SOCIAL INEQUALITIES AND PHARMACEUTICAL COST SHARING IN ITALIAN REGIONS

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In recent years, Italian citizens have increasingly been asked to share pharmaceutical costs, but at the same time, households' medicines expenditure has decreased. Cost-sharing policies have to be assessed not just in terms of limitation of moral hazard and revenue to the state, but also for equal opportunities for citizen users accessing health services. The aim of this article is to analyze how Italian co-payment policies ("ticket") on medicines may affect pharmaceutical expenditure of households, considering territorial and social groups variation. We reviewed the per capita private spending on medicines of Italian regions, separating pharmaceutical outlay and "ticket." Across the period 2001–2010 we found that the overall per capita private spending on medicines remained substantially stable, although medicine expenditure decreases while the "ticket" increases. When cost sharing rises, out-of-pocket spending on medicines by poorer families seems to remain unchanged; however, poorer families seem to reduce their pharmaceutical expenditure. Our analysis suggests that applying co-payment in Italy is partly successful, in terms of greater revenue to the health system, but in the last few years, cost-sharing increases would seem to have rebounded negatively on more vulnerable families, due to the economic crisis.

In recent years, Italian family spending at the chemist's has slowed down. ISTAT (Italian National Institute of Statistics) data show that, since 2008, per capita equivalent spending at constant 2010 prices (1) on medicines (cost of the pharmaceutical plus the copayment share) has fallen by 12 percent, going from roughly €33 in 2007 to about €29 in 2010. The economic recession, which has made many families tighten their belts, dovetails with a background in which, as of

2007, the citizen has increasingly been asked to share the health burden (including pharmaceuticals). There has in fact been a hike in the citizen's share ("ticket") of the cost of medical products, which translates into increased family outlay on medicines. From 2006 to 2010 it rose from 3.4 percent to 7.7 percent, according to OSMED (Observatory on the Use of Medicines) (2).

Forms of co-payment are a feature of many health systems (3, 4), with a view to striking a happy medium between use of medication and control of disease (5, p. 460; 6, 7). It is well-known that there are two reasons for introducing participation in the cost. The first is the issue of the *moral hazard*. By co-payment it is hoped to make service users more economically responsible in their behavior (4), although a key factor accounting for the demand of medicines is the role of the prescribing doctor (general practitioner or specialist). Empirical research has shown that the doctor-patient relationship is a central hub on which to work if one wants to reduce the likelihood of moral hazard to any significant extent (8, 9). On the other hand, some studies highlight that raising the price of the drug via higher levels of cost sharing has significant effects on patients' behavior: (*a*) reduction in consumption and (*b*) substitution of costly prescription drugs with less expensive substitutes. Moreover, although evidence on this issue is mixed, one could observe a generic medicines substitution when the differential between generic and brand drugs cost-sharing increases (10, pp. 731–732).

The second reason is closely bound up with the constant increase in health service costs. Among the many reasons for this are: an aging population, the evolution of morbidity, the medicalization of society, an increasing demand for quality by users, and the cost of technological innovation in the medical sector (11).

This increase has made it necessary for the Italian government to raise greater resources to finance the health system and maintain budgetary equilibrium. One should remember that controlling expenditure is a particularly acute problem in certain Italian regions where the financial deficit is still beyond solution (in particular, Latium, Abruzzo, Molise, Campania, and Calabria).

As Drummond and Towse (12, p. 1) point out, the two objectives involve a tradeoff. If the demand for medicines is nonelastic, the moral hazard will be low and the resources raised by co-payment high. By contrast, if that demand is elastic, the impact of co-payment on medicine consumption will be high and tend to reduce it, so the revenue will be low. Clearly, if the aim is to lower the cost to the third party (the state), both solutions are acceptable.

The picture looks different if co-payment policies are assessed not just in terms of revenue to the state, but also for their effects in terms of equal opportunities for citizen users accessing health services and, more generally, people's state of health (13).

Social research has shown that the proven increase in the cost borne by the user reflects worse on the weakest strata of the population, and less on the wealthier (14, 15). Lack of money makes it difficult to cope with the rising cost of services and may well make the very people who are already the most vulnerable become more fragile. It is well-documented in the literature that a

more frequent health demand is felt by the most vulnerable socioeconomically, for example, the elderly (16). It is thus clear that any effective or efficient co-payment policy must succeed in limiting distorting factors due to a demand for inappropriate services, without blocking access to the system by those who need medical attention but cannot afford the extra cost of co-payment. One of the main findings of the most important randomized experimental study of the effects of cost sharing, the Rand Health Insurance Experiment (RHIE) conducted in the United States between 1974 and 1982 (17), was that vulnerable individuals (as low-income people) show significantly worse indicators of morbidity and mortality when the co-payment is high. On the other hand, it must be recognized that although co-payment may reduce consumption, there is not conclusive evidence about its capacity to limit only the inappropriate demand and not the appropriate (18).

The literature, especially economic (4, 10, 14, 19), agrees that changing the cost borne by users, whether to increase or lower it, has a significant effect on how they consume medicines. In a recent article, Fiorio and Siciliani (20) estimate that in Italy, growth by one euro's co-payment (between 2002 and 2003) reduced the per capita number of prescriptions by 4 percent and the public's spending on pharmaceutical goods per capita by 3.4 percent. The authors also calculated that reducing (not eliminating) co-payment by one euro in certain regions increased the number of prescriptions per capita by 3.4 percent and spending on medicines by 4.9 percent.

Such data fail to throw light on two aspects that are essential for a proper understanding of how Italian co-payment policies may affect individuals.

First, the pharmaceutical cost borne by the National Health System varies considerably from region to region. Since 2002 it has been up to the region to decide whether and to what extent the citizen should pay for pharmaceuticals (among other things). This has introduced a regional factor that cannot be observed by global national averages (as Fiorio and Siciliani use). Mean values fail to take account of regional peculiarities: while the "ticket" tends to have a certain effect, this may vary with the region or change over time.

The second aspect is the consequences that arise as different social groups respond to an increase in the cost of medicines. Obviously bringing in, or upping, a "ticket" on medicaments does not affect those who are exempt (this decision is again left to the regions)—generally an age- or income-related category, or people with specific conditions (chronic disease, civil or war invalidity, etc.)—but even excluding this segment of the population, there remains a significant slice for whom the "ticket" heavily determines the decision to use medicines.

Out of this background, three strictly interconnected objectives emerge as the purpose of this work:

• To see whether, apart from measures to favor lower-income persons (families) or those in a particularly disadvantaged situation, there are any significant

differences in the medicine budget between wealthier families and the less well-off.
- To assess how far any differences observed between social groups are bound up with the amount of co-payment demanded of the individual.
- To observe whether the connections between medicine-consuming patterns and the amount of the "ticket" vary from Italian region to region, given that these have made different decisions in the last decade about cost sharing and how much to charge the public by way of co-payment.

DATA AND METHODS

The data used stem from two sources: the ISTAT (21) Italian household consumptions survey (which records the expenditure on medicines and "tickets," unfortunately without distinguishing between the two) and the aggregate OSMED (2) data on revenue from "tickets" on medicines in the Italian regions. Both sources are available from the late 1990s, though we decided to begin analysis from 2001. In that year, the "ticket" on medicines was eliminated throughout Italy (Law No. 388 of December 23, 2000), making 2001 a benchmark year for the health policies of later years. The national law No. 405 of November 16, 2001, allowed regions the autonomy to reintroduce the "ticket," though this has occurred in a differing manner among them.

