What drives private expenditure in Italy and France?

Structural Changes, International Trade and Multisectoral Modelling

edited by
Rossella Bardazzi
Maurizio Grassini

firenze university press
2008

Structural changes, international trade and multisectoral modelling / edited by Rossella Bardazzi, Maurizio Grassini. - Firenze : Firenze University Press, 2008.
(Atti ; 17)

http://digital.casalini.it/ 9788884537409

ISBN (on line) 978-88-8453-740-9
ISBN (print) 978-88-8453-739-3

339

Università di Firenze
Dipartimento di Studi sullo Stato

This work has been financed by the PRIN 2005 grants on the project "Deepening and Enlarging the European economy: an integrated modelling approach" (#2005139514) coordinated by the University of Florence.

Università degli Studi di Firenze
Firenze University Press
Borgo Albizi, 28, 50122 Firenze, Italy
http://www.fupress.com/

Printed in Italy

CONTENTS

DOMESTIC DEMAND

INTERNATIONAL TRADE

ENERGY

WHAT DRIVES HOUSEHOLD PRIVATE EXPENDITURE IN ITALY AND FRANCE?

Rossella Bardazzi[1]

1. Introduction

Private consumption is the main demand component in all capitalist economies making its behaviour of utmost importance for all policymakers. As economic model builders, estimating and forecasting household spending is a task the result of which substantially affects the performance of the overall macroeconomic model. INFORUM models have many years of experience in this field, as several approaches have been designed and tested in the past in different economic environments. This study is aimed at making a contribution to this cumulated knowledge as it applies a demand system to a highly disaggregated consumption function classification of two European countries: Italy and France. These economies belong to the Euro area thus sharing not only the same currency but also some economic policies shaped by European directives in terms of market reforms, regulations, taxation, and other fields. Therefore it's significant to verify to what extent household behaviour shares some common features in these countries and reacts in similar ways to symmetric and asymmetric shocks. Finally, we aim to test the suitability of a specific demand system designed by Almon (1996) to interpret private spending behaviour in different institutional settings.

The paper is organized as follows: Section 2 presents an aggregate interpretation of recent private consumption trends in the European economy with a special focus on Italy and France, then an analysis of tendencies by functions is presented in Section 3. The data and the model used are described in Section 4 while the estimation results for both countries are commented on in Section 5. Finally Section 6 concludes.

[1] Associate Professor, Faculty of Political Sciences, University of Florence (rossella.bardazzi@unifi.it).

2. Private consumption in Europe: an aggregate interpretation

Since 2001, growth in private consumption in the Euro area has been persistently sluggish and has been much weaker than in some other EU countries or in the USA. Although these economies have been subject to largely similar shocks, household spending seems to have been recently a less effective cyclical stabilising force in the euro area than elsewhere (EC 2006; Bank of Italy 2007). This evidence has promoted a renewed interest in empirical analyses to understand the causes of this trend and to suggest possible solutions with alternative policies. Indeed, understanding the behaviour of private consumption is crucial for the assessment of the economic situation in the short and medium term. As the largest expenditure component of GDP, household spending plays a central role in the cyclical fluctuations of activity around its long-term growth path.

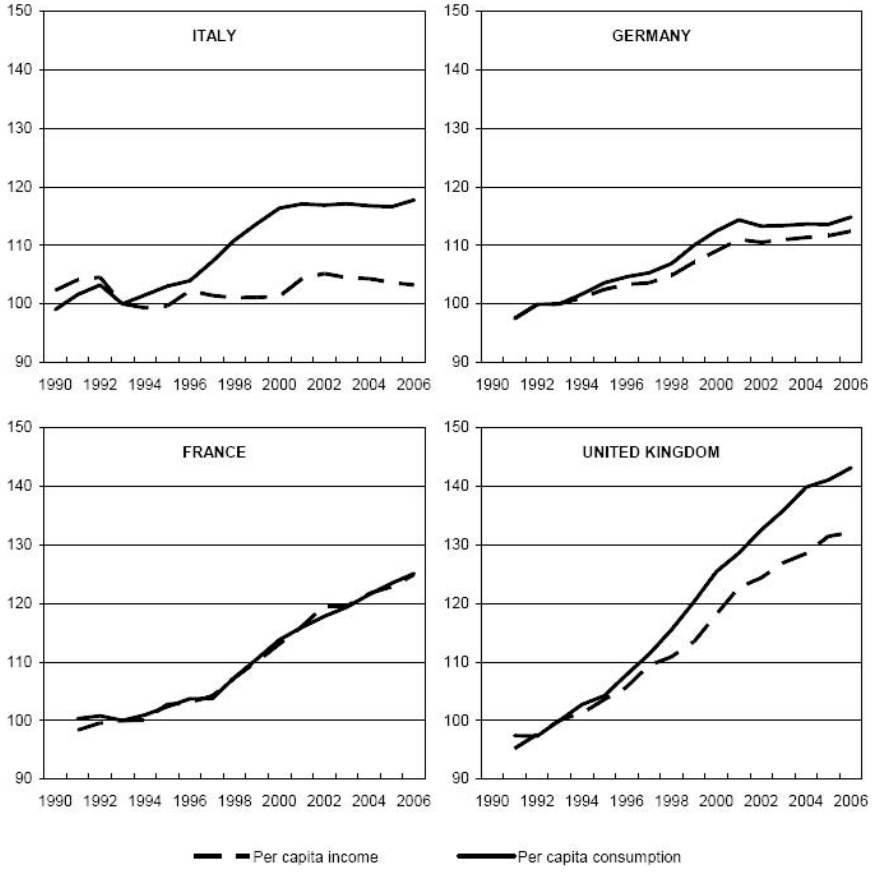
The traditional theory used to explain household spending behaviour is the life-cycle model: according to this model, over time households even out their consumption on the basis of their intertemporal budget constraint, which is the sum of current income, the discounted flow of future, expected income and the current endowment in wealth. Unexpected, permanent increases in income or wealth will expand consumption as they ease the budget constraint. This theory has been used to design the empirical model applied in a study commissioned by the European Commission to investigate the resilience of private spending in the Euro area (European Commission 2006). The main conclusions of the aggregate analysis presented in the first part of this study for all Euro countries show that it is possible to explain consumption behaviour using traditional determinants (disposable income and net financial wealth) and that demographic developments and fiscal policy innovations contribute to the explanation. A pervasive role of house prices has also been found at least for some countries[2]. However, the diversity of the European economies is significant, therefore assessing the driving determinants of private consumption is better done using country-specific equations.

