships between the calculated elasticities and the income levels, whether these are based on observed or 'theoretical' consumption bundles. Of course, the calculations based on the 'theoretical' consumption bundles suggest relationships that are much 'smoother' than the ones based on the observed consumption bundles.

The general finding is that the service aggregate is a luxury (and hence the goods' aggregate is a necessity). The calculated income elasticity of demand for services is above 1 in each year and each country while the calculated elasticity of demand for goods is less than 1. Moreover, the calculated elasticities stand in a definite relation to the level of total p.c. household consumption. This is illustrated by the scatter diagram for 2004 (based on the 'theoretical' consumption bundles) in Figure 5. (Scatter diagrams for other years have the same character.)

Figure 5.



As can be seen, services are particularly highly 'prized' in the poorest countries. The income elasticity of demand for services declines steeply as income rises from very low

levels. Income elasticity of demand for goods also declines with the income level. However, the rate of decline in that elasticity appears to be about constant.

It is not yet quite clear why the differences between rich and poor countries in terms of income elasticities of demand for both goods should explain the Regularity. Obviously, a rise in real income generates, *all other things being equal*, a much stronger rise in demand for services than for goods and this, in turn, may translate into a drop in relative good prices. However, in general a rise in real income cannot be independent of changes in the quantities demanded (and consumed) nor of the prices that ultimately obtain. At a national level it does not make much sense to study variations in total expenditure (or income) as if these could be separated from transactions by which certain levels of consumption and prices come into existence. The use of this particular *ceteris paribus* clause is therefore problematic when asking questions about a nation's demand responses to its own income level. (The question of that type may make perfect sense at the 'micro' level - e.g. while dealing with the likely demand responses of a single (preferably small) income group to variations in *its* nominal income).

5 Income-supply-demand interdependence

The nominal total expenditure (M) is the sum of expenditures on goods and services, and hence equals $(X_g p_g + X_s p_s)$. A change in M follows from a change (or changes) in one (or more) of its determinants (X_g , p_g , X_s , or p_s). A change in M itself does not mean anything - unless it reflects definite changes in some of the four variables. However, changes in one - or more - of the variables cannot be arbitrary. It is postulated that these changes must be linked through Eqs (2). Ultimately, one can dispose of M altogether and work with two equations:

$$X_g = (X_g p_g + X_s p_s)F/p_g \quad \text{and} \quad X_s = (X_g p_g + X_s p_s)(1-F)/p_s \quad (4)$$

where F:

$$F = \alpha_g + \beta_g[\log((X_g p_g + X_s p_s)/M^\circ) - \alpha_g \log(p_g) - (1-\alpha_g) \log(p_s)]$$

Moreover, it can be observed that the two absolute prices p_g , p_s can both be eliminated and replaced by the relative price p_g/p_s (for the sake of convenience denoted hereinafter as π). Eqs (4) thus take the following form:

$$X_g = (X_g + X_s/\pi)F \quad \text{and} \quad X_s = \pi (X_g + X_s/\pi)(1-F) \quad (5)$$

with F given as

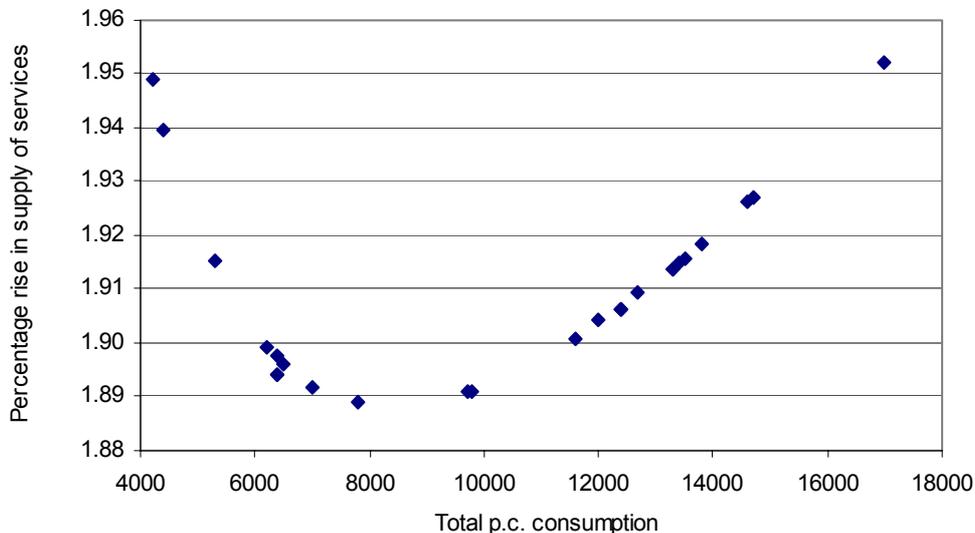
$$F = \alpha_g + \beta_g[\log((X_g + X_s/\pi)/M^\circ) - \alpha_g \log(\pi)]$$

Each of the Eqs (5) determines (the same) unique π corresponding to any fixed pair of values for (X_g, X_s) . But the relationship $\pi = \pi(X_g, X_s)$ is rather complex and probably cannot be expressed in explicit terms.

