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## Abstract

This paper aims to fill the gap on the analysis of risksharing channels at the micro level, both within and across households. Using data from the Bank of Italy's Survey on Household Income and Wealth covering the financial crisis, we are able to quantify in a unified and consistent framework several risksharing mechanisms that so far have been documented separately. We find that Italian households were able to smooth at least 78% of shocks to household head's non-financial income (labelled "basic income") in 2008-2010, a fraction rising to 80% in 2010-2012. The most important smoothing mechanism turns out to be within-household risksharing, which is able to absorb about half of a shock; but an analysis by net wealth discloses striking differences in within-household risksharing between "poor" and "rich" households. Self-insurance through saving/dissaving is also notable, as it cushions 28% of changes in basic income in 2008-2010, and 24% in 2010-2012. Interestingly, risksharing through portfolio diversification and private transfers is rather limited, but the overall degree of shock absorption occurring through private risksharing channels reaches 70%, as opposed to a meager 7% of a shock cushioned by public transfers and taxes.

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*Keywords:* Household Risksharing; Precautionary Saving; Consumption Smoothing; Income Smoothing.

“...[T]he only way to obtain such measures [of income and consumption] is by imposing an accounting framework on the data, and painstakingly constructing estimates from myriad responses to questions about the specific components that contribute to the total.”

Angus Deaton (1997)

# 1. Introduction

Households lie at the center of economic analysis, as they are the core unit of several decision-making processes and perform many economically relevant roles. In fact, there is a large literature focusing on the many roles that households play, both through market transactions (purchases of goods and services, supply of labor and capital services, management of home productions) and via non-market interactions (mutual assistance). Many of these activities are aimed at sharing risk both among household members and across households.

In fact, the idea that marriage produces some kind of risk sharing among its constituents has surfaced many times in the literature. Since Becker's contributions (1973, 1974)[10, 11], households economics has many times stressed the idea that marriage fosters risk sharing. The underlying idea is that transfers between spouses do achieve some smoothing in individual income streams' variability. Some authors (for example, Chami and Hess, 2005[20]) have gone as far as to suggest that individuals also marry in order to secure some hedging against macroeconomic risks. A bunch of applied studies (which most frequently employ micro data) provide some support to the idea that marriage achieves a certain amount of risk sharing (as, for example, in the contributions by Rosenzweig and Wolpin, 1985[65], 1994[64]; Rosenzweig, 1988[62]; Rosenzweig and Stark, 1989[63], and others).

There is, however, another subtle way that marriage may influence risk sharing, as it may be the case that more risk sharing comes at the expense of saving, as long as people feel more secure in their spousal agreement (as suggested, for example, by Devereux and Smith 1994[29]). This might decrease the buffer stock from which consumption shocks get smoothed, by the saving/dissaving channel.

As for risksharing across households, suffice it to note that the modern theory of risksharing has been developed centering on the household (or the individual) as its basic decision unit, entering transactions in the market (Arrow 1964[3], Townsend 1994[69]; see Huang and Litzenberger 1988[43] or Deaton 1992[24] for a systematization).

Yet despite the pivotal role that household risksharing plays in basic economic agents' decisions, very little empirical research has been devoted to the identification and measurement of the mechanisms through which households cope with the risk of income shocks, both between and within them. To be sure, initial empirical tests of risksharing were carried out at the micro level (Cochrane, 1991[21]; Mace, 1991[53]; Nelson 1994[56]; Hayashi, Altonji and Kotlikoff 1996[41]; Attanasio and Davis 1996[5], Declich and Ventura 2000[26]; Grande and Ventura 2002[37]; Krueger and Perri 2005[49], 2011[50]; Gervais and Klein 2010[36]); however these studies could only test whether the null hypothesis of full risksharing was rejected or not, without being able to identify or measure the economic mechanisms at work. This is all the more unsatisfactory when one considers that theoretical models predicting partial risksharing have been put forward.[1] On the other hand, the macro literature on international risksharing - whose theoretical underpinning is typically a representative-agent extension of the basic micro framework - has proceeded much further in the empirical analysis of risksharing channels. After the first regression tests[2] of full risksharing (Canova and Ravn 1996)[15], a vast body of literature has developed, starting with Asdrubali, Sørensen and Yosha (1996)[4], henceforth ASY (1996), with the aim to measure the extent of risksharing channels across countries (or regions) within a unified framework. In sum, as Blundell, Pistaferri, and Preston (2008)[12] point out, beside household saving and borrowing, there is scattered evidence on the role played by various partial insurance mechanisms on household consumption.

This paper aims to fill the gap on the analysis of risksharing channels at the micro level, both within and across households. Using data from the Bank of Italy's Survey on Household Income and Wealth (SHIW) in 2008-2012, we regress consecutive household income measures (from household non-financial income to household income, to household disposable income) on household head's non-financial income. By doing so, we are able to quantify in a unified and consistent framework risksharing mechanisms that so far have been documented separately. A well-known mechanism is portfolio diversification, which can be implemented

[1] Incomplete risksharing may arise due to exogenous factors, such as market incompleteness and transaction costs, or endogenous factors, such as limited commitment or enforceability (see Kehoe and Levine 1993[47], further developed by Kocherlakota 1996, Alvarez and Jermann 2000[2], Krueger and Uhlig 2006[48], Krueger and Perri 2011a[51]) and moral hazard.

[2] Tests of risksharing have also used correlation analysis to identify cross-country or cross-regional risksharing. Examples of this strand of the literature include Backus, Kehoe, and Kydland (1992)[8]), Pakko (1997)[58], Hess and Shin (1998)[42] and many others.

through complete markets for contingent claims or appropriate more parsimonious (and realistic) financial structures. Its role has been studied and quantified by Arrow (1964)[3], (1996) and Townsend (1994)[69], among others.[3] Another classical risksharing channel consists of fiscal transfer/tax mechanisms.[4] This has been introduced by Sachs and Sala-i-Martin (1992)[66] and von Hagen (1992)[70]. Dynarski and Gruber (1997)[31] study the smoothing effect on US household consumption of government transfers (including retirement income) and taxes separately. For Italy, Dedola, Usai and Vannini (1999)[28], Mélitz and Zumer (1999)[54] and Decressin (2002)[27] carry out analyses of public risksharing, but at a macro level. An important - albeit less studied - channel of consumption smoothing is intra-household risksharing, that is the smoothing of the household head's income shocks through other members' income changes. Hayashi, Altonji and Kotlikoff (1996)[41] and Dynarski and Gruber (1997) quantify the role of "wife's earnings", finding little effects. On the contrary, García-Escribano (2004)[33] models risksharing within families explicitly, obtaining the opposite result. Informal risksharing between households - through private gifts, transfers, aid and services - has been extensively studied in developing economies, but rarely quantified in Western countries, at least in the way we do in our empirical analysis. Finally, household self-insurance through asset accumulation and depletion (lending and borrowing in credit markets) has received the most attention, as it stems from the literature on permanent income/life cycle behavior. While the basic idea of our paper consists in applying the ASY methodology to households instead of countries, a mere carry-over of the ASY (1996) SUR estimation to a micro setting would be problematic. Indeed, differences exist between macro data on countries and micro data on households, as: i) the former typically include the entire population, while the latter constitute a sample to make inference on, with consequences in terms of selection bias and representativeness; ii) the former are typically more reliable, both because they originate from official sources and because they benefit from a sort of "convexification" due to aggregation, whereas the latter may be marred by measurement errors, especially in income variation; iii) data at country level are typically influenced by fewer variables than data at the household (or individual) level. Thus economic relations at lower aggregation levels can be identified only subject to more controls (demographic, geographic, economic, family-linked) than at higher aggregation levels. These difficulties may

[3]As mentioned above, many seminal studies on risksharing - which explicitly or implicitly only took into account portfolio diversification - aimed at testing full risksharing, without paying attention to its quantification.