Indeed looking at the dynamics of disposable income and household consumption in the largest euro economies – France, Germany and Italy – we may observe very different situations (figure 1). While in Italy the behaviour of consumption has been more dynamic compared with the sluggish performance of disposable income since 1990, the opposite behaviour is observed in Germany where consumers' loss of confidence lies behind the stagnation of per capita household consumption and in

[2] This result is particularly relevant for understanding the potential consequences of the more recent developments of the housing markets after the subprime mortgage crisis originated in the US.

France the private spending trend follows that of disposable income very closely and both have been rising for the last 15 years.

Fig. 1. Per capita household disposable income and consumption (indices 1993 = 100, chain-linked volumes)



Source: Bank of Italy on Eurostat data

Therefore the patterns of aggregate consumption across Europe are not easily identified by means of a common model specification. Varying institutional factors and structural changes may help to explain why spending and saving decisions are diverse across these countries. As in this paper we present an empirical estimation of personal consumption equations for Italy and France, in the following we have restricted our interest to these countries and surveyed the recent explanations for their performance in economic literature.

2.1 Italy

Looking at the graph for Italy in Figure 1 may help one to appreciate the effect of two major economic events that happened within the period analysed in the empirical study presented in this paper. In 1992-1993 a confidence crisis in the Italian currency (that forced the Lira out of the ERM, Exchange Rate Mechanism) generated a deep recession: for the first time in recent Italian history both household disposable income and consumption in real terms dropped for several quarters in a row. Consumer spending decreased less and recovered more rapidly than disposable income. This event called for changes in government policies with restrictions on social security, freezes on public employment and wages, cuts in public expenditures: these changes plausibly affected the permanent income of Italian households (Grant, Miniaci and Weber 2002).

A second important event happened a few years later when Italy joined the European Monetary Union: mortgage interest rates almost halved between 1997 and 1999 alleviating liquidity constraints for Italian consumers and causing their plans to shift from saving to consumption albeit facing increased economic uncertainty after a sequel of reforms in social security and labour market rules. A recent study based upon a new set of data on the wealth of households developed by the Bank of Italy (Bassanetti, Zollino 2007) estimates the link between consumption, financial and housing wealth on aggregate time series (1980-2006). This estimated long-term relationship shows a marginal propensity to consume out of disposable income to the order of 60 cents per one euro increase, while the MPC resulting from a similar change in financial and housing wealth are 6 cents and 1.5 cents respectively. The latter increase is smaller than those found by similar studies for the Anglo-Saxon economies, while the MPC with respect to financial wealth is about the same as in the other countries and the one with respect to income is slightly higher. These results are explained in several ways[3]. Firstly, Italian households own relatively little financial wealth as the consequence of a financial system which is essentially bank-based, thus limiting the size and participation in the stock market[4]. Secondly, although property is by far the largest and most widespread component of household wealth, the lower tendency to consume out of real wealth is due both to the large non-liquidity of

[3] Paiella (2007) finds similar results in her empirical analysis based on Italian household individual data covering the period 1991-2002.

[4] In 2005, financial assets in Italy were almost 4 times disposable income, a slightly lower ratio than in the United States and the UK. As far as dwellings are concerned, household wealth was 4 times disposable income, a figure similar to that of the UK, lower than France, and higher than Germany or the United States (see Bank of Italy 2007).

real assets[5] and to the prevailing bequest motive for holding onto their tangibles to pass on to their children. Besides, housing wealth is not only a store of value but also a consumer good in that it provides housing services: more than 70 per cent of Italian households own their principal residence with a consequent preference for consuming its services.

Notwithstanding the reduced tendency to consume out of wealth, according to the aggregate consumption function for Italy (Bassanetti, Zollino 2007) since the early 1990s disposable income has made a modest contribution to growth in consumption while the increase in household spending can be ascribed mainly to the growth in financial wealth. This growth can be essentially explained by savings and capital gains. In the 1990s savings contributed to accumulation nearly as much as capital gains, while in recent years capital gains became predominant. The same relevant role for financial wealth is found in the country-specific equation of the EC study, along with a strong effect of the real interest rate. However, this empirical model leaves some Italian consumption behaviour unexplained: disposable income, financial wealth and interest rates are the only significant variables but one-off dummies are often needed to improve the results. In the Bank of Italy analysis, a better set of data and, perhaps, a better specification of the aggregate equation suggests a more convincing interpretation of private spending: beside wealth effects (both financial and real), this aggregate model takes into account the economic shocks described above, checking for changes in real interest rates and real public consumption which are found significant. These results are interpreted by the authors as a Ricardian mechanism at work: in correspondence with the stringent restriction of public deficit in the first half of the 1990s there was a step-up in households' spending plans. On the other hand, the fall in real interest rates, connected with Italy's entry into the EMU, was presumably also perceived by households as permanent and contributed to shift their decisions from saving to consumption.

2.2 France

In France per capita consumption growth has been closer to disposable income behaviour (figure 1). Sustained dynamics of real disposable income drove private spending throughout the 1990s while the EC study findings account for a significant role of demographic factors too which

[5] High costs of mortgage refinancing and the lack of reverse annuity mortgage markets increase transactions costs for Italian households and prevent them from transforming changes in the value of real estate into purchasing power.

build slowly over time and hence add little to the understanding of recent patterns in French consumption while they might become relevant for long-term forecasting. Growth in financial wealth and in housing prices have supported consumption in more recent years. This strong relationship between consumption and disposable income is confirmed by other studies (Lollivier 1999) where income elasticity is measured with several econometric models and it is too high to confirm the life-cycle model where the consumer should aim to smooth his consumption aside from short-term income fluctuations.

Boissinot (2007) estimates life-cycle profiles for consumption in France using repeated cross-sections of the INSEE Budget Survey and finding the typical hump-shaped pattern of both total and non-durable consumption: consumption culminates at the age of 40 and declines evenly afterwards. This profile can be attributed not only to the life-cycle explanation but also to changes in the demographic composition of the population.

