# Household Expenditure and Property Taxes: Evidence from a Fiscal Consolidation Plan[☆]

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**Abstract**

In 2011, the Italian government passed a fiscal consolidation plan which profoundly changed the municipal tax system on residential properties (IMU). We exploit variation in the IMU paid across respondents of the Survey on Household Income and Wealth (SHIW) to identify the effect of residential property taxes on private expenditure, conditional on demographics, property characteristics and expectations on income and house prices. The IMU on the *main dwelling* generated small tax revenues but was associated with large expenditure cuts among households with mortgage debt and low liquid wealth. In contrast, the higher tax rate on *other residential properties* significantly improved the government fiscal position and triggered a proportional decline in households' savings. Overall, the direct contribution to the aggregate economy in 2012 was around -0.15% of GDP vis-à-vis some 0.90% of GDP in raised taxes.

*Keywords:* fiscal consolidation, property taxes, household expenditure, mortgage debt, liquid wealth.
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"*Household debtors are frequently young families acquiring homes and furnishing before they earn incomes to pay for them outright; given the difficulty of borrowing against future wages, they are liquidity-constrained and have a high marginal propensity to consume*"

(James Tobin, 1980, 'Asset accumulation and economic activity', p. 10)

## 1. Introduction

The Great Recession of 2007-09 has triggered an unprecedented wave of fiscal stimuli which have deteriorated significantly the public finances of most advanced economies. The steady expansion of government balance sheets has led to growing concerns on the sustainability of public debt, which in turn have sparkled an intense debate among academics and policy makers about the short-run effects of consolidation plans. While an important strand of recent empirical research has made notable progress to quantify the effects of tax rebates, little is known about the impact of austerity tax hikes on household expenditure and, more importantly, whether some groups of society disproportionally bear the costs of any possible adjustment in standards of living following a consolidation plan.

The present analysis fills this important gap in the literature exploiting a tax reform which took place in Italy at the end of 2011. A newly appointed national government led by Mr. Monti swiftly legislated a fiscal consolidation plan meant to alleviate sovereign concerns in international markets about the sustainability of Italian public debt by raising further taxes worth some 0.87 percent of GDP. The bulk of the intervention was a re-design of the municipal tax (the so-called "Imposta Municipal Unica" or simply "IMU") paid on the main dwelling (raising 4.0bn Euros in tax revenues) and on other residential

properties (raising additional 10.1bn Euros to 14.1bn Euros in total). The IMU affected 25.8 millions of tax payers (or around 70 percent of households) with an average contribution per tax-paying household around 357 Euros on the main dwelling and about 905 Euros on other residential properties.

Using a new set of questions on the amount of IMU paid appositely added to the bi-yearly Survey of Household Income and Wealth (SHIW), we identify the effects of property taxes on household behavior. We do so by comparing the change in expenditure for IMU payers between 2010 and 2012 (i.e. before and after the tax reform) to the change in expenditure for non-IMU payers over the same period, netting out the effect of demographics, the change in house value, property characteristics, expectations on income and house prices as well as regional fixed effects. In the most restrictive specification, we look only at home owners and thus focus exclusively on variation in the amount of taxes paid.

Our approach exploits four features of the 2011 property tax reform in Italy. First, the national government introduced a new tax on the main dwelling and increased by an exogenous factor the rental value used to compute the tax base on both the main dwelling and on other residential properties. Second, both the timing and the depth of the legislated changes were largely unanticipated. Third, municipal governments were allowed to unilaterally revise the basic marginal rates proposed by Monti's government and, as shown in Section 2, the geographical variation in municipal IMU tax rates was unrelated to local economic conditions. Fourth, the IMU tax was announced as an experiment (whose possible extension would have been subject to government revision) and the vast majority of respondents in the 2012 SHIW reported that they did not expect the tax to be permanent.

The empirical analysis isolates five major empirical regularities. First, the marginal propensity to consume (MPC) non-durable goods and services out of the IMU tax is around 0.03 whereas the marginal

propensity to spend (MPS) on durable goods is about 0.47. Second, these average effects mask pervasive heterogeneity across residential properties, with a large and significant MPS associated with the taxes paid on the main dwelling and a small and insignificant MPS out of taxes on other residential properties. In contrast, the MPCs are always statistically indistinguishable from zero. Third, the significant response to the main dwelling IMU tax is far more pronounced among home-owners with (mortgage) debt and with low liquid wealth-to-income ratio. Fourth, debtors concentrated their expenditure cut on vehicles purchases while non-debtors responded to the increase in property taxes with a reduction of their savings. Fifth, the direct negative consequences of the IMU tax on residential properties are estimated around 0.15 percent of GDP in 2012 vis-à-vis an increase in tax revenues of 0.90 percent of GDP (or 1.4 percent of personal consumption expenditure). While this suggests only a small recessionary effect on the aggregate economy relative to the sizable increase in tax revenues, the direct impact of fiscal austerity on the car industry in 2012 was large, around -9.4 percent of the market size in 2011.

**Related literature.** Our analysis makes contacts with at least five strands of empirical research. First, an important set of studies pioneered by Johnson et al. [22] and investigated further by Parker et al. [29], Agarwal and Qian [1] and Misra and Surico [26] look at household expenditure responses to fiscal stimuli, when (income) taxes are rebated. More specifically, Parker et al. [29] report on U.S. CEX data a significant MPS on durable goods of about 0.5 and an insignificant MPC on non-durable goods and services but find little evidence of heterogeneity. In contrast, the present analysis offers an unprecedented evaluation of fiscal austerity, when (property) taxes are increased, revealing pervasive heterogeneity across household debt positions. Second, a growing literature exemplified by Guajardo et al. [16] and Alesina et al. [3] investigate the impact of consolidation plans on the aggregate economy using the narrative

identification proposed by Romer and Romer [32] and find that tax increases tend to be more recessionary than public spending cuts. With these papers, we share the emphasis on fiscal austerity but we employ a different identification strategy and, more importantly, we use household survey data (rather than national statistics) to explore relevant sources of heterogeneity across groups of society. Third, a burgeoning line of theoretical research has recently emphasized the role that illiquid wealth (especially housing) could play in the transmission of macroeconomic policies. Selected examples include Eggertsson and Krugman [14], Kaplan and Violante [23], Ragot [31] and Andres et al. [4]. Our evidence provides support for the notion of debt-constrained households put forward by these theoretical frameworks. Fourth, a large number of contributions, including Campbell and Cocco [10], Attanasio et al. [5], Mian and Sufi [24], Guiso et al. [17] and Paiella and Pistaferri [28] look at the statistical association between consumption and house prices. While these earlier studies exploit either variation in house prices across regions or variation in expected house prices across households, our evidence is based on perceived house price changes as self-reported by each household. Finally, Jappelli and Pistaferri [21] report evidence of MPC heterogeneity using a hypothetical question in the SHIW about the expenditure response to a 10% increase in household income. Their average MPC is in line with our baseline estimates and the bi-modality of one and zero responses that they report is consistent with our findings of heterogeneity across the IMU taxes on the main dwelling and on other residential properties.

**Structure of the paper.** Section 2 describes the institutional design and the historical context in which the IMU was introduced. Section 3 details the empirical specification and the exogenous variation across SHIW respondents that we exploit for identification. The main results on the IMU tax paid on the main dwelling and on other residential properties as well as the heterogeneous responses across liquidity

and debt positions are presented in Section 4, together with evidence on saving flows. Estimates for different spending categories and further results on age, income and using probit regressions are the focus of Section 5. We conclude in Section 6 with some back of the envelope calculations that quantify the direct impact of the IMU tax reform on the Italian economy in 2012.

## 2. Institutional design

In this section, we first outline a brief history of property taxation in Italy. We then describe the specific context in which the IMU reform was introduced and finally we describe the variation in the IMU rates that we exploit in our econometric analysis.

### *2.1. A brief history of municipal property taxes in Italy*

The "Municipal Tax on Properties" ("Imposta Comunale sugli Immobili", aka "ICI") was introduced in the Italian legislation by the law by decree number 333 on July $11^{th}$, 1992 and subsequently transformed into law on December $30^{th}$, 1992.[1] The ICI tax base included three main categories: buildings, building plots, and farmlands. Our analysis on household expenditure will focus on the "buildings" category. Under the ICI system, the tax base for "buildings" was the registry rental value, defined as an estimate of what the rental value of the property would have been in 1988-1989 which was used as a base biennium. This (rough) estimate, which was self-reported to the municipal registry by the buyer at the time of purchase, was based on the location and building type but did not account for other important dimensions such as the type of construction, the age of the building, or more in general the building conditions. Not surprisingly,

[1] Respectively: "decreto legislativo 11 luglio 1992, n.333" and "decreto legislativo 30 dicembre 1992, n. 504".

the system became obsolete soon after its introduction but was left essentially unchanged in the following two decades against the backdrop of steadily growing market prices. In figure A.1 in AppendixA, we show that the ratio between registry values and market values at the end of the ICI system averaged around 3.6 (see Bocci et al. [7] and IMF [19] for similar evidence). The marginal tax rates were set independently by the municipal authorities within the range of 0.4-0.7 percent according to local preferences and any possible basic deduction.

The ICI remained substantially unchanged till the end of 2007, when the government led by Mr. Prodi approved an increase of the basic deduction of 0.133 percent.[2] The policy change applied only to taxes on the main dwelling with a cap of 200 Euros. Finally, on March $27^{th}$, 2008 the subsequent government led by Mr. Berlusconi abolished the ICI tax on the main dwellings (excluding three registry categories corresponding to "luxury houses", "villas" and "castles") with the law by decree number 93/2008 while the ICI tax on other properties remained unchanged.

### *2.2. The "IMU" tax*

On $4^{th}$ December 2011, the newly appointed Italian government led by Mr. Monti announced a fiscal consolidation plan which was meant to "ensure fiscal stability, growth and equity". The plan was passed into law with immediate effect on $22^{nd}$ December 2011.[3] Among the most sizable interventions, the government reformed the property tax system, abolished ICI and introduced a single municipal property tax under the heading of "Imposta Municipale Unica" ("IMU"). According to the official technical notes

[2] The law was officially passed on December $24^{th}$ ("Legge 24 Dicembre, 2007 n. 244") and published on the "Gazzetta Ufficiale" on December $28^{th}$ ("Gazzetta Ufficiale 28 Dicembre 2007").

[3] Law 22 December 2011, n. 24 (published on the "Gazzetta Ufficiale" on December $27^{th}$ 2011, n. 300).

accompanying the law, the introduction of the IMU accounted for three quarters of the increase in taxation associated with the 2011 austerity plan. The swift implementation of Monti's government IMU reform (in less than two months since the resignation of former prime minister Mr Berlusconi), together with the by-yearly frequency of the SHIW (conducted in 2010 and 2012), makes this property tax reform most likely unanticipated by households (especially back in 2010).[4]

The introduction of the IMU tax significantly reformed the property tax regime along three dimensions. First, it included the registry value of the main dwelling in the tax base, previously excluded. Second, the registry values (for both, main dwellings and other properties) were scaled up by an exogenous factor (homogeneous across all municipalities and equal to 1.6 for residential dwellings) so as to increase the tax base by an average of 49 percent (see IMF [19]). Finally, the IMU system set the basic tax rate on primary (other) residences at 0.4 (0.76) percent of the registry value but allowed municipalities to modify this rate within a 0.2 (0.3) percent band. Furthermore, the government set the basic deduction at 200 Euros plus an additional 50 Euro deduction per children less than 26 years old (up to a maximum of an additional 400 Euros) and each municipality was allowed to modify this, although around 98 percent of the municipalities chose the basic 200 Euros.[5] Overall, the IMU system determined a sharp increase in residential property taxation: the revenues on the main properties increased from 0.0bn Euros in 2011 to 4.0bn Euros in 2012 while those on other properties increased from 7.8bn in 2011 to 17.9bn in 2012. Between 2011 and 2012, total tax revenues on residential properties increased by 14.1bn Euros corresponding to around 0.90 percent

[4]The introduction of the IMU tax was originally planned by the $4^{th}$ Berlusconi's government (law by decree n. 23 of March $14^{th}$ 2011 published on the "Gazzetta Ufficiale" on December $6^{th}$ 2011, n.284.) and was expected to start in January 2014. However, because of a deliberate lack of clarity in communication, the public was largely unaware of the upcoming 2014 schedule. As discussed in details by the IMF [19], "The introduction of the IMU tax at the beginning of 2012 "fundamentally reformed, and increased, property taxation".

[5]Source: "IFEL" ("Institute for Local Economics and Finance" - "Istituto per la Finanza e l'Economia Locale") database (accessible at: www.webifel.it/ICI/AliquoteIMU.cfm).

of Gross Domestic Product (GDP) in 2012.[6]

Our analysis exploits the fact that in the 2012 Italian Survey on Household Income and Wealth (SHIW), respondents were asked to report the amount of IMU tax paid on both the main dwelling and other residential properties. In Figure 1, we plot the distribution of self-reported IMU payments per household from the SHIW, distinguishing between the amount of IMU tax paid on the main dwelling (in the first raw) and the amount paid on other residential properties (in the second raw). The first column displays the distribution of the absolute amount of euros paid whereas the second column reports it as a share of the household monthly income. Because of the deductions, 21.6 percent of home-owners did not pay the IMU tax on the main dwelling and 13.2 percent of more than one property home-owners did not pay the IMU tax on other properties. The IMU affected 25.8 millions of tax payers (or around 70 percent of households). The average payment on the main dwelling was about 357 Euros (or 14 percent of a household monthly income) while the average payment on all residential properties was 905 Euros (or 36 percent of a household monthly income).[7] Finally, around 70 percent of households perceived the policy change to be temporary.

### *2.3. IMU rate variation and local business cycle*

The variation in the amount of IMU tax paid across households stems from three main features of the law: demographics (and in particular the number of children eligible for deduction), property character-

[6] The direct benefits for the national government (in the form of either higher direct revenues or lower transfers to municipal governments triggered by the property tax reform) totalled to about two thirds of the overall change in IMU tax raised. To the extent that most municipal governments used the changes in IMU revenues to reduce their deficits, however, the consolidated balance sheet of the national government, which includes the net fiscal positions of all levels of governments, changed in 2012 by an amount close to the overall increase in IMU revenues, which amounted to about 0.90% of GDP. To give a sense for the magnitude of this intervention, we have calculated that the change in tax revenues associated with a 1% increase in VAT has an upper bound at around 0.25% of GDP, under the assumption of no drop in aggregate demand.

[7] As shown by Norregaard [27], it is very hard to evade property taxes in high-income countries like Italy.

istics (including surface and building type, which determine the house registry value) and local tax rates (given that municipalities are allowed to vary the basic rates set by the government). In the SHIW, we observe demographics and property characteristics but –to preserve anonymity– we are only provided with the region (rather than the municipality) where a household lives in. This implies that controlling for demographics and property characteristics in a projection of household expenditure change on the amount of IMU paid is likely to isolate variation in tax paid due either to geographical variation in the tax rates (see figure B.1 in Appendix B for a heat map that illustrates the municipal variation in two different provinces) or to unobserved characteristics that are not absorbed by our rich set of covariates. In 2012, 35.2% (57.3%) of municipalities chose to modify the basic tax rate on the main dwelling (other residential properties) set by the national government.

