Consumption and Wealth: New Evidence from Italy[*]

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Abstract

This paper estimates a consumption function for Italy. In addition to an estimate of permanent income, housing wealth, the interest rate on household loans and an index of credit conditions, our model introduces household net worth split into liquid and illiquid assets. The consumption dynamics are examined by using financial accounts and real national accounts in a Vector Error Correction Model (VECM) estimated from 1975 to 2017. The results show that the marginal propensity to consume out of liquid financial assets is positive and statistically significant and greater than that of illiquid assets; we also find a smaller and significant impact of housing wealth on consumption. As expected, permanent income explains a large fraction of consumption while the effect of the interest rate is negative.

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1 Introduction

There is widespread disagreement about the influence of wealth on households' consumption (Buiter, 2010; De Bonis and Silvestrini, 2012; Cooper and Dynan, 2016). The recent global financial crisis has renewed the debate on the channels through which wealth, housing as opposed to financial assets, may affect consumer spending. Across the world, non standard monetary policies and credit conditions influenced asset values. A reduction of interest rates and a relaxing of credit constraints may increase household consumption relative to their income (Jappelli and Pagano, 1994) and reduce downpayments (Balta and Ruscher, 2011; Liberati and Vacca, 2016). Moreover, lower interest rates increase the value of collateral-backed loans for households that already own the collateral (Poterba and Manchester, 1989; Miles, 1992).

In this paper we estimate a consumption function for Italy splitting up household net worth into liquid and illiquid components and taking into account the role of housing assets, permanent income and credit conditions. The Italian economy historically shows higher wealth accumulation and saving rates than other countries (De Bonis and Marinucci, 2017) although with a convergence in the latest years. There is no general consensus about housing wealth effects on consumption in Italy. These are positive and rather small according to Catte et al. (2004) and Guiso, Paiella, and Visco (2006), and sometimes even negative (Boone and Girouard, 2002; Slacalek, 2009). On the other hand, financial wealth effects are stronger and statistically significant than housing ones (Bassanetti and Zollino, 2010).

Many macro models consider net worth as a single variable having a unique effect on consumption, but its components have different degree of liquidability. Obtaining liquidity from housing wealth (using mortgage equity withdrawal; MEW onward) needs more time than from financial assets; moreover MEW does not exist in many countries. Notwithstanding the presence of booms and bursts, the ratio of Italian household financial wealth to GDP increased in the last 40 years. However, housing wealth remains the main asset for Italian households: this is common to many advanced economies (see De Bonis, Caprara, and Infante, 2018).

Different types of income shocks could lead to substantial differences in consumption responses. According to the simplest version of the permanent income hypothesis, only unanticipated permanent income shocks should induce substantial changes in consumption. On the contrary, expected or temporary income shocks should not alter consumption significantly. Then, effects on consumption depend on the households' perception about the transitoriness/permanence of the shocks (Jappelli and Scognamiglio, 2016). For this reason, in our analysis we control for the impact of the main recessions experienced by the Italian economy that could be recognized as shocks to the permanent income (Miniaci and Weber, 1999; Rodano and Rondinelli, 2014; Brandolini, Gambacorta, and Rosolia, 2018).[1]

Credit market conditions could affect aggregate consumption through different channels, as interest rates (i.e. mortgage or bond rates), credit limits (i.e. loan-to-value ceilings), debt renegotiations. The recent drop in interest rates following the Great Recession produced two opposite effects: it reduced mortgage payments and lowered financial assets returns. Thus, the effect of credit market conditions on consumption depends on the households balance

[1] See also Grant, Miniaci, and Weber (2002) and Bassanetti et al. (2009).

sheets. In our analysis the Italian credit conditions for the private sectors are proxied by the ratio of the used credit lines to the granted ones, a measure that tracks very well the credit conditions over the two recent crises.

Our contribution to the literature is threefold. First, we estimate the effects of liquid and illiquid financial wealth on consumption using the Italian financial accounts, based on the assumption that the higher the degree of liquidability of an asset the higher is expected to be its effect on expenditure. Second, to estimate long run effects, we reconstruct the quarterly relevant variables for financial wealth back to 1975. Third, we set out for the Italian economy the Friedman-Ando-Modigliani basic aggregate lifecycle/permanent income consumption model where the consumption function depends not only on past wealth, but also on an estimate of non-property permanent income, as in Aron and Muellbauer (2013); this is a more robust assumption than the Euler equation that assumes households to be continuously and efficiently trading off between consuming now and consuming in the next period. In our setting, a household wishing to sustain consumption will realize that not all of its assets can be spent now without damaging future consumption, and that future income has a bearing on sustainable consumption.

Aron et al. (2012) and Aron and Muellbauer (2013) employ a modified Ando and Modigliani (1963) consumption function which incorporates permanent income, income uncertainty, housing collateral and other credit effects:[2] estimation of consumption for U.S. highlights positive and significant wealth effects for all the components of the net worth, including the housing one. Following a similar approach Muellbauer, St-Amant, and Williams (2015) find that housing collateral effects on consumption are absent in Canada. For the euro area, Sousa (2010) estimates large significant financial wealth effects and nil and not significant effects of the MEW. Similar results are obtained by Slacalek (2009) which stresses that wealth effects - in particular the housing ones - are larger in countries with more developed mortgage markets. Consistent with this view Andersen and Leth-Petersen (2019) show how housing wealth gains in Denmark are related to the efficient working of the mortgage market rather than to the presence of collateral constraints. There is a consensus on the fact that mortgage equity withdrawal is important in the U.S., the U.K. and the Netherlands while is absent or smaller in other European countries.[3]

In a nutshell, we find that in our model income plays the lion's share in explaining household consumption attitudes over the past forty years and that, as expected, the effect of the interest rate is negative. About the wealth effects, we contribute to fill the gap that plagues the existing literature about the marginal propensity to consume out of financial wealth. An increase in liquid financial wealth, like deposits and bonds, rises household consumption by about 6 per cent; this effect is twice as large as that for illiquid financial wealth. Housing assets are also associated with an increase in consumption, but due to their lower degree of liquidability, the estimated effect is smaller (less than 2 per cent). All in all, these results are broadly consistent with Bassanetti and Zollino (2010), who find that the marginal propensity to consume out of housing and non-housing wealth is in the range of, respectively, 1.5-2 and 4-6 per cent.

[2] In countries where credit conditions indexes are not available a "latent interactive variable equation system" (LIVES) is employed. For more details see Duca and Muellbauer (2014).

[3] See (Barrell, Costantini, and Meco, 2015) for a comparison of the housing and financial wealth effects between the U.K. and Italy.

The paper is structured as follows. Section 2 describes the data. Section 3 explains the theoretical and empirical frameworks. The main results are reported in Section 4. Robustness checks are reported in Section 5. Finally, Section 6 concludes. In the appendices we report more detailed statistics and the model used to estimate the permanent income equation.

2 Data and descriptive statistics

We use quarterly data from 1975:q1 to 2017:q4 (see Tables A.1 and A.2). Our dataset mainly relies on the Italian financial accounts.[4] We split up financial assets into liquid and illiquid ones. The former ones include deposits, bonds, mutual funds and quoted shares net of total liabilities (NLA). Illiquid financial wealth is the sum of unquoted shares and other equity plus holdings of insurance and pension fund instruments (IFA). In 2017 household net financial wealth was twice Italian GDP against 70 per cent in 1975 (figure 1). Until the late 1990s, this dynamics follows that of the net liquid component, while in recent years the illiquid component gained more importance, as Italian households increased their holdings of insurance and pension fund instruments. Housing and land wealth (HA)[5] are the main assets for Italian households: in 2017 they were more than 3 times GDP (figure 2). The dynamics of this ratio is strongly correlated with housing prices.

Between 1975 and 2017 the ratio between consumption and GDP remained quite constant;[6] additionally, there was a decline of total household disposable income (figure 3). This confirms the very low growth of the Italian economy in the last 25 years. Consumption, income and wealth are expressed in real per capita terms.[7]

In our analysis we include the real mortgage rate. This is a proxy of the cost of credit for households. Finally, credit conditions can be approximated by the ratio between the used credit lines and the granted ones based on the Bank of Italy's Central Credit Register: a decrease of the ratio indicates a credit easing and viceversa; indeed this measure tracks the last two crises quite well. So, we define a general credit conditions index ($GCCI$) as the opposite of the previous measure[8] so that an increase of the index is interpretable as a credit easing; figure 4 shows the goodness of our credit index when compared with the dynamics of the real mortgage interest rate.[9]

[4]Before 1995 Italian financial accounts are only available at annual frequency: backward estimation is obtained by using temporal disaggregation methods available by the authors upon request (see also Bruno, 2008).