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partly explain the relative scarcity of studies on risksharing channels at the micro level in the last 20 years.[5]

This paper takes on the task of identifying and measuring household risksharing channels, and addresses the issues outlined above in several ways. First, by focusing on the household head's income, rather than on the household income, we mitigate endogeneity arising from the joint determination of consumption and hours of work (Dynarski and Gruber 1997) or other household-specific unobservable characteristics. Second, by testing regressions with prime-age household heads, we can avoid issues arising from life-cycle/permanent-income intertemporal choices, and focus on cross-sectional (i.e. risksharing) aspects. Third, we address the issue of measurement errors - which is particularly serious in survey microdata [6] - both in the independent variables (by using IV estimations), and in the dependent variables (by offsetting the increased standard error through accurate sample selection). Fourth, by adopting a specification based on household (head)'s income as a regressor (instead of aggregate income), we can more easily address the influence of taste shocks on the risksharing metric.[7]

Our reliance on SHIW data presents advantages which have been rarely exploited by the risksharing literature. Indeed, unlike the PSID - which only collects consumption data on food and housing, and not every year - SHIW surveys collect data on all consumption items on a biannual frequency, providing us with a more complete view of total consumption expenditure. In addition, by using true panels of households over couples of consecutive waves and using first differences, we reduce issues of attrition and avoid the inefficiencies of unbalanced data plaguing most previous analyses. Furthermore, unlike CEX data, observations on consumption and incomes in SHIW are collected for coincident periods. As Dynarski and Gruber (1997) point out, the availability of US representative consumption data only in the PSID and CEX surveys has forced researchers to merge them with income data at a higher level of aggregation;[8] but the resulting averaging out

[5] The only two articles we have found that attempt to measure household risksharing channels are Dynarski and Gruber (1997) and Park and Shin (2010)[59]. The former tries to measure the extent of risksharing mechanisms in the US, but without embedding them in a unified, internally consistent and theoretically based framework; as a consequence it is not clear that the various mechanisms identified in the analysis are complementary and their measures do not overlap. The latter uses a mere transposition of ASY to study Korean households, but without duly controlling for demographic and economic characteristics of the household. As for Hayashi, Altonji and Kotlikoff (1996), the article only deals with two broad channels (risksharing between and within households), does not quantify them (as it only tests for full risksharing) and estimates them separately, with the risk of overlaps.

[6] See Nelson (1994).

[7] See Sørensen and Yosha (1998).

[8] See for example Attanasio and Davis (1996).

of individual earnings variation has been detrimental for risksharing estimations, which are based precisely on those variations. Using our framework, we obtain results shedding light on household risksharing behavior under several dimensions. First, we find that Italian households were able to smooth at least 78% of shocks to household head's non-financial income in 2008-2010, a fraction rising to 80% in 2010-2012. Second, perhaps surprisingly, the most important, smoothing mechanism turns out to be within-household risksharing, which is able to absorb 38% of the shock in 2008-2010, and 40% in 2010-2012. Self-insurance is also notable, as it cushioned 28% of changes in basic income in 2008-2010, and 24% in 2010-2012. Informal risk sharing is particularly sizeable in the second spell of the recession when it amounts to 7.5%. Capital income risksharing plays an extremely limited role, as it only reaches significance in 2010-2012, with a meager 2.4% of a shock absorbed; this result is not totally surprising, given the often limited degree of financial depth uncovered in studies on Italian household portfolios as well as the well-known problem of under-reporting of financial assets in the surveys with the SHIW not being an exception (D'Aurizio et al. 2006)[23]. While private risksharing buffers 70% of a shock (74% in 2010-2012), public risksharing only cushions about 7% of a shock in both spells, with taxes smoothing more than transfers.

A breakdown by household head's net wealth quintiles shows a striking disparity in household ability to smooth shocks to household heads' non-financial income. In the 2008-2010 biennium, households with the poorest 40% of heads could only smooth 67% of shocks, and 78% in the third quintile; however, in the fourth and fifth quintiles households are able to buffer a whopping 93% of a shock, coming close to full risksharing. In the next biennium, the degree of risksharing increases in all net wealth classes, passing from 70% to 83%, to 95% and finally to a full 100% for the richest quintile of household heads.

The paper proceeds as follows. Section 2 develops the methodology to estimate channels of risk sharing within and between households. Section 3 presents the data. Section 4 illustrates the empirical implementation to quantify risksharing channels. Section 5 discusses the empirical results. Section 6 concludes.

# 2. Methodology

## 2.1. Conceptual framework

This section provides the theoretical foundations of the risksharing mechanisms that help smooth household consumption by absorbing shocks to the household heads' non-financial income (see Dynarski and Gruber 1997).

Consider a stochastic endowment economy, populated by N infinitely-lived households exhibiting time-separable Von Neumann-Morgenstern (VNM) expected utility functions over a single consumption good.[9] Uncertainty is represented by a state variable $s_t$ which summarizes the history up to time $t$ and the trajectory to infinity and can take on countably many values at any date $t$. The Pareto-optimal consumption allocations can be derived by solving the planning problem of maximizing the weighted sum of individual household utilities subject to the feasibility constraint that in each state of nature the sum of household consumptions cannot exceed the sum of all household head's endowments. Following standard treatments, such as Cochrane (1991), the first order conditions for all $s_t$ look like:

$$(\rho^j)\lambda^j U_c(C_t^j, \delta_t^j) = \mu_t, j = 1, ..., J \tag{1}$$

where $\rho^j$ is household $j's$ factor of time preference, $\lambda^j$ its Pareto weight, $\delta^j$ its taste shifter and $\mu_t$ is the Lagrange multiplier associated with the feasibility constraint, divided by the probability of $s_t$. The importance of this condition is that it already shows how at the optimum, households' marginal utility is independent of individual household (head)'s endowment. Dividing the expression (1) at two successive dates can get rid of the time-invariant Pareto weight, yielding:

$$\rho^j \frac{U_c(C_{t+1}^j, \delta_{t+1}^j)}{U_c(C_t^j, \delta_t^j)} = \frac{\mu_{t+1}}{\mu_t}, j = 1, ..., J. \tag{2}$$

The discounted growth of marginal utility is the same across households and, given aggregate consumption, is independent of individual household (head)'s endowments. The consequences for household consumption growth can be illustrated specifying a CRRA utility function. In this case,

$$\log\left(\frac{C_{t+1}^j}{C_t^j}\right) = \frac{1}{\gamma^j}\left[\log\left(\frac{\mu_{t+1}}{\mu_t}\right) - \log\left(\frac{b_{t+1}^j}{b_t^j}\right) - \log(\rho^j)\right] \tag{3}$$

where $\gamma^j$ is household $j's$ risk aversion coefficient and $b_t^j$ is a multiplicative taste shock. The planner's optimal risksharing solution thus prescribes that household consumption growth - net of preference variation $[\log(b_{t+1}^j/b_t^j), \gamma^j, \rho^j]$ and given aggregate consumption growth represented by $\log(\mu_{t+1}^j/\mu_t^j)$ - must be independent of idiosyncratic household variables, notably household (head)'s endowment.[10]

[9]Generalization to a production economy (Cochrane 1991) and to a multicommodity environment (Hayashi, Altonji and Kotlikoff 1996) is immediate.