To interpret the coefficient on IMU paid as the causal effect of the tax change on private expenditure, we need to verify that the geographical variation in the tax rates was not the municipal government response to (past) local economic conditions. The concern is that property tax rates may have been consistently higher in municipalities with a higher concentration of households with certain (financial and economic) characteristics. To assess this hypothesis, Table B.1 in the Appendix reports the correlation between the municipal IMU tax rates of 2012 and a number of indicator of local economic performance in 2010 and 2011, ranging from personal and business income to night light density.[8] The main take away from this table is that there is little evidence of a systematic relation between the IMU tax rates and the state of

[8]Data are collected by the US Air Force Weather Agency and distributed by the National Geophysical Data Center (accessible at: http://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html). Technically, the nighttime lights is derived from the average visible band digital number (DN) of cloud-free light detections multiplied by the percent frequency of light detection. The inclusion of the percent frequency of detection term normalizes the resulting digital values for variations in the persistence of lighting. The Arc-GIS software used to elaborate the raster automatically calculates the average density of all pixels within a municipal territory on a continuous scale between 0 ("low density" - dark) to 62 ("high density").

the municipal business cycle in the preceding years.

This latter result is echoed by Figure B.2, which records the correlations between the share of votes to the left-wing coalition in the municipal elections immediately before the property tax reform and (i) the IMU tax rates on the main dwelling (top left panel), (ii) the IMU tax rates on other properties (top right panel), (iii) night light density (bottom left panel) and (iv) business income growth (bottom right panel). While, on the one hand, the top row reveals a significant relation between the tax rates and political orientation, the findings in the bottom panel suggests that, on the other hand, political orientation is not systematically linked to local economic performance. This chimes with the evidence in Alesina and Paradisi [2] who show that the IMU tax rates tend to be systematically lower during local election years, which are randomly distributed across Italian municipalities.

## 3. Data and empirical framework

In this section, we present the survey data and outline the empirical specification that we use to link the amount of IMU tax paid by each household to their expenditure. As discussed in the previous section, we use a rich set of demographics and property-specific covariates to isolate exogenous variation across households at similar stage of their life-cycle, owing properties with similar value and characteristics but living in municipalities with different tax rates. Finally, we discuss and evaluate the role of possible confounding factors, including other non-IMU austerity interventions, as well as run a placebo test over two waves of the SHIW that witnessed no changes in the municipal tax system on properties.

*3.1. The household survey data*

Our dataset is based on the 'Survey on Households Income and Wealth' (SHIW) conducted by the Bank of Italy. The survey is run every two years and covers around 8,000 households distributed over about 3,000 Italian municipalities. The data are available in anonymous form. Each survey is conducted at the end of the respective year during the last few weeks of December. On average, about half of the households that appear in one survey overlap in the following wave. Given that sampling design involves unequal stratum sampling fractions, the use of sampling weights is required to obtain unbiased estimates of the corresponding aggregates. Weights are given at the households level. Each survey is split into six main sections: (A) "composition of household at 31st December", (B) "employment and incomes", (C) "payment instruments and forms of saving", (D) "principal residence, other property and debts", (E) "household expenditure", and (F) "supplementary pension plans and insurance policies".

In our econometric analysis, we rely on two consecutive surveys (2010 and 2012), although in some of the analyses we consider all waves from 2004 to 2012. The 2010 survey covers 19,836 individuals and 7,951 households while the 2012 survey covers 20,022 individuals and 8,151 households. We use household level data and keep households who were surveyed both in 2010 and 2012 (about 56 percent of the 2012 survey). Then, we drop observations with missing values in some relevant variables (typically the market value or the surface of the main dwelling for home-owners). Finally, to reduce the impact of compiling errors and outliers, we drop observations in the 0.5% tails of the distribution of total expenditure changes, leaving us with a sample of 4,013 observations.

We report the descriptive statistics of our working dataset in Table 1, highlighting median, $25^{th}$ and $75^{th}$ percentiles of the distribution of the variables of interest for the full regression sample (first three

columns), home owners only (middle panel) and mortgagors (last three columns). To correct for the under-reporting of financial assets, which D'Aurizio et al. [12] show to be particularly severe for affluent households, we rescale this variable by the ratio of the value of financial assets for the whole economy calculated by the Bank of Italy on data from the national statistical agency (ISTAT) and the aggregate variable obtained by summing up all households in the SHIW using population weights.

Based on the 2012 survey, the percentage of home-owners among households is around 71.5 percent. As shown in Figure C.1 of the Appendix, this share has displayed a remarkable stability over time. The share of mortgagors is 13.7 percent of the home-owners. Italian household net wealth is among the highest in the world but it has a defining peculiarity: its majority is represented by real assets (see also Piketty and Zucman [30]). The median net wealth among Italian households is around 270 thousand Euros (348 thousand Euros among home owners and 289 thousand Euros among home owners with mortgage debt) corresponding to a lower debt to income ratio relative to other advanced economies.[9] Relative to the full regression sample, which also include renters, home-owners tend to have a higher level of both net liquid and illiquid wealth. Relative to all home-owners, mortgagors tend to have a younger head, higher income, more volatile expenditure, lower net liquid wealth and real estates with a higher value.

### *3.2. Empirical specifications*

The goal of our analysis is to relate variation in the IMU paid to variation in household expenditure. As there was no tax on the main residential property in 2010 (and only a small amount of tax paid on

[9] In 2010 the median net wealth of Italian households was well above the Euro area average and almost the double then the median in Germany - see IMF [20]. Also, the proportion of households with debt in Italy was less than half with respect to Spain, Germany, and France (see IMF [20], page 5). Full International Monetary Fund (IMF) report available at: http://www.imf.org/external/pubs/ft/scr/2013/cr13348.pdf.

other residential properties because of the obsolete registry value then), we begin by looking at the effect of the IMU paid on the main dwelling in 2012 on the household expenditure change between 2010 and 2012. Then, we turn our attention to the richer specification that also includes as a regressor the IMU paid on other residential properties in 2012.[10] To ensure our empirical strategy isolates variation in the amount of taxes paid that is unrelated to household and property characteristics, a rich set of controls is featured in the following specification:

$$\triangle C_i = \alpha + \gamma \cdot IMUmain_i + \delta \cdot \triangle HP_i + \boldsymbol{\theta}\mathbf{X}_i + \varepsilon_i, \tag{1}$$

where $\triangle C_i$ indicates the change in expenditure (on either non-durable goods and services or durable goods) of household $i$ between 2010 and 2012 ($\triangle C_i = C_{i,2012} - C_{i,2010}$), $IMUmain_i$ is the amount of IMU tax paid on the main dwelling in 2012, $\triangle HP_i$ is the self-reported change in house price ($\triangle HP_i = HP_{i,2012} - HP_{i,2010}$), $\mathbf{X}_i$ contains a set of controls and $\varepsilon_i$ is an idiosyncratic shock. As controls in matrix $\mathbf{X}_i$, we add four sets of variables: (i) households demographics, including age and educational attainment of the household head, family size, number of children and their square values, two dummies that takes value of one for home-owners and mortgagors respectively, (ii) regional dummies, (iii) property characteristics including type of building, surface, number of owned properties and dummies for the type of neighborhood (city center, suburbs, etc..) and (iv) expectations about both future income and future house price.

As we control for both demographics and property characteristics, which influence either directly (through the deductions) or indirectly (through the registry value) the household-specific amount of munic-

[10] Unfortunately, the question on the amount of taxes paid on other residential properties was not asked in the 2010 SHIW.

ipal property tax paid, the coefficient $\gamma$ on IMU is likely to capture the variation in household consumption due to the municipal variation in the IMU tax rates. As the latter appears unrelated both to the local business cycle (as discussed in the previous section) and to other policy interventions during 2010 and 2012 (as we will show in the next section), equation (1) can be estimated using $OLS$ and the coefficient $\gamma$ can be interpreted as the causal effect of the IMU property tax on private spending. Finally, the coefficient $\delta$ captures the association between expenditure and subjective changes in the house value and, as such, is meant to absorb any possible wealth effect on household behavior.

In the richer specification, we also consider the $IMUother_i$ paid on other residential properties:

$$\triangle C_i = \alpha + \gamma_1 \cdot IMUmain_i + \gamma_2 \cdot IMUother_i + \delta \cdot \triangle HP_i + \boldsymbol{\theta}\mathbf{X}_i + \varepsilon_i. \tag{2}$$

where the coefficients of interest are now $\gamma_1$ and $\gamma_2$, representing the impact of the IMU tax on the main dwelling and the IMU tax on other residential properties on households expenditure.

Equations (1) and (2) are estimated either for full sample or for home-owners only, thereby exploiting in the latter case exclusively variation in the tax amount paid. To shed lights on the characteristics driving any possible expenditure response, in Section 4 we split our sample into households with low and high net liquid wealth to income ratios and then into households with and without (mortgage) debt. The heterogeneity from these sample splits is then compared to more traditional groupings based on age and income. Finally, in Section 5, we focus on categories of durable expenditure in an effort to evaluate whether the significant responses identified in Section 4 are concentrated in any particular sub-component.

### *3.3. Confounding factors*

As discussed in Section 2, the IMU tax reform of December 2011 was largely unanticipated and swiftly implemented. Still, the availability of households survey data only in 2010 and 2012 poses the challenge that other confounding factors may distort the inference one can draw on the causal effect of the IMU tax on private expenditure. In this section, we take this challenge at face value and we ask whether the IMU reform was correlated with any other significant policy or macroeconomic changes that may have occurred over this biennium. Accordingly, we use specifications which are all like (1) and (2) but the dependent variables which in turn becomes: the amount of taxes paid on other non-IMU austerity plan interventions, changes in households transfers from the government (including pensions), changes in house value, changes in the taxes paid on "super-cars"[11] and changes in those non-durable goods and services whose VAT increased between 2010 and 2012.

The dependent variable in the first column of Table 2 is calculated as the sum of the increase in taxation on electricity bills, the increase in taxation on cooking gas, the increase in taxation on motor fuel, and the increase of the local (regional) marginal tax rate on personal income. This is meant to capture the host of other austerity interventions that were passed together with the IMU tax reform in December 2011.[12]

[11] We proxy the increase of taxes on "super-cars" with the value of the car if above 40,000 times the average yearly tax rate on "super-cars" of 1.26% estimated using Automobile Club of Italy data.

[12] More specifically, the variable is constructed summing the aforementioned four components as follows. For the electricity bill we take the 5.8 percent (equal to the marginal increase in taxation) of the 2010 consumption (estimated from the 2012 answer to question E10a-B reported in database "q12e.dta", assuming the same growth rate of total non durable expenditure). Similarly, for cooking gas we take the 1.8 percent (equal to the marginal increase in taxation) of the 2010 consumption of cooking gas (estimated from the 2012 answer to question E10a (A and C) reported in database "q12e.dta", assuming the same growth rate of total non durable expenditure). For the gasoline austerity, we multiply the 2010 consumption on gasoline (estimated from the 2012 answer to question E10a-F reported in database "q12e.dta", assuming the same growth rate of total non durable expenditure divided by the average 2010 price at the pump (1.538 Euro per litre - source: Ministry of Economics and Finance and Ministry of Development Economics data available at: http://dgerm.sviluppoeconomico.gov.it/dgerm/prezzimedi.asp)) by 0.1944 (equal to the marginal increase in taxation). Finally, for the increase of personal income tax, we multiply the 2010 income by the increase in the marginal regional tax rate on personal income ("addizionali regionali IRPEF", source: Ministry of Economics and Finance data available at:

The columns on transfers and house value assess whether the change in municipal property taxation was associated, amplified or perhaps offset by other changes in the government budget, the household balance sheet or the tax base. This seems particularly important in the light of the Fornero reform of the Italian pension system, which was also part of the fiscal consolidation plan passed into law by Mr. Monti's government in December 2011.

Given the very significant change in vehicles expenditure associated with the IMU reform (reported in Section 5), the fourth column evaluate the relation between the amount of IMU taxes paid by each households and the taxes paid on supercars (meaning those above 185 kW), whose tax rate was also changed in 2011.

An additional confounding factor occurred in September 2011 when the government led by Mr. Berlusconi passed an increase in the VAT rate from 20 to 21 percent. Accordingly, the last column of Table 2 reports the consumption response of those non-durable goods and services that were subject to the VAT rate change. Reassuringly, in each of the two panels and samples, there is little evidence that the amount of IMU tax paid by each household was systematically related to any of the policy and economic changes summarized in Table 2.

In Figure 2, we explore further the impact of the VAT change by reporting the evolution of three price indexes form national accounts: (i) items that experienced an increase in the VAT rate (dash-dotted black line), (ii) items that did not experience an increase in the VAT rate (light gray solid line) and (iii) cars (red solid line), which will be shown in Section 5 to be the single most responsive expenditure category to the IMU reform. The vertical lines correspond to the dates of the introduction of the VAT rate increase

http://www.finanze.gov.it/export/finanze/Per_conoscere_il_fisco/Fiscalita_locale/newaddregirpef/), according to the declared residency of each household.

and the IMU reform respectively. Two main developments are apparent from Figure 2. First, following the VAT rate change of September 2011, both the increase in the price index on all items subject to the VAT rate hike and the increase in the price index on cars (which were also subject to the VAT rate change) are far sharper than the mild increase in the price index on flat-VAT rate items. Second, the behavior of the price index on increased-VAT rate items decouples from the behavior of the car price index around December 2011 when the IMU tax reform was passed by Mr Monti's government. Given we will show that vehicles purchases was the single most responsive category to the IMU reform, we interpret the flat profile of the car price index after the introduction of the IMU (relative to the steadily rising profile of the price index on all increased-VAT rate items) as most likely stemming from the causal effect of the IMU tax on household expenditure.

Finally, the inference on the effects of an increase in property taxes may be distorted by a decline in government expenditure, which –as illustrated in Table D.1 of AppendixD mainly came in the form of a fall in wages for public employees (see Born et al. [8]). To respect this hypothesis, we focus on two sub-groups of households: those headed by a public employee and those not. We find no statistical differences in the coefficients on $IMUmain_i$ and $IMUother_i$ across the two groups, with estimated responses being possibly stronger for non-public employees. In summary, the results in this section suggest that the effects of the IMU tax paid on household expenditure seem unlikely to be confounded by other policies or economic factors that changed over the same period.

### *3.4. Placebo test*

As a further empirical validation of the extent to which our framework is well-suited to capture the

causal effect of the IMU tax paid on household expenditure, we run placebo regressions –using either specification (1) or (2)– that correlate the change in expenditure of each household between 2008 and 2010 with the IMU tax paid by that very household in 2012. If the IMU fiscal shock of December 2011 was unanticipated and was indeed the trigger of the significant expenditure decline in 2012 (which we document in the next section), then we would expect it to have no significant effect on expenditure before 2012, especially given that no actual changes in property taxes occurred between the end of 2008 and the end of 2010 when these two other waves of the SHIW were conducted.

In this section (and in this section only), all other right hand side variables (including $\triangle HP_i$) refer to te period 2008-2010. In contrast, $IMUmain_i$ and $IMUother_i$ refer to the amount of taxes paid by household $i$ in 2012. The left hand side variable is the expenditure change of that same household $i$ between 2008 and 2010. For the placebo analysis, we only rely on households who appear in all three waves. Accordingly, the regression sample is reduced from 4,013 to 2,488 observations.