2.3 France and Italy: a comparison of descriptive evidence

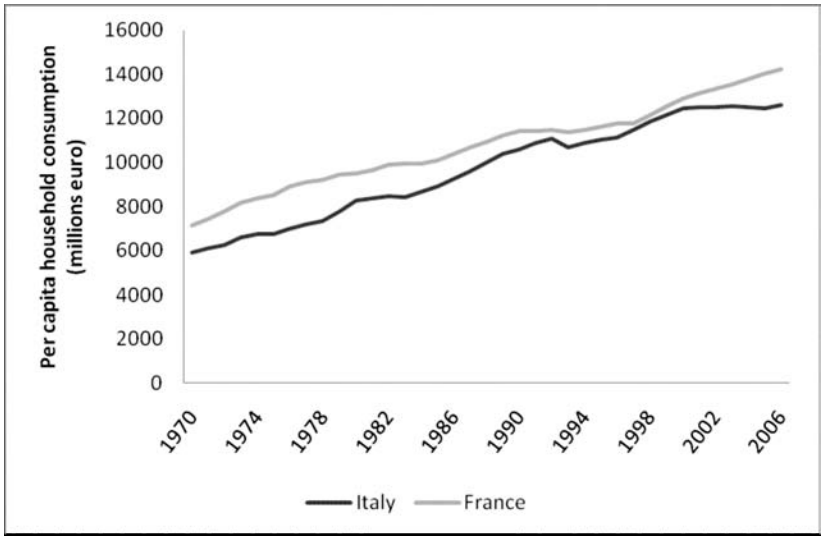
This study is aimed at investigating whether a disaggregated system of demand is flexible enough to interpret the behaviour of consumption in different countries. As briefly described above the profile of private spending has developed very differently in these two countries. A long term perspective of this evidence is represented in figure 2. A progressive reduction of the distance between the French and Italian levels of per-capita consumption took place up to the end of 1990s although the event of the 1992 currency crisis in Italy is clearly visible. Since 2000 the growth of per-capita spending in constant terms is around zero, while the French consumer increases his consumption at around 1.5 percentage points every year.

In 2006 economic activity accelerated in all the major euro-area countries, although for different reasons. Looking at the contributions of various demand components to GDP growth (table 1), Italy and France show similar growth rates of overall economic activity but the determinants of this result are very different: in France the main contribution is from private spending which is double compared to Italy (1.9 against 0.8%), while the role of net exports is negative. The Italian final consumption result is similar to the German case where economic growth is faster and generated mainly by an exceptional rise in exports which strongly boosted investment. Finally, domestic demand was the main stimulus behind Spain's accelerated economic growth (3.9%).

This recent evidence confirms that although the overall economic growth in Italian and French economies is proceeding at a similar pace,

the role of private spending in this result is very different. Thus it is worth investigating the possible explanations of this evidence at a more disaggregated level of spending functions.

Fig. 2. Per capita household consumption (chain-linked, reference year 2000)



Source: Eurostat data.

Tab. 1. Contributions of demand components to GDP growth – Main EMU countries 2006 (% values)

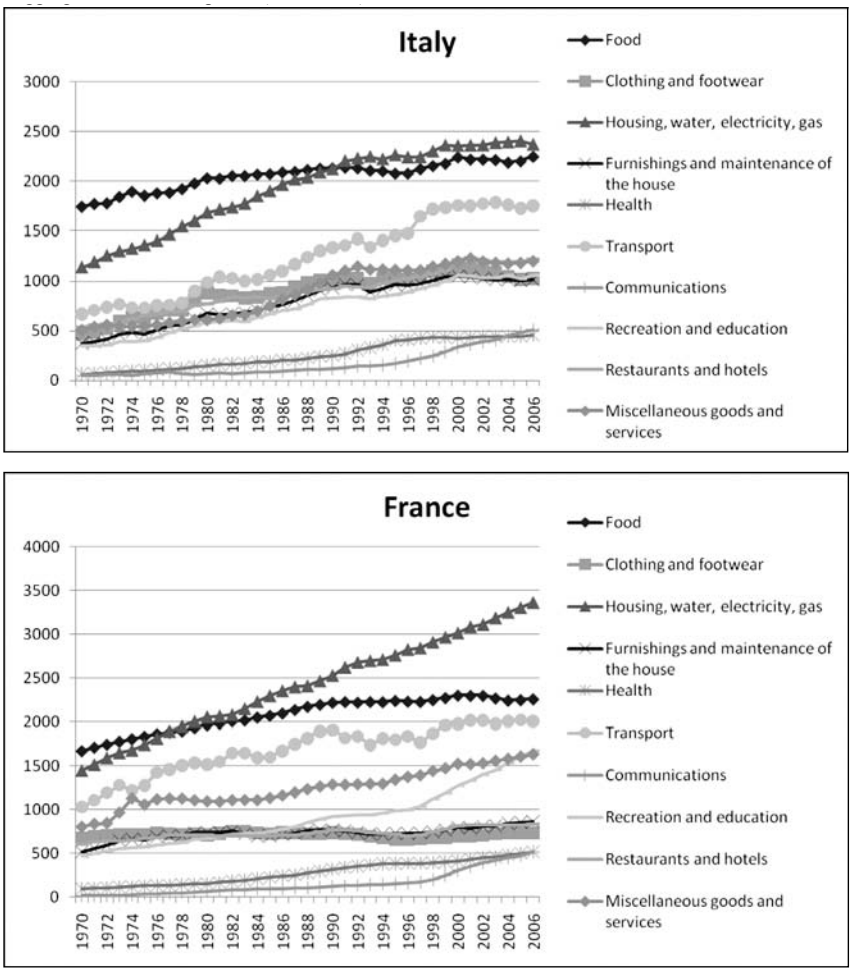
	Italy	*France*	*Germany*	*Spain*	*EMU*
Final consumption	0,8	1,9	0,8	2,9	1,4
Fixed Investments	0,5	0,8	1	1,8	1
Inventories	0,3	-0,3	-0,2	0,1	0
Net Exports	0,3	-0,4	1,1	-1	0,3

Source: Eurostat data.