If we turn from the national to the regional breakdown of co-payment, we see that the various cost-sharing policies diverge over time. Figure 1 shows how this is reflected in the "ticket" quota.

We chose to go deeper into three regional setups that can be taken as symptomatic of the different health policies implemented since 2001. The choice stems from the observation that regional application of the "ticket" falls into three patterns.

The first involved keeping the quota stable until 2008, after which there was a slight increase. The second pattern entailed a fairly high "ticket" in the first year or so after 2001, steadily maintaining the amount thereafter with no dramatic increase toward the end. The third pattern broadly involved containment of the "ticket" quota to begin with, followed by a sharp hike, especially from 2006 on. By contrast with these easily recognizable patterns, Calabria, Molise, Sicily, and Liguria followed a ragged course. These four regions went through alternate expansion and contraction of co-payment on pharmaceutical products.

We can thus label three co-payment patterns as follows (leaving out Calabria, Molise, Sicily, and Liguria, which are hard to fit in):

1. The "go & stop" model (Lombardy, Piemonte, Puglia, and Venetia)
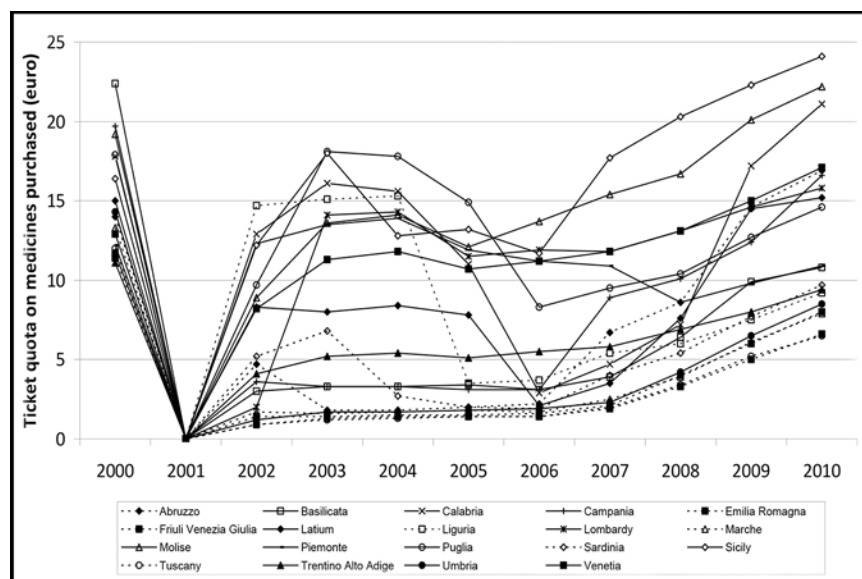2. The "stop & go" model (Abruzzo, Basilicata, Campania, and Latium)

Figure 1. Co-payment on medicines (ticket quota on medicines purchased) in all Italian regions.

3. The "containment" model (Emilia Romagna, Friuli Venetia Giulia, Marche, Sardinia, Tuscany, Trentino-Alto Adige,[1] and Umbria)

For each model we did an in-depth analysis on a single region that was substantially representative of the three patterns (respectively, Lombardy, Campania, and Tuscany) and representative of the three Italian macro regions (respectively, Nord, South, and Centre), which are very different in their social and economic historical development (22). Furthermore, we selected these three regions because they are densely populated and consequently have a large sample size in our data (i.e., 25,146, 17,521, and 14,145 households interviewed between 2001 and 2010 in the ISTAT survey).

By 2003, Lombardy had raised the co-payment quite appreciably (14%), but kept it fairly constant, finishing at 16 percent in 2010. Tuscany kept co-payment fairly low until 2008 (under 5%) and only gradually raised it thereafter, reaching about 7 percent in 2010. Campania kept the quota quite low until 2006 (under 5%) and then hiked it sharply until by 2010 the figure stood at 17 percent.

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[1] It should be recalled that the region of Trentino-Alto Adige is composed of two independent administrative entities: the province of Trento and the province of Bolzano (for reasons of availability in the data, we have considered the aggregate of the two).

In the next step, we correlate the co-payment pattern in the three regions selected with medicine expenditure by Italian households. The indicator of family affluence is deciles of equivalent consumption distribution (23).

Since the dependent variable is the private outlay on medicines, we should stress the need to bear certain sociodemographic characteristics of families strictly in mind insofar as they may be associated with a worse state of health and hence greater health care expenditure. We should apply to such information as we possess the possible confounding factors of gender and age (i.e., ISTAT reference person of the family), the presence of elderly family members (aged over 74 years), the presence of children (aged up to 6 years), and the size of family (values are per capita but family size could introduce a further scale effect). To this end we applied two regression models (Tobit and OLS) whereby we sought to estimate coefficients between the consumption decile and the expenditure on medicines (hence that forms our dependent variable).[2] Such coefficients may be construed as providing a yardstick of family spending according to economic status.

The first model (Tobit regression) shows the outlay on medicine for each decile of household consumption, separate for region and year, to observe the different amount of health expenditure in medicine for different levels of economic well-being. Deciles are used as a categorical variable. Moreover, the Tobit model allows consideration of censored cases that had no pharmaceutical consumptions. The assumption (24) is that the latent process that generates the lack of outlay on medicine is the same as the one that generates the positive expenditure, namely the health status of the household members. We built a single variable that combines the three regions analyzed, the 10 years, and the 10 deciles, the aim being to join time, territorial, and socioeconomic factors. In the Tobit regression model, the reference category is the poorest households in Lombardy in 2001.

The second model (OLS) shows the average gradient between decile household consumption (used as a metric variable) and the outlay in medicine.

Thus we were able to establish the variation in medicine outlay per unit increase in consumption decile (hence a range from 1 to 10) and to assess how such variation changed in time. In other words, the estimated beta parameter values tell us how in the considered regions the outlay ratio changed according to the family consumption decile. Therefore, the higher the beta parameter value, the greater the outlay differential between affluent families (in the uppermost deciles) and the poorest families (in the lowest deciles).

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[2] We tested a model whose dependent variable was the natural logarithm of the outlay on medicines (adding a minute quantity to zero-outlay families). The results do not substantially vary.

RESULTS

According to both OSMED and ISTAT data, the overall per capita private spending on medicines is slightly diminished in the last few years (there is a 0.69 correlation between the two measures), but when the two amounts, medicine expenditure and "ticket" are separated, one can see that per capita spending pattern on the "ticket" increases in the same period. Figure 2 shows the per capita expenditure on medicaments in euros for 1998–2010, harmonized with 2010 (in current euros) according to the consumer price index for worker and white-collar families.

In the next step we correlate the co-payment pattern in the three regions selected with the outlay on medicines by decile of household consumption. In Figures 3, 4, and 5 we report the beta coefficients of the Tobit regression on the estimates of mean per capita expenditure on medicines.[3]

According to the results of the model, the first point was only to be expected: most families tend to spend more than the benchmark category (the poorest decile in Lombardy in 2001; see Figure 3 on the left). The medicine expenditures for families in other deciles, other regions, and other years nearly always have positive values (this, however, never occurs for the families of the first decile of Tuscany and Campania for all years considered), the range varying from about –10/20 to about 60 euros.