[5]From 1991 official annual data on Italian housing and land wealth are provided by Istat. Before this period we use annual estimation by Cannari, D'Alessio, and Vecchi (2017). Then quarterly data are obtained by using temporal disaggregation methods available by the authors upon request (see also table A.2).

[6]In our sample period all the ratios of the main GDP components remained substantially constant.

[7]Data on consumer price index and total population are taken from Istat.

[8]The ratio between the used credit lines to the granted ones is multiplied by -1.

[9]This measure is consistent with diffusion indexes which split up the inverse of credit tightness between consumption and mortgages purposes provided by the Banca d'Italia Bank Lending Survey (BLS) starting from 2003:q1.

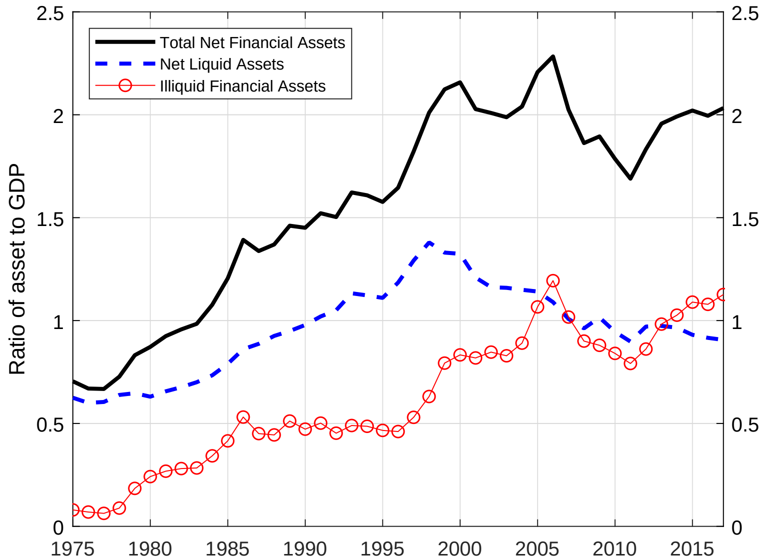

Figure 1: **Italian financial assets as ratios to GDP.**

Source: Financial Accounts and Istat.

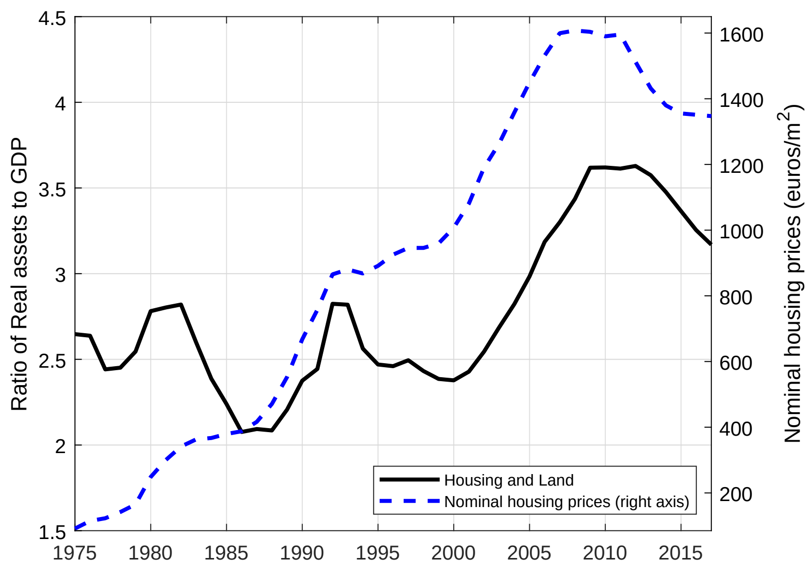

Figure 2: **Household real assets as ratio to GDP.**

Source: Cannari, D'Alessio, and Vecchi (2017), Istat and ECB.

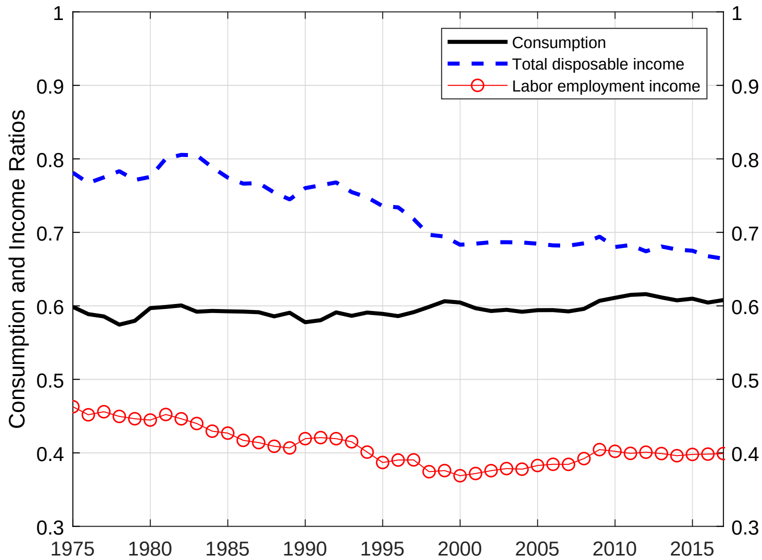

Figure 3: **Consumption and Incomes as ratio of GDP.**

Source: Istat and Brandolini, Gambacorta, and Rosolia (2018).

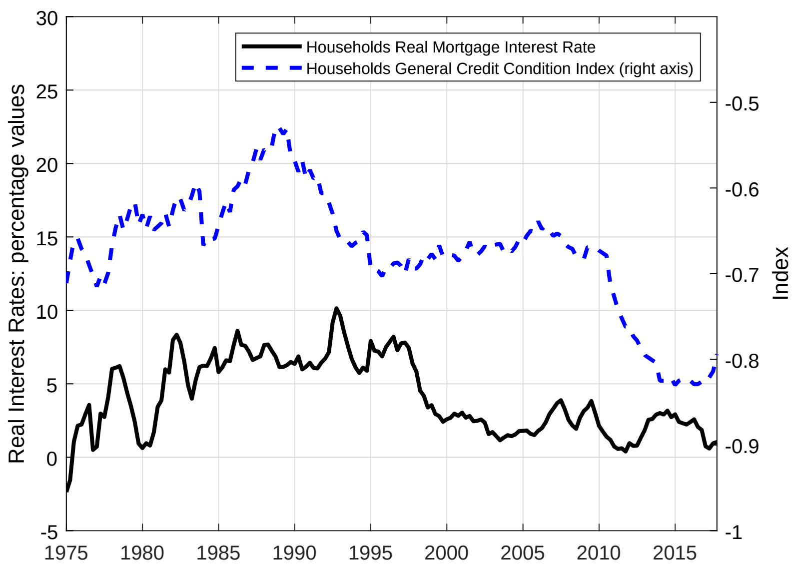

Figure 4: **Credit conditions in Italy.**

Source: Bank of Italy.

3 The Model

3.1 The theoretical framework

In this section we build up a permanent income consumption function in line with the contribution by Aron et al. (2012) who follows the insights of the Friedman-Ando-Modigliani formulation. In the stylized basic life-cycle, aggregate consumption function with permanent income, when the real interest rate is not taken into account, assumes the following form:

$$c_t = \gamma^* A_{t-1} + \omega^* y_t^P \tag{1}$$

where c_t is the real per capita consumption, y_t^P is the permanent real per capita income and A_{t-1} is the real per capita level of net wealth of the previous period. Equation (1) requires a forecasting of y_t^P.