The results of the placebo test are shown in Table 3. Both $IMUmain_i$ and $IMUother_i$ never affect significantly either non-durable consumption or durable expenditure and the estimated coefficients have often the wrong sign.[13] On the other hand, the wealth effect of house prices is highly significant for non-durable consumption (but not for durable expenditure), with magnitudes that are not statistically different from the point estimates we present in the next section for 2010-2012.

## 4. The Response of Household Expenditure

In this section, we present the main results of our analysis. We start with the baseline estimates in

[13] Similar results are obtained using the change in vehicle expenditure between 2008 and 2010 as dependent variable.

Table 4, which associate the IMU taxes paid on the main dwelling and other residential properties with non-durable and durable expenditure. Then, we explore the heterogeneity of these responses and the extent to which they may depend from individual circumstances or characteristics. More specifically, we split households according to their net liquid wealth to income ratio and to whether they have (mortgage) debt, providing strong evidence of significant variation across these groups. In the final part of this section, we show that the households who did not contract their expenditure reduced their savings instead. In the next section, we will show that the evidence in favor of heterogeneity is far weaker and less accurate along more traditional dimensions such as age and income.

### *4.1. Baseline results*

The estimates of equation (1) and equation (2) are presented in Panel A and Panel B of Table 4, respectively. The two columns on the left refer to the full sample whereas those on the right exclude renters and therefore focus on home-owners only. The odd columns display the relevant IMU and house price coefficients for a specification using non-durable consumption on the left hand side whereas the dependent variable in the even columns is durable expenditure.

Four main empirical regularities emerge from these baseline estimates. First, the MPC associated with the IMU tax paid on the main dwelling in columns (1) and (3) is always very close to and never statistically different from zero. Second, the MPS on durable goods from $IMUmain_i$ is always very significant and large, with point estimates around 0.47-0.48 in columns (2) and (4). Interestingly, Parker et al. [29] report a marginal propensity to spend of 0.5 in response to the 2008 U.S. income tax rebate while Jappelli and Pistaferri [21] document that for every additional euro of transitory income, the average SHIW respondent

would have increased total consumption by 48 cents. Third, the results on $IMUmain_i$ are robust to using a richer specification that also includes $IMUother_i$ among the regressors. Fourth, and in sharp contrast to the main dwelling, the IMU tax paid on other residential properties in Panel B triggers neither a significant contraction in non-durable consumption nor a significant contraction in durable expenditure, with point estimates always in the neighborhood of zero.[14]

Of independent interest, both panels record also the estimates of the house price effect. In particular, the coefficient on $\triangle HP_i$ is small and statistically indistinguishable from zero in columns (2) and (4) for durable expenditure. But the marginal propensity to consume out of housing wealth in columns (1) and (3) is always very significant and precisely estimated at 1% (i.e. a 1000 euro appreciation in house prices tends to lead to a 10 euro increase in non-durable consumption). While these estimates are in line with the wealth effects reported by Guiso et al. [17] and Paiella and Pistaferri [28] on earlier SHIW samples, they are sizably smaller than the 5 to 7 cents reported by Mian et al. [25] for the U.S. or the 7 to 9 cents reported by Campbell and Cocco [10] for the U.K.. On the other hand, the smaller house price effect on consumption relative to these other countries is consistent with the notion that a lack of refinancing opportunities –and in particular of mortgage equity withdrawal– makes housing wealth in Italy significantly more illiquid (see Calza et al. [9], IMF [18] and Grant and Peltonen [15]).

### *4.2. Liquid wealth*

A large empirical literature exemplified by the important contributions of Johnson et al. [22], Parker

[14] To assess the influence of any possible under-reporting, we have verified that our findings are not sensitive to adjusting individual household consumption and household expenditure by the ratio of the corresponding aggregate variable from national statistics to its SHIW counterpart, which has been aggregated using household weights.

et al. [29], Jappelli and Pistaferri [21] and Agarwal and Qian [1] emphasize the role that liquidity constraints may play in driving heterogeneity in the marginal propensities to consume and to spend. In keeping with these studies, Table 5 splits the sample in two groups of households depending on whether the level of held net liquid wealth (defined as total financial assets net of unsecured debt and mortgage payments) is smaller or larger than their monthly disposable income. As typical whenever the grouping variable is continuous, results may be somewhat sensitive to the specific cutoff chosen as well as to using dummy variables for each group and their interaction with the variable of interest (as opposed to splitting the sample). We come back to these issues at the end of this section.

The estimates in Panel A suggest that households with net liquid wealth below one month of their income respond to the IMU tax on the main dwelling with a large and significant cut on durable goods, with point estimates around one both, for the full sample of column (2) and for home-owners only in column (4). In Section 5, we will show that the size of these estimated MPS is largely driven by the contraction in the expenditure of a large indivisible good, namely vehicles. On the other hand, the MPCs recorded in columns (1) and (3) are never statistically different from zero whereas the responses of both non-durable consumption and durable expenditure to the IMU tax paid on other residential properties are imprecisely estimated, probably reflecting the fact that only few households with so low liquid wealth own more than one property. Finally, the marginal propensities to consume out of housing wealth tend to be larger than their full sample counterparts in Table 4.

The estimates for more affluent households (i.e. with liquidity in excess of one monthly income) are reported in Panel B. In sharp contrast to the case of Panel A, households with higher liquidity contract neither their consumption nor their expenditure (independently on whether they pay taxes on the main

dwelling or other residential properties) and display a marginal propensity to consume out of housing wealth which is smaller than the households with lower liquidity. In the AppendixF, we show that similar results are obtained retaining a single sample but using a dummy for the lower liquidity group together with two variables that interact such a dummy with $IMUmain_i$ and $IMUother_i$.

To assess the statistical significance of the heterogeneous responses across alternative liquidity cutoffs, we collect in Figure 3 the findings from a set of specifications that use the single sample and the interaction variables described above, across progressively increasing thresholds for the multiple of monthly income below which we classify a household as with lower liquid wealth. The blue solid (broken) line reports the point estimates (90% confidence confidence band) for the coefficient on $IMUmain_i$, which represents the durable response of the higher liquidity group. The red lines refer to the sum of $IMUmain_i$ and the interaction of the lower-liquidity group dummy with $IMUmain_i$, thereby representing the durable response of the less affluent households. While the bands of the MPS of the lower liquidity group tends to include neither zero nor the point estimates of the MPS for the more affluent households up to three times their monthly income, the two distributions largely overlap throughout the chart before converging (both in terms of point estimates and confidence bands) by the cutoff of four multiples of the monthly income.

In summary, net liquid wealth appears strongly correlated with the household characteristics that make some agents display a large marginal propensity to spend. At the same time, the evidence of heterogenous responses from a cutoff categorization based on liquidity seems statistically tenuous. In the next section, we go beyond the simple liquidity categorization and ask whether a household debt position may provide sharper evidence for the presence of liquidity constraints so as to yield significant differences in the spending responses across alternative group strategies.

*4.3. (Mortgage) debt*

A growing strand of empirical studies, including Dynan [13], Violante et al. [33], and Cloyne and Surico [11], advocates a role for household debt in the transmission of structural and policy shocks. The geographical variation across municipalities with different IMU rates allows us an unprecedented evaluation of this hypothesis in the context of an austerity tax. To this end, in Table 6 we group households according to whether they have debt (first two columns) or not (last two columns). In an effort to maximize number of observations, we include all types of (secured and unsecured) debt in Panel A whereas we focus on the smaller sample of mortgage debt in Panel B. [15]

The main take away from Table 6 is that the significant average effects on durable goods recorded in the previous tables are entirely driven by home-owners with debt, whose marginal propensities to spend (out of the taxes paid on the main dwelling) in column (4) tend to be larger and more significant despite the very few number of observations. The results from columns (1) and (2) of Panel B reveal further that removing as few as some 400 mortgagors from the full sample yields very small and largely insignificant responses on both property taxes. In the next section, we will show that vehicle purchases account for the lion share of the behavior of durable goods and that the magnitude of the MPSs in Table 6 is consistent with the typical downpayment for buying a car.

To build intuition for the link between household balance sheets, liquid wealth and the presence of liquidity constraints, in Figure 4 we report the average value of the net liquid wealth together with the

[15] Mortgage debt represents on average around 70% of total household debt in Italy. The majority of this is secured against the main dwelling with a typical loan-to-value around 50%. About half of all mortgages are on fixed rates but we have verified that the results in this section are robust to using mortgagors with either variable- or fixed-rate products only, though the standard errors increase substantially due to the very few number of observations in each sub-group.

total amount of IMU taxes paid by mortgagors and non-mortgagors according to the number of properties owned. While there is little difference in the IMU tax paid across the two groups, mortgagors tend to hold less liquidity, with their median value typically closer to the median value of property taxes paid, especially for home-owners with only one property.

To investigate further the extent to which mortgagors may indeed be liquidity constrained, Figure 5 compares by number of dwellings the distribution of the net saving rate, which is disposable income minus total consumption as a share of disposable income, with the distribution of the debt service ratio, which is mortgage repayments as a share of disposable income. Mortgagors owing only one property seem to fit well the notion of 'wealthy hand-to-mouth' agents: after expenditure and mortgage repayments, they are left with essentially very little disposable income as exemplified by a very small distance between the median values of net saving rates (17%) and debt service ratio (16%). In contrast, mortgagors with more than one property appear far less constrained, with a vast portion of the distribution of the net saving rate located to the right of its debt service ratio counterpart.

In summary, grouping households by their debt position, and in particular whether home-owners with only one property have a mortgage or not, seems to provide far sharper evidence of significant heterogeneity in the expenditure responses than grouping households by their liquid wealth to income ratio.[16] Furthermore, inspecting the household balance sheets of the different groups suggests that mortgage debt may be more closely related (than the liquidity to income ratio) to the presence of liquidity constraints.

[16] Table F.1, and in particular the p-values for the null hypothesis of the interaction terms being equal to zero, demonstrates formally the statistical superiority of the grouping strategy based on household debt.

*4.4. The role of savings*

Having shown in the previous section that debtors/mortgagors owning only one property have significantly reduced their durable expenditure, in this section we shed lights on the resources that non-debtors had to rely upon to pay their IMU taxes. Table 7 complements the findings from Table 6 by recording the estimates of a regression for home-owners only that is all like (2) but the left hand side variable, which is now the difference (between the 2010 and 2012 waves) in households' saving flows defined by the answers to the question "Were you able to save this year? If so, how much did you save?".[17]

Three main results emerge from this exercise. First, the reduction in saving flows for non-debtors in columns (1) and (3) of Table 7 are large and significant, with the sum of the coefficients on $IMUmain_i$ and $IMUother_i$ being not statistically different from the two euros of taxes that the average owner of both, a main dwelling and another residential property would have paid. Second, the IMU tax paid on the main home had a positive but insignificant impact on debtors' savings, consistent with the finding of a larger-than-one MPS in Table 6. Third, the IMU taxes on other residential properties paid by the small number of debtors/mortgagors with more than one property are associated with a marginally significant reduction in savings, which is however not statistically different from one.

In summary, the IMU reform had little impact on the saving behavior of mortgagors owning only one property but implied that the rest of Italians had to drive significantly down their saving flows to resist any

[17] More specifically, in the 2012 survey the questions we rely on are the C42, C43, and C44. Question C42 asks "Please consider all of the sources of income for your household that you have told me about during this interview (employment income, rent, income from capital, etc.). Could you tell me if in 2012 your household i) spent its entire yearly income and didn't manage to save anything, ii) spent less than its entire yearly income and succeeded in saving, iii) spent more than its entire yearly income, drawing on savings or borrowing". Question C43 asks "About how much did you save in 2012?". Finally, question C44 asks "About how much more than your income did you spend in 2012?". In the 2010 survey the questions were respectively the C43, C44, and C45.

expenditure cut. As the IMU taxes paid on other residential properties were associated with no expenditure cuts but brought about some reduction in saving flows among debtors/mortgagors, we conclude that the lower incidence of debt repayments on disposable income for this latter group (shown in Figure 5) seems likely to have made them better placed (than debtors/mortgagors owing only one property) to cope with unanticipated negative income shocks. On the other hand, the behavior of home-owners without debt appears the most consistent with the absence of significant liquidity constraints.

## 5. Further results

In this section, we explore further the extent of heterogeneity in the household responses to the IMU property taxes across spending categories. In particular, we show that vehicle purchases (or lack thereof) are a main driver of the aggregate results and that the magnitude of the coefficients on $IMUmain_i$ reported in Table 6 for debtors is consistent with a typical downpayment for buying a car. Finally, we discuss the results of a number of sensitivity analyses (fully presented in the Appendix), including the assessment of the heterogeneous responses by age and income as well as the estimation of probit regressions meant to ameliorate concerns about measurement errors.

### *5.1. Spending categories*

To shed lights on the findings in the previous section, we re-run specification (2) over several categories of non-durable and durable expenditure. Given the estimates in the previous tables, it should not come as a surprise that we find little evidence of heterogeneity among non-durable goods and services. As for durable goods, we find that vehicle purchases are the only component that displays large and significant

responses to the IMU taxes. This is recorded in Table 8, which splits durable expenditure into vehicles and every other spending category for the full-sample and home-owners only in the top panel and for debtors and mortgagors in the bottom panel.

The coefficients on vehicles purchases in columns 2 and 4 of Panel A are similar (and statistically indistinguishable) from the coefficients on durable expenditure in Table 4. When vehicles purchases are excluded from durable expenditure in columns 1 and 3, however, both IMU tax coefficients become small and insignificant, revealing that this durable category drives the total expenditure response. In Panel B of Table 8, we restrict our attention to the two sub-sets of households who display the strongest durable expenditure response and show that their behavior is indeed driven by vehicle purchases. While the coefficients on $IMUmain_i$ in columns 2 and 4 are slightly smaller (although insignificantly so) than their durable expenditure counterparts in Table 6, the difference appears to be accounted for by the imprecisely estimated response of other durables (which however represent less than 30 percent of total durable expenditure).

In Figure 6, we provide a graphical counterpart of the results in Table 8. In particular, we show not only that (i) the average reduction in vehicle purchases by IMU payers (dashed-dot dark gray line) was larger than the average reduction by those home-owners who –because of the deductions– did not pay IMU taxes (dashed gray line), but also that (ii) the average reduction for IMU payers with mortgage (red line) was even more pronounced that the average reduction across all IMU payers.[18]

Two points are worth emphasizing about the magnitude of the vehicle expenditure response in Table 8. First, Italian households paid a significant amount of property taxes in 2012, with an average around 357

[18] Similar graphical evidence is obtained for debtors.

euros and a significant portion of payers above 1000 euros. Accordingly, it should not come as a surprise that some households may have chosen to postpone or give away a large durable purchase, whose saving could prove sufficient to offset the significant increase in property taxes (possibly over a number of years). Second, in the light of the size of the average IMU payment mentioned above, a marginal propensity to spend around two –while statistically very close to one– is entirely consistent with a downpayment of 10% on a vehicle purchase, whose average in the 2010 SHIW is around 8,000 euros. Interestingly, Parker et al. [29] find that the response of American households to the 2008 tax rebate was concentrated on car expenditure while Misra and Surico [26] show that this is driven by a handful of vehicle purchases by mortgagors, who display a marginal propensity to spend on this category around three (though not statistically different from one).

The results in Table 8 are further corroborated by independent evidence reported in Figure 7, which displays the monthly sale volumes of new and used cars as published by the Italian automobile association ('Automobil Club Italia'). The vertical line denotes the launch of the IMU reform in December 2011 and this is also the month when the break in the mean of the time series is apparent. Afterwards, the number of monthly sales moves to values that are on average around 10% lower than the average number of sales during 2011.