3. Household consumption by functions: a long-term perspective

An analysis of household spending by function is useful for understanding the long-term dynamics of different expenditures within household budgets. Figure 3 shows private expenditures in Italy and France classified according the two-digit level COICOP (Classification Of Individual Consumption by Purpose) guidelines. Since 1970 both for Italy

Fig. 3. Final consumption expenditure of households by consumption purpose - COICOP 2 digit - aggregates at constant prices (1970-2006)



Source: Eurostat data

and France housing expenditures (including water, electricity, gas) have increased steadily and represent, with actual and imputed rents, almost one-third of annual consumption. In both countries the real per-capita expenditure for transport is also growing at a steady pace and it follows the expenditure for food in terms of budget share. At the bottom of both graphs are the lines for communication expenses and health[6], which in-

[6] This refers to health expenditures paid directly by households, not including the

deed represent the smallest shares in the average household budget but which are both growing as a result of the development of new technologies and the increasingly ageing population.

These disaggregated dynamics depend on the determinants we have already analysed for the aggregate consumption level but they are also affected by changes in tastes, relative prices, demographics and other factors. In the following sections we will show that these variables have been very influential on disaggregated private demand and that, particularly after the introduction of the common currency, the change in relative prices is very different according to consumption item. To perform this empirical analysis a disaggregated demand system was applied to both economies over a very detailed dataset.

4. The demand system and the dataset

4.1 The functional form

Although the estimation of demand functions on time-series data was certainly the dominant concern in demand analysis in the Eighties, with the design of new theoretical demand systems, in more recent years fewer contributions have been found in related literature. From the theoretical point of view, there is a widespread consensus for the most popular system demand, the Almost Ideal Demand System (AIDS) designed by Deaton and Muellbauer (1980), which indeed has supplanted nearly all other systems in applied work. As to the empirical studies on consumption by detailed expenditure functions the evidence on this issue including the period after the adoption of the euro is virtually nil both for the Italian and for the French economies.

The time-series system of consumer demand equations used in this study is the PADS model developed by Almon (1979, 1996)[7]. This demand system has already been used for forecasting Italian (Bardazzi and Barnabani 2001) and US consumption (Dowd *et al.* 1998). In another chapter of this book a comparison of PADS with AIDS and the Linear Expenditure System for Switzerland is also presented. As explained by Almon, the PAD system is favoured when desirable long-run properties – such as non-negative budget shares in the long-term – are required as in a long-run forecasting macromodel. As summarized by its author,

goods and services consumed by families but provided for by the public administration (these are included in a new concept introduced by SEC95 and defined as «effective consumption»).

[7] The 1996 paper was re-published in Almon C., The Craft of Economic Modelling, Volume 3, available on the website inforumweb.umd.edu.

the basic requirements for a market system of demand include at least the following:

- It should allow for complementarity and substitution effects between different goods;
- It should be homogenous of degree zero in income and prices;
- It should add up, i.e. the sum of the expenditures of all products should be equal to total expenditure;
- As income rises, marginal propensities to consume should be different for each good and depend upon relative prices;
- It should take into account the effect of other variables besides income and prices (time, demographic factors, interest rates etc.);
- It should not be too complicated to be estimated and suitable for large system of goods also.

The PAD system satisfies these requirements and, in its basic form, specifies that the demand for a good depends, linearly, on income, a cyclical variable and a time trend, and, non-linearly, on the prices of all other goods. The analytical form of the system is the following:

$$\frac{q_{it}}{Pop_t} = \left(a_i + b_i\, y_t + c_i\, \Delta y_t + d_i\, time \right) \left(\frac{p_i}{P} \right)^{-\lambda_i} \prod_{k=1}^{n} \left(\frac{p_i}{p_k} \right)^{-\lambda_k s_k} \left(\frac{p_i}{P_G} \right)^{-\mu_G} \left(\frac{p_i}{P_g} \right)^{-\nu_g}$$

where:
$q_{it}\ /Pop_t$ is consumption per-capita in constant prices of product i,
y_t is income (total expenditure) per-capita in constant prices,
Δy_t is equal to $(y_t - y_{t-1})$,
time is time trend,
s_k is the budget share of product k in the base year,
p_k is the price index for product k, equal to 1 in base year,
a, b, c, d, λ, μ, and ν are parameters to be estimated (λ is the individual good price response parameter, μ is the group price parameter and ν is the subgroup price parameter),
and P, P_G, P_g are over-all, group, and subgroup price indexes given by:

$$P = \prod_{all\ k} p_k^{s_k} \qquad P_G = \left(\prod_{k \in G} p_k^{s_k} \right)^{1/\sum_{k \in G} s_k} \qquad and \qquad P_g = \left(\prod_{k \in g} p_k^{s_k} \right)^{1/\sum_{k \in g} s_k}$$

In this model, consumption products are organized into economically relevant groups and subgroups: a commodity can be a strong complement/substitute for other items in its own group while interacting less strongly with the prices of goods in other groups. Similarly, the functional form allows subgroups within which we suppose even greater sensitivity of

the demand for one product to the price of others in the same subgroup. This specification serves two purposes: it economizes on the number of parameters, making this an empirically estimable system; and it divides consumption up into natural functional categories of human needs. This method is almost the only sensible way to deal with very large systems.

The system satisfies the following constraints:

$$\sum_{i=1}^{n} b_i = 1 \quad [1] \qquad \sum_{i=1}^{n} a_i = 0 \quad [2] \qquad \sum_{k=1}^{n} c_{ik} = 0 \quad [3]$$

The first two constraints ensure constant-price adding up: as we move away from the base year, a spreader is employed. The spreader adjusts expenditure for each commodity by allocating the difference between total expenditures (y) and the sum of expenditures in proportion to the marginal propensities to consume with respect to y at the current prices[8]. The third constraint imposes homogeneity of degree zero in all prices and income in the system. However, this system has a lot of price parameters to be estimated depending on the number of years and on the expenditure categories. To reduce this number, Slutsky symmetry at the base year prices is assumed. Therefore, we assume that:

$$c_{ij} \cdot q_i / p_j = c_{ji} \cdot q_j / p_i$$

Multiplying both sides by (p_i p_j /y), we obtain

$$c_{ij} / s_j^o = c_{ji} / s_i^o$$

where s_i^o is the base year share of total expenditures for commodity *i*. If we now define $\lambda_{ij}=c_{ij}/s_j^o$, we have the symmetry condition

$$\lambda_{ij} = \lambda_{ji}$$

which reduces the number of price parameters by half. A further restriction is imposed by combining commodities into groups and sub-groups. This grouping technique was introduced by Almon (1979) and improved by the same author (Almon, 1996) with a specification where every product has its own-price elasticity. We will have as many price-exponent parameters as there are commodities plus groups plus subgroups. Estimation will be simplified by the following definitions:

[8] The amount to add up is usually very small (2% of the total expenditure) as it has been tested both in the US and in the Italian model.

$$\lambda_{ij} = \lambda_i + \lambda_j$$

if product *i* and product *j* are not in the same group or subgroup;

$$\lambda_{ij} = \lambda_i + \lambda_j + \mu_G$$

if products *i* and *j* are in the same group *G* but not in the same subgroup;

$$\lambda_{ij} = \lambda_i + \lambda_j + \mu_G + \nu_g$$

if they are in the same subgroup *g* of the same group *G*.

In fact, when household data are available, results from the cross-section work may be incorporated within a modified-version of the demand system described above as presented in Bardazzi and Barnabani (2001). Moreover, this system can benefit from interaction with a Demographic Projection Model as show in Bardazzi (2003) and Dowd *et al.* (1998). However, in this paper the cross-section stage of analysis was not performed and we only applied the time-series model. Instead, some specific product equations have been enriched with variables other than price, income and time. In fact, other factors such as interest rates, demographics, dummy variables for some regime changes may be relevant to the demand for some specific commodities. Therefore we will experiment some of these additional variables in consumption equations for selected categories.

The PAD system means that parameters can be constrained if they show implausible values – such as positive price elasticities or negative income elasticities offset by positive time coefficients – and it is the responsibility of the model builder to provide the soft constraints to obtain reasonable parameters coherent with economic theory: this step is quite difficult since it is a trade-off between the model's fit and the forecasting performance of the system[9].

4.2 The data

The Italian data used for estimating the demand system is the personal consumption expenditures in constant 2000 Euros produced by the National Statistical Institute according to a classification based up-

[9] The mathematics of estimation including soft constraints is explained by Almon (1996) and, for the Italian case, by Bardazzi and Barnabani (2001).

on the COICOP classification at 3-digit level adapted to Italian households preferences. The number of expenditure categories used here is 56 as shown in table 2[10]. For France, household consumption by function produced by INSEE is more detailed and was aggregated to match the Italian data since it was based on the same statistical concepts as defined by SEC95. This allowed us to compare the results of the regressions run from 1992 to 2006.

Tab. 2. Groups and subgroups of commodities for PADS estimation

	Consumption categories	Group	Subgrp		Consumption categories	Group	Subgrp
1	Cereals and Bakery Products	1		29	Drug Preparation, Sundries and orthopedic eq.		
2	Meat	1	1	30	Physicians, Dentists, Other Medical Professionals		
3	Fish	1	1	31	Hospitals, Nursing Homes		
4	Dairy Products	1	1	32	Vehicles	4	2
5	Fats & Oils	1		33	Operation of Motor Vehicles (excluding fuels)	4	2
6	Fruit	1		34	Fuels and oil	4	2
7	Fresh vegetables	1		35	Public Transportation	4	
8	Sugar, marmelade, syrups, honey	1		36	Postal services		
9	Other Food n.e.c.	1		37	Telephone and communication equipment	6	3
10	Coffee, Tea and Cocoa	1		38	Telephone and communication services	6	3
11	Nonalcoholic Beverages	1		39	TV, Radio, Photo, Computers	6	
12	Alcoholic Beverages			40	Other recreational durables	6	
13	Tobacco			41	Recreational equipment	6	
14	Clothing	2		42	Flowers, plant, pets		
15	Footwear and Repair	2		43	Recreational and cultural Services		
16	Rents			44	Books		
17	Tenant Occupied Rent			45	Magazines and Newspapers		
18	House maintenance			46	All-inclusive holidays		
19	Water and other household services			47	Education		
20	Electricity, gas, and other fuels			48	Bar and Restaurants		
21	Furniture	3		49	Hotels & motels		
22	Household Linen	5		50	Personal Care equipment		
23	Kitchen and Household Large Appliances	3		51	Personal care items n.e.c.		
24	Kitchen and Household small Appliances	5		52	Personal Care services		
25	China, Glassware and Tableware	5		53	Social services		
26	Household and garden utensils	5		54	Insurance		
27	Other Non-Durables			55	Financial Services		
28	Domestic Services			56	Other Services n.e.c.		

Other variables used in the system are consumption price deflators computed from the series at current and constant prices, total expenditure used as a proxy variable of disposable income and total population. Moreover, for some commodities interest rates are used as explanatory variables (Treasury bill rate at 3 months)[11] as well as other demographic indicators produced by ISTAT and INSEE.

According to the approach used here, groups and subgroups of commodities are designed so as to estimate price interactions between specific expenditure categories. Thus in the 56-item classification 6 different groups were created — as shown in table 2 – (1 is Food, 2 Clothing and Footwear, 3 Household Durables, 5 Minor Household Durables,

[10] The official ISTAT classification is 58, we have excluded 2 items (narcotics, personal services n.e.c.) because these cells are empty.

[11] Italian Ministry of Treasury, Eurostat, Agence France Trésor.

4 Transportation, 6 Recreational Durables) and within some of them 3 subgroups (1 Protein Food, 2 Vehicles and operation, 3 Communication eq. and services). Within these groups a commodity can be either a complement or substitute for other items in its own group while having weaker price interactions with goods in other groups.