Since consumption and income tend to grow exponentially, formulating the consumption function in logs has advantages. By defining y_t the current real per capita income, after some manipulations, the log approximation of equation (1) can be written as:

$$\ln c_t = \alpha_0 + \ln y_t + \gamma^* \frac{A_{t-1}}{y_t} + \ln \left(\frac{y_t^P}{y_t} \right) \tag{2}$$

where $\gamma = \gamma^*/\omega^*$ and $\alpha_0 = \ln \omega^*$. The log ratio of permanent to current income reflects expectations of income growth. The log ratio can be proxied by functions of forecasted income growth rates as follows:

$$\ln \left(\frac{y_t^P}{y_t} \right) = \frac{\sum_{s=1}^{k} \delta^{s-1} \mathbb{E}_t \ln \left(y_{t+s}^w \right)}{\sum_{s=1}^{k} \delta^{s-1}} - \ln \left(y_t \right) = \ln \left(y_t^P \right) - \ln \left(y_t \right) \tag{3}$$

where δ is a discount factor equal to 0.95; in line with Chauvin and Muellbauer (2018) that use this length for France, k is set to be equal to 40, i.e. a time horizon of 10 years.

Since we believe that both labor (y) and non-labor (y^{nl}) incomes affect household consumption choices, we compute the permanent income as follows:

$$y^P = f\left(y^w\right) \quad \text{where} \quad y^w = \mu y + (1-\mu)\, y^{nl} \tag{4}$$

Textbook stories usually assume $\mu = 0$ or $\mu = 1$. In this work we calibrate $\mu = 0.6$, i.e. the average share of the Italian households labor employment income to the total disposable one.[10] End-of-sample problems due to the discount of future income are overcome by assuming a quarterly growth rate equal to that of the previous period. Shorter time horizons are also suggested by a large strand of literature when households anticipate future credit constraints, according to the buffer-stock theory of saving (Deaton, 1991). Precautionary behavior also generates buffer-stock saving, as in Carrol (2001a,b), where it is argued that plausible calibrations of micro-behavior can give a practical income forecasting horizon of about three years. This horizon was originally suggested by Friedman (1957, 1963) in his

[10] By adding social benefits (mainly pension transfers) and taxes and social contributions (not distinguishable between property related and non-property related) the share lowers to 0.5 percent (see table 5.1 in Bank of Italy, 2018); in this case our results do not basically change.

application of the permanent income hypothesis to aggregate consumption data. In Section 5 we check our results by using $k = 12$, i.e. an horizon of 3 years.[11]

When real interest rates are variable, the change of log consumption can be approximated as:

$$\Delta \ln c_t \approx \lambda \left[\alpha_0 + \alpha_1 r_t + (\ln y_t - \ln c_{t-1}) + \alpha_2 \ln \left(\frac{y_t^P}{y_t} \right) + \gamma^* \frac{A_{t-1}}{y_t} \right] + \varepsilon_t \tag{5}$$

where λ measures the speed of adjustment.

The previous formulation can be improved along different directions. First, we can split up net wealth into three categories based on the degree of liquidity. Second, we can test the existence of a shift of the consumption-income ratio due to credit conditions. Third, we can introduce inside the cointegration space permanent shocks to control for the possibility of level shifts in the long-run equilibrium relationship. Finally, it is possible to impose short-run effects and dummies to take into account the effects of special events and temporary shocks. Accordingly, equation (5) can be "augmented" in the following way:

$$\begin{aligned} \Delta \ln c_t \approx \lambda \Bigg[& \alpha_{0t} + \alpha_1 r_t + (\ln y_t - \ln c_{t-1}) + \alpha_2 \ln \left(\frac{y_t^P}{y_t} \right) \\ & + \gamma_1 \frac{NLA_{t-1}}{y_t} + \gamma_2 \frac{IFA_{t-1}}{y_t} + \gamma_3 \frac{HA_{t-1}}{y_t} + \tau_1 d_1 + \tau_2 d_2 + \tau_3 d_3 \Bigg] \\ & + \beta_1 \Delta \ln y_t + \beta_2 \Delta \ln c_{t-4} + \beta_3 \Delta nr_t + \beta_4 \Delta \ln c_t^P + \beta_5 \Delta_4 GCCI_{t-1} + \varepsilon_t \end{aligned} \tag{6}$$

where $\alpha_{0t} = \alpha_0 + \alpha_{0c} GCCI_t$ and $GCCI_t$ is a general credit conditions index. NLA stands for net liquid assets, including deposits, bonds, mutual funds and quoted shares net of total liabilities; IFA is the illiquid financial wealth, i.e. the sum of unquoted shares and other equity plus holdings of insurance and pension fund instruments. HA is the housing and land wealth.

Among the short-run effects we consider the change of the labor disposable income ($\Delta \ln y_t$), the change of the nominal borrowing rate (Δnr_t), the change of the real per capital public spending (Δc_t^P) and the 4-quarter variation of the lagged credit condition index $\Delta_4 GCCI_{t-1}$. We include public spending to test for the possible crowding-out effects of private consumption.[12] We consider the quarterly change of 4 quarters lagged consumption to handle the residual autocorrelation of the model.

Following the 1992 crisis, Italy experienced different important social security reforms whose effects have lasted over time.[13] To control for the social security reform of the early Nineties, we use a dummy variable $d_1 = 1$ in 1992:q3 and 0 otherwise. In addition, we take into account the deep recessions due to the global financial and sovereign debt crises, introducing $d_2 = 1$ in 2007:q2 and 0 otherwise and $d_3 = 1$ in 2011:q3 and 0 otherwise.

[11] In Appendix A.2 we explore the possibility to derive values for the permanent income by a forecasting model which exploits the idea that the deviation of permanent income from current one should be related to the deviation of current income around some trend, but with downward shifts after the 1992-1993 currency crisis and 2007-2009 global financial crisis, augmented by economic variables and demography.

[12] The public spending has been deflated with the deflator of public consumption.

[13] After the main and substantial intervention of the 1992 social security reform (the so called Amato's reform), other complementary measures were taken in subsequent years: the Dini's reform in 1995, the Maroni's reform in 2005 and the Fornero's reform in 2011.

With these ingredients, we test the existence of different marginal propensities to consume for liquid and illiquid assets, and for housing (γ_1 and γ_2 versus γ_3), and the possible presence of intercept shift stemming from changes in credit facilities.

3.2 The empirical model and the cointegration analysis

In this Section we estimate a Vector Error Correction (VEC) model to infer the long run effects of wealth on consumption based on equation (6). Our VEC model abstracts from deterministic components outside the cointegration relationship and can be represented by the following formula:

$$\Delta Y_t = \underbrace{\lambda}_{n\cdot r} \left[\underbrace{\Gamma'}_{r\cdot n} \underbrace{Y_{t-1}}_{n\cdot 1} \right] + \sum_{i=1}^{p-1} \beta_i \Delta Y_{t-i} + \varepsilon_t \tag{7}$$

where β_i for $i = 1 \dots p-1$ are the short run effects and ε_t is a zero mean i.i.d. shock. In the square brackets we focus on the cointegrated space: vector $\Gamma' Y_{t-1}$ contains the long-run cointegrating relations among variables, while matrix λ is the speed of adjustment to the equilibrium; $\sum_{i=1}^{p-1} \beta_i \Delta Y_{t-i}$ takes into account the short-run effects and dummy controls. Application of the model represented in equation (7) requires to test empirically the presence of one or more cointegration vectors (equal to r) among variables of vector Y_t.

The endogenous variables we consider are the logarithm of the real per capita consumption ($\ln c_t$), the logarithm of the real disposable per capita income ($\ln y_t$), the logarithm of the ratio between permanent and current real per capita incomes $\left(\ln \frac{y_t^P}{y_t}\right)$, and ratios between the one-period lag real per capita assets and the current level of the real disposable per capita income (NLA_{t-1}/y_t, IFA_{t-1}/y_t and HA_{t-1}/y_t), the general credit conditions index ($GCCI_t$) and the real mortgage rate r_t.

Since cointegration tests require that time series must be non-stationary, we first implement univariate unit root test to assess the presence of integration. Based on the statistical significance of the intercept and linear time trend, we specify the ADF (Dickey and Fuller, 1979) and KPSS (Kwiatkowski, Phillips, Schmidt, and Shin, 1992) test regressions. All variables appear to be integrated of order one.[14] We initially estimate an unrestricted VAR(p). To select the optimal VAR lag length, we employ several information criteria for different specifications of our model (including or not $GCCI_t$). Following the SC and HQ tests we choose $p = 2$: this choice allows us to maintain a parsimonious model in terms of parameters as well as to be consistent with the economic intuition. Then we run the Johansen (1991, 1995) cointegrations analysis in order to verify if among integrated time series cointegration relationships arise. From the maximum eigenvalue cointegration rank test we obtain a unique cointegrating vector ($r = 1$) which links the log ratio of consumption to income, real interest rate, the three asset-to-income ratios and $GCCI_t$.[15] Previous information suggests

[14] Since the ADF test is often criticised for its low power in rejecting the null hypothesis, especially when the sample size is small, we also implement stationarity tests such as the KPSS test. Results of the unit root tests are available by the authors upon request.