The absolute values emerging from the figures suggest that families from the poorer deciles broadly tend to spend the same sum in time: slightly lower in Tuscany and Campania, higher in Lombardy. Mean per capita outlay on medicines thus falls in the lower area of figures. If one looks at the lowest deciles, the variation in medicine outlay over the decade analyzed varies almost not at all in all these regions. This emerges quite clearly if one looks at the uncertainty surrounding estimates.

We would remind the reader that values of pharmaceutical expenditure are indexed to 2010 purchasing power, so we must deduce from the data that the poorest families' outlay on medicines remained constant. Furthermore, these families are likely to benefit from so-called exemptions (a reduction or elimination of the cost of the "ticket"), a welfare policy implemented by all regional health systems to support the most disadvantaged households.[4]

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[3] For reasons of space, the output table of the Tobit regression is omitted. We report in the graphical form only the beta coefficients of the equivalent consumption deciles. The full results are available in Appendix Table A2.

[4] If one considers the exemptions based only on income, in Lombardy there are none. In Campania, they are provided for all individuals in households where ISEE (Equivalent Economic Situation Indicator) does not exceed €10,000. In Tuscany, exemptions are planned for households with income tax or ISEE indicator up to €36,151. Considering unemployment conditions, in Lombardy exemptions are provided for people registered at Employment Centers with a family income less than €27,000 per year. In Campania and Tuscany, exemptions apply to unemployed persons and their family with a total income of less than €8,263, less than €11,362 in the presence of a spouse, plus €516 for each child.
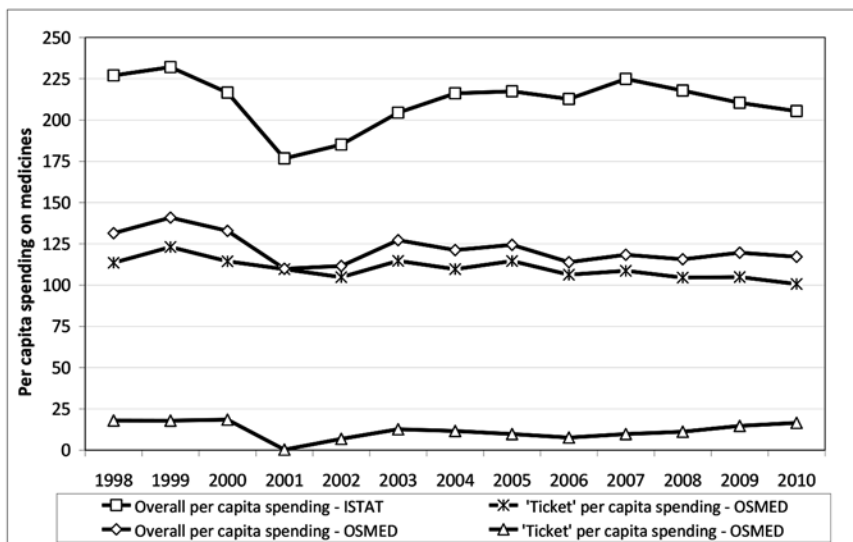
Figure 2. Trends in per capita spending on medicines: ISTAT and OSMED data compared.
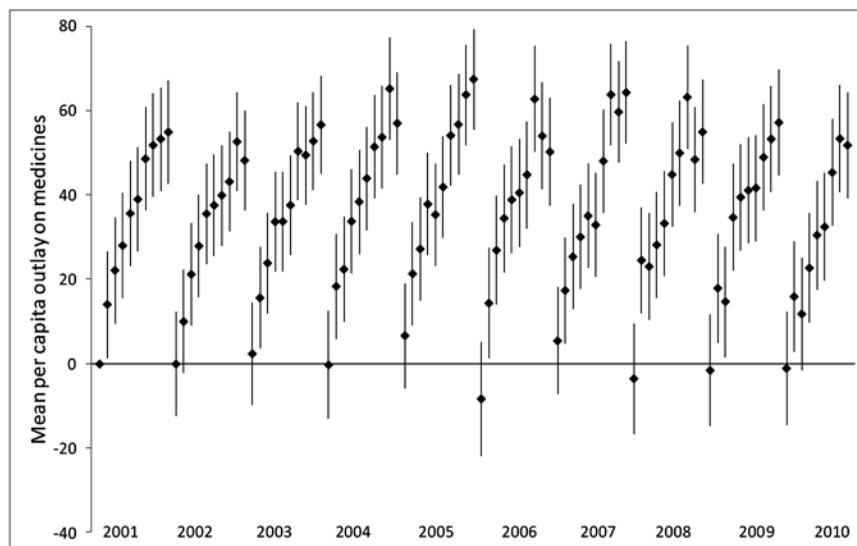
Figure 3. Tobit model estimates of mean per capita outlay on medicines in Lombardy by decile of family income, per year, and relative confidence intervals to 95 percent.
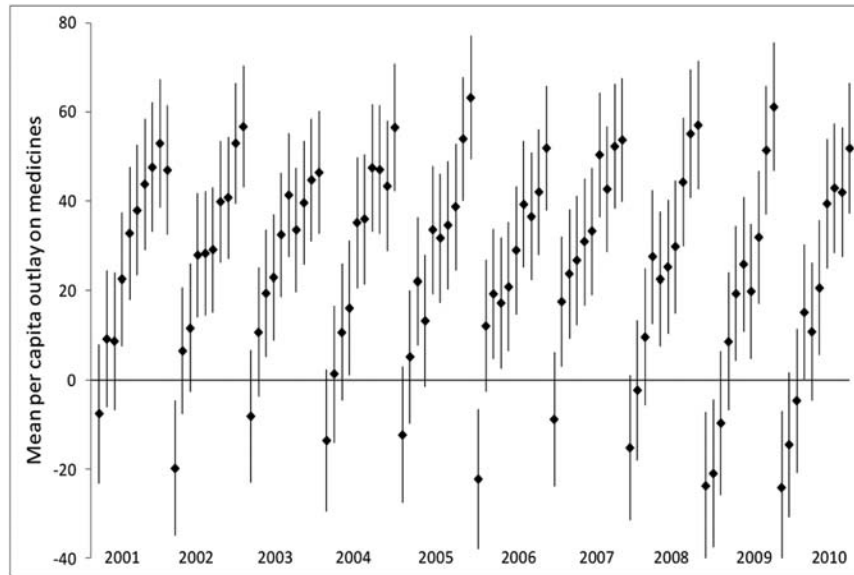
Figure 4. Tobit model estimates of mean per capita outlay on medicines in Tuscany by decile of family income, per year, and relative confidence intervals to 95 percent.

Figure 5. Tobit model estimates of mean per capita outlay on medicines in Campania by decile of family income, per year, and relative confidence intervals to 95 percent.

The next stage in our analysis is to describe to what extent there has been any change in the pharmaceutical outlay differential between families in various consumption deciles over the period considered and in the three regions, and whether any change is associated with differences related to the "ticket" quota.