[10]As shown by Cochrane (1991) this result can be generalized to other utility functions, even non-separable in leisure. More precisely, the utility function may assume any form (provided it

The diametrically opposite case emerges when the planner cannot shift the consumption good between households; in this case, idiosyncratic risk cannot be shared and the trivial solution is for the household to simply consume the household head's endowment $W$, so that:

$$\log\left(\frac{C^j_{t+1}}{C^j_t}\right) = \log\left(\frac{W^j_{t+1}}{W^j_t}\right) \tag{4}$$

The optimal planner solution can be decentralized and implemented, in full or in part, through several mechanisms, depending on the financial and institutional structure of the economy. For example, the existence of complete markets of Arrow-Debreu contingent claims (Arrow, 1964), or a specific set of securities (Duffie and Huang, 1985[30]), allows households to implement the full risksharing solution through asset diversification. Such optimal allocation can also be attained in a bonds-only economy, provided that the endowment shocks are all transitory (Baxter and Crucini, 1995[9]; Levine and Zame, 2002[52]; Willen, 1999[71]). Similarly, the existence of appropriate government tax/transfers mechanisms allows subsidizing, at least partially, households whose head's non-financial income has been hit by a negative shock, drawing from incomes hit by a positive shock. In addition, risksharing can be provided through self insurance, that is by asset accumlation (saving) and depletion (dissaving) through lending and borrowing. A peculiar type of saving is represented by the timely purchase of durables, which may constitute an additional channel of self insurance. Furthermore, informal risksharing can take place, especially in developing economies, through private gifts, transfers, aid or services. Finally, partial risksharing can be attained if the household head's non-financial income can be pooled with the income of other household members. Unlike some previous work, we maintain a very general setup by not assuming any particular financial or institutional structure for our economy, and let the empirical analysis reveal whether the extent of risksharing in our sample is full, partial or nil. We also refrain from modelling endogenous frictions leading to market imperfections (such as limited commitment or enforceability). In fact, the stylized facts and statistical linkages that we uncover will help shed some light precisely on the most appropriate financial and institutional structure or endogenous market imperfections characterizing the Italian economy in the period under exam.

is concave and monotonic), may not be time-separable, may not be a VNM function; in addition, arbitrary shocks may be included.

## 2.2. Empirical Model of Risk Sharing Channels

If risk is fully shared through market or non-market institutions, household consumption should not respond to idiosyncratic shocks to household head's non-financial income. As in Cochrane (1991) and Dynarski and Gruber (1997), we operationalize this notion by analyzing the regression coefficient of household consumption change on the change in household head's non-financial income:

$$\log\left(\frac{C^j_{t+1}}{C^j_t}\right) = \alpha + \beta \log\left(\frac{W^j_{t+1}}{W^j_t}\right) + u^j_t \tag{5}$$

where the disturbance may include a measurement error. Here the $\alpha$ intercept captures the effect on consumption variation of aggregate variables, notably aggregate consumption or aggregate income.[11] It is useful to keep in mind that autarky implies that the $\beta$ coefficient is equal to one. On the other hand, if insurance markets are perfect, then this coefficient should be zero.[12] Intermediate values can then be interpreted as measuring the degree of risksharing. As pointed out by Dynarski and Gruber (1997) and Fafchamps (2011), the $\beta$ coefficient captures the extent to which the household manages to smooth consumption in the face of the head's non-financial income shocks. In other words,

$$1 - \beta = \frac{\mathrm{Cov}(\Delta logC^j, \Delta logW^j)}{\mathrm{Var}(\Delta logW^j)} \tag{6}$$

is an appropriate measure of the extent of household consumption smoothing via risksharing. The main contribution of the risksharing channels methodology consists in a decomposition of the overall risksharing measure $1 - \beta$ into the smoothing contributions of the different risksharing mechanisms mentioned above. For every household, we reconstruct the following variables:

- Basic income (household head's wage income + autonomous income + pensions): $W$
- Non-financial income (household's basic income): $H$
- Total income (i.e., non-financial income + capital income from real estate and financial assets + end-of-service gratuities): $Y$

[11] In some specifications of the risksharing model, the term $\log(\mu^j_{t+1}/\mu^j_t)$ is specified as aggregate consumption growth (e.g. Mace 1991), and at times it is added as a regressor to the income growth measure (eg Obstfeld 1994). However, in a cross-section the aggregate term is replaced by the constant term.

[12] See Blundell, Pistaferri, and Preston (2008).

- Gross income (total income + public transfers received[13]): $YG$
- Disposable income (gross income - taxes paid[14]): $YD$
- Total disposable income (disposable income + inter-and-intra-generational (private) transfers[15]): $YT$
- Total consumption expenditure (total disposable income - savings): $C$
- Non-durable consumption: (total consumption expenditure - durable consumption expenditure): $Cn$

The econometric model is based on the idea that, if two successive income measures do not co-move, the smoothing mechanism represented by their difference is at work. For instance, to the extent that $H$ and $Y$ do not co-move, it means that financial income flows have provided a smoothing effect. By the same token, to the extent that $YG$ and $YD$ do not co-move, it means that taxes have provided further smoothing. Take the following identity for every household $j$:

$$W^j = \frac{W^j}{H^j}\frac{H^j}{Y^j}\frac{Y^j}{YG^j}\frac{YG^j}{YD^j}\frac{YD^j}{YT^j}\frac{YT^j}{C^j}\frac{C^j}{Cn^j} \tag{7}$$

After taking logs and first differences,

$$\Delta w^j = (\Delta w^j - \Delta h^j) + (\Delta h^j - \Delta y^j) + ... + (\Delta yt^j - \Delta c^j) + (\Delta c^j - \Delta cn^j) + \Delta cn^j \tag{8}$$

where lowercase letters indicate logs.

Multiplying both sides by $\Delta w^j$ and taking expectations, and then dividing through by $\mathrm{Var}(\Delta w^j)$, we obtain a constrained sum of simple regression coefficients:

$$1 = \frac{\mathrm{Cov}(\Delta w^j, \Delta w^j - \Delta h^j)}{\mathrm{Var}(\Delta w^j)} + ... + \frac{\mathrm{Cov}(\Delta w^j, \Delta yt^j - \Delta c^j)}{\mathrm{Var}(\Delta w^j)} + \frac{\mathrm{Cov}(\Delta w^j, \Delta c^j - \Delta cn^j)}{\mathrm{Var}(\Delta w^j)} \tag{9}$$

or

$$1 - \beta = \beta_H + \beta_K + \beta_{Tr} + \beta_{Tax} + \beta_I + \beta_S + \beta_{DC} \tag{10}$$

[13] They include unemployment benefits, mobility allowances and various forms of social assistance payments (such as attendance and disability living allowance) which are directly surveyed in the SHIW plus family allowances (ANF) which are simulated (see footnote 17).

[14] See footnote 17.

[15] These include gifts and transfers from (non-cohabitant) relatives and friends and maintenance payments. Apart from the latter item this variable is conceivable as adding to YD informal transfers between households.

The overall risksharing measure $1 - \beta$ is decomposed into 7 coefficients. The first coefficient on the RHS - $\beta_H$ - measures the percentage of basic income changes that is smoothed within the household; the second - $\beta_K$ - the percentage of basic income changes that is further smoothed by capital incomes; the third and the fourth - $\beta_{Tr}$ - and - $\beta_{Tax}$ - the further smoothing provided by taxes and transfers, respectively; the fifth - $\beta_I$ - represents the share that is further smoothed by informal transfers between households; then $\beta_S$ is the amount of smoothing provided by saving and dis-saving. Finally, $\beta_{DC}$ represents possible smoothing provided by a variation in durable expenditures.
The next section will detail the econometric methodology we use to gauge these coefficients as correctly as possible, addressing the estimation issues arising from our setup.

# 3. Data

Our analysis of household risk sharing uses the panel component of biannual data from the Bank of Italy's SHIW, for the periods 2008-2010 and 2010-2012. The main objective of the SHIW is to study the economic behavior of Italian households, defined as groups of individuals related by blood, marriage or adoption and sharing the same dwelling. The sample size comprises about 8000 households per year selected from population registers and the survey contains a sizable panel component which allows econometricians to estimate target variables' processes and transitions. The longitudinal component allows us to follow over 50% of the households in two spells of twice-repeated observations.[16]Data collection is entrusted to a specialized company using professional interviewers and CAPI methodology. The survey collects the following information:

- characteristics of the household and of its members (number of income earners, gender, age, education, job status, industry sector, and characteristics of the dwelling);
- income (wage and salaries, income from self-employment, pensions and other financial transfers, income from financial assets and real estate);
- consumption and saving (food consumption, other nondurables, expenses for housing, health, insurance, spending on durable goods, and household

[16]In the panel component, the sampling procedure is determined in two stages: (i) selection of municipalities (among those sampled in the previous survey); (ii) selection of households to re-interview. This implies that there is a fixed component in the panel (for instance, households interviewed 10 times between 1994 and 2012, or 4 times from 2006 to 2012) and a new component every survey (for instance, households interviewed only in 2012).

saving);

- wealth in terms of real estate, financial assets, liabilities;
- special modules such as capital gains, inheritance, risk aversion, unpaid work, economic mobility, social capital, tax evasion, financial literacy.