[15] When we run the trace test some evidence in favor of r >1. Nevertheless, given our economic a priori based on our theoretical setup we set the rank r=1.

that our consumption function can be estimated by using a VECM(1).[16]

4 Results

Table 1 shows our main findings about the long-run and short-run effects of wealth on consumption. We follow a step by step approach, adding progressively new variables in the regressions.

We begin by estimating a simple version of the model described by equation (6), where we do not distinguish between financial and real assets ($\gamma^* = \gamma_1 = \gamma_2 = \gamma_3$) and do not include interest rates ($\alpha_1 = 0$ and $\beta_3 = 0$) neither the general credit condition index ($\alpha_{0c} = 0$ and $\beta_5 = 0$). Column [1] shows that both coefficients of the estimated permanent income to the current one (α_2) and the total net worth (γ^*) have the expected positive signs and are statistically significant. The estimated long-run marginal propensity to consume (*mpc*) out of total net worth is approximately 2.8 percent.[17]

Column [2] adds the real mortgage interest rate ($\alpha_1 \neq 0$) and the change of the nominal one ($\beta_2 \neq 0$). All long-run coefficients are statistically significant again: as expected, $\alpha_1 < 0$ confirming the negative relationship between consumption and real interest rate. Moreover, the introduction of r_t does not change the sign and the statistical significance of the other coefficients.

In column [3] we split up total net worth into the financial component and the housing one. This model can be represented by equation (6) when $\alpha_{0c} = \beta_5 = 0$ and $\gamma_1 = \gamma_2$. Our results show that the *mpc* of the financial assets is greater than that of housing one: a unit increase in financial and housing wealth would be associated with a yearly increase of 4.3 and 1.0 percent in total households' consumer spending, respectively. Both coefficients are statistically significant. Interestingly, the statistically significant coefficient associated to the forecast income growth turns out to be lower than one.

Column [4] relaxes the textbook model, by allowing the ratio to income of net liquid assets (liquid assets minus households' debt) to have a different coefficient from illiquid assets and housing wealth. With respect to the previous model we remove the constraint $\gamma_1 = \gamma_2$. This is a novelty for Italy. The estimated *mpc* out of net liquid assets (γ_1) is 5.4 percent and greater than the *mpc* of illiquid financial wealth ($\gamma_2 = 3.5$ percent) and of the *mpc* total net worth (γ^*) highlighted in column [1]. Coefficients related to net liquid and illiquid financial assets turn out statistically significant whilst the effect of the housing wealth remains significant but smaller ($\gamma_3 = 1.2$ percent).

In column [5] we introduce the general credit conditions index which should shift the intercept of the model. We do not find the expected shift due to the introduction of credit conditions: the associated parameter (α_{0c}) is statistically insignificant. However, we confirm all the previous findings: the coefficient related to the permanent income to the current one is positive and statistically significant; the *mpc* out of net liquid assets (5.7 per cent) is greater than the *mpc* of illiquid financial (3.0 percent) and housing (1.3 per cent) ones. The real mortgage interest rate has a negative influence on consumption whereas the estimated

[16] Results are available upon request.

[17] To derive the annualised *mpc*s of the wealth to income ratios, coefficients reported in Table 1 are multiplied by 4.

permanent income to the current one (α_2) accounts for around 60% percent of the variation of per capita real consumption.[18]

In all regressions from column [1] to column [5] we include three dummies inside the cointegration space to control for (i) the 1992 recession, (ii) the beginning of the financial turmoil in 2007, (iii) the start of the debt sovereign crisis in Italy.[19] Only the dummy for 1992 is statistically significant consistently with the sharp decrease of the total disposable income highlighted in figure 3.[20] Given this result we investigate further the issue. Brandolini, Gambacorta, and Rosolia (2018) find that the 1992 currency crisis and the double-dip recession from 2008 to 2013 affected consumption and savings rates. Sovereign debt crisis (10 quarters from 2011:q3 to 2013:q4) lasted longer than the previous slumps, in particular with respect to the 1992 one (6 quarters from 1992:q3 to 1993:q4). Then we test if the length of the crises affects our estimates by introducing step dummies rather than a dummy variable indicators for the events' quarters. So, in column [6] τ_i for $i = 1, 2, 3$ is equal to 1 if the Italian economy is in recession, according to the official dating by Istat, and 0 otherwise. This increases the relevance of the sovereign debt crisis but its coefficient remains not statistically significant. Moreover the *mpc* out of net liquid assets increases at 6.3 percent and the one out of the housing wealth rises at 1.8 percent. In this detailed specification both the explained variance and the log likelihood are the highest among all models.

Moving from the long-run to the short-run effects the current income (y_t) has a positive association with consumption. Public spending has a negative and significant influence on consumption while the effect of the credit condition index is positive. Finally, the speed of convergence to the long-run equilibrium (λ) is equal to 0.23 in column [6]) and it is statistically significant in all models.

[18] By running a stability analysis we find that our results are quite robust when different sample sizes are chosen (full sample; 1975-1995; 1975-2000; 1975-2015; 1985-2017).

[19] Outside the cointegrating relation, we also test the significance of additional dummy variables to control for other specific events, e.g. the official join of Italy to the single currency area in 1998 or the profit tax increases of funds and insurances relative to the other financial instruments in 2012 and 2014: no statistically significant effects arise.

[20] Rossi and Visco (1995) estimate that the impact of the 1992 social security reform in the long run leads the private saving ratio to rise by 3 percentage points.

Table 1: **Italian Consumption Function Estimates, 1975-2017.**

Dep. Var. = $\Delta \ln c_t$	Symbol	(1)	(2)	(3)	(4)	(5)	(6)
				Long-run effects			
Speed of adjustment	λ	0.123537 (0.01013) [12.1937]	0.153496 (0.00974) [15.7524]	0.196952 (0.01811) [10.8744]	0.211273 (0.02138) [9.88189]	0.210102 (0.02163) [9.71338]	0.234976 (0.02882) [8.15264]
$(\ln y_t - \ln c_{t-1})$	-	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Constant	α_0	0.191315 (0.02913) [6.56675]	0.233471 (0.02952) [7.90807]	0.222234 (0.02937) [7.56547]	0.191861 (0.03073) [6.24322]	0.162377 (0.04104) [3.95610]	0.147008 (0.03683) [3.99142]
$GCCI_t$	α_{0c}					-0.026391 (0.06818) [-0.38706]	0.039336 (0.06182) [0.63633]
r_t	α_1		-0.004404 (0.00215) [-2.04607]	-0.002929 (0.00166) [-1.76943]	-0.002903 (0.00156) [-1.85948]	-0.002656 (0.00160) [-1.66347]	-0.001842 (0.00143) [-1.28707]
y_t^P / y_t	α_2	1.190953 (0.13588) [8.76491]	1.325771 (0.11488) [11.5402]	0.743775 (0.10065) [7.39005]	0.635211 (0.09464) [6.71210]	0.590128 (0.10734) [5.49756]	0.484874 (0.10192) [4.75743]
A_{t-1}/y_t	$\gamma^* = \gamma_1 = \gamma_2 = \gamma_3$	0.007103 (0.00079) [8.97387]	0.006788 (0.00066) [10.3404]				
TFA_{t-1}/y_t	$\gamma_1 = \gamma_2$			0.010873 (0.00075) [14.5068]			
NLA_{t-1}/y_t	γ_1				0.013437 (0.00165) [8.14404]	0.014191 (0.00160) [8.85026]	0.015719 (0.00142) [11.0774]
IFA_{t-1}/y_t	γ_2				0.008699 (0.00207) [4.21102]	0.007586 (0.00206) [3.69063]	0.007071 (0.00184) [3.83584]
HA_{t-1}/y_t	γ_3			0.002583 (0.00120) [2.14784]	0.002927 (0.00121) [2.42366]	0.003234 (0.00155) [2.09071]	0.004528 (0.00152) [2.98034]