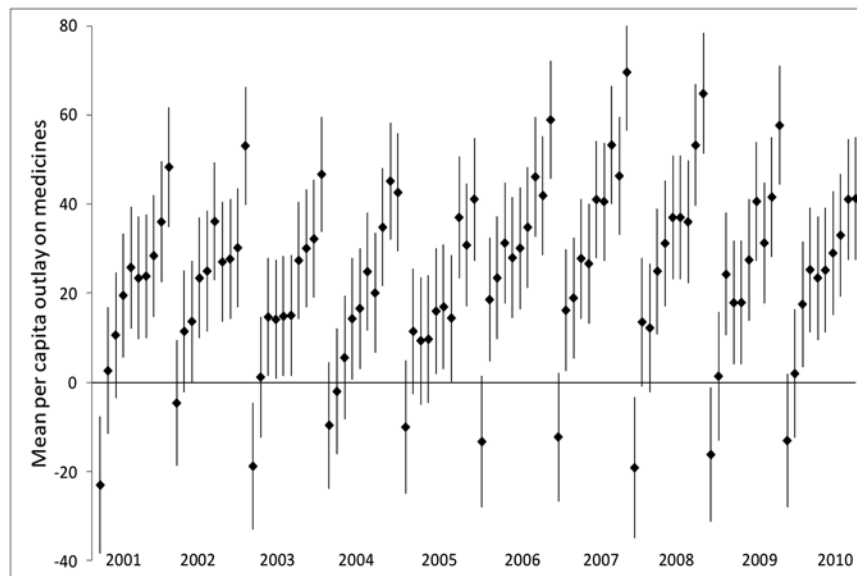Table 1 shows the results of OLS regression on the medicine expenditure by decile of household consumption (as covariate) for region and year. These coefficients are proxies of the gradient between the pharmaceutical expense and the economic well-being of households. Figures 6, 7, and 8[5] depict not only the beta values of the estimated effects (gray line) and their associated confidence interval, but also the weight of the "ticket" as a percentage of the outlay on medicines (black line) over the same time span. Our aim was to see if varying the cost sharing had a differentiated effect on families such as to alter the gap between affluent and indigent families in terms of outlay on medicines. Note that, as mentioned earlier, the poorest families do not change their medicine-purchasing habits over time, so an increase or fall in beta value can only be put down to changing budget patterns in families from the higher deciles.

Let us begin with Lombardy (see Figure 6). Matching the sharp increase in the "ticket" from 2003, there was a greater expense differential between families from the upper deciles and those from the lowest. Cost sharing seems to have been borne more by the less poor families (not belonging to the first decile). From 2007 on, following a period of relative stability, the "ticket" began to rise again; but unlike before, the gap in spending by the families from different deciles narrowed, albeit slightly. Thus one may infer that the less poor families slightly reduced their expenditure on medicines.

In Tuscany (see Figure 7), until 2006 we see substantial stability both in the co-payment borne by the users and in the ratio between families from different deciles in terms of pharmaceutical costs. The year after, a gradual increase in the co-payment was matched by a contraction in the rich-poor spending differential, in line with the pattern in Lombardy for the same years.

Lastly, Campania (see Figure 8) witnessed a sharp rise in the "ticket" as of 2007, with an initial corresponding widening of the medicine-outlay gap between the top and the bottom deciles. However, in the following years, while co-payment continued to rise quite steeply, the differential between families diminished appreciably.

These conclusions need confirmation, but point to a more sophisticated inter-pretation than Drummond and Towse's theory (12). The elasticity of the medicine demand seems to differ according to the affluence bracket. The poorer families seem less exposed to the "ticket" in that often they are exempt, but over time their

[5] Analyses for all regions are available from the authors upon request.

Table 1

Regression model (OLS) on the medicine expenditure by decile of household
consumption (as covariate) for region and year, controlled for the
demographic characteristics of the family
$(N = 56{,}548, R^2 = 0.114)$

	Beta	Std. Error	Sig.
(Constant)	–8.97	0.479	0.000
Lombardy – 2001	3.44	0.127	0.000
Lombardy – 2002	3.14	0.116	0.000
Lombardy – 2003	3.56	0.113	0.000
Lombardy – 2004	3.92	0.125	0.000
Lombardy – 2005	4.14	0.121	0.000
Lombardy – 2006	3.63	0.136	0.000
Lombardy – 2007	3.98	0.125	0.000
Lombardy – 2008	3.63	0.130	0.000
Lombardy – 2009	3.47	0.134	0.000
Lombardy – 2010	3.47	0.136	0.000
Tuscany – 2001	3.09	0.174	0.000
Tuscany – 2002	3.21	0.155	0.000
Tuscany – 2003	3.01	0.156	0.000
Tuscany – 2004	3.38	0.171	0.000
Tuscany – 2005	3.30	0.164	0.000
Tuscany – 2006	2.96	0.163	0.000
Tuscany – 2007	3.37	0.163	0.000
Tuscany – 2008	3.10	0.173	0.000
Tuscany – 2009	2.78	0.173	0.000
Tuscany – 2010	2.60	0.173	0.000
Campania – 2001	2.22	0.151	0.000
Campania – 2002	2.42	0.146	0.000
Campania – 2003	2.16	0.141	0.000
Campania – 2004	2.46	0.143	0.000
Campania – 2005	2.10	0.154	0.000
Campania – 2006	3.04	0.150	0.000
Campania – 2007	3.28	0.148	0.000
Campania – 2008	3.07	0.158	0.000
Campania – 2009	2.55	0.151	0.000
Campania – 2010	2.09	0.156	0.000
Gender of reference person of the family	6.72	0.194	0.000
Age of reference person of the family	1.91	0.034	0.000
Elderly persons over 74 years old	5.52	0.209	0.000
Children up to six years	5.58	0.233	0.000
Family size	–4.44	0.075	0.000