From these items, we reconstructed households' balance sheets, income statements, statements of cash flows and consolidated financial statements, along the lines suggested by Samphantharak and Townsend (2006)Furthermore, since the data does not allow constructing household members' gross incomes, we proceeded to reconstruct gross incomes using an imputation methodology - through *EGaLiTe* tax&benefit MSM simulations[17] - to recover gross figures for basic income and disentangle household allowances from disposable income.
Our variables are measured as reported in 2.2, and are all in nominal terms. The precise definition for the rate of variation is that reported footnote 18 (section 4) For Italy, Padula (2004) and Jappelli and Pistaferri (2006)[44], 2010[45],2011[46]), employ the SHIW data to study the joint dynamics of household income and consumption.
Table 1 shows some descriptive statistics summarizing the distribution of key variables used in the estimate for the two subperiods. In particular, the first two-year of crisis (2008-2010) is characterized by a marked average fall in household heads basic income ($\Delta w^j$, -7.5%), with a distribution, negatively skewed, with median equal to 2% and standard deviation of 57%. However, in the same spell nominal nondurable consumption rate of growth ($\Delta cn^j$) is positive both for the average and for the median household (5.6% and 4.9%, respectively), while a contraction in durable consumption ($\Delta dc^j$) appears. In the second spell (2010-2012), basic income average rate of growth is roughly zero, while the median household head

[17] *EGaLiTe* (see for other applications Gastaldi *et al.*, 2014[35]) uses a standard iterative method to simulate net-to-gross personal income trajectories. In particular the fiscal module simulates the personal income taxation (PIT) progressive structure, including its regional/local surtaxes and the main tax expenditures. Moreover, it approximates the distribution of family allowances (Assegno al Nucleo Familiare) which represent the main subsidy for households with dependent children in Italy but - unfortunately - cannot be directly disentangled from the labor income information reported in the survey. Finally, the fiscal module simulates the tax impact of owner-occupied dwellings (whose imputed rent is fully deductible from the PIT tax base in the period 2008-2010) which in the second spell is embodied in the new property tax "IMU". This latter tax-payment for 2012 is self-reported by respondents in the survey. Since a micro analysis of tax evasion behavior is beyond the scope of this study, we adopt the simplifying assumption of no tax evasion in earnings. This can be easily accepted for employees while bringing lower accuracy in reconstructing gross figures for the self-employed. The loss of accuracy is however mitigated by the fact that we work with changes in variables, and tax evasion in Italy does not tend to vary much over time.

experiences a negative variation (-0.8%) in the same variable. Nondurable consumption, in this two-years period, grows both in mean and in median (at a rate of almost 10%) while a pretty large contraction characterizes durable expenditure (-26% and -59% mean and median values, respectively).

Table 1: Descriptive statistics

| | spell | mean | 50% | Std. Dev. |
|---|---|---|---|---|
| $\Delta w^j$ | 2008-10 | -7.46% | 2.11% | 56.70% |
| | 2010-12 | 0.04% | -0.83% | 73.19% |
| $\Delta cn^j$ | 2008-10 | 5.57% | 4.88% | 34.32% |
| | 2010-12 | 9.62% | 9.52% | 38.61% |
| $\Delta dc^j$ | 2008-10 | -2.92% | -6.90% | 170.98% |
| | 2010-12 | -26.30% | -58.82% | 171.59% |

Sources: Bank of Italy SHIW 2008-10-12 (panel component for consecutive waves)

# 4. Estimation

At the empirical level, our baseline estimation model implementing the identity above is the following cross-sectional SUR:

$$\begin{aligned}
\Delta w^j - \Delta h^j &= \nu_H + \beta_H \Delta w^j + \varepsilon^j_H \\
\Delta h^j - \Delta y^j &= \nu_K + \beta_K \Delta w^j + \varepsilon^j_K \\
\Delta y^j - \Delta yg^j &= \nu_{Tr} + \beta_{Tr} \Delta w^j + \varepsilon^j_{Tr} \\
\Delta yg^j - \Delta yd^j &= \nu_{Tax} + \beta_{Tax} \Delta w^j + \varepsilon^j_{Tax} \\
\Delta yd^j - \Delta yt^j &= \nu_I + \beta_I \Delta w^j + \varepsilon^j_I \\
\Delta yt^j - \Delta c^j &= \nu_S + \beta_S \Delta w^j + \varepsilon^j_S \\
\Delta c^j - \Delta cn^j &= \nu_{DC} + \beta_{DC} \Delta w^j + \varepsilon^j_{DC}
\end{aligned} \tag{11}$$

where the $\nu_{\cdot}$ intercepts capture the effect on the dependent variables of aggregate changes. The SUR estimation accounts for the likely cross-equation error correlations, in view of the symmetric structure of our problem.[18]

[18] This baseline SUR estimation is similar to Park and Shin (2010). Likewise, to deal with possible zeros we redefine percentage variations as $d.Y^j_t = \frac{Y^j_t - Y^j_{t-1}}{(Y^j_t + Y^j_{t-1})/2}$ where $Y$ is a generic variable.

Before estimating the SUR in 11 one can separately estimate the following single equation which is linearly dependent:

$$\Delta cn^j = \nu + \beta \Delta w^j + \varepsilon^j \tag{12}$$

Note that from equations 11, the sum of the $\beta_.$ coefficients equals $1 - \beta$, that is the coefficient of the equation 12. Hence, to estimate the overall degree of risksharing we may as well estimate this coefficient. Starting from this baseline estimation, other augmented estimations are performed, in order to address potential econometric issues.

## 4.1. Household characteristics and life-cycle behavior

Household-level data are subject to numerous influences, which are typically controlled for using an additional set of demographic and economic variables, so that equation 13 above becomes:

$$\log\left(\frac{Cn^j_{t+1}}{Cn^j_t}\right) = \alpha + \beta \log\left(\frac{W^j_{t+1}}{W^j_t}\right) + \gamma' \log \mathbf{X}^j_t + u^j_t \tag{13}$$

where $\mathbf{X}^j_t$ is a vector including standard controls, as suggested in most research on the topic.[19]
Consequently, the SUR system in (11) is also estimated using additional covariates in each equation. One of these controls is of particular interest: a measure of household head's net wealth interacted with household head's basic income variation. Not only will the wealth variable control for size effects in consumption, but, more importantly, it will also ensure that influences on consumption stemming from life-cycle behavior are mitigated.[20]An additional covariate is the variation in household components which controls for changes in the household economies of scale and for taste shocks due to changes in the household structure. In our preferred estimation the augmented SUR system is run on a restricted sample of households with prime-age household heads (aged 30-55); this mitigates concerns related to life-cycle choices, such as moving from student to worker or deciding retirement. Finally, a measure of the individual expectation for the future replacement rate achievable with the public pension is used in our preferred estimation, in order to purge the beta coefficient from effects linked to retirement decisions and public pensions.

[19]See Mace (1991) or Dynarski and Gruber (1997).
[20]Controls for demographic and household characteristics also contribute to minimize the effect of life-cycle behavior.

## 4.2. Measurement errors, preference shocks, omitted variables bias, and endogeneity

Because of the survey characteristics (e.g., response bias), and the imputation exercise we carried out to recover gross incomes, our data - and particularly basic incomes- may be subject to measurement errors. This problem is only partially mitigated by the accurate surveying methodology applied in sampling SHIW households and by our use of changes in variables. As is well known, such (classical) measurement error boils down to an endogeneity bias stemming from the basic income variable. Addressing this bias also corrects the inefficiency associated to the coefficient's standard error.

A second source of endogeneity bias is the potential correlation between the basic basic income change measure and the household preference variation (taste shifter, risk aversion coefficient and rate of time preference) as well as the leisure measure in case of non-separability of the utility function (see Cochrane 1991). The former problem is partially addressed by adding demographic and household characteristics; the latter problem is addressed in part by using household head's basic income as a regressor (as opposed to household basic income), in part by including a measure of aggregate leisure, which in our cross-sections amounts to adding an intercept in the regressions.