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Dep. Var. = $\Delta\ln c_t$	Symbol	(1)	(2)	(3)	(4)	(5)	(6)
d_1	τ_1	-0.196036	-0.136422	-0.096365	-0.097783	-0.081637	-0.053621
		(0.06538)	(0.05380)	(0.04104)	(0.03817)	(0.03672)	(0.01484)
		[-2.99844]	[-2.53566]	[-2.34781]	[-2.56144]	[-2.22340]	[-3.61405]
d_2	τ_2	-0.021878	-0.020373	-0.025658	-0.015145	-0.009851	-0.008334
		(0.06604)	(0.05257)	(0.04013)	(0.03750)	(0.03587)	(0.01247)
		[-0.33130]	[-0.38758]	[-0.63938]	[-0.40389]	[-0.27462]	[-0.66809]
d_3	τ_3	-0.091659	-0.066623	-0.006402	-0.003247	0.037752	-0.016775
		(0.06596)	(0.05230)	(0.04016)	(0.03738)	(0.03614)	(0.01288)
		[-1.38962]	[-1.27383]	[-0.15941]	[-0.08687]	[1.04458]	[-1.30286]
				Short-run effects			
$\Delta\ln y_t$	β_1	0.159617	0.164015	0.131594	0.123708	0.112405	0.086463
		(0.04159)	(0.04175)	(0.04073)	(0.04055)	(0.03935)	(0.03842)
		[3.83819]	[3.92843]	[3.23079]	[3.05041]	[2.85651]	[2.25030]
$\Delta\ln c_{t-4}$	β_2	0.315211	0.311097	0.286639	0.287384	0.306833	0.322005
		(0.06555)	(0.06766)	(0.06579)	(0.06507)	(0.06300)	(0.05951)
		[4.80879]	[4.59793]	[4.35658]	[4.41675]	[4.86998]	[5.41091]
Δnr_t	β_3		-0.000258	2.96E-05	0.000170	-0.000122	-0.000356
			(0.00098)	(0.00095)	(0.00095)	(0.00092)	(0.00088)
			[-0.26293]	[0.03108]	[0.17975]	[-0.13299]	[-0.40566]
$\Delta\ln c_t^P$	β_4	-0.052991	-0.056572	-0.056875	-0.053075	-0.051579	-0.049005
		(0.01948)	(0.01986)	(0.01915)	(0.01892)	(0.01828)	(0.01756)
		[-2.72036]	[-2.84857]	[-2.96934]	[-2.80546]	[-2.82103]	[-2.79034]
$\Delta_4 GCCI_{t-1}$	β_5					0.089824	0.062320
						(0.02355)	(0.02337)
						[3.81443]	[2.66631]
R^2		0.351109	0.349603	0.390906	0.400349	0.442707	0.482454
Adj. R^2		0.339093	0.333444	0.375773	0.385450	0.425291	0.466281
Log likelihood		1906.141	1745.843	1749.401	1750.128	2277.375	2284.342
AIC		-22.41133	-20.29932	-20.34.218	-20.35094	-26.49850	-26.58243
SC		-21.54897	-19.15575	-19.19.862	-19.20737	-25.03624	-25.12017

Notes: standard errors in parenthesis; t-statistics in square brackets. Dummies in column (6) are step dummies.

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5 Robustness Analysis

In this Section we run some robustness checks, using a different (i) estimation of the permanent income, (ii) interest rate and (iii) specification of the model. For comparison, in table 2 we report in the first column regression results [5] taken from table 1.

As discussed in Section 3.1 a strand of literature suggests to use a shorter horizon to calculate the permanent income ($y^P_{k=12}$): by setting 12 quarters, i.e. 3 years, we find $\alpha_2 =$ around 0.27 whereas the statistical significance of the real interest rate lowers. With reference to wealth effects, financial assets remain statistically significant while housing wealth lowers its significance (table 2).

Our econometric results are robust when we use a different estimation of the permanent income which takes into account economic and demographic variables. Following Chauvin and Muellbauer (2018) we regress the permanent income computed in equation 3 on a set of economic and demographic variables, introducing a double split trend corresponding to the 1992-1993 and 2007-2009 crises. We assume that the post 1993 and the post 2009 slowdowns were not foreseen: economic agents learn gradually about the recessions (the details are reported in appendix A.2). By using the fitted values of the learning model we basically confirm all previous results (y^P_{lear}).

Then we analyse the effects of interest rates on bonds and deposits on consumption. One may envisage that higher returns on deposits and bonds might increase saving and depress consumption. Columns [r_{dep}] and [r_{bond}] show the estimates in the case of the real deposits rate and the real benchmark bond rate of the General Government with an average duration equals to 6.5 years rather than the real mortgage one. As already seen mortgage rates influence consumption. We get negative – but not significant – effects of the interest rates on deposits and bonds on consumption.[21] All other previous results are confirmed.

In the last two columns of table 2 we test different specifications of the model in order to assess possible changes in the magnitude of the *mpc*s out of wealth. Column [GLA] provides estimates for a specification in which we separate gross liquid assets ($\gamma_{1,gla}$) and debts ($\gamma_{1,loans}$). All our previous results hold and we do not observe large improvements in the contribution of liquid assets: the *mpc* out of gross liquid wealth is statistically significant around 5.2 percent whereas debts show a not statistical significant coefficient. Finally, column [HP] reports estimations by adding the log ratio between house prices and per capita income to proxy the saving need for a downpayment. On the one hand, since in Italy houses are very often acquired through inheritance, when housing prices go up we can expect positive effects on consumption from housing assets. On the other hand, given the relatively undeveloped mortgage market, people who do not have their own house must save to buy it: for them we could expect a negative sign from the saving for a downpayment. Overall, we find a small housing wealth effect (γ_3) which is offset by the downpayment one (γ_4).

[21] Elmendorf (1996) shows as economists' understanding of the response of household saving and consumption to changes in interest rates is quite limited and it is not possible to provide a precise estimate of the interest rate elasticity of saving with any confidence. Moreover, Cloyne, Ferreira, and Surico (2016) highlights that households heterogeneity matters for the monetary policy transmission: after an interest rate change, households with mortgages to pay adjust their consumption significantly whereas renters and outright home-owners are far less sensitive.

Table 2: **Robustness estimations.**

Dep. Var. = $\Delta \ln c_t$	Symbol	(5)	$y^P_{k=12}$	y^P_{lear}	r_{dep}	r_{bond}	*GLA*	*HP*
				Long-run effects				
Speed of adjustment	λ	0.210102	0.161423	0.203363	0.194310	0.198852	0.223054	0.270419
		(0.02163)	(0.02685)	(0.02910)	(0.02374)	(0.02328)	(0.01749)	(0.01178)
		[9.71338]	[6.01097]	[6.98892]	[8.18469]	[8.53997]	[12.7560]	[22.9597]
$(\ln y_t - \ln c_{t-1})$	-	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Constant	α_0	0.162377	0.130605	0.143244	0.134497	0.142214	0.261832	2.256490
		(0.04104)	(0.05352)	(0.04222)	(0.03967)	(0.04465)	(0.05859)	(0.49624)
		[3.95610]	[2.44024]	[3.39313]	[3.39060]	[3.18538]	[4.46883]	[4.54720]
$GCCI_t$	α_{0c}	-0.026391	-0.051453	-0.011390	-0.030645	-0.019055	0.041875	-0.025742
		(0.06818)	(0.07987)	(0.06867)	(0.07383)	(0.08117)	(0.07312)	(0.05578)
		[-0.38706]	[-0.64420]	[-0.16587]	[-0.41508]	[-0.23474]	[0.57269]	[-0.46145]
r_t	α_1	-0.002656	-0.000157	-0.002370	-0.000900	-0.000986	-0.003581	-0.004736
		(0.00160)	(0.00210)	(0.00169)	(0.00158)	(0.00140)	(0.00149)	(0.00121)
		[-1.66347]	[-0.07444]	[-1.40037]	[-0.56819]	[-0.70464]	[-2.40916]	[-3.89850]
y^P_t / y_t	α_2	0.590128	0.266156	0.450799	0.494272	0.508373	0.797780	0.923231
		(0.10734)	(0.19899)	(0.11793)	(0.12134)	(0.11751)	(0.11417)	(0.08140)
		[5.49756]	[1.33754]	[3.82264]	[4.07332]	[4.32606]	[6.98737]	[11.3417]
NLA_{t-1}/y_t	γ_1	0.014191	0.016301	0.016222	0.014771	0.015031		0.013243
		(0.00160)	(0.00226)	(0.00165)	(0.00174)	(0.00171)		(0.00135)
		[8.85026]	[7.21209]	[9.86058]	[8.47449]	[8.80216]		[9.77825]
GLA_{t-1}/y_t	$\gamma_{1,gla}$						0.012837	
							(0.00155)	
							[8.27937]	
$LOANS_{t-1}/y_t$	$\gamma_{1,loans}$						0.005134	
							(0.01164)	
							[0.44110]	
IFA_{t-1}/y_t	γ_2	0.007586	0.005784	0.007693	0.008267	0.008008	0.004709	0.001398
		(0.00206)	(0.00272)	(0.00212)	(0.00225)	(0.00216)	(0.00258)	(0.00192)
		[3.69063]	[2.12872]	[3.62775]	[3.68198]	[3.70352]	[1.82598]	[0.73025]
HA_{t-1}/y_t	γ_3	0.003234	0.002231	0.002993	0.003087	0.003221	0.001792	0.008446
		(0.00155)	(0.00219)	(0.00160)	(0.00168)	(0.00167)	(0.00174)	(0.00159)
		[2.09071]	[1.01841]	[1.86532]	[1.83394]	[1.93022]	[1.02951]	[5.30223]
$\ln HP_{t-1}/y_{t-1}$	γ_4							-0.163060
								(0.03867)
								[-4.21658]