In summary, the previous section has shown that home-owners with debt appears to drive the expenditure response to the IMU taxes over the full-sample. This section has further shown that the very significant adjustment in vehicle purchases appears to drive the behavior of total expenditure.

*5.2. Sensitivity analysis*

In this section, we summarize the findings from a set of additional analyses whose estimates are reported in the Appendix:

- *AGE.* In Table F.2 of AppendixF, we group households into younger and older according on whether their head belongs or not to the youngest quartile of the household head age distribution.[19] The top panel refers to the full sample whereas the bottom panel focuses on home-owners only. The results reveal that (i) the younger group tends to have a larger marginal propensity to spend than the older group, (ii) this is driven by vehicle purchases, whose estimates appear sharper for the home-owners sample, and (iii) the evidence of heterogeneous responses on durable goods is far weaker than when households are grouped according to their debt positions, in a combination of smaller point estimates (in absolute value) and larger standard errors than in Table 6. While the results in Table F.2 are consistent with the evidence in Table 1 that debtors tend to be younger than non-debtors, it also suggests that age seems less likely than debt to be a primitive determinant of the heterogeneity we have documented so far.

- *INCOME.* The analysis of Table F.3 focuses on income, using the 75th percentile of the distribution of household income to categorize observations in to lower- (bottom 25 percent) and higher- (top 75 percent) groups. The MPSs of less affluent households tend to be imprecisely estimated and their distribution largely overlap with the distributions of the MPS for the higher-income group. The

[19] Neither for age nor for income, results are significantly different using any other percentile between 60 and 90 as cutoff.

point estimates of the latter are marginally (more strongly) significant for total durable (vehicle) expenditure, thought both set of estimates for either group tend to be far smaller than the coefficients in Table 6. While Table 1 reveal that debtors tend to have higher income than the rest of the sample, also in Table F.3 the inference on heterogeneous responses is far weaker than the inference one can draw from Section 4. This suggests that –unlike a household's debt position– age and income appear only weakly correlated with the unobserved characteristics that drive the excess sensitivity of durable expenditure to the IMU-induced income change.

- *MEASUREMENT ERRORS*. While non-durable and durable expenditure may be subject to non-negligible measurement errors, Attanasio et al. [6] note that whether a household owns or purchases a durable good such vehicles is likely to be far less uncertain. We build on this intuition to construct two binary variables that take the value of one if vehicle expenditure and non-vehicle durable expenditure respectively are positive and zero otherwise. These become the dependent variables in separate probit regressions that use the same regressors as in the rest of the paper. The results in Table F.4 reveals –consistently with the estimates in Table 8– that only for debtors and mortgagors paying the IMU tax on the main dwelling significantly reduces the probability of buying a vehicle. Furthermore, Figure F.4 shows that the marginal effect of $IMUmain_i$ (which is the probability of purchasing a vehicle following the payment of the IMU tax on the main dwelling) is a monotonically decreasing function of the amount of tax paid.

## 6. Conclusions

This paper offers an unprecedented evaluation of the heterogeneous effects of fiscal austerity on household expenditure using a large and unanticipated change on residential property taxes in Italy during 2011. Our analysis reveals that the taxes paid on the main dwelling triggered a large and very significant decline in household expenditure whereas the taxes paid on other residential properties caused a small and statistically insignificant change. The adjustment was mostly beard by home-owners with mortgage debt and was concentrated on vehicles purchases whereas households without debt responded by decreasing their savings.

While the IMU reform may have also generated non-negligible general equilibrium effects, we can use the estimates in the present analysis together with data from national statistics reported in Figure 8 to offer some back of the envelope calculations for the direct effect of the tax reform on the aggregate economy in 2012 along the lines of Johnson et al. [22]. The tax revenues on the main dwelling (other residential properties) for 2012 totaled 4.0bn (10.7) Euros or 0.3 (0.57) percent of GDP. Bearing in mind an average marginal propensity to spend of 0.47 for the main dwelling and a coefficient statistically indistinguishable from zero for other properties (see column 4 of Table 4), the direct recessionary effect of the IMU reform on the Italian economy in 2012 was about 0.15 percent of GDP (or 0.29 percent of personal consumption expenditure) vis-à-vis a tax revenue expansion around 0.90 percent of GDP (or 1.44 percent of personal consumption expenditure).

As for the specific categories that drive the aggregate result, the estimates in Table 8 identify a large drop in vehicle purchases for debtors. The time series of car sales records an average fall of about 208,000 units per year between 2009 and 2011. But during 2012, car sales plummeted by around 636,000 units: an

extra fall of some 428,000, which represent about 9.4 percent of the 2011 market size. Assuming an average car purchase around 8,200 Euros (based upon the 2012 SHIW), the direct loss was as large as 2.9bn Euros. We conclude that while the short-run direct cost (in the form of foregone expenditure) of the IMU reform for the Italian economy was small relative to the amount of extra taxes raised, the negative consequences for the car industry in 2012 were significant. This is consistent with the pattern in Figure 8: the decline in vehicle expenditure (red broken line) during 2012 (shaded area) appears far more pronounced than the decline steadily visible in any other year since the Great Recession of 2007-08.

As for policy implications, the present analysis contributes to two important debates on the design of (housing) wealth taxes and on the aggregate consequences of fiscal consolidation plans. More specifically, our evidence suggests that setting higher property tax rates for home-owners with more than one residential property as well as providing owner-occupier mortgagors with (property) tax deductions based on their level of outstanding debt (as for instance currently done in The Netherlands, Spain and Switzerland among other countries) can generate a sizable increase in government revenues over a relatively short period of time while minimizing the contractionary effects that may otherwise be associated with levying a property tax. Furthermore, our analysis provides both one instance in which an austerity tax appears highly recessionary (when borne by households with debt) but also another instance in which the same austerity tax does not seem recessionary at all (when borne by households without debt), suggesting that the policy decision of what specific group(s) of society to target could (and perhaps should) become another relevant dimension along which to evaluate the effectiveness and desirability of austerity plans.

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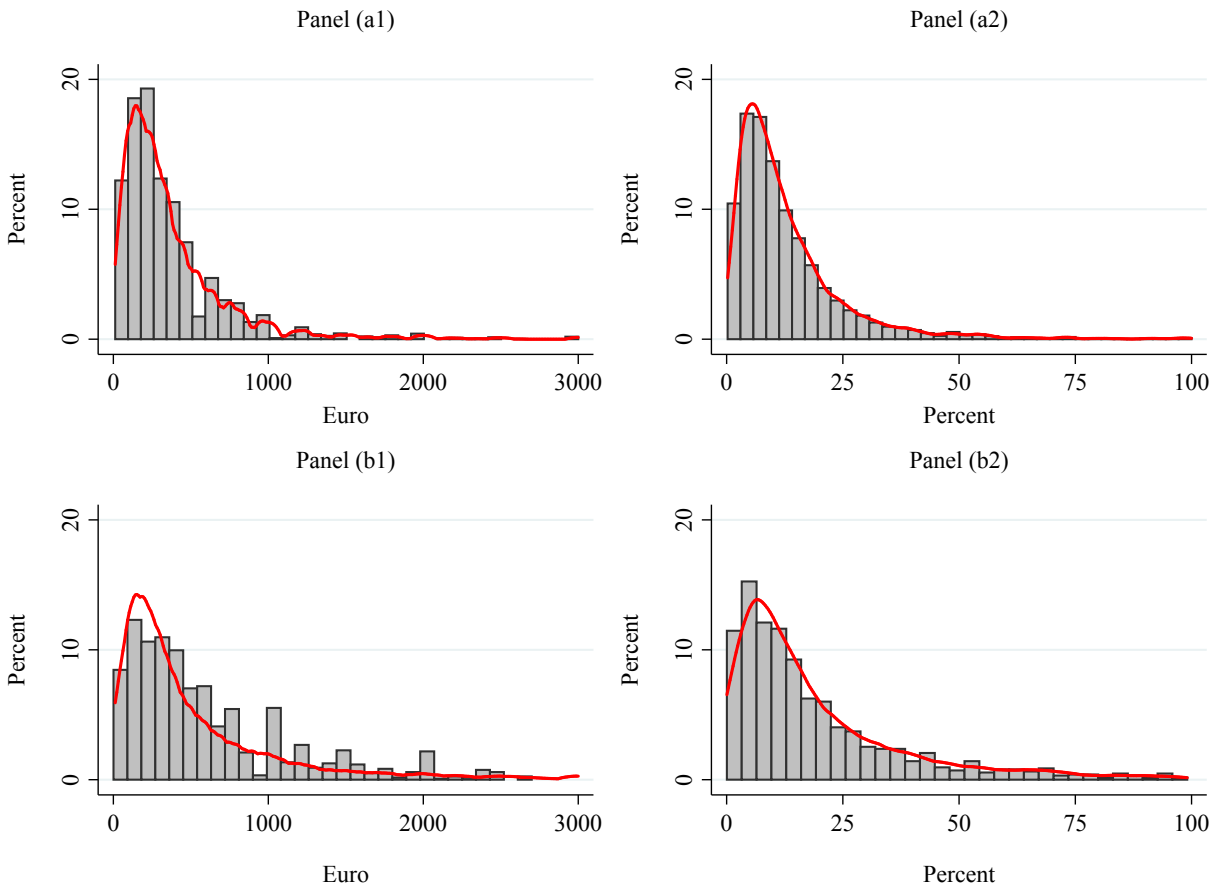
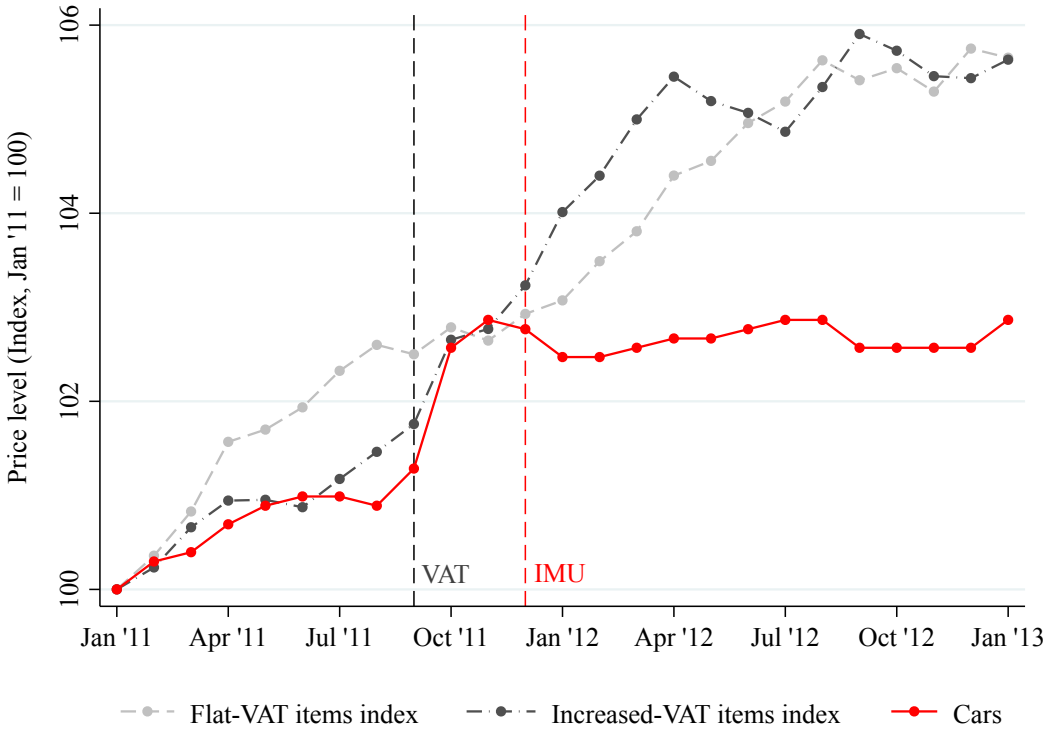
## Figures and Tables

Figure 1: IMU - Tax burden per household.



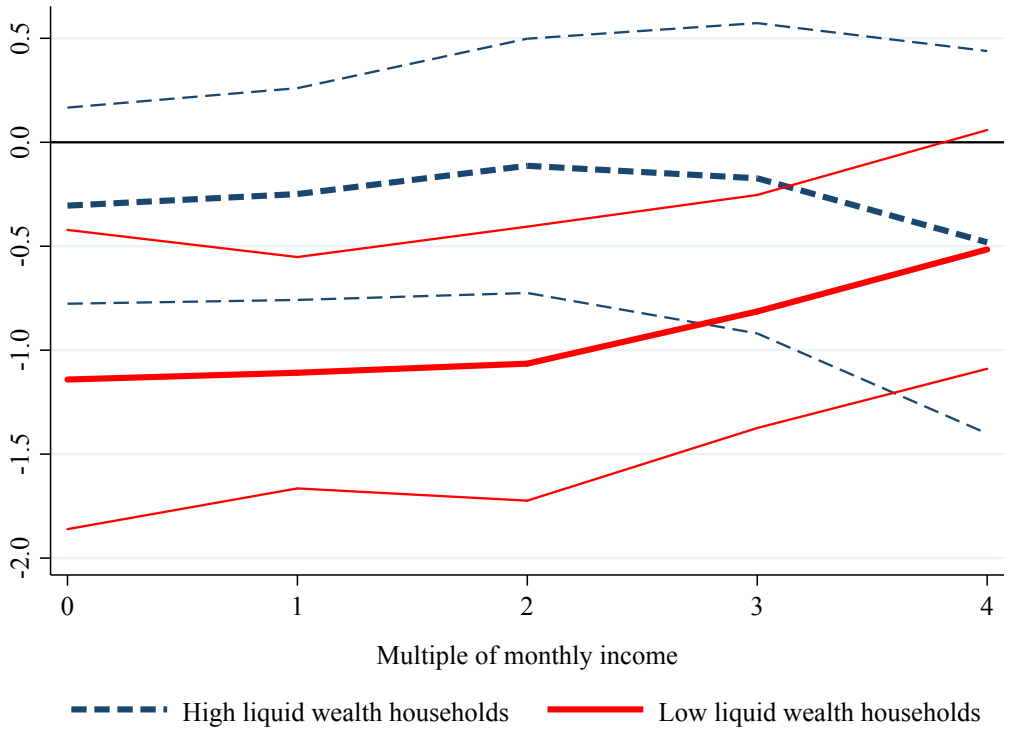

Note: The figures refer to owners, IMU tax payers only. The red line plots the Epanechnikov kernel density. Panel a1 (a2) refers to the amount paid on main dwellings in Euro per household (as a share of households' monthly income), excluding 14 observations higher than 3,000 Euros. Panel b1 (b2) refers to the amount of IMU tax paid (as a share of monthly income) on other properties, excluding 129 observations higher than 3,000 Euros. Source: authors' calculations on SHIW survey data (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).

Figure 2: Evolution of prices.