5. Estimation results

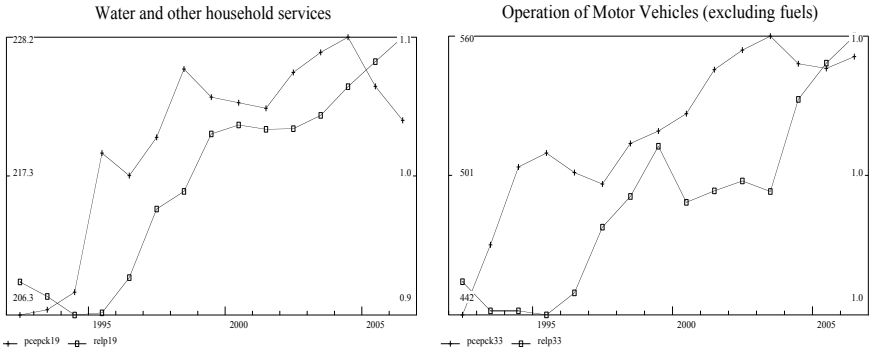
The estimation of the program was done with a computer program designed for this system by Almon and improved by Horst (2002). The demand system for both countries was run initially without any constraint on the parameters but did not produce satisfactory results. In fact, in the Italian case there were 12 consumption categories with positive own (compensated) price elasticities and the income elasticities of the same number of categories (some of which are the same) were negative. Therefore, we investigated the relationship between the relative price and the real expenditure by commodity to understand the strong positive price elasticities and found some interesting evidence. Indeed some items – as shown in Figure 4 for two illustrative cases – had rising relative prices but the amount spent on them in real terms has also been going up, thus causing trouble in the system as their price parameters affected demand for all other goods. Therefore, some of these commodities were treated as insensitive to prices while for others soft constraints were imposed. Finally, it can be shown that some expenditure categories were characterised by a sort of 'euro effect' as their relative prices accelerated after the introduction of the new currency (for instance Bar and Restaurants, Fresh vegetables in Figure 5).

In the French case, these problems were slightly less severe, with 11 out of 56 positive price elasticities and only 5 wrong income elasticities and were similarly treated with soft constraints.

Selected results of groups and subgroups of commodities are presented in table 3 for the Italian case. In each panel several parameters are reported: the own price parameter (lambda), the share of total expenditure for each good, income and price elasticities, the time trend, and the group and any subgroup price parameters. Finally, cross price elasticities are shown at the bottom of each panel: in general, positive values of price elasticities imply substitutability and negatives suggest complementarity.

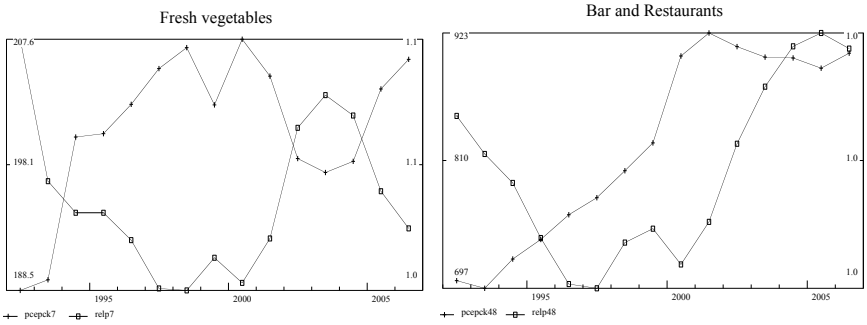
In the first group – Food – income elasticities are positive but very low, there is a negative time trend both for fats and oils (5) consumption and for coffee and tea (10) while price elasticities are all negative. Price interaction within the group goes in the direction of substitutability: cross price elasticities are mostly positive especially for meat (2), while the prices of fats and oil (5) and of coffee and tea (10) do not affect purchases of other goods

Fig. 4. Relative price and expenditure in real terms



Source: author's calculations.

Fig. 5. The 'Euro effect'



Source: author's calculations.

in this group. Within the protein subgroups we find a weak complementarity while these goods are substitutes to other food items in the group.

Clothing and footwear are complements in Group 2 as expected, income elasticity is positive and high while the time trend coefficient is negative and very high. An alternative specification of the equation, not shown here, including as an explanatory variable the share of people over 65 years old improves the results, capturing part of the negative trend of this commodity.

For Group 3, Household Durables, a different specification of the basic equation was used: since interest rates have been proven to explain the behaviour of Italian household aggregate consumption, we tried to verify if some commodities benefited from the fall in interest rates due to the convergence process towards the common currency. Indeed, easier access to consumer credit had a detectable though weak effect on the

Tab. 3. Italy: Results of Demand System Estimation by Group and Subgroup

Group 1: Food

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu	Nu
1 Cereals and Bakery Products	0	0,55	0,028	0,79	-0,8	0,5	0,4	
2 Meat	1	0,15	0,034	0,25	-0,36	0,51		-0,05
3 Fish	1	0,07	0,01	0,48	-0,24	-0,02		-0,05
4 Dairy Products	1	-0,01	0,021	0,7	-0,19	-0,82		-0,05
5 Fats & Oils	0	-0,19	0,008	0,95	-0,1	-1,13		
6 Fruit	0	0,05	0,011	0,25	-0,33	0,27		
7 Fresh vegetables	0	-0,01	0,016	0,21	-0,28	0,54		
8 Sugar, marmelade, syrups, honey	0	0,22	0,01	0,64	-0,5	0,55		
10 Coffee, Tea and Cocoa	0	0,8	0,002	0,35	-1,09	-0,65		
11 Nonalcoholic Beverages	0	0,24	0,009	0,93	-0,53	0,24		

Cross Price Elasticities

	1	2	3	4	5	6	7	8	10	11
1	-0,8	0,04	0,01	0,02	0	0,01	0,01	0,01	0,01	0,01
2	0,04	-0,36	-0,01	-0,04	0	0,01	0,01	0,01	0	0,01
3	0,04	-0,04	-0,24	-0,04	0	0	0,01	0,01	0	0,01
4	0,04	-0,05	-0,02	-0,19	0	0	0	0,01	0	0,01
5	0,03	0,01	0	0	-0,1	0	0	0,01	0	0
6	0,04	0,02	0	0,01	0	-0,33	0	0,01	0	0,01
7	0,04	0,02	0	0,01	0	0	-0,28	0,01	0	0,01
8	0,05	0,03	0,01	0,01	0	0,01	0,01	-0,5	0	0,01
10	0,06	0,05	0,01	0,02	0,01	0,01	0,02	0,02	-1,09	0,01
11	0,05	0,03	0,01	0,01	0	0,01	0,01	0,01	0,01	-0,5

Subgroup 1: Protein food

Group 2: Clothing and Footwear

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu
14 Clothing	0	0.25	0.07	1.84	-0.46	-16.8	-0.01
15 Footwear and Repair	0	0.23	0.019	1.36	-0.46	-3.1	

Cross Price Elasticities

	14	15
14	-0.46	0.01
15	0.04	-0.46

Group 3: Household Durables

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	IntRates	Mu
21 Furniture	0	0.23	0.034	0.31	-0.52	0.09	-0.1	0.26
23 Kitchen and Household Large Appliances	0	0.27	0.009	1.38	-0.72	-1.05	-0.09	

Cross Price Elasticities

	21	23
21	-0.52	0.06
23	0.23	-0.72

purchase of furniture (21) and of large household appliances (23). The same effect was found in Group 4 (Transportation) for the purchase of vehicles (32) and in Group 6 for Recreational Durables.