Figure 6. Percentage of ticket expenditure on household's medicine outlay (black line) and beta coefficients and confidence intervals of the OLS regression model predicting medicine outlay as a function of consumption decile (gray line) – Lombardy.
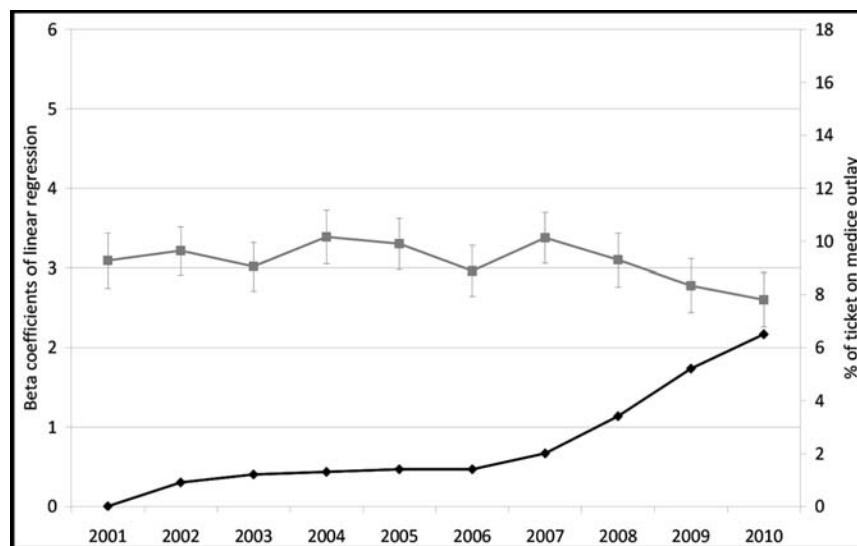
Figure 7. Percentage of ticket expenditure on household's medicine outlay (black line) and beta coefficients and confidence intervals of the OLS regression model predicting medicine outlay as a function of consumption decile (gray line) – Tuscany.
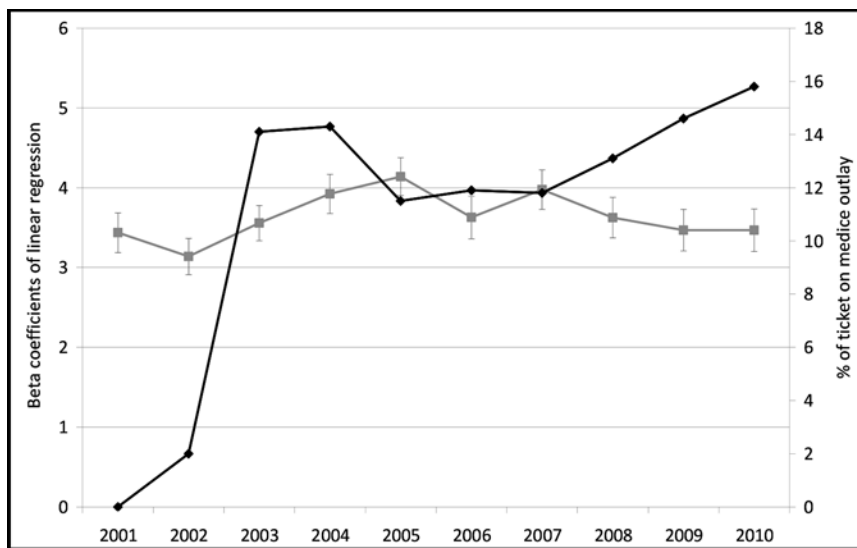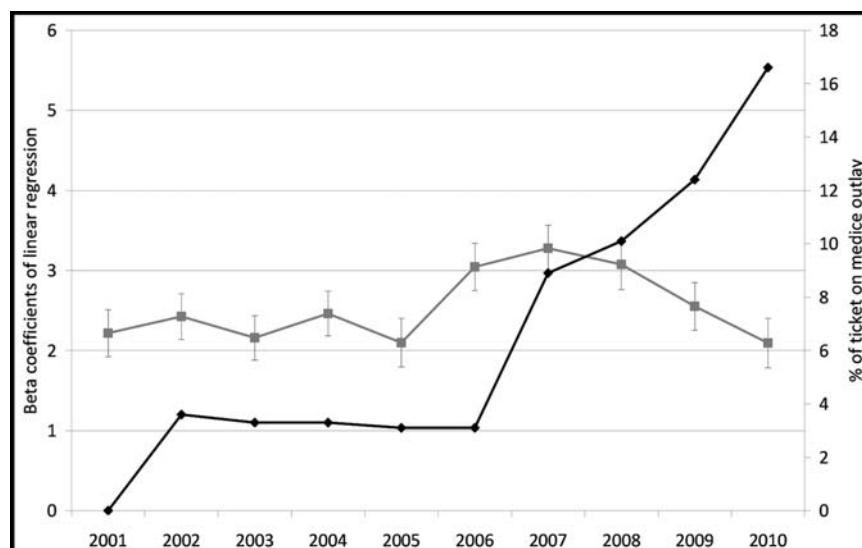
Figure 8. Percentage of ticket expenditure on household's medicine outlay (black line) and beta coefficients and confidence intervals of the OLS regression model predicting medicine outlay as a function of consumption decile (gray line) – Campania.

outlay on medicines remains unchanged. The less poor families seem to fit the economic cycle more closely, in that they reduce their pharmaceutical expense as the hike to co-payments cuts in and affects their pockets.

DISCUSSION AND CONCLUSIONS

The analysis has shown that the quota due to the "ticket" has risen in recent years while the overall expenditure on medicine has decreased.

Analysis of consumer patterns, however, has shown that there is a clear gradient between family affluence (estimated by deciles of equivalent consumption) and outlay on medicines, although the data available make it impossible to take due account of families' varying burden of illness and disability, which would provide a direct association between the need for medicine and spending at the chemist's.

The poorest families—sociodemographic characteristics being equal—tend to spend less on medicines than the wealthier ones. There seems a fairly regular association between consumer decile and outlay. We have also seen that per capita spending remains similar over our period for the poorest decile families, while it is the upper strata that adjust their spending over time.

The three regions examined—Lombardy, Tuscany, and Campania—have different histories of household pharmaceutical expenditure and co-payment schemes over the time span. And yet there seems to be a similar effect on inequality from increasing co-payment, despite regional peculiarities that can hardly be ignored. On this point we must emphasize that analysis of other regions (not shown here for reasons of space) again clearly evidences an association between institutional co-payment choice and the differential between family consumption decile and outlay on medicines. The pattern presented by that association is complex and idiosyncratic, with occasional changes of sign, but does broadly confirm the three models identified for the three reference regions: "stop & go," "go & stop," and "containment."

In the cases of Lombardy, Tuscany, and Campania, the data follow a similar pattern: the picture changes according to family affluence and the period when the increase was applied. It looks as if, prior to the economic crisis, the richer families responded to increased co-payment by spending more on medicines. However, after 2008 when the crisis set in, increases in co-payment reduced the outlay differential between families from the top and bottom deciles. That means the wealthier families are more elastic in their spending at the chemist's than the poor.

Our analysis suggests that applying co-payment is partly successful at the beginning of the period considered (until 2007), in terms of equity and greater revenue to the health system. One deduces that the contraction in expense by the richer families is not due to lack of means but to cutting down on superfluous medicines. For example, we can suppose that wealthier households might reduce their consumption of self-medication drugs or limit their purchase of "discretionary" drugs.[6] According to studies by Harris and colleagues (25) and Lundberg and colleagues (26), the consumption of both "essential" drugs and "discretionary" drugs was reduced when the user charges increased, although the relative reduction was greatest for discretionary drugs. On the other hand, patients have a financial interest in choosing cheaper drugs when co-payment increases (3, p. 104). But while such effects of co-payment may be welcomed for their equity, we must note that in the last few years cost sharing has gone steadily up. In this instance, a glance at Figures 6, 7, and 8 reveals that raising the "ticket" has rebounded negatively on more vulnerable families, those in deciles just above the poorest one, namely deciles second and third. In general, one has to also take into account the regressivity of the expenditure in medicines (27): in fact poorer families (i.e., households with a level of consumption below 60% of the median equalized expenditure) spend in percentage more than the

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[6] Harris and colleagues (25, p. 911) subdivide the therapeutic categories of a subset of selected drugs into drugs whose withdrawal could have important effects on health status ("essential") and drugs prescribed primarily for symptomatic relief, often on an as-needed basis for self-limiting conditions ("discretionary").

other families (see Figure 9). The same figure also shows that in later years, the weight of the pharmaceutical expenditure of poorer households is diminished with respect to other familial consumptions.