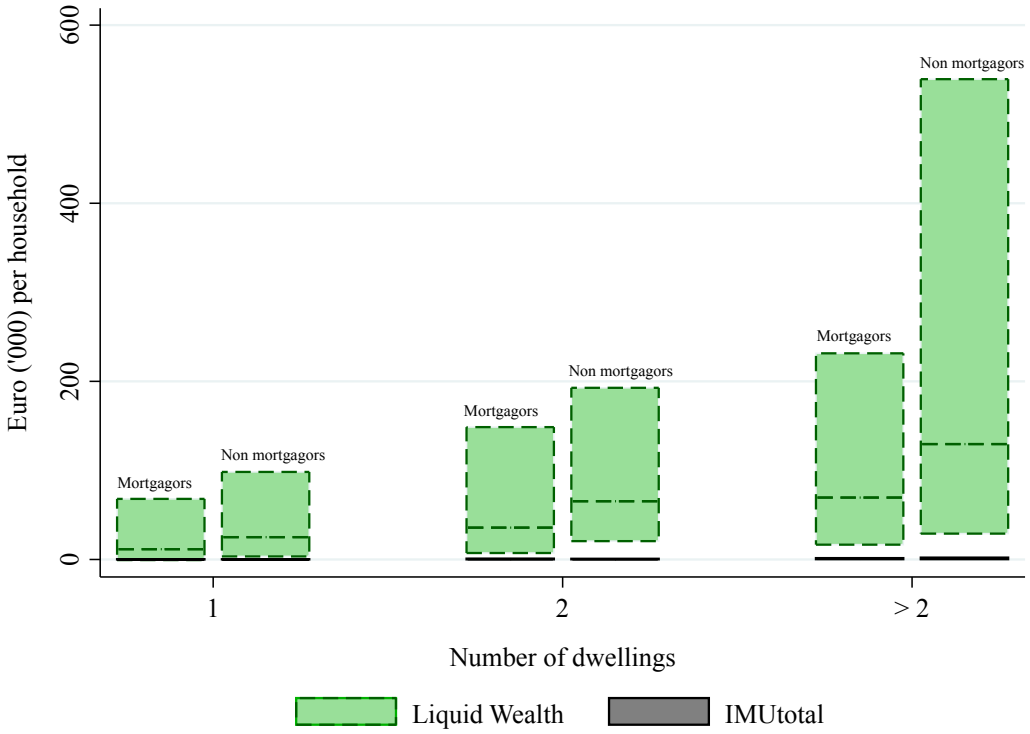

Note: the figure shows the evolution of prices for cars, items subject to the 2011 VAT increase, and items exempted from VAT increase (these items are subject to a 0 percent VAT, 4 percent VAT, or 10 percent VAT according to the category; these VAT rates were unchanged in the considered period). The aggregate indexes (for "Flat-VAT items" and "Increasing-VAT items") are weighted averages of the respective sub-indexes. The relative weights are provided by ISTAT. Inflation for "cars" refer to the "motor cars" category (ISTAT code 711). Items excluded from VAT changes include: "education", "food" (excluding "ready-made meals"), "restaurants and hotels", "miscellaneous goods and services" (excluding "mineral or spring waters"), "actual rentals for housing", "water supply and miscellaneous services relating to the dwelling", "electricity, gas and other fuels", "medical products, appliances and equipment", "out-patient service", "hospital services", "transport services", "postal services", "recreational and cultural services", "newspapers, books and stationery". The share of items (including cars) subject to the VAT increase in 2011 was 40.6 percent. Source: authors' calculations on ISTAT data (available at: http://dati.istat.it/?lang=en).

Figure 3: Expenditure response of high and low liquid wealth households.



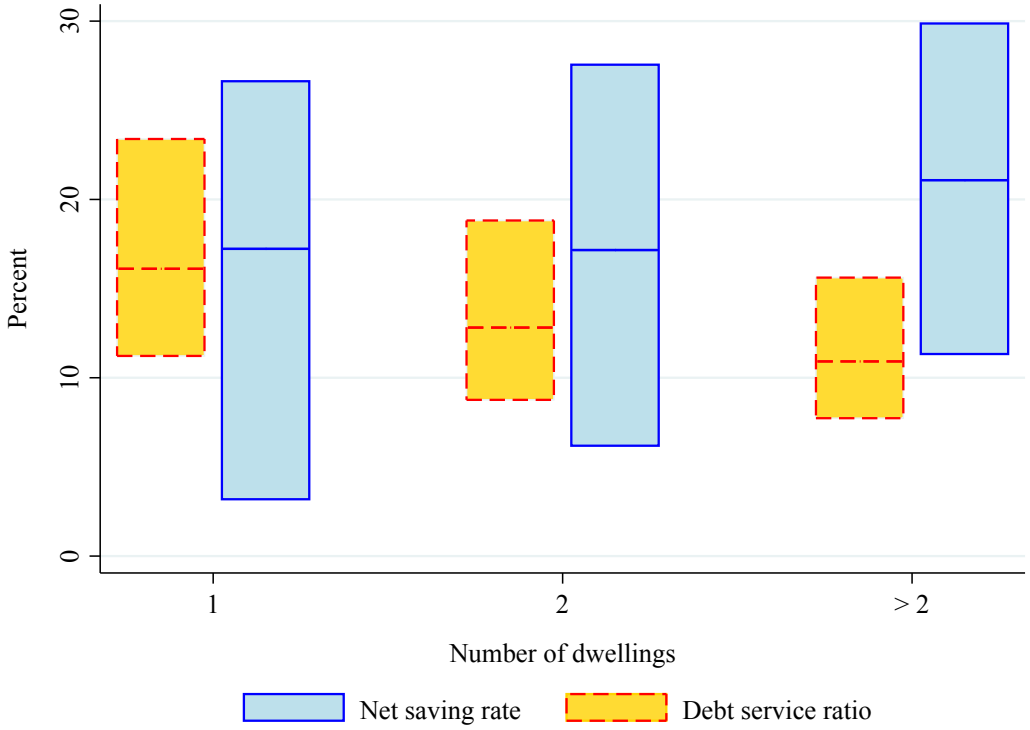

Note: the figure shows the durable expenditure response of high liquid wealth households versus low liquid wealth households. The blue dashed line plots the coefficient on the variable "IMUmain" (amount of IMU tax paid on the main dwelling) in a specification in which we allow as additional regressors a dummy measuring the level of (net) liquid wealth (defined as the sum of liquid financial assets net of mortgage repayments and uncollateralized debt) and its interactions with "IMUmain" and "IMUother". The red line plot the sum of the coefficients on the "IMUmain" variable and the interaction of "IMUmain" with the liquidity dummy. The liquidity dummy varies according to the threshold reported on the x-axis of the figure (for instance, for the threshold "one month", the liquidity dummy takes the value of "1" for households with net liquid wealth lower than one month of their disposable income). The thin lines (red and dashed-blue) plot the 90 percent confidence intervals. Source: authors' calculations on Bank of Italy SHIW surveys data (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).

Figure 4: Distribution of net liquid wealth and total IMU paid per number of property.



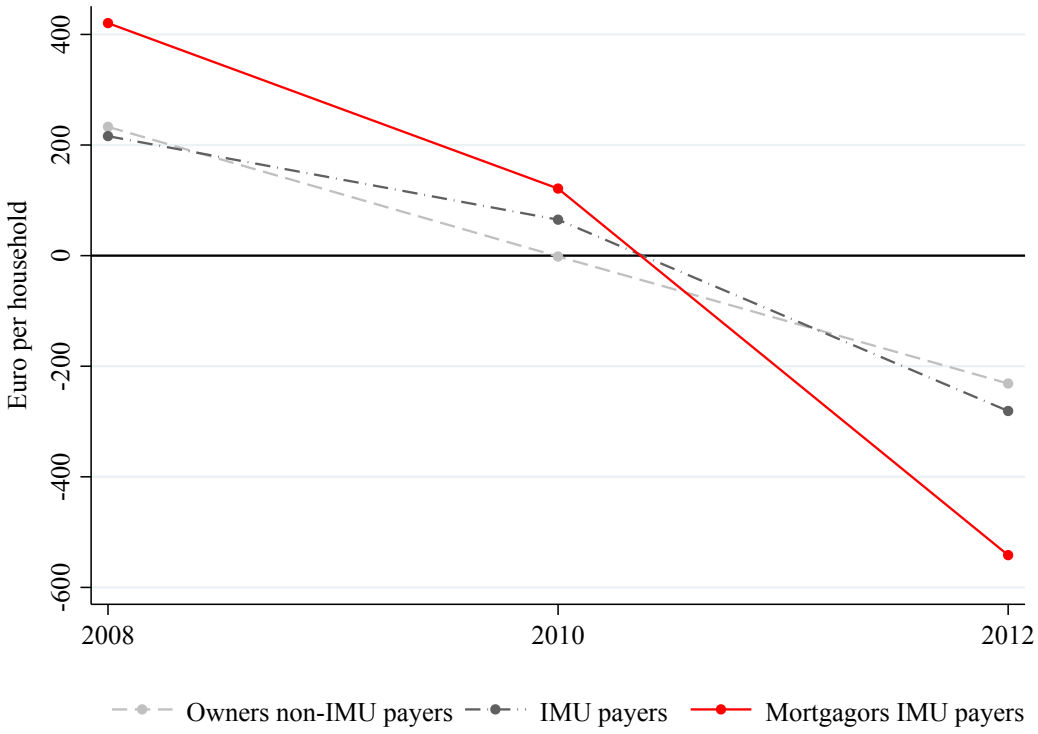

Note: the figure shows the distribution of net liquid wealth and total IMU paid for home owners by number of properties. For each of the three categories (one dwelling, two dwellings, and three or more dwellings), we split between households with no mortgage debt (right columns) and households with mortgage debt (left columns). The bars span in between the 25th and 75th percentile of the distribution while the horizontal lines in each bar indicate the median of the distribution. Liquid wealth is defined as the difference between total financial assets (variable "af" in the SHIW survey, database "ricfxx.dta" where "xx" indicates the year of the survey), mortgage service payments (variables "tdebita11" plus "tdebita12" plus "tdebita13", database "alld2_res.dta" in the 2012 survey), debts toward commercial firms (variable "pf1" in the SHIW survey, database "ricfxx.dta" where "xx" indicates the year of the survey), and debts towards other households (variable "pf2" in the SHIW survey, database "ricfxx.dta" where "xx" indicates the year of the survey). Source: authors' calculations on Bank of Italy SHIW surveys data (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).

Figure 5: Distribution of net saving rates and debt service ratio per number of property.



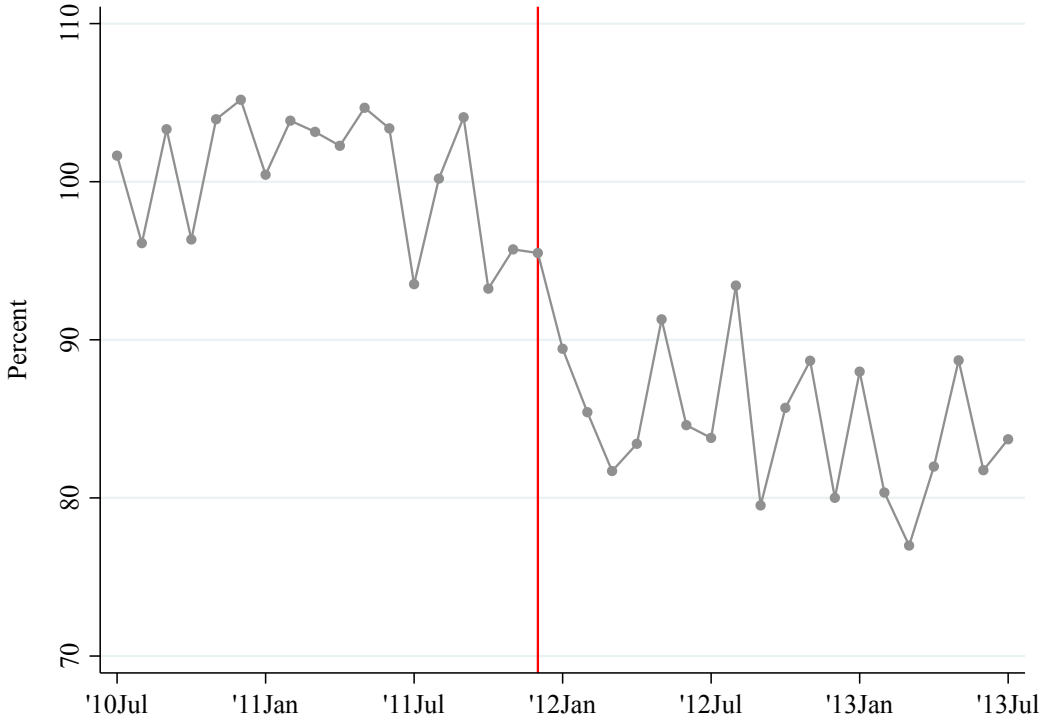

Note: the figure shows the distribution of net saving rates (using after tax income) and debt service ratio to net disposable income by number of properties. The bars span in between the 25th and 75th percentile of the distribution while the horizontal lines in each bar indicate the median of the distribution. Monthly saving rates defined as the ratio between variable "s2" and variable "y2" in database "cons12.dta". Mortgage service payments is based on variables "tdebita11" plus "tdebita12" plus "tdebita13", database "alld2_res.dta" in the 2012 survey. Source: authors' calculations on Bank of Italy SHIW surveys data (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).

Figure 6: Expenditure on vehicles.



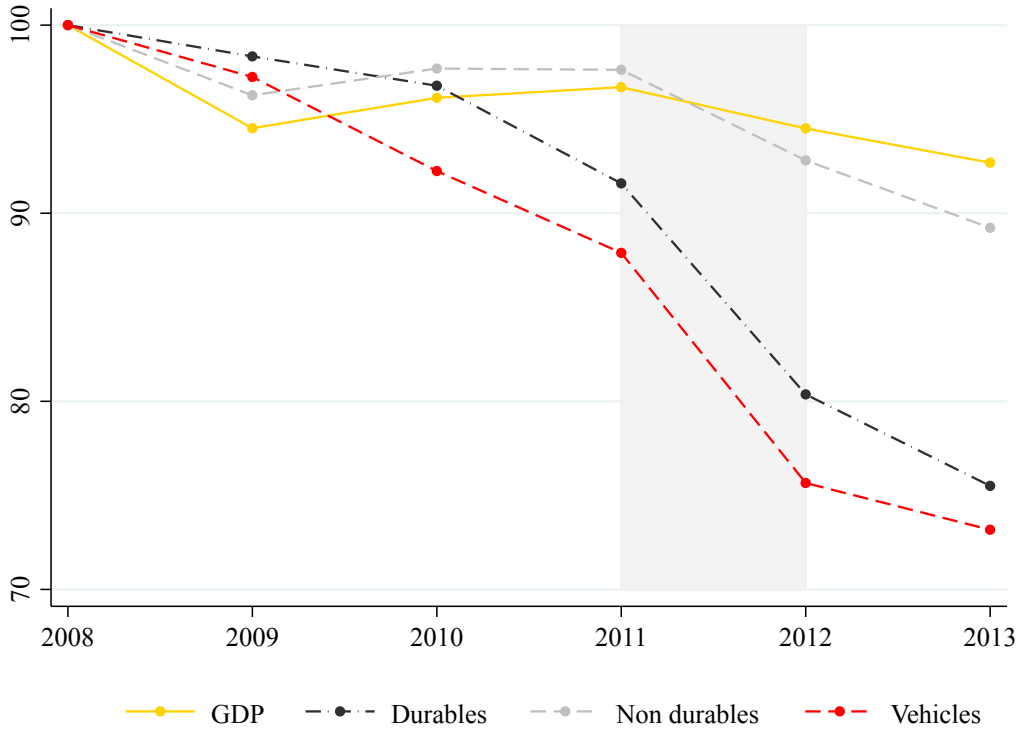

Note: The chart shows the expenditure on vehicles over time among home owners in deviation from their respective means. The chart is based on those households entering in the three waves of the SHIW survey reported. The expenditure on vehicles refers to variable "cd1" in database "consXX.dta" (where the suffix "XX" refers to the year of the survey). The households with a debt are identifies using the variable "deb12a" ("Amount of debts owed at the end of the year to banks or financial companies for the purchase or restructuring of builings") in database "famiXX.dta". Source: authors' calculations on Bank of Italy SHIW surveys data (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).