The price interaction of transportation commodities indicates substitutability both within the group and the subgroup of vehicles and op-

Group 4: Transportation

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	IntRates	Mu	Nu
32 Vehicles	2	1.11	0.043	1.3	-1.63	-0.01	-0.2	0.25	0.29
33 Operation of Motor Vehicles	2	0.24	0.041	1.06	-0.83	1.54			0.29
34 Fuels and oil	2	0.29	0.036	1.73	-0.91	3.44			0.29
35 Public Transportation	0	0.24	0.018	0.47	-0.7	1.39			

Cross Price Elasticities

	32	33	34	35
32	-1.63	0.25	0.22	0.06
33	0.33	-0.83	0.19	0.05
34	0.33	0.22	-0.91	0.05
35	0.18	0.1	0.09	-0.7

Subgroup 2: Vehicles and operation

Group 5: Minor Household Durables

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu
22 Household Linen	0	0.14	0.005	0.28	-2.9	0.39	3.51
24 Kitchen and Household small Appliances	0	0.3	0.002	1.23	-3.56	-1.55	
25 China, Glassware and Tableware	0	0.21	0.006	1.59	-2.66	-0.5	
26 Household and garden appliances	0	0.17	0.003	1.39	-3.21	0.28	

Cross Price Elasticities

	22	24	25	26
22	-2.9	0.49	1.31	0.72
24	0.99	-3.56	1.31	0.72
25	0.99	0.49	-2.66	0.72
26	0.99	0.49	1.31	-3.21

Group 6: Recreational Durables

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	IntRates	Mu	Nu
37 Telephone and communication equipment	3	0.46	0.006	3.56	-0.91	1.37	-0.1	0.18	0.07
38 Telephone and communication services	3	0.86	0.019	2.62	-1.2	3.51			0.07
39 TV, Radio, Photo, Computers	0	0.59	0.011	1.81	-0.97	-0.04	-0.19		
40 Other recreational durables	0	0.24	0.004	1.6	-0.65	-0.85			

Cross Price Elasticities

	37	38	39	40
37	-0.91	0.18	0.06	0.02
38	0.06	-1.2	0.06	0.02
39	0.04	0.12	-0.97	0.02
40	0.03	0.11	0.06	-0.65

Subgroup 3: Communication eq. and services

eration. Income elasticity is particularly high for purchase of fuels in a framework of rising world oil prices and stagnant disposable income.

Minor household durables in Group 5 did not turn out to be necessities especially small china and glassware (25) and household and garden appliances (26) and they are strong substitutes for household linen (22) and small appliances (24).

Finally, recreational durables (Group 6) are luxuries showing very high income elasticities and are weak substitutes for each other both within the group and the subgroup of communication equipment and services.

Estimation results for France are shown in table 4 without cross price elasticities values, which are summarized by the mu and nu parameters. Some differences compared to the Italian results are worth stressing:

Tab. 4. France: Results of Demand System Estimation by Group and Subgroup

Group 1: Food

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu	Nu
1 Cereals and Bakery Products	0	-0.28	0.02	0.02	-0.05	0.72	0.22	
2 Meat	1	-0.2	0.038	0.1	-0.2	-1.18		0.21
3 Fish	1	-0.21	0.011	0.25	-0.31	0.2		0.21
4 Dairy Products	1	-0.11	0.02	0.26	-0.37	0.79		0.21
5 Fats & Oils	0	0.22	0.004	0.15	-0.57	-0.59		
6 Fruit	0	-0.09	0.009	0.78	-0.25	-0.05		
7 Fresh vegetables	0	-0.01	0.014	0.41	-0.32	-0.19		
8 Sugar, marmelade, syrups, honey	0	-0.15	0.01	0.54	-0.19	0.61		
10 Coffee, Tea and Cocoa	0	-0.01	0.003	0.06	-0.34	-0.01		
11 Nonalcoholic Beverages	0	0.2	0.007	0.52	-0.55	2.59		

Subgroup 1: Protein food

Group 2: Clothing and Footwear

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu
14 Clothing	0	-0.84	0.044	1.18	-0.38	-3.4	2.64
15 Footwear and Repair	0	-0.44	0.009	1.51	-4.34	-0.65	

Group 3: Household Durables

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu
21 Furniture	0	0.25	0.016	0.61	-0.23	-2	-0.44
23 Kitchen and Household Large Appliances	0	1.18	0.008	1.96	-1.01	-2.99	

Group 4: Transportation

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu	Nu
32 Vehicles	2	0.25	0.043	1.34	-0.04	-4.1	0.23	-1.02
33 Operation of Motor Vehicles	2	0.25	0.051	0.85	-0.07	1.34		-1.02
34 Fuels and oil	2	0.4	0.038	0.18	-0.15	-3.04		-1.02
35 Public Transportation	0	0.24	0.019	1.82	-0.81	-1.31		

Subgroup 2: Vehicles and operation

Group 5: Minor Household Durables

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu
22 Household Linen	0	0.23	0.003	1.93	-0.55	-1.29	0.51
24 Kitchen and Household small Appliances	0	6.56	0.001	3.46	-6.89	-2.96	
25 China, Glassware and Tableware	0	0.24	0.007	0.55	-0.51	-0.19	
26 Household and garden appliances	0	0.24	0.004	1.58	-0.54	-0.57	

Group 6: Recreational Durables

Equation	Subgroup	lambda	share	IncEl	OwnPrEl	Time	Mu	Nu
37 Telephone and communication equipment	3	2.03	0.003	3.41	-2.08	-5.78	0.26	-0.35
38 Telephone and communication services	3	0.18	0.019	6.54	-0.43	-2.98		-0.35
39 TV, Radio, Photo, Computers	0	0.5	0.022	2.91	-0.77	0.11		
40 Other recreational durables	0	0.23	0.003	3.36	-0.61	-0.37		

Subgroup 2: Vehicles and operation

goods in the subgroup of protein food (Group 1) are substitutes for each other and in general within the group. The same price interaction is es-

timated in Group 2 for Clothing (14) and Footwear (15). An alternative specification with interest rates for durables was tested but rejected as the coefficients all had the wrong positive sign.