A third source of endogeneity bias is potential omitted variables bias, to the extent the explanatory variables indicated by consumption theory and econometric practice (which we have included) capture some effect of other variables lumped in the error term.

In our final specification, we address all these endogeneity problems by running IV regressions, with instruments which are plausibly exogenous to consumption and correlated with household head's basic income, like a sudden unemployment spell in the arrival year, or a particular sector in the starting year (e.g. agricultural sector or public sector). Note that the use of these instruments can address simultaneously all the sources of endogeneity mentioned above.[21] Even in the case the measurement error in the original variable is correlated with the measurement error of the instrument, such correlation will likely disappear with the time differencing we adopt. For example, if a household head always underreports her basic income, the effect will wash out when taking first differences.[22]

[21] In the case of residual correlation between non-separable leisure and job loss, we use the alternative instrument (sector).

[22] See Dynarski and Gruber (1997).

## 4.3. Nonlinearities

An important source of potential bias might be nonlinearities in the determination of consumption, such as the existence of liquidity constraints. As Dynarski and Gruber (1997) point out, consumption changes may not respond to small and frequent variations in the head's earnings, but it may well suffer from large, low-frequency changes (such as an unemployment spell). Hence, our use of unemployment spells as instruments may reveal the existence of such liquidity constrained (or simply rule-of-thumb, myopic) behavior. We also try to mitigate issues related to liquidity constraints by focusing on household heads with positive basic income in the start year.

## 4.4. Sample selection bias

We need to ensure that the probability of a household-year being included in the sample depends only on the exogenous variables and the permanent component of the error term.[23] The response bias and sample selection bias stemming from the administration of the survey have been thoroughly addressed in several papers by the Bank of Italy, which provide the weights necessary to recalibrate the sample variables to make them representative of population variables.

## 4.5. Attrition

We address issues of attrition - arising from the unavoidable changes of the sample over time (due to births, deaths, marriages, divorces, new sample units arriving, old sample units dropping) - by limiting our scope to a true panel of households; thus, our cross-sections contain the same households followed across the entire sample period. As for changes within the same household, we control for the number and age of components.

## 4.6. Outliers

Similarly to differenced logarithms, our formulation in terms of percentage variations with reference to the mean (see footnote 18) is able to significantly reduce the influence of outliers: indeed, in our preferred estimation subsample , they are limited to one severe case only for the dependent variable in the first spell of variation that we drop from the sample itself.

[23]As pointed out by Hayashi, Altonji and Kotlikoff (1996), this assumption is made, often implicitly, in virtually all panel data studies on consumption.

# 5. Results

It is worth recalling, also for comparison purposes, that the variable whose variance we are breaking down is the change in household head's basic income, and thus all the results we discuss have to be referred to that variable.

## 5.1. Overall risksharing

Table 2 illustrates the results for 2008-2010 and 2010-2012 of our baseline specification (column 1), the augmented specification (column 2) and the IV estimation (column 3) for nondurable consumption changes (i.e. the equation (12)) over the baseline sample characterized by household heads aged 30-55 with a positive initial basic income.

Our preferred estimation (IV in column 3) shows that Italian households were able to smooth at least 78% of a shock to the household head's basic income changes in 2008-2010, a fraction rising to 80% in 2010-2012. Remarkably, these coefficients are much lower in the baseline and augmented specifications, suggesting that our strategy of adopting a series of controls and instruments to isolate the pure relation between household head's basic income changes and household consumption changes is vindicated. Furthermore, our tests on the instruments adopted [24]reveal their fitness by means of an $F$ test of excluded instruments always well above the conventional measure of 10. Moreover, since the IV model is over-identified, we can test the instruments' validity with the Hansen J statistic. In both spells we cannot reject the null that the instruments satisfy the required orthogonality conditions.

Despite differences between the various specifications, the qualitative conclusions carry over across all estimations: household risksharing in Italy can smooth at least three quarters of a shock to the head's basic income. This result is consistent with most studies on risksharing in Italy, both at the micro and macro level: for example, at the macro level, Scorcu (1997)[67] and Cellini and Scorcu (2002)[19] for 1971-1993, Pellegrini (1997)[60] and Dedola, Usai and Vannini (1999)[28] for 1983-1992, Mélitz and Zumer (1999)[54] for 1984-1992, Gardini, Cavaliere and Fanelli (2005)[34] for 1960-1995, and Cavaliere, Fanelli and Gardini (2006)[18] for 1960-2001 all find a notable and significant degree of smoothing among Italian regions; at the micro level Krueger and Perri (2011)[50] for 1987-2008 reach results

[24]In the first spell of variation we use as instruments the transition from employment to unemployment and working in the public sector in the starting year (2008); in the second spell, the transition to unemployment and working in the farming sector in the starting year (2010). Workers of both sectors enjoy a particular treatment due to direct job protection or indirect sector subsidization

Table 2: Overall risksharing

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| | 2008-10 | 2010-12 | 2008-10 | 2010-12 | 2008-10 | 2010-12 |
| | (OLS without controls) | | (OLS with controls) | | (IV) | |
| **Dep. var.:** $\Delta cn^j$ | 2008-10 | | | | | |
| ***Unsmoothed consumption*** | | | | | | |
| [$\beta$] **Δ(base income hh)** | 0.144*** | 0.085*** | 0.102*** | 0.057** | **0.218***** | **0.196***** |
| | (0.0253) | (0.0252) | (0.0280) | (0.0281) | (0.0477) | (0.0602) |
| i_Δincome*wealth | | | -0.016** | -0.010* | | |
| | | | (0.0067) | (0.0057) | | |
| Δhousemembers | | | 0.259*** | 0.177* | 0.242*** | 0.165 |
| | | | (0.0741) | (0.0952) | (0.0795) | (0.1060) |
| hh got-in-retirement | | | -0.379*** | -0.061 | | |
| | | | (0.1119) | (0.0538) | | |
| hh got-in-unemployment | | | -0.143** | -0.041 | | |
| | | | (0.0706) | (0.0782) | | |
| Tenant-Occupied Dwelling | | | -0.01 | -0.133*** | | |
| | | | (0.0282) | (0.0347) | | |
| Northwest | | | 0.012 | -0.113*** | | |
| | | | (0.0243) | (0.0380) | | |
| Constant | 0.067*** | 0.104*** | 0.070*** | 0.157*** | 0.068*** | 0.097*** |
| | (0.0127) | (0.0148) | (0.0166) | (0.0180) | (0.0132) | (0.0151) |
| R-squared | 0.057 | 0.026 | 0.102 | 0.083 | 0.062 | -0.005 |
| N. of cases | 1260 | 1344 | 1260 | 1344 | 1260 | 1344 |
| F test of excluded instruments) | | | | | 38,198 | 16,150 |
| Hansen J statistic (P-val) | | | | | 0.847 | 0.258 |
| Endogeneity test of endogenous regressors (P-val) | | | | | 0.127 | 0.074 |
| Instrumented | | | | | Δ(base income hh) | Δ(base income hh) |
| Excluded instruments | | | | | Got-in-unemployment, Public sector (2008) | Got-in-unemployment, Farming sector (2010) |

Sources: Bank of Italy SHIW 2008-10-12 (panel component for consecutive waves) on the overall degree of risksharing which are extremely similar to ours.

## 5.2. Risksharing channels

How this overall smoothing breaks down across the 7 channels of risksharing we have identified is shown in Table 3.