Figure 7: Monthly sales of (new and used) cars.




Note: The figure shows the evolution of monthly sales of cars (new and used vehicles). The series refers to the seasonally adjusted sales as a share of the 2011 average level. The seasonal adjustment has been performed using an unobserved component model casted in the state-space (the Kalman filter has been initiated using a diffuse prior). The vertical red line indicates the month when the IMU tax was announced (December 2011). Source: authors' own calculations on ACI ("Automobile Club d'Italia") data (available at: http://www.aci.it/laci/studi-e-ricerche/dati-e-statistiche/auto-trend.html).

Figure 8: Evolution over time of key variables.




Note: The series 'GDP' refers to real Gross Domestic Product estimated by ISTAT (Italian National Institute of STATistics). The series 'Durable' and 'Non durable' refer to real households consumption of durable and non durable goods estimated by ISTAT. Finally, the series 'Vehicles' refers to the total number of cars (new and used) and motorbikes (new and used) sold. Source: authors' own calculations on ISTAT data (available at www.istat.it), and ACI ("Automobile Club d'Italia") data (available at: http://www.aci.it/laci/studi-e-ricerche/dati-e-statistiche/auto-trend.html).

Table 1: Summary statistics, regression sample.

| | | **Full sample** | | | **Home owners** | | | **Mortgagors** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **Unit** | *Median* | *25%* | *75%* | *Median* | *25%* | *75%* | *Median* | *25%* | *75%* |
| Education | Index | 3.0 | 2.0 | 4.0 | 3.0 | 2.0 | 4.0 | 4.0 | 3.0 | 4.0 |
| # components | Units | 2.0 | 1.0 | 3.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 4.0 |
| Age | Years | 62.0 | 50.0 | 73.0 | 62.0 | 51.0 | 73.0 | 49.0 | 43.0 | 57.0 |
| Children | Units | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 1.0 | 0.0 | 2.0 |
| Income | Euro ('000) | 31.1 | 20.2 | 47.1 | 35.7 | 24.3 | 51.9 | 42.5 | 29.5 | 58.1 |
| △ Y | Euro ('000) | 1.7 | -2.9 | 6.5 | 2.1 | -2.9 | 7.4 | 2.5 | -2.9 | 8.9 |
| △ C | Euro ('000) | 0.6 | -3.6 | 5.1 | 0.9 | -3.6 | 5.9 | 1.5 | -4.8 | 7.7 |
| △ CD | Euro ('000) | 0.0 | -0.4 | 0.0 | 0.0 | -0.5 | 0.0 | 0.0 | -0.8 | 0.3 |
| △ CD1 | Euro ('000) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| △ CN | Euro ('000) | 0.9 | -3.0 | 4.9 | 1.2 | -3.0 | 5.4 | 1.8 | -3.4 | 7.2 |
| Net liquid wealth | Euro ('000) | 44.4 | 6.3 | 152.2 | 63.4 | 13.5 | 196.7 | 37.4 | 9.5 | 114.1 |
| Real estate | Euro ('000) | 172.4 | 60.9 | 304.4 | 213.1 | 142.0 | 355.1 | 243.5 | 152.1 | 365.2 |
| Mortgage debt | Euro ('000) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 18.0 | 90.0 |
| IMU main | Euro | 120.0 | 0.0 | 300.0 | 200.0 | 60.0 | 400.0 | 200.0 | 60.0 | 400.0 |
| IMU other | Euro | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 | 0.0 | 120.0 |
| △ House Price | Euro ('000) | 0.0 | -35.0 | 20.0 | 0.0 | -50.0 | 50.0 | 0.0 | -50.0 | 40.0 |
| # properties | Units | 1.0 | 1.0 | 2.0 | 1.0 | 1.0 | 2.0 | 1.0 | 1.0 | 2.0 |
| **Number of observations** | | **4,013** | | | **3,132** | | | **431** | | |

Note: "Age" and "Studio" refer to the age and the education level (1 = elementary or lower, 6 = post-graduate degree) of the head of the household. "△ Y" refers to the change of household disposable income. "△ C" refers to the change of household consumption. "△ CD" refers to the change of household consumption on durables. "△ CD1" refers to the change of household consumption on vehicles. "Net liquid wealth" calculated as the difference between financial assets and unsecured financial liabilities (variables "af", "pf2", and "pf3" in database "ricf2012.dta"). "Real estate" refers to the variable "ar1" ("Real assets (housing, land, and other buildings)") in database "ricf2012.dta". "Mortgage debt" refers to variable "deb12a" in dataset "fami2012.dta".

Table 2: Confounding factors.

| **Panel A** | Austerity non-IMU | Transfers | △ HP | Supercar | VAT |
|---|---|---|---|---|---|
| IMU main | **0.02** | **0.57** | **0.02** | **0.01** | **-0.10** |
| | [0.01] | [0.97] | [0.02] | [0.01] | [0.39] |
| Observations | 4,013 | 4,013 | 4,013 | 4,013 | 4,013 |
| $R^2$ | 0.26 | 0.02 | 0.21 | 0.03 | 0.11 |
| **Panel B** | Austerity non-IMU | Transfers | △ HP | Supercar | VAT |
| IMU main | **0.02** | **0.53** | **0.02** | **0.01** | **-0.10** |
| | [0.01] | [0.99] | [0.02] | [0.01] | [0.39] |
| IMU other | **0.00** | **0.18** | **0.01** | **-0.01** | **-0.06** |
| | [0.02] | [0.39] | [0.00] | [0.01] | [0.27] |
| Observations | 4,013 | 4,013 | 4,013 | 4,013 | 4,013 |
| $R^2$ | 0.26 | 0.02 | 0.21 | 0.03 | 0.11 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%.IMU "main" and "other" refer to the IMU tax paid for the main dwelling and other properties respectively. $\triangle HP$ refers to the change of (self-reported) market value of all properties owned. "Austerity non-IMU" refers to the sum of the increase in taxation on electricity bills, the increase in taxation on cooking gas, the increase in taxation on motorfuel, and the increase of the local (regional) marginal tax rate on personalincome. "Transfers" refers to total transfers to households, including pensions. "Supercar" is a variable calculated as the product between the value of the car if above 40,000 Euros and the average yearly taxrate of 1.26% on supercar (estimated using Automobile Club of Italy data). Finally, "VAT" refers to theconsumption change on non-durable goods and services whose VAT rate changed in September 2011.

Table 3: Placebo results.

| **Panel A** | Full sample | | Home owners | |
|---|---|---|---|---|
| | Non durables | Durables | Non durables | Durables |
| IMU main | **0.03** | **0.27** | **0.11** | **0.20** |
| | [0.84] | [0.51] | [0.88] | [0.52] |
| △ HP ('000 €) | **9.25*** ** | **0.68** | **9.17*** ** | **0.72** |
| | [1.74] | [0.70] | [1.77] | [0.68] |
| Observations | 2,488 | 2,488 | 2,426 | 2,426 |
| $R^2$ | 0.14 | 0.01 | 0.15 | 0.01 |
| **Panel B** | Full sample | | Home owners | |
| | Non durables | Durables | Non durables | Durables |
| IMU main | **0.02** | **0.29** | **0.11** | **0.22** |
| | [0.85] | [0.52] | [0.90] | [0.53] |
| IMU other | **0.02** | **-0.10** | **-0.01** | **-0.10** |
| | [0.19] | [0.09] | [0.21] | [0.09] |
| △ HP ('000 €) | **9.25*** ** | **0.68** | **9.17*** ** | **0.73** |
| | [1.74] | [0.70] | [1.77] | [0.67] |
| Observations | 2,488 | 2,488 | 2,426 | 2,426 |
| $R^2$ | 0.14 | 0.02 | 0.15 | 0.02 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non durables" refers to the change in household expenditure on non durable goods (variable "cn" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey)."Durables" refers to the change in household expediture on durable goods (variable "cd" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned.Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table 4: Baseline results.

| **Panel A** | Full sample | | Home owners | |
|---|---|---|---|---|
| | Non durables | Durables | Non durables | Durables |
| IMU main | **-0.03** | **-0.48**** | **-0.03** | **-0.47**** |
| | [0.66] | [0.21] | [0.66] | [0.22] |
| △ HP ('000 €) | **9.98***** | **0.20** | **10.01***** | **0.33** |
| | [0.97] | [0.45] | [1.01] | [0.46] |
| Observations | 4,013 | 4,013 | 3,132 | 3,132 |
| $R^2$ | 0.17 | 0.02 | 0.19 | 0.02 |
| **Panel B** | Full sample | | Home owners | |
| | Non durables | Durables | Non durables | Durables |
| IMU main | **-0.02** | **-0.48**** | **-0.03** | **-0.47**** |
| | [0.67] | [0.22] | [0.67] | [0.22] |
| IMU other | **-0.03** | **-0.02** | **-0.05** | **0.01** |
| | [0.43] | [0.11] | [0.43] | [0.12] |
| △ HP ('000 €) | **9.99***** | **0.20** | **10.02***** | **0.33** |
| | [0.98] | [0.45] | [1.02] | [0.47] |
| Observations | 4,013 | 4,013 | 3,132 | 3,132 |
| $R^2$ | 0.17 | 0.02 | 0.19 | 0.02 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non durables" refers to the change in household expenditure on non durable goods. (variable "cn" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey)"Durables" refers to the change in household expediture on durable goods (variable "cd" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned.Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table 5: Liquid wealth to income ratio.

| **LLW** | Full sample | | Home owners | |
|---|---|---|---|---|
| | Non durables | Durables | Non durables | Durables |
| IMU main | **-0.35** | **-1.02*** ** | **0.06** | **-1.00** ** |
| | [0.82] | [0.31] | [0.88] | [0.42] |
| IMU other | **0.41** | **0.33** | **0.25** | **0.39** |
| | [1.76] | [0.61] | [1.75] | [0.57] |
| △ HP ('000 €) | **13.61*** ** | **-0.24** | **13.68*** ** | **-0.24** |
| | [2.56] | [0.98] | [2.56] | [0.92] |
| Observations | 1,527 | 1,527 | 1,054 | 1,054 |
| $R^2$ | 0.18 | 0.04 | 0.21 | 0.06 |
| **HLW** | Full sample | | Home owners | |
| | Non durables | Durables | Non durables | Durables |
| IMU main | **-0.04** | **-0.29** | **-0.04** | **-0.28** |
| | [1.00] | [0.33] | [1.00] | [0.33] |
| IMU other | **-0.07** | **-0.06** | **-0.08** | **-0.04** |
| | [0.50] | [0.12] | [0.51] | [0.12] |
| △ HP ('000 €) | **9.36*** ** | **0.47** | **9.30*** ** | **0.54** |
| | [1.22] | [0.53] | [1.23] | [0.55] |
| Observations | 2,486 | 2,486 | 2,078 | 2,078 |
| $R^2$ | 0.19 | 0.03 | 0.20 | 0.04 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non durables" refers to the change in household expenditure on non durable goods (variable "cn" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey)."Durables" refers to the change in household expediture on durable goods (variable "cd" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned."LLW" indicates "Low Liquid Wealth" households defined as the household with net liquid wealth below one month of disposable income. "HLW" indicates "High Liquid Wealth" households defined as the household with net liquid wealth above one month of disposable income. Net liquid wealth is defined as total financial assets (variable "af" in dataset "ricfXX.dta") net of unsecured debt and mortgage payments. Disposable income refers to variable "y2" in dataset "consXX.dta" (where the suffix XX indicates the year of the survey). Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table 6: Debtors (Mortgagors) vs. non debtors (mortgagors).

| **Panel A** | Non debtors | | Debtors | |
|---|---|---|---|---|
| | Non durables | Durables | Non durables | Durables |
| IMU main | **-0.13** | **0.21** | **-0.03** | **-2.97*** ** |
| | [0.62] | [0.24] | [1.73] | [0.59] |
| IMU other | **-0.15** | **0.05** | **0.13** | **-0.08** |
| | [0.54] | [0.12] | [0.77] | [0.52] |
| △ HP ('000 €) | **10.17*** ** | **0.10** | **9.44*** ** | **-0.09** |
| | [1.29] | [0.46] | [2.46] | [1.01] |
| Observations | 3,121 | 3,121 | 892 | 892 |
| $R^2$ | 0.17 | 0.03 | 0.25 | 0.07 |
| **Panel B** | Non mortgagors | | Mortgagors | |
| | Non durables | Durables | Non durables | Durables |
| IMU main | **-0.09** | **-0.09** | **0.03** | **-2.68** ** |
| | [0.74] | [0.23] | [2.46] | [0.99] |
| IMU other | **-0.06** | **0.05** | **0.10** | **-0.58** |
| | [0.46] | [0.10] | [0.86] | [1.19] |
| △ HP ('000 €) | **9.84*** ** | **0.24** | **11.02** ** | **-0.40** |
| | [1.15] | [0.47] | [4.37] | [1.65] |
| Observations | 3,582 | 3,582 | 431 | 431 |
| $R^2$ | 0.17 | 0.02 | 0.32 | 0.12 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non durables" refers to the change in household expenditure on non durable goods (variable "cn" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey)."Durables" refers to the change in household expediture on durable goods (variable "cd" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively. $\triangle HP$ refers to the change of (self-reported) market value of all properties owned. "Debtors" refer to households with (secured or unsecured) debt at the end of 2012 (meaning with positive entry of the variable "pf" in database "ricf12.dta")."Mortgagors" refer to households with mortgage debt at the end of 2012 (meaning with positive entry of the variable "deb12a" in database "fami12.dta"). Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table 7: Saving flows.

| | Non Debtors | Debtors | Non mortgagors | Mortgagors |
|---|---|---|---|---|
| IMU main | **-1.82**** | **0.17** | **-1.73**** | **0.89** |
| | [0.73] | [1.60] | [0.74] | [1.63] |
| IMU other | **-0.38** | **-0.94*** | **-0.42** | **-1.76*** |
| | [0.41] | [0.47] | [0.33] | [1.00] |
| △ HP ('000 €) | **0.79** | **-1.22** | **0.59** | **-0.65** |
| | [1.41] | [3.11] | [1.53] | [5.14] |
| Observations | 3,121 | 892 | 3,582 | 431 |
| $R^2$ | 0.03 | 0.05 | 0.03 | 0.09 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non durables" refers to the change in household expenditure on non durable goods."Durables" refers to the change in household expediture on durable goods. IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned. The dependent variable is defined as the change in savings (measured by questions C42 (C43), C43 (C44), and C45 (C46) in the 2012 (2010) survey) asking "where you able to save this year?If so, how much? IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively. "Debtors" refer to households with debt at the end of 2012 (meaning with positive entry of the variable "pf" in database "ricf12.dta")."Mortgagors" refer to households with mortgage debt at the end of 2012 (meaning with positive entry of the variable "deb12a" in database "fami12.dta"). "IMU main + other" refers to the sum of the regression coefficients "IMU main" and "IMU other". Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table 8: Vehicles versus non-vehicles durable expenditure