However, the gradual rise in co-payment due to the economic crisis has led to a sharp contraction in medicine consumption, except among first-decile families; this reduction has resulted in a lowering of the expenditure gradient (i.e., poorer families spend less than richer ones). This increases the suspicion that in recent years (since 2008) the "ticket" has acted increasingly on the demand for medicines, making it more elastic and to greater detriment of those in the lowest deciles. If this were confirmed (we should need detailed data panels on pharmaceutical expenditure relating to all Italian regions, as well as on users' socioeconomic characteristics), it would be cause for distinct social alarm. At a period of economic crisis like the present, the risk of not being able to afford necessary medicines might extend to some families that have hitherto not been affected by such a problem.
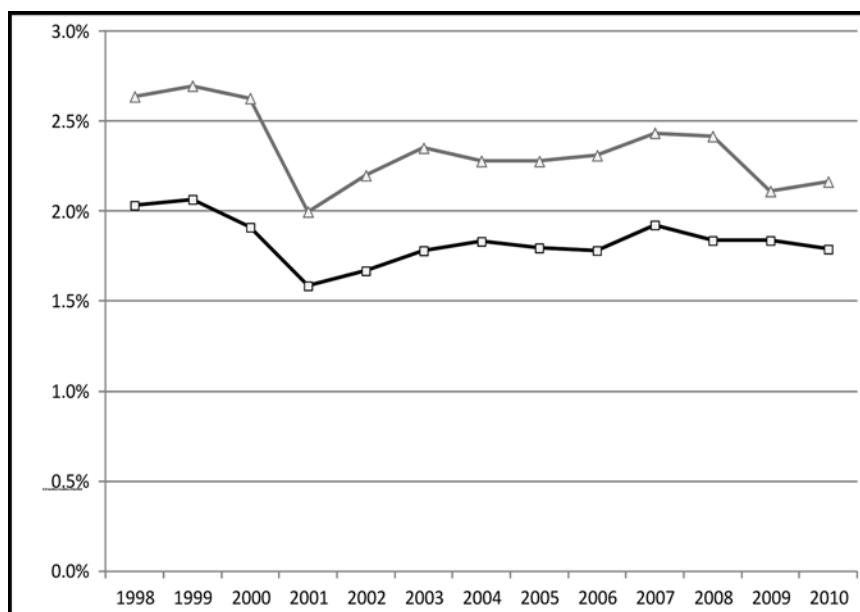
Figure 9. Percentage of Italian households' expenditure on overall equivalized pharmaceutical consumptions by poor families, consumption below 60 percent of the median equivalized expenditure (gray line), and by other families (black line). *Source*: Our elaboration on Italian household expenditure survey – ISTAT (1998–2010).

Table A1

Sample size by year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lombardy	2467	2943	3141	2523	2710	2143	2534	2351	2207	2127
Tuscany	1284	1636	1601	1338	1456	1465	1471	1300	1298	1296
Campania	1721	1865	1977	1923	1634	1739	1804	1563	1702	1593

Table A2

Regression model (Tobit) on the medicine expenditure by region, year, and decile of household consumption (as factors) controlled for the demographic characteristics of the family (N = 56,548, censored cases 27,642)

	Beta	Std. Error	Sig.
(Intercept)	−78.4	4.936	0.000
Lombardy – 2001–01 (reference category)	0.0		
Lombardy – 2001–02	14.1	6.399	0.027
Lombardy – 2001–03	22.2	6.360	0.000
Lombardy – 2001–04	28.1	6.316	0.000
Lombardy – 2001–05	35.7	6.253	0.000
Lombardy – 2001–06	39.1	6.223	0.000
Lombardy – 2001–07	48.7	6.187	0.000
Lombardy – 2001–08	51.9	6.170	0.000
Lombardy – 2001–09	53.3	6.186	0.000
Lombardy – 2001–10	55.0	6.182	0.000
Lombardy – 2002–01	0.0	6.252	0.999
Lombardy – 2002–02	10.1	6.175	0.103
Lombardy – 2002–03	21.3	6.100	0.000
Lombardy – 2002–04	28.0	6.099	0.000
Lombardy – 2002–05	35.6	6.026	0.000
Lombardy – 2002–06	37.6	6.033	0.000
Lombardy – 2002–07	40.0	6.006	0.000
Lombardy – 2002–08	43.2	5.986	0.000
Lombardy – 2002–09	52.7	5.952	0.000
Lombardy – 2002–10	48.3	5.997	0.000

Table A2 (Cont'd.)

	Beta	Std. Error	Sig.
Lombardy – 2003–01	2.4	6.118	0.690
Lombardy – 2003–02	15.7	6.074	0.010
Lombardy – 2003–03	23.9	6.001	0.000
Lombardy – 2003–04	33.7	5.987	0.000
Lombardy – 2003–05	33.8	5.974	0.000
Lombardy – 2003–06	37.7	5.937	0.000
Lombardy – 2003–07	50.4	5.895	0.000
Lombardy – 2003–08	49.5	5.892	0.000
Lombardy – 2003–09	52.8	5.884	0.000
Lombardy – 2003–10	56.7	5.871	0.000
Lombardy – 2004–01	–0.2	6.447	0.975
Lombardy – 2004–02	18.4	6.318	0.004
Lombardy – 2004–03	22.5	6.326	0.000
Lombardy – 2004–04	33.8	6.241	0.000
Lombardy – 2004–05	38.5	6.217	0.000
Lombardy – 2004–06	44.0	6.187	0.000
Lombardy – 2004–07	51.5	6.145	0.000
Lombardy – 2004–08	53.8	6.137	0.000
Lombardy – 2004–09	65.3	6.103	0.000
Lombardy – 2004–10	57.1	6.130	0.000
Lombardy – 2005–01	6.7	6.283	0.284
Lombardy – 2005–02	21.4	6.195	0.001
Lombardy – 2005–03	27.3	6.167	0.000
Lombardy – 2005–04	37.9	6.122	0.000
Lombardy – 2005–05	35.4	6.107	0.690
Lombardy – 2005–06	42.0	6.094	0.010
Lombardy – 2005–07	54.2	6.038	0.000
Lombardy – 2005–08	56.8	6.046	0.000
Lombardy – 2005–09	63.8	6.023	0.000
Lombardy – 2005–10	67.5	6.007	0.000
Lombardy – 2006–01	–8.3	6.853	0.228
Lombardy – 2006–02	14.4	6.629	0.029
Lombardy – 2006–03	27.0	6.519	0.000
Lombardy – 2006–04	34.6	6.464	0.000
Lombardy – 2006–05	38.9	6.435	0.000
Lombardy – 2006–06	40.6	6.432	0.000
Lombardy – 2006–07	44.9	6.402	0.000
Lombardy – 2006–08	62.8	6.336	0.000
Lombardy – 2006–09	54.1	6.387	0.000
Lombardy – 2006–10	50.3	6.434	0.000
Lombardy – 2007–01	5.5	6.407	0.390
Lombardy – 2007–02	17.4	6.325	0.006

Table A2 (Cont'd.)