Table 3: Risksharing channels

| | *Channels* | 2008-10 | 2010-12 | 2008-10 | 2010-12 | 2008-10 | 2010-12 |
|---|---|---|---|---|---|---|---|
| | | SUR=OLS | | SUR (constrained) | | SUR (constrained) | |
| | 1. Base income from other members | | | | | | |
| [$\beta_H$] | Δ(base income hh) | 0.340*** | 0.405*** | 0.423*** | 0.516*** | **0.390*** ** | **0.413*** ** |
| | | '(0.0153) | '(0.0147) | '(0.0167) | '(0.0174) | '(0.0163) | '(0.0165) |
| | i_Δincome*wealth | | | 0.024*** | 0.018*** | 0.037*** | 0.014*** |
| | | | | '(0.0047) | '(0.0047) | '(0.0044) | '(0.0041) |
| | Northwest | | | 0.007 | 0.071*** | | |
| | | | | '(0.0146) | '(0.0209) | | |
| | Δhousemembers | | | | | -0.220*** | -0.124*** |
| | | | | | | '(0.0313) | '(0.0306) |
| | Constant | -0.027*** | 0.018* | -0.026*** | 0.005 | -0.026*** | 0.023** |
| | | '(0.0087) | '(0.0107) | '(0.0093) | '(0.0126) | '(0.0084) | '(0.0107) |
| | 2. Capital incomes (financial and real) | | | | | | |
| [$\beta_K$] | Δ(base income hh) | -0.003 | 0.007 | 0.021*** | 0.031*** | **0** | **0.024*** ** |
| | | '(0.0063) | '(0.0051) | '(0.0064) | '(0.0066) | '(0.0069) | '(0.0058) |
| | i_Δincome*wealth | | | 0.003 | 0.009*** | 0.003 | 0.010*** |
| | | | | '(0.0018) | '(0.0018) | '(0.0019) | '(0.0014) |
| | Northwest | | | 0.003 | -0.027*** | | |
| | | | | '(0.0070) | '(0.0103) | | |
| | Constant | -0.007* | -0.011*** | -0.005 | -0.003 | -0.007** | -0.011*** |
| | | '(0.0036) | '(0.0037) | '(0.0037) | '(0.0049) | '(0.0036) | '(0.0037) |
| | 3. Public transfers other than pensions | | | | | | |
| [$\beta_{Tr}$] | Δ(base income hh) | 0.059*** | 0.070*** | 0.032*** | 0.023*** | **0.022*** ** | **0.033*** ** |
| | | '(0.0050) | '(0.0061) | '(0.0044) | '(0.0059) | '(0.0051) | '(0.0068) |
| | i_Δincome*wealth | | | -0.009*** | -0.006*** | -0.022*** | -0.016*** |
| | | | | '(0.0012) | '(0.0016) | '(0.0014) | '(0.0017) |
| | Δhousemembers | | | -0.041*** | -0.031** | -0.037*** | -0.007 |
| | | | | '(0.0107) | '(0.0151) | '(0.0126) | '(0.0154) |
| | Constant | -0.006** | 0.002 | -0.003 | -0.008** | -0.004 | 0.001 |
| | | '(0.0029) | '(0.0045) | '(0.0022) | '(0.0040) | '(0.0026) | '(0.0044) |
| | 4. PIT & Property tax on OODs | | | | | | |
| [$\beta_{Tax}$] | Δ(base income hh) | 0.044*** | 0.023*** | 0.058*** | 0.024*** | **0.047*** ** | **0.029*** ** |
| | | '(0.0029) | '(0.0024) | '(0.0033) | '(0.0029) | '(0.0033) | '(0.0028) |
| | i_Δincome*wealth | | | 0.003*** | 0.001 | 0.001 | 0.002*** |
| | | | | '(0.0009) | '(0.0008) | '(0.0009) | '(0.0007) |
| | Δhousemembers | | | -0.025*** | -0.031*** | | |
| | | | | '(0.0069) | '(0.0076) | | |
| | hh got-in-unemployment | | | 0.059*** | 0.045*** | | |
| | | | | '(0.0108) | '(0.0112) | | |
| | Constant | 0.008*** | 0.002 | 0.007*** | 0.003 | 0.008*** | 0.002 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | ’(0.0017) | ’(0.0018) | ’(0.0016) | ’(0.0019) | ’(0.0017) | ’(0.0018) |
| | 5. Informal transfers | | | | | | |
| $[\beta_I]$ | Δ(base income hh) | 0.045*** | 0.080*** | 0.012** | 0.052*** | **0.039*** ** | **0.074*** ** |
| | | ’(0.0056) | ’(0.0073) | ’(0.0052) | ’(0.0075) | ’(0.0062) | ’(0.0085) |
| | i_Δincome*wealth | | | -0.003** | -0.007*** | -0.003** | -0.002 |
| | | | | ’(0.0014) | ’(0.0019) | ’(0.0017) | ’(0.0021) |
| | Δhousemembers | | | -0.053*** | -0.004 | | |
| | | | | ’(0.0121) | ’(0.0203) | | |
| | hh got-in-unemployment | | | -0.082*** | -0.112*** | | |
| | | | | ’(0.0190) | ’(0.0298) | | |
| | south | | | 0.009 | -0.020* | | |
| | | | | ’(0.0059) | ’(0.0105) | | |
| | tenant-occupied dwelling | | | | | 0.006 | |
| | | | | | | ’(0.0069) | |
| | Constant | 0 | -0.018*** | 0 | -0.003 | -0.002 | -0.018*** |
| | | ’(0.0032) | ’(0.0054) | ’(0.0027) | ’(0.0054) | ’(0.0037) | ’(0.0054) |
| | 6. Saving/dissaving | | | | | | |
| $[\beta_S]$ | Δ(base income hh) | 0.377*** | 0.323*** | 0.331*** | 0.273*** | **0.301*** ** | **0.233*** ** |
| | | ’(0.0237) | ’(0.0171) | ’(0.0246) | ’(0.0198) | ’(0.0231) | ’(0.0178) |
| | i_Δincome*wealth | | | -0.003 | -0.001 | -0.005 | -0.005 |
| | | | | ’(0.0062) | ’(0.0049) | ’(0.0071) | ’(0.0048) |
| | Δhousemembers | | | -0.083* | -0.176*** | | |
| | | | | ’(0.0461) | ’(0.0447) | | |
| | hh got-in-unemployment | | | 0.184** | 0.202*** | | |
| | | | | ’(0.0794) | ’(0.0706) | | |
| | tenant-occupied dwelling | | | 0.014 | 0.100*** | -0.050* | 0.110*** |
| | | | | ’(0.0207) | ’(0.0237) | ’(0.0263) | ’(0.0252) |
| | ERR | | | -0.011 | -0.067 | **-0.118** ** | **-0.024** |
| | | | | ’(0.0622) | ’(0.0512) | ’(0.0523) | ’(0.0456) |
| | i_Δincome*ERR | | | -0.108 | -0.072 | **-0.145*** ** | **-0.173*** ** |
| | | | | ’(0.0673) | ’(0.0436) | ’(0.0478) | ’(0.0392) |
| | Constant | -0.012 | -0.060*** | -0.002 | -0.028 | 0.074** | -0.068** |
| | | ’(0.0135) | ’(0.0125) | ’(0.0411) | ’(0.0325) | ’(0.0364) | ’(0.0298) |
| | 7. Durable expenditures | | | | | | |
| $[\beta_{DC}]$ | Δ(base income hh) | -0.005 | 0.008 | 0.02 | 0.022* | **-0.017** | **-0.002** |
| | | ’(0.0142) | ’(0.0090) | ’(0.0184) | ’(0.0123) | ’(0.0156) | ’(0.0103) |
| | i_Δincome*wealth | | | | | -0.005 | -0.002 |
| | | | | | | ’(0.0043) | ’(0.0025) |
| | tenant-occupied dwelling | | | | | 0.060*** | 0.005 |
| | | | | | | ’(0.0181) | ’(0.0153) |
| | Constant | -0.022*** | -0.037*** | -0.005 | -0.048*** | -0.038*** | -0.038*** |
| | | ’(0.0081) | ’(0.0066) | ’(0.0273) | ’(0.0180) | ’(0.0094) | ’(0.0076) |
| | R-squared eq.1 | 0.283 | 0.362 | 0.339 | 0.414 | 0.328 | 0.367 |
| | R-squared eq.2 | 0 | 0.001 | 0.009 | 0.029 | 0.002 | 0.037 |
| | R-squared eq.3 | 0.099 | 0.087 | 0.127 | 0.042 | 0.255 | 0.146 |
| | R-squared eq.4 | 0.152 | 0.061 | 0.208 | 0.067 | 0.153 | 0.067 |
| | R-squared eq.5 | 0.048 | 0.081 | 0.054 | 0.099 | 0.051 | 0.081 |
| | R-squared eq.6 | 0.167 | 0.21 | 0.134 | 0.153 | 0.155 | 0.187 |
| | N. of cases | 1260 | 1344 | 1260 | 1344 | 1260 | 1344 |