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Dep. Var. $= \Delta \ln c_t$	Symbol	(5)	$y^P_{k=12}$	y^P_{lear}	r_{dep}	r_{bond}	*GLA*	*HP*
d_1	τ_1	-0.081637	-0.117850	-0.084342	-0.103100	-0.099782	-0.059600	-0.057696
		(0.03672)	(0.04849)	(0.03822)	(0.03889)	(0.03832)	(0.03418)	(0.02773)
		[-2.22340]	[-2.43041]	[-2.20682]	[-2.65113]	[-2.60359]	[-1.74377]	[-2.08083]
d_2	τ_2	-0.009851	-0.010330	-0.012282	-0.015466	-0.015221	0.003200	0.018591
		(0.03587)	(0.04742)	(0.03717)	(0.03884)	(0.03798)	(0.03358)	(0.02732)
		[-0.27462]	[-0.21785]	[-0.33043]	[-0.39821]	[-0.40074]	[0.09529]	[0.68058]
d_3	τ_3	0.037752	0.044400	0.039265	0.038612	0.041746	0.030444	0.019177
		(0.03614)	(0.04777)	(0.03745)	(0.03915)	(0.03888)	(0.03378)	(0.02741)
		[1.04458]	[0.92955]	[1.04847]	[0.98627]	[1.07378]	[0.90137]	[0.69964]
				Short-run effects				
$\Delta \ln y_t$	β_1	0.112405	0.088389	0.092708	0.103866	0.104653	0.123107	0.147144
		(0.03935)	(0.04202)	(0.04021)	(0.03968)	(0.03955)	(0.03933)	(0.03998)
		[2.85651]	[2.10357]	[2.30558]	[2.61775]	[2.64641]	[3.13034]	[3.68014]
$\Delta \ln c_{t-4}$	β_2	0.306833	0.366271	0.326777	0.319367	0.314681	0.299102	0.308774
		(0.06300)	(0.06338)	(0.06262)	(0.06117)	(0.06266)	(0.06380)	(0.06537)
		[4.86998]	[5.77904]	[5.21870]	[5.22058]	[5.02184]	[4.68843]	[4.72378]
Δnr_t	β_3	-0.000122	-0.035800	-0.000126	-0.046656	-0.047555	-0.054538	-0.053622
		(0.00092)	(0.01885)	(0.00093)	(0.01805)	(0.01802)	(0.01843)	(0.01884)
		[-0.13299]	[-1.89963]	[-0.13554]	[-2.58496]	[-2.63878]	[-2.95946]	[-2.84554]
$\Delta \ln c^P_t$	β_4	-0.051579	-0.000413	-0.039876	-0.000488	4.98E-05	-0.000257	-0.000421
		(0.01828)	(0.00095)	(0.01828)	(0.00140)	(0.00096)	(0.00092)	(0.00094)
		[-2.82103]	[-0.43416]	[-2.18101]	[-0.34960]	[0.05185]	[-0.27936]	[-0.44872]
$\Delta_4 GCCI_{t-1}$	β_5	0.089824	0.107457	0.100755	0.092731	0.090688	0.090993	0.089968
		(0.02355)	(0.02421)	(0.02353)	(0.02346)	(0.02375)	(0.02363)	(0.02422)
		[3.81443]	[4.43848]	[4.28114]	[3.95259]	[3.81896]	[3.85032]	[3.71531]
R^2		0.442707	0.400371	0.435417	0.440952	0.442380	0.437896	0.413290
Adj. R^2		0.425291	0.381633	0.417773	0.423482	0.424954	0.420330	0.394956
Log likelihood		2277.375	2232.294	2117.655	2274.590	2261.609	2516.595	2820.691
AIC		-26.49850	-25.95535	-25.02644	-26.46493	-26.30854	-29.29633	-32.96013
SC		-25.03624	-24.49309	-23.54600	-25.00267	-20.484628	-27.70284	-31.36664

Notes: standard errors in parenthesis; t-statistics in square brackets.

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6 Conclusions

The recent financial and economic crises and their impact on households' wealth have spurred new interest on the relationship between consumption and wealth. This paper studies the long-run effects of housing and financial wealth on household consumption in Italy. Our main contribution is to estimate a VEC model with a disaggregation of financial wealth into a net liquid component (deposits, bonds, quoted shares, and mutual funds net of total debts) and an illiquid one (unquoted shares and insurance technical reserves). Using quarterly data, our analysis covers the time span from 1975 to 2017.

We find a positive and statistically significant effect of financial and housing assets on consumption. The influence of net liquid wealth (about 6 per cent) is greater than that of illiquid assets (about 3 per cent) whereas housing effect is positive but smaller (less than 2 per cent). Our results are broadly consistent with Bassanetti and Zollino (2010), who find that the marginal propensity to consume out of housing and non housing wealth is in the range of, respectively, 1.5-2 and 4-6 per cent. Our results show that permanent income has a positive impact on consumption while the effect of the real interest rate is negative. An index of credit constraints does not imply a robust significant shift of the consumption-income ratio while being relevant in the short-run.

The econometric results are robust to the use of different methods to estimate permanent income and to the inclusion in the regressions of control variables to take into account pension reforms, recessions, public spending, and interest rates on deposits and bonds. Permanent shocks and macroeconomic conditions matter: for instance the currency crises of 1992 had a negative significant association with consumption.

References

Andersen, Y. H and S. Leth-Petersen. 2019. "Housing Wealth Effects and Mortgage Borrowing." Working Paper 133, Danmarks Nationalbank.

Ando, A. and F. Modigliani. 1963. "The Life Cycle Hypothesis of Savings: Aggregate Implications and Tests." *American Economic Review* 53:55–84.

Aron, J., J. V. Duca, J. Muellbauer, A. Murphy, and K. Murata. 2012. "Credit, Housing Collateral and Consumption, Evidence from the U.K., Japan and the U.S." *Review of Income and Wealth* 58 (3):397–423.

Aron, J. and J. Muellbauer. 2013. "Wealth, Credit Conditions, and Consumption: Evidence From South Africa." *Review of Income and Wealth* 59:S161–S196. (Special Issue).

Balta, N. and E. Ruscher. 2011. "Household Savings and Mortgage Decisions: the Role of the Down-Payment Channel in the Euro Area." Economic Papers 445, European Commission.

Bank of Italy. 2018. "Annual Report for 2017." May 2018.

Barrell, R., M. Costantini, and I. Meco. 2015. "Housing wealth, financial wealth, and consumption: New evidence for Italy and the UK." *International Review of Financial Analysis* 42:316–323.

Bassanetti, A., M. Cecioni, A. Nobili, and G. Zevi. 2009. "The main recessions in Italy: a retrospective comparison." Questioni di Economia e Finanza (Occasional Papers) 46, Bank of Italy, Economic Research and International Relations Area.

Bassanetti, A. and F. Zollino. 2010. *Housing Markets in Europe*, chap. "The Effects of Housing and Financial Wealth on Personal Consumption: Aggregate Evidence for Italian Households". Springer.

Boone, L. and N. Girouard. 2002. "The stock market, the housing market and consumer behaviour." OECD Economic Studies 35, OECD.