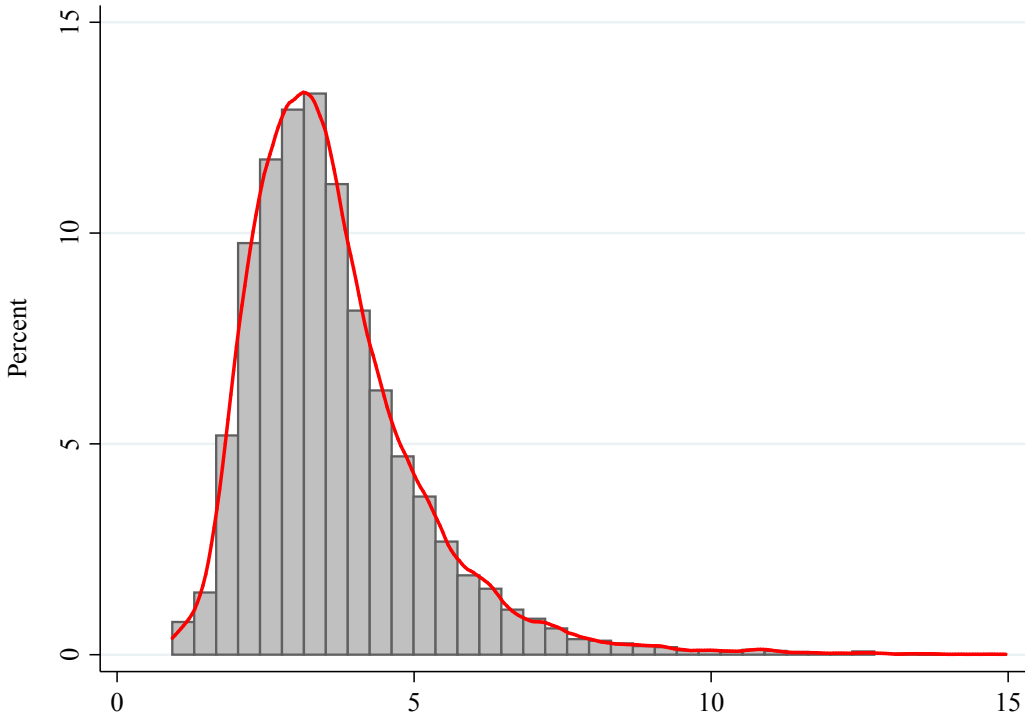
| **Panel A** | Full sample | | Home owners | |
|---|---|---|---|---|
| | Non vehicles | Vehicles | Non vehicles | Vehicles |
| IMU main | **0.08** | **-0.56**** | **0.10** | **-0.57**** |
| | [0.14] | [0.21] | [0.14] | [0.22] |
| IMU other | **-0.03** | **0.01** | **-0.03** | **0.04** |
| | [0.07] | [0.10] | [0.07] | [0.10] |
| △ HP ('000 €) | **0.49*** | **-0.29** | **0.49*** | **-0.16** |
| | [0.27] | [0.33] | [0.27] | [0.34] |
| Observations | 4,013 | 4,013 | 3,132 | 3,132 |
| $R^2$ | 0.02 | 0.02 | 0.03 | 0.02 |
| **Panel B** | Debtors | | Mortgagors | |
| | Non vehicles | Vehicles | Non vehicles | Vehicles |
| IMU main | **-0.80*** | **-2.17***** | **-0.94** | **-1.74*** |
| | [0.45] | [0.56] | [0.93] | [0.91] |
| IMU other | **-0.07** | **-0.01** | **-0.30** | **-0.29** |
| | [0.18] | [0.39] | [0.47] | [0.93] |
| △ HP ('000 €) | **0.89** | **-0.98** | **1.86** | **-2.26**** |
| | [0.81] | [0.91] | [1.39] | [1.04] |
| Observations | 892 | 892 | 431 | 431 |
| $R^2$ | 0.05 | 0.07 | 0.09 | 0.12 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non Vehicles" refers to the change in household expenditure on durable goods, excluding vechicles (variable "cd2" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey)."Vehicles" refers to the change in household expediture on vechicles (variable "cd1" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned.Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

# Appendix

## AppendixA. House registry and market values

Figure A.1: Ratio between house market values and registry values.

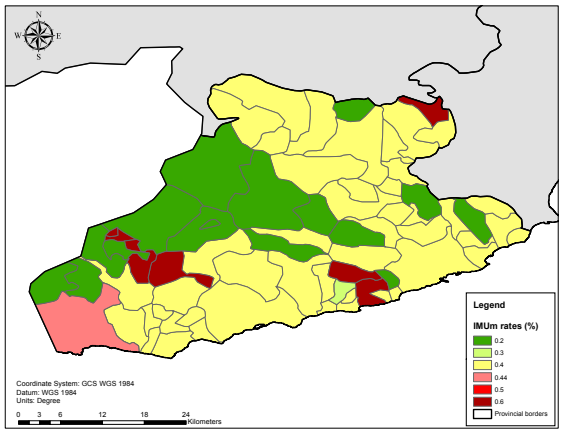



Note: The figure plots the distribution of the ratio between house market values and registry values (averages in each municipality for a total of 7,867 observations). The mean of the distribution is 3.64 and the standard deviation is 1.48. The figure refers to 2009, average of all types of residential houses. Registry values are essentially stable over time because of their nature while market values are time dependent. The red line plots the Epanechnikov kernel density with a bandwidth of 0.2350. Source: authors' own calculation on Ministry of Economics and Finance data. Specifically, we rely on the data of the fiscal department ("Agenzia delle Entrate"), database "OMI" ("quotazioni immobiliari dell'Osservatorio del Mercato Immobiliare dell'Agenzia delle Entrate").

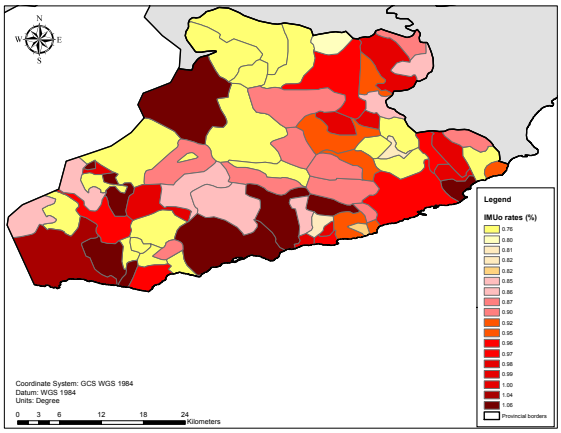
## AppendixB. IMU tax rate heat maps

Figure B.1: IMU rates heat maps.

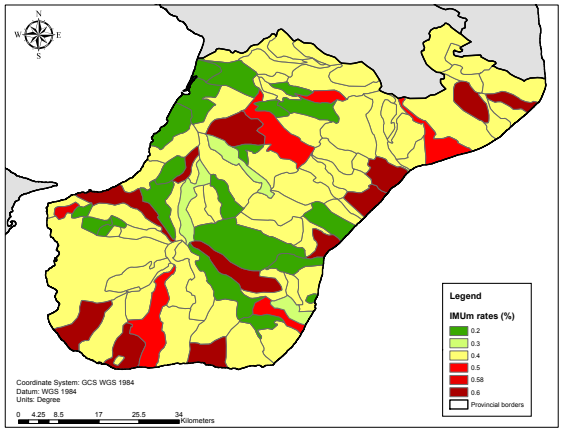
**Panel (A):** IMU main rates - Prov. "Imperia".



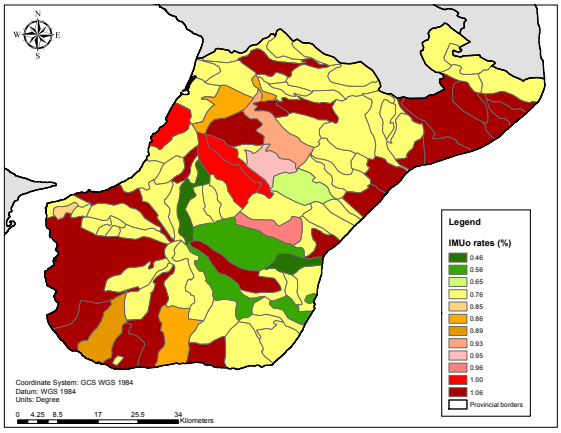

**Panel (B):** IMU other rates - Prov. "Imperia".




**Panel (C):** IMU main rates - Prov. "Reggio Calabria".




**Panel (D):** IMU other rates - Prov. "Reggio Calabria".




Source: authors' calculations on IFEL data (available at: http://www.webifel.it/ICI/AliquoteIMU.cfm)

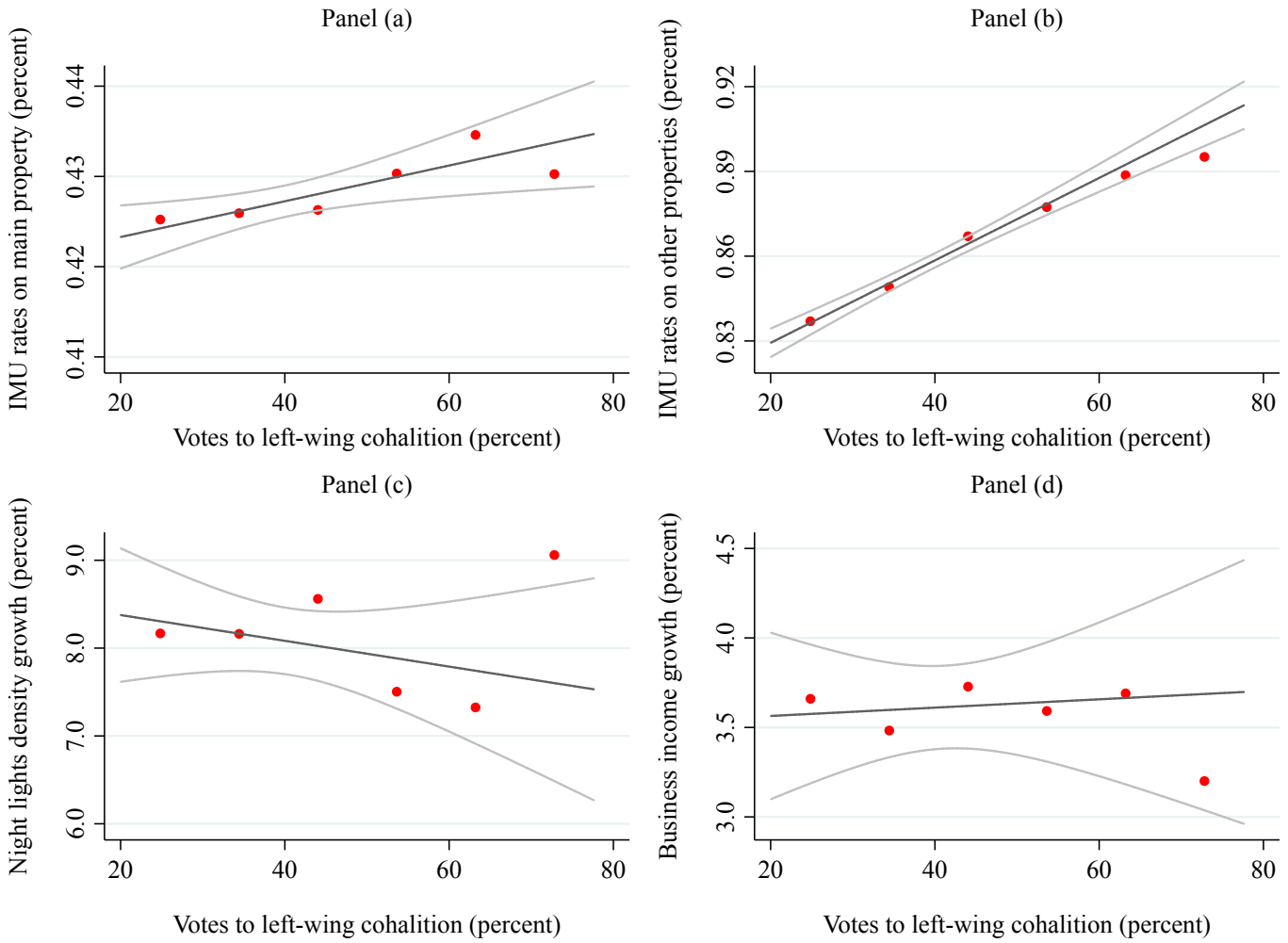
Table B.1: Correlation between IMU rates and local economic activity.

| **Variable** | **Year** | **IMU rate on main dwelling*** | **IMU rate on other properties*** |
|---|---|---|---|
| Personal income | 2011 | 0.153 | 0.125 |
| Personal income | 2010 | 0.143 | 0.122 |
| Personal income | $\Delta$ '10 - '11 | -0.026 | -0.016 |
| Business income | 2011 | 0.045 | -0.073 |
| Business income | 2010 | 0.053 | -0.029 |
| Business income | $\Delta$ '10 - '11 | -0.032 | 0.008 |
| Night lights density | 2011 | -0.012 | -0.060 |
| Night lights density | 2010 | -0.004 | -0.062 |
| Night lights density | $\Delta$ '10 - '11 | -0.037 | -0.003 |
| IMU rate on other properties | 2012 | 0.325 | |

* IMU rates (both, main and other) refer to 2012.

Night lights density correlations exclude small municipalities ($<$ 5,000 inhabitants) and big cities ($>$ 300,000 inhabitants).

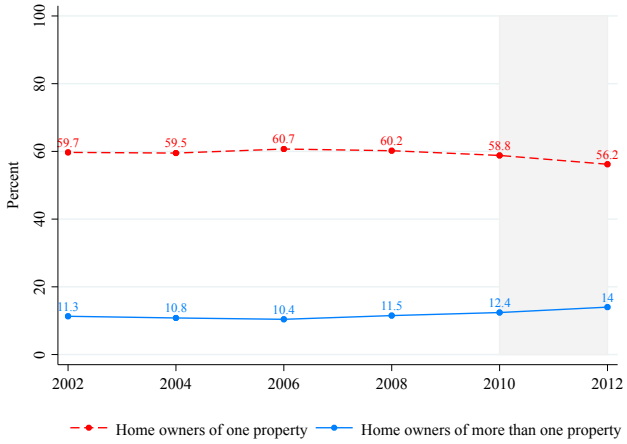
Figure B.2: Correlations political orientation - IMU rates - local business cycle.



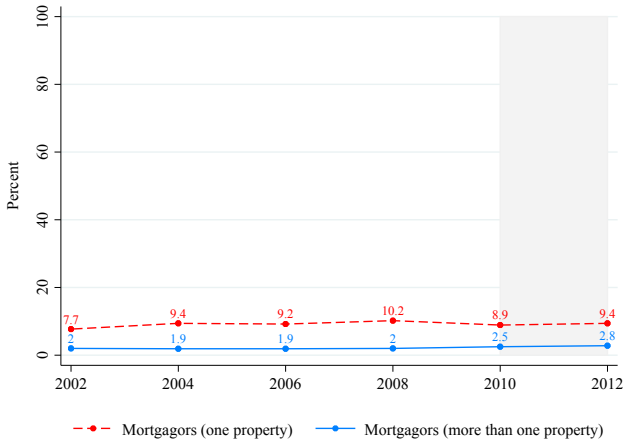

Note: Each dot on the charts represents the average of the respective bin. For most municipalities the latest regional election before the IMU change was in 2010. Source: authors' calculations on IFEL data (available at: http://www.webifel.it/ICI/AliquoteIMU.cfm) and Ministry of Interior data.