Tab. 5. Housing expenditures estimation: Italy and France

ITALY Equation	Included	lambda	share	IncEl	OwnPrEl	Time
16 Rents	0	0	0.018	-0.12	0	0.36
17 Tenant Occupied Rent	0	0	0.103	0.3	0	8.65
18 House maintenance	1	0.23	0.012	1.28	-0.48	-2.77
19 Water and other household services	1	0.21	0.017	0.52	-0.45	1.66
20 Electricity, gas, and other fuels	1	0.21	0.034	0.07	-0.45	3.37
FRANCE						
16 Rents	0	0	0.039	0.51	0	6.94
17 Tenant Occupied Rent	0	0	0.128	0.39	0	21.51
18 House maintenance	1	0.23	0.013	0.07	-0.36	1.65
19 Water and other household services	1	0.21	0.014	0.09	-0.34	3.51
20 Electricity, gas, and other fuels	1	0.23	0.035	0.71	-0.35	0.4

As a final point, table 5 presents the estimation results for some consumption categories both for Italy and France. These are the functions with rising importance within the household budget as already shown in Figure 3, as related to contract tariffs for household utilities, rents and house maintenance. These consumptions are somewhat subtracted from arbitrage and represent a constraint within the budget with fewer substitutes – at least in highly regulated markets as in these countries –, and therefore less price sensitive. This is the main reason why rents (16) and tenant occupied rent (17) are not considered as part of the system and their prices do not affect the prices of other goods. On the other hand, house maintenance (18), water and other services (19), and electricity gas and other fuels (20) are weakly price and income elastic. For Italian households, house maintenance expenditures are decreasing with time and are very sensitive to income dynamics. Relative prices of these goods have been rising in recent years and their equation results may help to explain the difference between high perceived inflation and the overall price dynamics as reported by the national statistical offices.

6. Conclusions

In this paper we have estimated a system of consumption functions for two European countries: Italy and France. The results of this highly disaggregated system (56 functions) broadly confirm the conclusions of other studies performed on aggregate data. In the Italian case, financial conditions have shown a certain influence on expenditure decisions, particularly for durable goods. On the one hand, we may observe that some goods have become luxuries within a budget constraint where

some necessary and non-reducible expenditures (such as housing expenditures) have been rising since the year 2000. On the other, households did not react appropriately to the rising relative prices[12] of some services (such as Bar and Restaurants) after the Euro cash changeover: the new currency made it more difficult for the consumer to distinguish a price increase from an exchange rate effect especially for items which are seldom bought, thus allowing firms to take advantage of this confusion. This specific event causes difficulties in estimating consumption at a detailed level because of price interactions among goods: however the flexibility of the PAD system makes it possible to tackle the problem by isolating the problematic items from the rest of the system. Finally, estimation results were more reliable in the French case where in most cases disposable income is the main driver behind consumption decisions, whereas for Italian household demand other factors (such as demographic changes, financial conditions, labour market reforms) seems to be at work in influencing consumer behaviour thus requiring additional future work on some equations.

As a final remark it should be remembered that the empirical, disaggregated analysis presented here as the aggregate estimates of other studies commented on at the beginning of the paper, is designed to find an interpretation for the past behaviour of private consumption. However, model builders are well aware that perfectly fitting equations do not guarantee a similar performance when they are inserted into a general equilibrium model like Inforum models. Furthermore in forecasting some explanatory variables which were found significant in the system they may create problems and a change in the specification may be required (see Horst 2002).

References

Almon C. 1979, *A System of Consumption Functions and its Estimation for Belgium*, «Southern Economic Journal», 46: 86-106.

Almon C. 1996, *A Perhaps Adequate Demand System*, INFORUM Working Paper, #96-007, University of Maryland.

Bank of Italy 2007, Household Wealth in Italy 1995-2005, Supplements to the «Statistical Bulletin», XVII, 75, December 2007.

Bardazzi R., M. Barnabani 200), *A Long-run Disaggregated Cross-section and Time-series Demand System: an Application to Italy*, «Economic Systems Research", 13, 4: 365-389.

Bassanetti A. and F. Zollino 2007, *The effects of housing and financial wealth on personal consumption: aggregate evidence for Italian household*, paper presented

[12] This phenomenon has also been verified in several European countries by the European Central Bank (see ECB, 2003).

at the Conference on Italian Household Wealth, Perugia (16-17 October 2007).

Boissinot J. 2007, *Consumption over the Life Cycle: Facts for France*, Document de Travail, Direction des Études et Synthèses Économiques, G2007/09, INSEE.

Deaton A., J. Muellbauer 1980, *An Almost Ideal Demand System*, «American Economic Review», 70: 312-326.

Dowd T., Monaco R., Janoska J.J. 1998, *Effects of Future Demographic Changes on the US Economy: Evidence from a Long-run simulation model*, Economic Systems Research, vol. 10: 239-262.

European Central Bank 2003, *Effects of the introduction of the euro banknotes and coins on consumer prices*, in *Annual Report 2002*: 40-42.

European Commission 2006, *Assessing the Factors of Resilience of Private Consumption in the Euro Area*, European Economy, «Economic Papers», 252, June 2006.

Grant C., Miniaci R.,Weber G. 2002, *Changes in Consumption Behaviour: Italy in the early 1990s*, «Giornale degli Economisti e Annali di Economia», 61, 1: 61-101.

Horst R. 2002, *Consumption Equations in Idlift: Extension and Revision*, INFORUM Working Paper, #02-007, University of Maryland.

Lollivier S. 1999, *La consummation sensible aux variation de revenue, meme sur le court terme*, «Economie et Statistique1, 324-325, 4/5, INSEE.

Paiella M. 2007, *Does Wealth affect Consumption? Evidence for Italy*, «Journal of Macroeconomics», 29: 189-205.