Brandolini, A., R. Gambacorta, and A. Rosolia. 2018. "Inequality amid income stagnation: Italy over the last quarter of a century." Questioni di Economia e Finanza (Occasional Papers) 442, Bank of Italy, Economic Research and International Relations Area.

Bruno, G. 2008. *Financial Accounts: History, Methods, the Case of Italy and International Comparisons*, chap. Obtaining quarterly Series From the Annual Financial Accounts. Bank of Italy.

Buiter, W. H. 2010. "Housing Wealth Isn't Wealth." *Economics - The Open-Access, Open-Assessment E-Journal* 4:1–29.

Cannari, L., G. D'Alessio, and G. Vecchi. 2017. *Measuring Wellbeing. A History of Italian Living Standards*, chap. Wealth. Oxford University Press.

Carrol, C. 2001a. "Death to the Log-Linearized Consumption Euler Equation! (And Very Poor Health to the Second-Order Approximation)." *Advances in Macroeconomics* 1 (1):article 6, 1–32.

———. 2001b. "A Theory of the Consumption Function with and without Liquidity Constraints." *Journal of Economic Perspectives* 15 (3):23–45.

Catte, P., N. Girouard, R. Price, and C. André. 2004. "Housing markets, wealth, and the business cycle." OECD Economics Department Working Paper 394, OECD.

Chauvin, V. and J. Muellbauer. 2018. "Consumption, household portfolios and the housing market in France." In *Economics and Statistics*, vol. 58. 157–178.

Cloyne, J., C. Ferreira, and P. Surico. 2016. "Monetary Policy When Households Have Debt: New Evidence on the Transmission Mechanism." Bank of England Working Paper 589, Bank of England.

Cooper, D. and K. Dynan. 2016. "Wealth Effects and Macroeconomic Dynamics." *Journal of Economic Surveys* 30 (1):34–55.

De Bonis, R., D. Caprara, and L. Infante. 2018. "Household Wealth in Italy and in Advanced Countries." Questioni di Economia e Finanza (Occasional Papers) 470, Bank of Italy, Economic Research and International Relations Area.

De Bonis, R. and M. Marinucci. 2017. "A first look at the links between aggregate household wealth and some macroeconomic variables." Mimeo, Bank of Italy.

De Bonis, R. and A. Silvestrini. 2012. "The effects of financial and real wealth on consumption: new evidence from OECD countries." *Applied Financial Economics* 22 (5):409–425.

Deaton, A. 1991. "Saving and Liquidity Constraints." *Econometrica* 59 (5):1221–1248.

Dickey, D. A. and W. A. Fuller. 1979. "Distribution of the Estimators for Autoregressive Time Series with a Unit Root." *Journal of American Statistical Association* 74 (366):427–431.

Duca, J. V. and J. Muellbauer. 2014. *A Flow-of-Funds Perspective on the Financial Crisis*, chap. "Tobin LIVES: Integrating Evolving Credit Market Architecture into Flow-of-Funds Based Macro-Models". Palgrave Studies in Economics and Banking. Palgrave Macmillan, London.

Elmendorf, D. W. 1996. "The Effect of Interest-Rate Changes on Household Saving and Consumption: A Survey." Finance and Economics Discussion Series 27, Board of Governors of the Federal Reserve System (U.S.).

Friedman, M. 1957. *A Theory of the Consumption Function.* Princeton University Press. Princeton, NJ.

———. 1963. *Measurement in Economics*, chap. Windfalls, the 'Horizon' and Related Concepts in the Permanent Income Hypothesis. Stanford University Press, Palo Alto, CA.

Grant, C., R. Miniaci, and G. Weber. 2002. "Changes in Consumption Behaviour: Italy in the Early 1990s." *Giornale degli Economisti* 61 (1):61–101.

Guiso, L., M. Paiella, and I. Visco. 2006. "Do Capital Gains Affect Consumption? Estimates of Wealth Effects from Italian Households' Behavior." In *Long-run Growth and Short-run Stabilization*, Chapters, chap. 3. Edward Elgar Publishing.

Jappelli, T. and M. Pagano. 1994. "Saving, Growth and Liquidity Constraints." *Quarterly Journal of Economics* 109:83–109.

Jappelli, T. and A. Scognamiglio. 2016. "Monetary Policy, Mortgages and Consumption: Evidence from Italy." Working Paper 454, CSEF Working Papers.

Johansen, S. 1991. "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models." *Econometrica* 59 (6):1551–1580.

———. 1995. *Likelihood-based Inference in Cointegrated Vector Autoregressive Models*. Oxford University Press.

Kwiatkowski, D., P. C. B. Phillips, P. Schmidt, and Y. Shin. 1992. "Testing the null hypothesis of stationarity against the alternative of a unit root." *Journal of Econometrics* 54 (13):159–178.

Liberati, D. and V. Vacca. 2016. "With (more than) a little help from my bank. Loan-to-value ratios and access to mortgages in Italy." Questioni di Economia e Finanza (Occasional Papers) 315, Bank of Italy.

Miles, D. 1992. "Housing Markets, Consumption and Financial Liberalization in the Major Economies." *European Economic Review* 36:1093–1136.

Miniaci, R. and G. Weber. 1999. "The Italian Recession of 1993: Aggregate Implications of Microeconomic Evidence." *The Review of Economics and Statistics* 81 (2):237–249.

Muellbauer, J., P. St-Amant, and D. Williams. 2015. "Credit Conditions and Consumption, House Prices and Debt: What Makes Canada Different?" Staff Working Paper 40, Bank of Canada.

Poterba, J. M. and J. Manchester. 1989. "Second Mortgages and Household Saving." *Regional Science and Urban Economics* 19:325–46.

Rodano, L. and C. Rondinelli. 2014. "The Italian Household Consumption: A Comparison Among Recessions." *Politica economica* (2-3):203–234.

Rossi, N. and I. Visco. 1995. "National saving and social security in Italy." *Ricerche Economiche* 49 (4):329–356.

Slacalek, J. 2009. "What drives personal consumption? The role of housing and financial wealth." *The B.E. Journal of Macroeconomics* 9 (1). (Topics).

Sousa, R. M. 2010. "Wealth effects on consumption: evidence from the Euro Area." *Banks and Bank Systems* 5 (2):70–78.

Appendix

A.1 Raw data descriptive statistics

In this Section we show the main descriptive statistics of the variables used in the analysis. Then, we report the high frequency data used to disaggregate the low frequency ones.

Time series (obs. 172)	Mean	Median	Max	Min	S.D.
Consumption (billions)	147.0567	152.507	263.261	11.275	83.98126
Consumer Price Index	0.673156	0.745334	1.089300	0.098104	0.310897
Disposable income (billions)	171.8844	191.0208	293.0782	13.93096	91.64209
Public spending (billions)	13.66560	12.16600	26.29400	0.911390	8.315137
Public spending deflator	0.679971	0.755915	1.017700	0.164010	0.285057
Total population (thousands)	57,512.94	57,030	60,758	54,659	1,713.409
Annual Gross Domestic Product (billions)	1,364.010	1,424.891	1,690.222	8,503.673	247.2216
Housing and land (billions)	2,857.804	2.510.444	5,946.776	192.5057	1,970.303
Deposits and currency (billions)	613.7531	652.1050	1,360.950	38.00218	414.3684
Bonds (billions)	398.4576	431.4650	802.1000	7.810000	261.0661
Insurances and pension schemes (billions)	322.0681	194.4000	995.1000	3.820000	307.4185
Quoted shares (billions)	63.82302	69.27000	208.8300	0.060000	48.60939
Unquoted shares (billions)	438.6559	297.3900	1,221.450	0.380000	341.8622
Mutual funds (billions)	199.7385	121.5700	532.2400	0.173000	190.2826
Loans (billions)	281.8244	177.3050	717.2700	5.370000	267.4981
Ratio between used and granted credit lines ($\times$ -1)	-0.672517	-0.667000	-0.528000	-0.830000	0.070435
Mortgage interest rate (percent)	9.969496	10.01365	23.70400	1.970500	6.264203
Deposit interest rate (percent)	5.705121	5.929850	15.31300	0.298140	4.744162
Bond interest rate (percent)	8.669795	8.974300	21.21000	0.704280	5.396912
Nominal house prices (euros/m^2)	885.3302	910.3700	91.45000	1632.400	509.7601