Sources: Bank of Italy SHIW 2008-10-12 (panel component for consecutive waves)

The table reveals that the most important smoothing mechanism is within-household risksharing ($\beta_H$), which is able to absorb 39% of the shock in 2008-2010, and almost 41% in 2010-2012. This result is in contrast with the findings on the PSID in Hayashi, Altonji and Kotlikoff (1996)[41] and on both the PSID and the CEX in Dynarski and Gruber (1997)[31] - who find nonsignificant effects of non-head income - but parallels the results on the PSID in García-Escribano (2004)[33] - who uses an ASY (1996)-style measure of smoothing. Our result reflects Mocetti, Olivieri and Viviano (2011)'s[55] finding that the effects of the economic crisis on the Italian labour market have been partly absorbed within the households, thanks to i) the greater diffusion of large households (the more adults present the lower the risk of joblessness) and ii) the greater propensity to link household formation to employment status.

Self-insurance ($\beta_S$) is also quite large, as it cushions, on average, 30% of changes in basic income shocks in 2008-2010, and 23% in 2010-2012. In order to disentangle the role of life-cycle/pension motives from precautionary savings the equation for this channel is augmented with a measure of the individual expectation for the future replacement rate achievable with the public pension. This information is available in the SHIW for the whole sample of active individuals. We use this variable (ERR) both alone and interacted[25]with household head's basic income. Interestingly enough, the elasticity for the interaction is negative (-14% and -17%, for the first and second spell, respectively) and statistically significant at the 1% level, revealing a lower shock absorption from savings/dis-savings for those households whose head has a higher-than-average expectation for her replacement rate. At a macro level Dedola, Usai and Vannini (1999)[28] find somewhat lower but still notable results for Italy in 1983-1992.

Capital income risksharing ($\beta_K$) plays an extremely limited role, as it only reaches significance in 2010-2012, with a meager 2.4% of shock absorption; this result, while unknown to the previous literature, is not really surprising, given the often limited degree of financial depth uncovered in studies on Italian household portfolios as well as the well-known problem of under-reporting of financial assets in the surveys, SHIW not being an exception (D'Aurizio et al. 2006).[26] A similar argument holds for net wealth which, if anything, exerts a negligible effect on consumption smoothing, at least when interacted with basic income, with the only exception of the first, within-household channel, where its interaction is slightly positive.[27] To these formal channels we can add the informal one - consisting in private transfers between households ($\beta_I$) - that seems to be particularly sizeable in the second spell of the recession when it almost doubles to 7.4% of a shock.

While private risksharing channels buffer about 70% of a shock (73% in 2010-2012), public risksharing only cushions between 6% and 7% of a shock, with

[25]ERR interacted is centered on its year specific mean

[26]See Guiso and Jappelli (2000)[39].

[27]This is consistent with a study by Paiella (2007)[] on the effect of wealth on consumption in the SHIW.

taxes[28]smoothing more than transfers in the first period.[29]However, it is worth noting that the tax channel excludes risksharing through tax evasion - a phenomenon which is particularly widespread in Italy and which we could not take into account in the reconstruction of basic incomes (see footnote 17)[30].

At a macro level, in Italy Decressin (2002) finds very similar results and Dedola, Usai and Vannini (1999) even higher coefficients for 1983-1992, whereas Mélitz and Zumer (1999) find the public risksharing channel to be insignificant for 1984-1992.
Finally, the adjustment of durable expenditure seems to exert a slight dismoothing effect that, however, is statistically non-significant. Our results on a sample of all household heads are extremely similar to the above, though some estimates feature a lower statistical significance, indicating that, once self-insurance has been accounted for, life-cycle considerations are not particularly important for our baseline sample.
By comparing results in estimations with or without instruments, we observe that the measured overall degree of risksharing drops by about 12%; this is an indication that previous studies that did not control strictly for endogeneity or nonlinearities tended to overstate the total degree of risksharing, thus possibly accepting the full risksharing null instead of rejecting it. In particular, the significant drop in risksharing when basic income is instrumented with unemployment spells suggests that liquidity constraints are likely a non-negligible source of departure from optimal consumption behavior.

[28]It is worth to say the gross incomes are - almost entirely - deterministic functions of net incomes. Therefore we do not adjust the standard errors for simulation variation

[29]Asymmetry with respect to positive and negative shocks should be carefully considered, (as in Dynarski and Gruber 1997), in order to better assess the role of the tax smoothing channel as a risk sharing device. It turns out, in fact, that taxation as an automatic smoothing device works much better with positive than with negative shocks, actually exhibiting some quite nonlinear dynamics. This is most likely the reason why the corresponding equation does not pass the usual tests of exogeneity. However, instrumenting household head's basic income changes does not solve the problem, for it overplays negative shocks vs. positive ones, and results in a much lower significance of the corresponding coefficient. We have chosen, therefore, to stick to our preferred estimation in this case, too.

[30]The biggest discrepancy between our measure of tax risksharing and the actual tax risksharing including tax evasion risksharing arises in the case the interviewed household head lies on the growth of her gross income (to the tax authorities) but not on the growth of her net income (to SHIW interviewers). In this case the tax risksharing that we measure is presumably smaller than the tax risksharing illicitly attained by the household.

## 5.3. Further decompositions: the role of wealth

The SHIW presents the undisputable advantage of covering a dualistic economy like Italy, featuring a large degree of variation across regions, socio-economic strata and, ultimately, households. Acciari and Mocetti (2013) report that the Gini index for Italian households is among the highest, both internationally and interregionally, and Brandolini and Torrini (2010) point out that Italy is the sole advanced country exhibiting such wide territorial differences. Of course, geographic heterogeneity is a reflection of household heterogeneity, for example in terms of income (D'Alessio 2012) and joblessness distribution (Mocetti, Olivieri and Viviano 2011). Due to this ample variability, the SHIW is suitable to be further explored beyond the risksharing channels analysis, to uncover the determinants of certain mechanisms through further decompositions of our results.
It is well known that a household consumption response to income shocks may depend on the household (head)'s wealth, due to permanent income and liquidity constraints considerations. For this reason we introduced an interaction term of net wealth and basic income as an additional covariate in our second and third specifications. Yet we can exploit further the wealth variable to break down risksharing behavior according to the level of the household head's net wealth. Our motivation lies on the wealth effects that the literature has postulated on household risksharing behavior. For example, a major strand of consumption research has explored the differences between "poor" and "rich" households, postulating that the former may be less able to access credit and financial markets,[31]while the latter may save at higher rates[32]and invest in riskier assets.[33]
Tables 4 and 5 illustrates the results of our estimations of overall risksharing (as in Table 2) by quintiles of household net wealth.

The most important result emerging is the striking disparity in household (head)'s ability to smooth shocks to basic income, depending on net wealth. In the 2008-2010 (Table 4) biennium, households with the poorest 40% of heads[34] could only smooth 67% of shocks, and 78% in the third quintile; however, in the fourth and fifth quintiles households are able to buffer a whopping 93% of a shock, coming close to full risksharing. In the next biennium (Table 5), the degree of risksharing increases in all net wealth classes, passing from 70% to 83%, to 95% and finally to a full 100% for the richest quintile of household heads. The constant term - which captures the dependency of consumption on aggregate variables -

[31]For example, Campbell and Mankiw (1990) assume that a fraction of households consumes its current income, due to liquidity constraints or myopic behavior.

[32]See Carroll (2000), Dynan, Skinner, and Zeldes (1996), Gentry and Hubbard (1998), Huggett (1996), Quadrini (1999).

[33]See Carroll (2000a).

[34]According to the endogeneity test the IV estimator is required for this subgroup only.