## AppendixC. Share of Home Owners overtime

Figure C.1: Evolution over time of ownership and mortgage exposure.
**Panel (A):** share of home owners over time.




**Panel (B):** share of households with a mortgage debt over time.




Note: Panel (A) shows the percentage of households that own one property (red line) and more than one property (blue line) in each year as a share of total number of households. Panel (B) shows the percentage of mortgagors that own one property (red line) and more than one property (blue line) in each year as a share of total number of households. To determine the home-owner households we rely on the database "qXXd.dta" (where the letters "XX" indicates the year of the SHIW survey) and include all households listed in it. Mortgagors are determined using the variable "deb12a" in database "famiXX.dta". All observations are weighted averages. Source: authors' calculations on Bank of Italy (SHIW surveys, several years) data (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).

## AppendixD. Main fiscal aggregates - Italian economy

Table D.1: Main fiscal aggregates.

| | 2011 | 2012 | Δ'12-'11 (%) |
|---|---|---|---|
| Total current expenditure | 771.6 | 765.1 | -0.8 |
| Wages | 174.0 | 166.2 | -4.5 |
| Intermediate consumption | 89.4 | 87.0 | -2.7 |
| Final consumption | 329.2 | 315.7 | -19.5 |
| Interest payments | 78.4 | 84.1 | 7.3 |
| Transfers to households | 5.4 | 6.1 | 13.0 |
| Total capital expenditure | 63.7 | 64.5 | 1.3 |
| **Total expenditure** | **835.3** | **829.6** | **-0.7** |
| Total current revenues | 765.7 | 775.1 | 1.2 |
| Indirect taxes | 237.1 | 246.1 | 3.8 |
| Direct taxes | 232.7 | 239.7 | 3.0 |
| Total capital revenues | 11.0 | 5.9 | -46.4 |
| **Total revenues** | **776.7** | **781.0** | **0.6** |
| **Fiscal balance** | **-58.7** | **-48.6** | **-17.2** |
| **GDP** | **1,620.7** | **1,566.9** | **-3.9** |

Note: all figures are in real 2012 Euros.
Transfers to households include current and capital transfers.

## AppendixE. 2012 SHIW questions about IMU tax

We rely on questions D33, D34, D35, D36 and D37 of the 2012 survey.[20] The questions ask the following.

- **Question D33:** *"In 2012 , did you or a member of your household have to pay the Municipal Property Tax (IMU) for principal residence?".*
- **Question D34:** *"What was the total amount paid in 2012?".*
- **Question D35:** *"During 2012 did you or a member of your household have to pay the Municipal Property Tax on other properties (if they are co-owned with non-members of your household, please consider only your own portion)?".*
- **Question D36:** *"What was the total amount you paid in 2012?".*
- **Question D37:** *"In your opinion, which is the probability that the Municipal Property Tax (IMU) will be abolished within the next five years and not replaced by another similar tax? On a scale of 0 to 100, assign a low number if there is little chance of this happening and a high one if there is a good chance".*

[20] The answers are reported in the "q12d.dta" dataset (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).

## AppendixF. Further results

Table F.1: Interaction terms - durable goods.

| | LLW | Debtors | Mortgagors |
|---|---|---|---|
| IMU main | **-0.25** | **-0.05** | **-0.21** |
| | [0.31] | [0.29] | [0.24] |
| IMU other | **-0.05** | **0.04** | **0.02** |
| | [0.12] | [0.10] | [0.10] |
| IMU main + Interaction main | **-1.08*** ** | **-2.58*** ** | **-2.67*** ** |
| | [0.36] | [0.68] | [0.69] |
| IMU other + Interaction other | **0.23** | **0.08** | **-0.39** |
| | [0.27] | [0.41] | [0.82] |
| △ HP ('000 €) | **0.23** | **0.26** | **0.25** |
| | [0.47] | [0.47] | [0.48] |
| *P-values of the H0:* | | | |
| Interaction main = 0 | 0.148 | 0.006 | 0.006 |
| Interaction other = 0 | 0.297 | 0.783 | 0.624 |
| Observations | 4,013 | 4,013 | 4,013 |
| $R^2$ | 0.02 | 0.02 | 0.02 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. The left-hand-side variable "durables" refers to the change in household expenditure on durable goods. IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned. "LLW" indicates "Low Liquid Wealth" households defined as the household with net liquid wealth below one month of disposable income. IMU (other) + Interaction refers to the sum of the coefficients of IMU (other) and the interaction between IMU (other) and a dummy respectively identifying the LLW, debtors and mortgagors. The dummies identifying the LLW, debtors and mortgagors are also added as controls. The threshold to identify Low Liquid Wealth (LLW ) households is a value of net liquid wealth below one month of household income. Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table F.2: Age groups.

| **Full sample** | Younger cohorts | | | Older cohorts | | |
|---|---|---|---|---|---|---|
| | Non durables | Durables | Vehicles | Non durables | Durables | Vehicles |
| IMU | **0.35** | **-0.84** | **-0.97*** | **-0.12** | **-0.32** | **-0.37** |
| | [1.08] | [0.65] | [0.49] | [0.72] | [0.28] | [0.24] |
| IMU other | **-0.26** | **0.52** | **0.25** | **-0.01** | **-0.06** | **-0.02** |
| | [0.72] | [0.38] | [0.34] | [0.58] | [0.10] | [0.09] |
| △ HP ('000 €) | **8.87***** | **-0.06** | **-1.66** | **10.11***** | **0.27** | **0.05** |
| | [2.07] | [1.07] | [0.97] | [1.39] | [0.43] | [0.37] |
| Observations | 1,082 | 1,082 | 1,082 | 2,931 | 2,931 | 2,931 |
| $R^2$ | 0.20 | 0.05 | 0.04 | 0.18 | 0.02 | 0.02 |
| **Home owners** | Younger cohorts | | | Older cohorts | | |
| | Non durables | Durables | Vehicles | Non durables | Durables | Vehicles |
| IMU | **0.58** | **-1.43**** | **-1.59***** | **-0.24** | **-0.19** | **-0.24** |
| | [0.99] | [0.67] | [0.54] | [0.80] | [0.28] | [0.23] |
| IMU other | **-0.47** | **0.68** | **0.37** | **0.01** | **-0.06** | **-0.03** |
| | [0.73] | [0.42] | [0.39] | [0.58] | [0.10] | [0.09] |
| △ HP ('000 €) | **10.55***** | **0.65** | **-1.08** | **9.89***** | **0.24** | **0.08** |
| | [2.20] | [1.18] | [0.99] | [1.41] | [0.41] | [0.35] |
| Observations | 801 | 801 | 801 | 2,331 | 2,331 | 2,331 |
| $R^2$ | 0.25 | 0.06 | 0.05 | 0.19 | 0.03 | 0.02 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non durables" refers to the change in household expenditure on non durable goods. (variable "cn" in dataset "consXX.dta")"Durables" refers to the change in household expediture on durable goods (variable "cd" in dataset "consXX.dta"). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned. Younger (Older) cohorts defined as the younger 25 (older 75) percent of the household head's age distribution. Control variables include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table F.3: Income groups.

| **Full sample** | Lower income | | | Higher income | | |
|---|---|---|---|---|---|---|
| | Non durables | Durables | Vehicles | Non durables | Durables | Vehicles |
| IMU | **0.56** | **-0.53** | **-0.67** | **-0.13** | **-0.52*** | **-0.61**** |
| | [1.30] | [0.61] | [0.57] | [0.71] | [0.26] | [0.24] |
| IMU other | **-1.26** | **0.24** | **0.30** | **-0.02** | **-0.03** | **0.01** |
| | [1.07] | [0.34] | [0.30] | [0.45] | [0.11] | [0.10] |
| △ HP ('000 €) | **13.80***** | **-0.19** | **-0.85** | **9.64***** | **0.23** | **-0.27** |
| | [2.95] | [0.89] | [0.52] | [0.95] | [0.48] | [0.36] |
| Observations | 1,004 | 1,004 | 1,004 | 3,009 | 3,009 | 3,009 |
| $R^2$ | 0.21 | 0.07 | 0.09 | 0.18 | 0.02 | 0.02 |
| **Home owners** | Lower income | | | Higher income | | |
| | Non durables | Durables | Vehicles | Non durables | Durables | Vehicles |
| IMU | **0.53** | **-0.36** | **-0.67** | **-0.17** | **-0.52*** | **-0.60**** |
| | [1.58] | [0.67] | [0.66] | [0.71] | [0.26] | [0.25] |
| IMU other | **-0.93** | **0.15** | **0.25** | **-0.02** | **-0.02** | **0.01** |
| | [1.16] | [0.40] | [0.34] | [0.45] | [0.11] | [0.09] |
| △ HP ('000 €) | **13.84***** | **-0.55** | **-0.96*** | **9.77***** | **0.32** | **-0.17** |
| | [2.91] | [0.97] | [0.53] | [0.98] | [0.48] | [0.35] |
| Observations | 499 | 499 | 499 | 2,633 | 2,633 | 2,633 |
| $R^2$ | 0.34 | 0.11 | 0.15 | 0.18 | 0.02 | 0.02 |

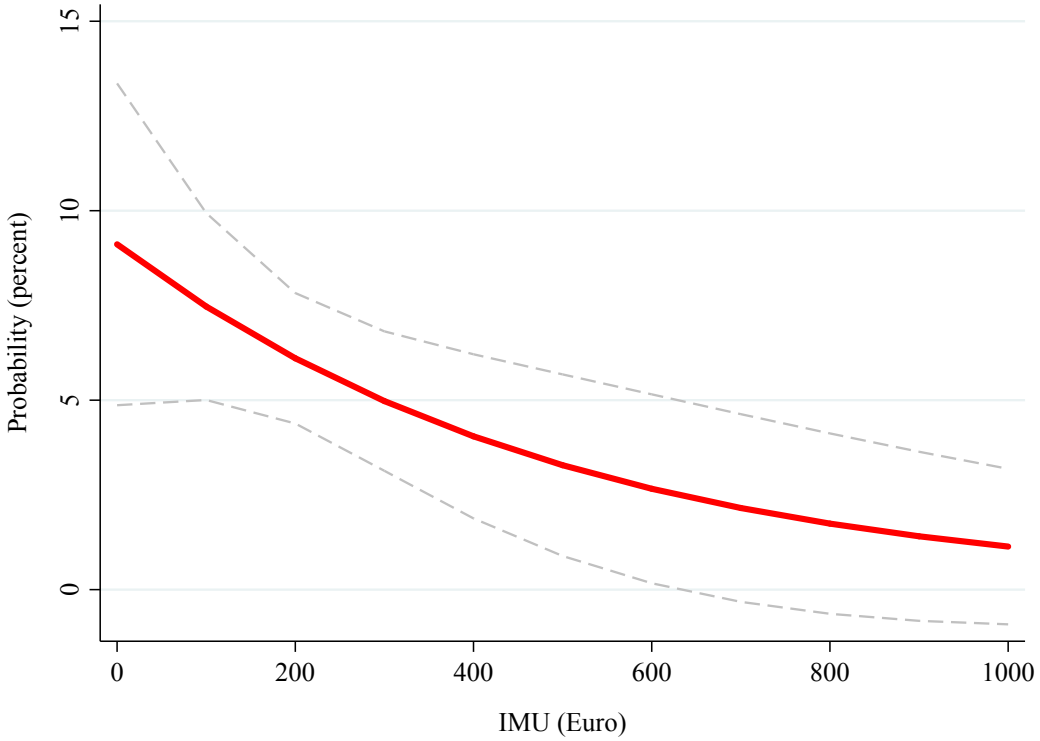
Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non durables" refers to the change in household expenditure on non durable goods. (variable "cn" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey)"Durables" refers to the change in household expediture on durable goods (variable "cd" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned. Lower (Higher) income cohorts defined as the bottom 25 (upper 75) percent of the household income distribution. "Vehicles" refers to the change in household expediture on vechicles (variable "cd1" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Table F.4: Probit results.

| **Panel A** | Full sample | | Home owners | |
|---|---|---|---|---|
| | Non-vehicles | Vehicles | Non-vehicles | Vehicles |
| IMU main | **0.04** | **-0.17** | **0.10** | **-0.16** |
| | [0.11] | [0.12] | [0.11] | [0.12] |
| IMU other | **-0.05** | **-0.04** | **-0.05** | **-0.04** |
| | [0.04] | [0.05] | [0.04] | [0.05] |
| △ HP ('000 €) | **0.01** | **-0.01** | **0.01** | **-0.01** |
| | [0.01] | [0.01] | [0.01] | [0.01] |
| Observations | 4,013 | 4,013 | 3,132 | 3,132 |
| Area under ROC | 0.63 | 0.77 | 0.62 | 0.76 |
| **Panel B** | Debtors | | Mortgagors | |
| | Non-vehicles | Vehicles | Non-vehicles | Vehicles |
| IMU main | **0.06** | **-1.01*** ** | **0.10** | **-1.06** ** |
| | [0.25] | [0.35] | [0.35] | [0.54] |
| IMU other | **-0.09** | **-0.03** | **0.02** | **0.21** |
| | [0.07] | [0.11] | [0.11] | [0.18] |
| △ HP ('000 €) | **-0.01** | **-0.01** | **-0.01** | **-0.01** |
| | [0.01] | [0.01] | [0.01] | [0.01] |
| Observations | 892 | 892 | 431 | 431 |
| Area under ROC | 0.66 | 0.82 | 0.71 | 0.80 |

Note: robust standard errors clustered by regions in brackets. *** indicates significance at 1% level, **at 5% * at 10%. "Non Vehicles" refers to the change in household expenditure on durable goods, excluding vechicles (variable "cd2" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey)."Vehicles" refers to the change in household expediture on vechicles (variable "cd1" in dataset "consXX.dta" where the suffix "XX" indicates the year of the survey). IMU "main" and "other" refer to the tax on the main dwelling and other properties respectively.$\triangle HP$ refers to the change of (self-reported) market value of all properties owned. "Debtors" refer to households with debt at the end of 2012 (meaning with positive entry of the variable "pf" in database "ricf12.dta")."Mortgagors" refer to households with mortgage debt at the end of 2012 (meaning with positive entry of the variable "deb12a" in database "fami12.dta"). Probit estimated via maximum likelihood.Control variables (omitted for brevity) include: (i) households demographics,(ii) geographical dummies, (iii) dummies of main dwelling commercial area,and (iv) expectations about future income and future house prices.

Figure F.4: IMU marginal.




Note: The figure shows the marginal effect of the variable "IMUmain" on the dichotomous variable "buying a vehicle". The dummy variable "buying a vehicle" is constructed based on the variable "cd1" in database "cons12.dta". We assigned a value of "1" in the dummy variable for all entries greater than one. Restricting the positive entries in the dummy to higher values (for instance, values greater than 5,000 Euros in order to focus only on cars) makes little or no difference. The dashed lines plot the 95 percent confidence intervals. Source: authors' calculations on SHIW survey data (available at: https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/).