Table A.1: **Descriptive Statistics: 1975-2017.**

Time series	Source	Frequency	Temporal disaggregation/aggregation
Consumption	Istat	Quarterly	-
Consumer Price Index	Istat	Monthly	Quarterly average
Disposable income	Istat	Quarterly data from 1995; Annual data before	High freq. data: private sector disposable income
Public spending	Istat	Quarterly	-
Public spending deflator	Istat	Quarterly	-
Total population	Istat	Quarterly	-
Gross Domestic Product	Istat	Quarterly	-
Housing and land	Istat	Annual official (estimated) data from (before) 1991;	High freq. data: House prices
Deposits and currency	Bank of Italy	Quarterly data from 1995; Annual data before	High freq. data: M2plus
Bonds	Bank of Italy	Quarterly data from 1995; Annual data before	High freq. data: Stocks of Gov. securities and Republic of Italy loans
Insurances and pension schemes	Bank of Italy	Quarterly data from 1995; Annual data before	High freq. data: Stocks of Gov. securities and Republic of Italy loans
Quoted shares	Bank of Italy	Quarterly data from 1995; Annual data before	High freq. data: Stock index
Unquoted shares	Bank of Italy	Quarterly data from 1995; Annual data before	High freq. data: Stock index
Mutual funds	Bank of Italy	Quarterly data from 1995; Annual data before	High freq. data: Stock index
Loans	Bank of Italy	Quarterly	-
Ratio between used and granted credit lines	Bank of Italy	Quarterly	-
Mortgage interest rate	Bank of Italy	Monthly	Quarterly average
Deposit interest rate	Bank of Italy	Monthly	Quarterly average
Bond interest rate	General Government	Monthly	Quarterly average
Nominal house prices	ECB and Revenue Agency	Quarterly	-

Table A.2: **Data: Source and Treatment.**

A.2 The permanent income forecasting model

In the following we report the forecasting model with households' learning (see Chauvin and Muellbauer, 2018). By departing from the permanent income described in Section 3.1 we add some economic and demographic variables:

$$\begin{aligned} \ln y^P \sim c + t + t^{1993:q4}_{learning} + t^{2009:q4}_{learning} \\ + \ln y_t + MIB_t + \ln hp_t + r_{ma,t-1} + spread_t \\ + \Delta(u_{ma,t} - u_{ma,t-9}) + \ln \frac{labor_{t-1}}{pop_{t-1}} + \ln \frac{pop_{45-60,t}}{pop_t} + \varepsilon_t \end{aligned} \tag{A.1}$$

where c and t represent the intercept and time trend of the regression, $\ln y$ is the log real per capita income, MIB is the real primary benchmark Index for the Italian equity markets, $\ln hp$ represents the log real house prices, r_{ma} is the 4-quarters moving average of the real mortgage rate, $spread$ is the difference between the returns of the German and Italian 10 years T-bills, u_{ma} is the 4-quarters moving average of unemployment rate, $\ln \frac{labor}{pop}$ is the log of the ratio between the labor force and the total population and $\ln \frac{pop_{45-60}}{pop}$ is the log of the ratio between the population aged in the class 45-60 years and the total population. Finally, $t^{1993:q4}_{learning}$ and $t^{2009:q4}_{learning}$ are dummies used to assume a gradual learning over 2 years from 1993:q4 and 2009:q4, respectively. In particular, $t^{1993:q4}_{learning}$ ($t^{2009:q4}_{learning}$) is computed by using a 2-year declining weighted moving average with quarterly discount factor of 0.95 of a dummy equal to 0 until 1993:q3 (2009:q3), and 1,2,3, and so on, from 1993:q4 (2009:q4). The regression is estimated by OLS methods (see table A.3). The forecasted permanent

Dependent variable: Log real permanent income	Sample: 1975:q1-2017:q4				
	Coefficient	Std. Error	t-value	Pr(>|t|)	
Constant	-3.7950089	0.2651992	-14.310	< 2e-16	***
Linear trend	0.0034121	0.0002651	12.873	< 2e-16	***
Split Trend from 1993:Q4; discounted present value	-0.0031829	0.0002541	-12.528	< 2e-16	***
Split Trend from 2009:Q4; discounted present value	-0.0022446	0.0004118	-5.451	1.86e-07	***
Log real per capita income	0.1958700	0.0407851	4.802	3.58e-06	***
Log real stock market index	0.0090984	0.0033538	2.713	0.007401	***
Log real house prices	-0.1099885	0.0096041	-11.452	< 2e-16	***
Borrowing real interest rate (4-qts moving average, t-1)	-0.0037669	0.0007815	-4.820	3.31e-06	***
Log labor force/total population (t-1)	0.5320262	0.0801153	6.641	4.62e-10	***
Spread IT-DE 10 years T-bill	0.0012901	0.0005447	2.368	0.019067	*
Δ unemployment rate (4-qts moving average, t - t-9)	-0.0036659	0.0010661	-3.438	0.000746	***
Log population aged between 45-60/total population	0.0890290	0.0616464	1.444	0.150642	
DW	0.5797				
R^2	0.9899				
Adj. R^2	0.9892				
Residual standard error:	0.0111				

Notes: Statistical significance at the 10%, 5% and 1% levels are denoted by *, ** and ***.

Table A.3: **Estimates for the permanent income model.**

income is shown in figure A.1 where it is also possible to appreciate the effect of the linear and split trends. Figure A.2 reports the forecasted income growth.

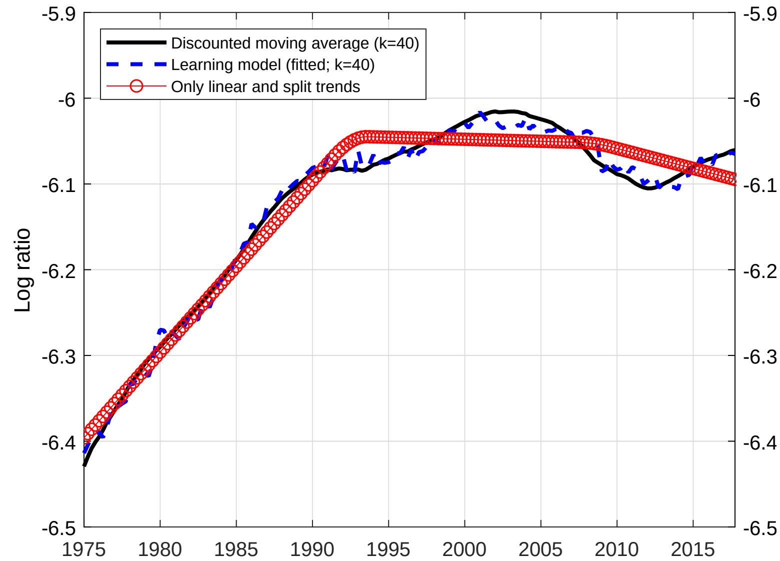

Figure A.1: **Permanent income.**

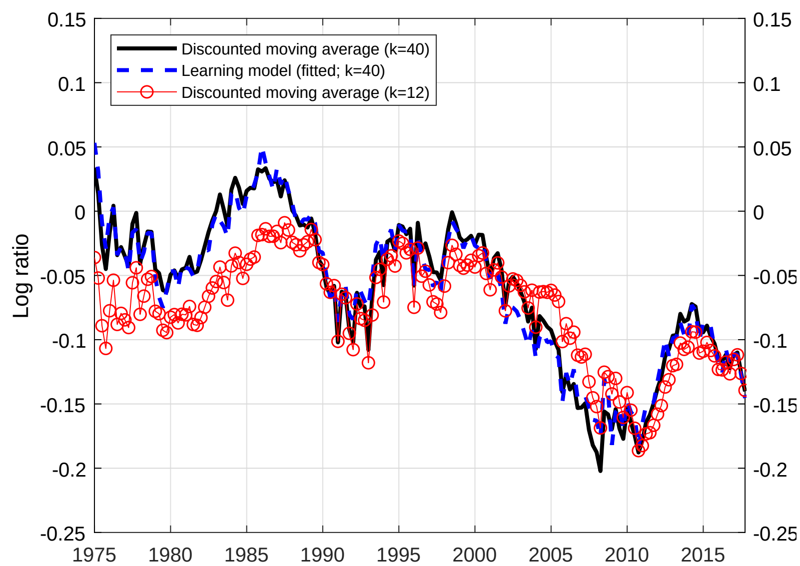

Figure A.2: **Forecasted permanent income growth.**