	Beta	Std. Error	Sig.
Lombardy – 2007–03	25.4	6.284	0.000
Lombardy – 2007–04	30.1	6.263	0.000
Lombardy – 2007–05	35.1	6.220	0.000
Lombardy – 2007–06	33.0	6.267	0.000
Lombardy – 2007–07	48.1	6.174	0.000
Lombardy – 2007–08	63.9	6.112	0.000
Lombardy – 2007–09	59.8	6.098	0.000
Lombardy – 2007–10	64.4	6.097	0.000
Lombardy – 2008–01	−3.5	6.627	0.601
Lombardy – 2008–02	24.6	6.368	0.000
Lombardy – 2008–03	23.1	6.390	0.000
Lombardy – 2008–04	28.2	6.377	0.000
Lombardy – 2008–05	33.3	6.313	0.000
Lombardy – 2008–06	44.9	6.268	0.000
Lombardy – 2008–07	50.0	6.262	0.000
Lombardy – 2008–08	63.3	6.188	0.000
Lombardy – 2008–09	48.5	6.260	0.000
Lombardy – 2008–10	55.0	6.241	0.000
Lombardy – 2009–01	−1.5	6.693	0.822
Lombardy – 2009–02	18.0	6.506	0.006
Lombardy – 2009–03	14.8	6.618	0.025
Lombardy – 2009–04	34.8	6.396	0.000
Lombardy – 2009–05	39.5	6.365	0.000
Lombardy – 2009–06	41.2	6.348	0.000
Lombardy – 2009–07	41.7	6.359	0.000
Lombardy – 2009–08	49.0	6.357	0.000
Lombardy – 2009–09	53.3	6.345	0.000
Lombardy – 2009–10	57.3	6.322	0.000
Lombardy – 2010–01	−1.0	6.767	0.880
Lombardy – 2010–02	16.0	6.633	0.016
Lombardy – 2010–03	11.9	6.695	0.076
Lombardy – 2010–04	22.8	6.598	0.001
Lombardy – 2010–05	30.6	6.505	0.000
Lombardy – 2010–06	32.5	6.484	0.000
Lombardy – 2010–07	45.4	6.421	0.000
Lombardy – 2010–08	53.4	6.371	0.000
Lombardy – 2010–09	51.9	6.389	0.000
Lombardy – 2010–10	61.2	6.356	0.000
Tuscany – 2001–01	−7.4	7.870	0.344
Tuscany – 2001–02	9.3	7.738	0.230
Tuscany – 2001–03	8.8	7.775	0.258
Tuscany – 2001–04	22.6	7.580	0.003

Table A2 (Cont'd.)

	Beta	Std. Error	Sig.
Tuscany – 2001–05	32.9	7.477	0.000
Tuscany – 2001–06	38.0	7.385	0.000
Tuscany – 2001–07	43.9	7.424	0.000
Tuscany – 2001–08	47.7	7.356	0.000
Tuscany – 2001–09	53.0	7.313	0.000
Tuscany – 2001–10	47.0	7.357	0.000
Tuscany – 2002–01	−19.7	7.654	0.010
Tuscany – 2002–02	6.6	7.181	0.357
Tuscany – 2002–03	11.7	7.217	0.105
Tuscany – 2002–04	28.0	7.025	0.000
Tuscany – 2002–05	28.4	6.996	0.000
Tuscany – 2002–06	29.2	7.035	0.000
Tuscany – 2002–07	39.9	6.923	0.000
Tuscany – 2002–08	40.9	6.885	0.000
Tuscany – 2002–09	53.1	6.810	0.000
Tuscany – 2002–10	56.8	6.881	0.000
Tuscany – 2003–01	−8.0	7.500	0.284
Tuscany – 2003–02	10.8	7.246	0.137
Tuscany – 2003–03	19.5	7.155	0.006
Tuscany – 2003–04	23.0	7.107	0.001
Tuscany – 2003–05	32.6	7.002	0.000
Tuscany – 2003–06	41.4	6.965	0.000
Tuscany – 2003–07	33.6	7.027	0.000
Tuscany – 2003–08	39.7	6.971	0.000
Tuscany – 2003–09	44.8	6.933	0.000
Tuscany – 2003–10	46.5	6.977	0.000
Tuscany – 2004–01	−13.5	7.999	0.092
Tuscany – 2004–02	1.5	7.770	0.850
Tuscany – 2004–03	10.7	7.696	0.163
Tuscany – 2004–04	16.2	7.638	0.034
Tuscany – 2004–05	35.3	7.344	0.000
Tuscany – 2004–06	36.1	7.358	0.000
Tuscany – 2004–07	47.6	7.250	0.000
Tuscany – 2004–08	47.1	7.293	0.000
Tuscany – 2004–09	43.4	7.391	0.000
Tuscany – 2004–10	56.6	7.220	0.000
Tuscany – 2005–01	−12.2	7.702	0.112
Tuscany – 2005–02	5.3	7.528	0.482
Tuscany – 2005–03	22.1	7.249	0.002
Tuscany – 2005–04	13.4	7.444	0.072
Tuscany – 2005–05	33.7	7.221	0.000
Tuscany – 2005–06	31.8	7.262	0.000

Table A2 (Cont'd.)

	Beta	Std. Error	Sig.
Tuscany – 2005–07	34.7	7.225	0.000
Tuscany – 2005–08	38.8	7.170	0.000
Tuscany – 2005–09	54.0	7.006	0.000
Tuscany – 2005–10	63.3	7.021	0.000
Tuscany – 2006–01	–22.1	7.940	0.005
Tuscany – 2006–02	12.2	7.454	0.102
Tuscany – 2006–03	19.4	7.335	0.008
Tuscany – 2006–04	17.4	7.383	0.019
Tuscany – 2006–05	21.0	7.320	0.004
Tuscany – 2006–06	29.1	7.197	0.000
Tuscany – 2006–07	39.4	7.163	0.000
Tuscany – 2006–08	36.6	7.214	0.000
Tuscany – 2006–09	42.1	7.124	0.000
Tuscany – 2006–10	52.0	7.056	0.000
Tuscany – 2007–01	–8.7	7.589	0.250
Tuscany – 2007–02	17.7	7.317	0.016
Tuscany – 2007–03	23.8	7.236	0.001
Tuscany – 2007–04	26.8	7.277	0.000
Tuscany – 2007–05	31.0	7.177	0.000
Tuscany – 2007–06	33.4	7.157	0.000
Tuscany – 2007–07	50.5	7.033	0.000
Tuscany – 2007–08	42.8	7.089	0.000
Tuscany – 2007–09	52.4	7.060	0.000
Tuscany – 2007–10	53.8	7.026	0.000
Tuscany – 2008–01	–15.1	8.196	0.065
Tuscany – 2008–02	–2.2	7.950	0.782
Tuscany – 2008–03	9.7	7.702	0.207
Tuscany – 2008–04	27.6	7.535	0.000
Tuscany – 2008–05	22.6	7.604	0.003
Tuscany – 2008–06	25.3	7.554	0.001
Tuscany – 2008–07	29.9	7.504	0.000
Tuscany – 2008–08	44.3	7.307	0.000
Tuscany – 2008–09	55.2	7.309	0.000
Tuscany – 2008–10	57.1	7.301	0.000
Tuscany – 2009–01	–23.7	8.419	0.005
Tuscany – 2009–02	–20.9	8.363	0.013
Tuscany – 2009–03	–9.6	8.116	0.238
Tuscany – 2009–04	8.7	7.751	0.262
Tuscany – 2009–05	19.5	7.652	0.011
Tuscany – 2009–06	25.9	7.576	0.001
Tuscany – 2009–07	20.0	7.614	0.009
Tuscany – 2009–08	32.0	7.475	0.000

Table A2 (Cont'd.)