More about the properties of the function $\pi = \pi(X_g, X_s)$ may be learned through the application of the implicit functions theorem to either of the Eqs(5). In particular, the impacts of ‘small changes’ in the supplies X_g, X_s on the relative price π can be elicited. It turns out that the elasticity of π with respect to X_g ranges between -1.32 and -1.45 and the elasticity of π with respect to X_s ranges between about $+0.55$ and $+0.73$.¹⁰ One implication of this finding is that for the relative price to stay unchanged a 1% rise in the supply of goods would have to be accompanied by the supply of services rising much more (about 1.8% in 1999, 2.3% in 2007). A larger than this rise in the supply of services would also raise the relative price of goods – a rise lower than that in the supply of services would depress the relative price of goods. Interestingly, the rate of growth in the supply of services that keeps the relative price constant under 1% growth in the supply of goods seems to vary nonlinearly with the levels of supplies (and with the income level). This is illustrated by Figure 6.¹¹

Figure 6

Percentage rise in supply of services at which 1% rise in the supply of goods leaves the relative price unchanged, 2004



¹⁰ The ranges for the elasticity values evolve with time. For 1999 the elasticity of π with respect to X_g ranges between -1.32 and -1.35 , for 2007 between -1.41 and -1.45 . The ranges for the elasticity with respect to X_s are $\langle +0.70; +0.73 \rangle$ and $\langle +0.58; +0.62 \rangle$ respectively.

¹¹ The schedule of Figure 6 has the minimum at about 8000 euro (2004 PPP). The schedules for other years happen to have their minima also at about 8000 euro (at the respective year PPP).

6 Concluding remarks

A simple ‘developmental’ (or structural-change) story is implicit in the elasticity values of π . First, it may be observed that, if the supply of both items were to rise at the *same* speeds, the relative price of goods would have to *fall*. Assuming that a unit of goods is as costly to produce as a unit of services, one would then expect relatively higher profits in the service sectors – and a higher rate of growth of that sector. Unless the rate of growth of the service sector is *very much higher* than the rate of growth of the goods’ sector, prices of services would be strengthening vs. the prices of goods. Hence a kind of positive feedback should be expected to operate, with prices of services strengthening in line with rising demand (and supply) of services (as illustrated by Figure 3). Furthermore, one could even expect here some reallocation of labour and capital from the production of goods to the production of services. Second, even if services were increasingly somewhat *more* costly to produce than goods, the expansion of the production of services would still be induced. As long as the expansion of services’ production does not *strongly* outpace the expansion of the production of goods, prices of goods will be losing out to prices of services. Concluding, a plausible explanation of the tendency of the relative price of goods to fall with rising income does not need the assumption of its production costs falling, relative to the production costs of services, with rising income. All that is needed to explain this tendency is a specific pattern of demand formation. Given that pattern, one can even assume that goods are equally (or even more) costly to produce than services, irrespectively of the income level.

As explained, with this specific pattern of demand formation profits would be getting stronger in the production of services – especially if the physical productivities of labour and capital did not differ between the two sectors. But, in such circumstances it would be reasonable to expect higher wage pressures in the service sector – and eventually higher/rising relative levels of unit costs in that sector. This could give rise to the impression of higher wage (and cost) levels as being responsible for the higher relative price of services in more affluent countries. That impression does not explain yet why higher relative prices of services in more affluent countries are associated with rising demand for services (see e.g. Figure 3). To account for that fact one would have to complement the cost-side story with a demand-side one. The explanation proposed in this paper is more parsimonious: it suggests that the demand-side patterns are capable of illuminating the tendency of the relative price of services to rise with income *and* the tendency of the service sector to expand with its relative price simultaneously. Moreover, it also suggests that the observed relative costs may adjust to relative prices via adjustments in relative wages (or incomes) – rather than the prices adjusting to costs. Such a direction of adjustments seems to have been secularly characterizing agriculture (as distinguished from all other activities). Food, being a necessity (subject to Engel’s Law), loses out, in terms of prices and quantities demanded, to non-food goods and services. Ironically, agriculture used to be the prime example of a diminishing-returns activity, hence implying productivity falling with the scale of production. The productivity developments

notwithstanding, the 'price-scissors' have been working against agriculture – at least since David Ricardo's formulation of the law of diminishing returns to agricultural activity. Consequentially, farmers' incomes (net of governmental subsidies) keep falling short – surely and steadily - of wages and incomes earned in other trades.

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