Table 4: Overall risksharing by net wealth quintiles (2008-10)

| | 1st and 2nd quintiles (IV) | 3rd quintile (OLS) | 4th quintile (OLS) | 5th quintile (OLS) |
|---|---|---|---|---|
| **Dep. var.:** $\Delta cn^j$ | | | | |
| ***Unsmoothed consumption*** | | | | |
| [$\beta$] $\Delta$(base income hh*) | 0.327*** | 0.215** | 0.07 | 0.065* |
| | '(0.0739) | '(0.0910) | '(0.0535) | '(0.0381) |
| $\Delta$housemembers | 0.424*** | 0.305** | 0.322 | 0.177 |
| | '(0.0775) | '(0.1330) | '(0.2113) | '(0.1599) |
| i_$\Delta$income*wealth | | -0.029 | -0.042 | 0.006 |
| | | '(0.1142) | '(0.0594) | '(0.0202) |
| hh got-in-retirement | | -0.512*** | | -0.081 |
| | | '(0.0426) | | '(0.0686) |
| hh got-in-unemployment hh | | 0.732*** | 0.05 | -0.227 |
| | | '(0.1893) | '(0.0767) | '(0.1918) |
| Tenant-Occupied Dwelling | | -0.146 | -0.005 | -0.086 |
| | | '(0.1018) | '(0.0547) | '(0.0749) |
| Northwest | | 0.045 | 0.02 | 0 |
| | | '(0.0568) | '(0.0408) | '(0.0676) |
| | | | '(.) | |
| Constant | 0.058*** | 0.052** | 0.026 | 0.117*** |
| | '(0.0128) | '(0.0259) | '(0.0284) | '(0.0376) |
| R-squared | 0.095 | 0.135 | 0.033 | 0.034 |
| N. of cases | 1708 | 237 | 277 | 245 |
| F test of excluded instruments) | 55.813 | . | . | . |
| Hansen J statistic (overi$\Delta$ test of all instruments) (P-val) | 0.272 | . | . | . |
| Endogeneity test of endogenous regressors (P-val) | 0.105 | . | . | . |
| Instrumented | $\Delta$(base income hh) | . | . | . |
| Excluded instruments | Got-in-unemployment, Public sector | . | . | . |

Sources: Bank of Italy SHIW 2008-10 (panel component)

Table 5: Overall risksharing by net wealth quintiles (2010-12)

| | 1st and 2nd quintiles (IV) | 3rd quintile (OLS) | 4th quintile (OLS) | 5th quintile (OLS) |
|---|---|---|---|---|
| **Dep. var.:** $\Delta cn^j$ | | | | |
| ***Unsmoothed consumption*** | | | | |
| [$\beta$] $\Delta$(base income hh*) | 0.293*** | 0.174*** | 0.052 | -0.032 |
| | ’(0.0701) | ’(0.0416) | ’(0.0488) | ’(0.0696) |
| $\Delta$housemembers | 0.445*** | 0.375*** | -0.011 | 0.306*** |
| | ’(0.0716) | ’(0.0915) | ’(0.0757) | ’(0.0586) |
| i_$\Delta$income*wealth | | -0.014 | -0.026 | -0.02 |
| | | ’(0.0492) | ’(0.0388) | ’(0.0555) |
| hh got-in-retirement | | -0.076 | -0.355*** | 0.083 |
| | | ’(0.3795) | ’(0.0340) | ’(0.1029) |
| hh got-in-unemployment hh | | 0.065 | -0.026 | -0.144 |
| | | ’(0.1143) | ’(0.1201) | ’(0.1870) |
| Tenant-Occupied Dwelling | | -0.178 | -0.246*** | 0.011 |
| | | ’(0.1236) | ’(0.0914) | ’(0.2550) |
| Northwest | | 0.053 | -0.081 | -0.192*** |
| | | ’(0.0700) | ’(0.0572) | ’(0.0711) |
| Constant | 0.047*** | 0.114*** | 0.147*** | 0.209*** |
| | ’(0.0132) | ’(0.0316) | ’(0.0312) | ’(0.0381) |
| R-squared | 0.049 | 0.151 | 0.092 | 0.1 |
| N. of cases | 1694 | 246 | 294 | 275 |
| F test of excluded instruments) | 44.83 | . | . | . |
| Hansen J statistic (overi$\Delta$ test of all instruments) (P-val) | 0.483 | . | . | . |
| Endogeneity test of endogenous regressors (P-val) | 0.065 | . | . | . |
| Instrumented | $\Delta$(base income hh) | . | . | . |
| Excluded instruments | Got-in-unemployment, Farming sector | . | . | . |

Sources: Bank of Italy SHIW 2010-12 (panel component for consecutive waves)

increases in parallel, thus confirming a better fit of successively richer household heads behavior with the full risksharing paradigm.
Unsurprisingly, better-off households mainly smooth consumption through private risksharing channels. However, interestingly enough, in Italy they appear to rely heavily on within-household risksharing. This channel, amounting to 49% and 54% for those in the fourth quintile, in the first and in the second spell respectively, skyrockets to a striking 77% for households in the top quintile in the 2010-2012 biennium. For these latter households the weight of this channel doubles from the first to the second spell. As expected, this channel replaces in importance self-insurance for richer households.
On the other hand, poorest households smooth a smaller 32% of a shock through income from other members in both spells, and between 25% and 29% through self-insurance, overall relying for at least 57% on private risksharing channels.[35]
These results on the polarization of risksharing, driven by within-household risksharing, are consistent with models of positive assortative mating (Greenwood et al. 2014), where "marrying your like" generates inequality in household income distribution.

It may appear that our results of a substantial degree of household risksharing contradict Jappelli and Pistaferri (2006)'s finding of a significant mobility of log consumption of SHIW households from 1987 through 1995, which is in conflict with the implications of full risksharing with a power utility function. In fact, the opposite is true: apart from obvious differences in the time period and the estimation methodologies, a changing distribution of consumption is in line both with our general approach - which allows and corrects for utility functions which may be neither leisure nor time-separable, nor even VNM functions - and with our results on risksharing varying by wealth classes. Indeed, as "poor" households keep failing to attain full insurance, as we illustrated, the distribution of consumption may well change over time.

# 6. Conclusions

The literature has long raised the question of the economic mechanisms underlying the high degree of risksharing often found in micro data. Indeed, while a stream of the literature has always implicitly assumed that risksharing is carried out solely through portfolio diversification, the emergence of the channels literature has shifted the focus towards the diversity of mechanisms implementing (or preventing) the planner allocation. This paper, sheds a light on such risksharing

[35]The detailed results on risksharing channels by net wealth quintiles are available from the authors upon request.

mechanisms operating across households. Hence, for example, our results provide a set of possible mechanisms underlying Krueger and Perri (2011)'s findings in SHIW data of a low correlation between labor income and consumption, and of a notable effect of wealth on consumption. Most importantly, our methodology can be carried over to other settings to investigate household risksharing in countries where adequate income and consumption data on households is available.

Our finding of a preponderant role played by intra-household risksharing bears important consequences also for microeconomic modelling. Indeed, as pointed out by Attanasio and Lechene (2002)[7], the pooling of monetary resources is a necessary condition of the unitary model of household behavior (but not of more general models). In the unitary model, household decisions are analyzed under the hypothesis that the household is a single and monolithic decision unit that somehow maximizes the welfare of its members. This hypothesis is of great analytical convenience and vastly simplifies the empirical analysis, especially when data on individual members' consumption are not measured or even hard to define. Our finding - which enters a long empirical controversy on the realism of this hypothesis - lends support to the palatability of the assumption that welfare is equally or optimally distributed within the household. A high degree of intra-household risksharing also brings about macroeconomic consequences: findings for the US by Halla and Scharler (2012)[40] show that marriages do not just improve the allocation of risk at the individual level, but also have implications for the allocation of risk at the more aggregated state level. Finally, in terms of macro modelling, our results show that the bulk of risksharing takes place either within the household or through self-insurance, that is simply by using the simplest financial tools available to borrow or lend. This suggests that, in modeling consumption in economies like Italy, a bonds-only financial structure might be enough to support the basic patterns of consumption.

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