	Beta	Std. Error	Sig.
Tuscany – 2009–09	51.5	7.282	0.000
Tuscany – 2009–10	61.2	7.281	0.000
Tuscany – 2010–01	–24.0	8.637	0.005
Tuscany – 2010–02	–14.4	8.190	0.079
Tuscany – 2010–03	–4.5	8.133	0.576
Tuscany – 2010–04	15.3	7.591	0.044
Tuscany – 2010–05	10.9	7.727	0.158
Tuscany – 2010–06	20.7	7.586	0.006
Tuscany – 2010–07	39.5	7.372	0.000
Tuscany – 2010–08	43.0	7.137	0.000
Tuscany – 2010–09	42.1	7.336	0.000
Tuscany – 2010–10	51.9	7.361	0.000
Campania – 2001–01	–22.9	7.758	0.003
Campania – 2001–02	2.7	7.139	0.703
Campania – 2001–03	10.7	7.114	0.132
Campania – 2001–04	19.6	7.023	0.005
Campania – 2001–05	25.9	6.883	0.000
Campania – 2001–06	23.5	6.952	0.001
Campania – 2001–07	23.9	6.991	0.001
Campania – 2001–08	28.5	6.905	0.000
Campania – 2001–09	36.1	6.856	0.000
Campania – 2001–10	48.4	6.787	0.000
Campania – 2002–01	–4.5	7.113	0.525
Campania – 2002–02	11.6	6.917	0.095
Campania – 2002–03	13.8	6.893	0.046
Campania – 2002–04	23.5	6.822	0.001
Campania – 2002–05	25.1	6.815	0.000
Campania – 2002–06	36.2	6.698	0.000
Campania – 2002–07	27.1	6.777	0.000
Campania – 2002–08	27.8	6.789	0.000
Campania – 2002–09	30.3	6.773	0.000
Campania – 2002–10	53.2	6.635	0.000
Campania – 2003–01	–18.7	7.144	0.009
Campania – 2003–02	1.3	6.855	0.850
Campania – 2003–03	14.8	6.717	0.028
Campania – 2003–04	14.2	6.770	0.035
Campania – 2003–05	14.9	6.783	0.028
Campania – 2003–06	15.1	6.796	0.026
Campania – 2003–07	27.5	6.671	0.000
Campania – 2003–08	30.2	6.643	0.000
Campania – 2003–09	32.3	6.651	0.000
Campania – 2003–10	46.8	6.540	0.000

Table A2 (Cont'd.)

	Beta	Std. Error	Sig.
Campania – 2004–01	–9.5	7.165	0.185
Campania – 2004–02	–1.9	7.117	0.786
Campania – 2004–03	5.7	7.007	0.419
Campania – 2004–04	14.4	6.869	0.036
Campania – 2004–05	16.7	6.844	0.015
Campania – 2004–06	24.9	6.707	0.000
Campania – 2004–07	20.2	6.786	0.003
Campania – 2004–08	34.9	6.672	0.000
Campania – 2004–09	45.2	6.598	0.000
Campania – 2004–10	42.7	6.667	0.000
Campania – 2005–01	–9.9	7.571	0.190
Campania – 2005–02	11.6	7.114	0.104
Campania – 2005–03	9.5	7.228	0.190
Campania – 2005–04	9.8	7.228	0.175
Campania – 2005–05	16.1	7.123	0.024
Campania – 2005–06	17.1	7.086	0.016
Campania – 2005–07	14.5	7.174	0.043
Campania – 2005–08	37.1	6.932	0.000
Campania – 2005–09	30.9	6.956	0.000
Campania – 2005–10	41.2	6.937	0.000
Campania – 2006–01	–13.2	7.474	0.078
Campania – 2006–02	18.7	6.973	0.007
Campania – 2006–03	23.5	6.934	0.001
Campania – 2006–04	31.4	6.831	0.000
Campania – 2006–05	28.1	6.836	0.000
Campania – 2006–06	30.2	6.893	0.000
Campania – 2006–07	34.9	6.820	0.000
Campania – 2006–08	46.2	6.739	0.000
Campania – 2006–09	42.0	6.762	0.000
Campania – 2006–10	59.0	6.679	0.000
Campania – 2007–01	–12.1	7.306	0.097
Campania – 2007–02	16.3	6.862	0.018
Campania – 2007–03	19.1	6.862	0.005
Campania – 2007–04	27.9	6.778	0.000
Campania – 2007–05	26.7	6.822	0.000
Campania – 2007–06	41.1	6.653	0.000
Campania – 2007–07	40.7	6.674	0.000
Campania – 2007–08	53.3	6.640	0.000
Campania – 2007–09	46.4	6.640	0.000
Campania – 2007–10	69.7	6.570	0.000
Campania – 2008–01	–19.0	7.957	0.017
Campania – 2008–02	13.6	7.264	0.060

Table A2 (Cont'd.)

	Beta	Std. Error	Sig.
Campania – 2008–03	12.3	7.259	0.089
Campania – 2008–04	25.1	7.117	0.000
Campania – 2008–05	31.3	7.094	0.000
Campania – 2008–06	37.1	6.974	0.000
Campania – 2008–07	37.1	6.971	0.000
Campania – 2008–08	36.1	6.938	0.000
Campania – 2008–09	53.3	6.900	0.000
Campania – 2008–10	64.9	6.841	0.000
Campania – 2009–01	−16.1	7.648	0.036
Campania – 2009–02	1.50	7.300	0.838
Campania – 2009–03	24.3	6.955	0.000
Campania – 2009–04	18.0	7.006	0.010
Campania – 2009–05	18.0	6.994	0.010
Campania – 2009–06	27.6	6.882	0.000
Campania – 2009–07	40.7	6.759	0.000
Campania – 2009–08	31.4	6.834	0.000
Campania – 2009–09	41.7	6.791	0.000
Campania – 2009–10	57.7	6.742	0.000
Campania – 2010–01	−12.9	7.581	0.088
Campania – 2010–02	2.1	7.304	0.776
Campania – 2010–03	17.6	7.069	0.013
Campania – 2010–04	25.4	7.065	0.000
Campania – 2010–05	23.5	7.010	0.001
Campania – 2010–06	25.3	7.026	0.000
Campania – 2010–07	29.1	6.968	0.000
Campania – 2010–08	33.1	6.974	0.000
Campania – 2010–09	41.2	6.855	0.000
Campania – 2010–10	41.4	6.929	0.000
Gender of reference person of the family	10.1	0.694	0.000
Age of reference person of the family	4.2	0.128	0.000
Elderly persons over 74 years old	11.7	0.743	0.000
Children up to six years	12.1	0.830	0.000
Family size	−3.6	0.273	0.000

Log likelihood = −176615.64

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