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FAMILY TIES: OCCUPATIONAL RESPONSES TO COPE WITH A HOUSEHOLD INCOME SHOCK

Massimo Baldini
Costanza Torricelli
Maria Cesira Urzì Brancati

Family ties: occupational responses to cope with a household income shock

Massimo Baldini[a,b], Costanza Torricelli[a,c,d*], Maria Cesira Urzì Brancati[a,d]

a. Department Economics, University of Modena and Reggio Emilia

b. CAPP (Centro Analisi Politiche Pubbliche, Modena)

c. CEFIN (Centro Studi di Banca e Finanza, Modena)

d. CeRP (Collegio Carlo Alberto, Torino)

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Abstract

We use household panel data to explore the link between transitions of a household member (not only the wife) into the workforce and negative income shocks (unemployment and/or income support) suffered by another household member. We take the case of Italy where family ties other than spousal ones are particularly strong, and we also consider the role of household illiquidity due to housing. After accounting for standard socio-economic controls, results show significant reactions to income shocks, especially during the Great Recession. Moreover, at high levels of portfolio illiquidity, transitions are significantly more likely for households hit by a shock.

JEL: D12; D14; J22; C25

Keywords: household labour decisions; household portfolios; discrete-choice models

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Introduction

During the first year of the Great Recession, between 2008 and 2009, the GDP of the Euro (17) area dropped by 4.4 per cent according to OECD statistics; in the following months, unemployment rates soared, especially in Southern European countries (Italy, Spain, Greece and Portugal), and the value of real and financial assets declined sharply. What began as a financial crisis sparked by the US housing market bubble (and the abuse of subprime loans) soon turned into the deepest recession since the 1930s. As a consequence, many households, especially those who believed the effects of the shocks to be permanent, were forced to reduce consumption expenditures (Christelis et al. 2012). While different governments in different countries chose more or less expansionary fiscal and monetary policies to counteract the effect of the crisis, at the household level individuals adopted a series of strategies to cope with financial strain due to a loss of income.

From a theoretical point of view, a standard intertemporal budget constraint posits that individuals facing an unforeseen negative income shock can react in different ways: they may increase labour supply, reduce planned consumption, resort to borrowing (either from credit institutions or other family members and friends), or use their savings (Browning and Lusardi, 1996). An increase in labour supply, either at the extensive margin (from not participating in the labour market to participating) or intensive margin (increasing the number of hours worked) depends on the relative price and effectiveness of all the alternatives/combinations. As stressed by Lundberg (1985), when credit constraints are binding and in the absence of savings (or in the presence of liabilities), increasing labour supply, or at least trying to, is more likely. The recent increase in the number of active persons in Europe, despite the recession, seems to suggest that such a reaction could be taking place: data from EUROSTAT show that the active population in Europe (EU17) has increased by over 2 million units, or 1 per cent, between 2008 and 2013; however, while the variation in the activity rate is positive for women (+4 per cent, or 2.8 million units), it has dropped by 1 per cent for men. In Italy, where the drop in GDP has been severe and potentially more permanent, data from Italian National Institute of Statistics show that among

women aged 35-44 years the activity rate from 2008 to 2012 increased from 67.8 per cent to 69 per cent.

The aim of this paper is to analyse the potential increase of labour supply as a coping strategy against income losses. More specifically, we assess whether inactive individuals (not only the spouse) who are part of a household hit by an income shock are more likely to transit into the workforce. By income shock we mean the event that at least one household member (not necessarily the head of household) fell into unemployment and/or started receiving some kind of work-related income support, since both cases imply a reduction in family income. Our analyses are based on a discrete choice model and, besides standard socio-economic and demographic variables, we use portfolio controls with special attention to portfolio illiquidity due to housing. We also control for potential sample selection and estimate a standard Heckman selection model.

We use data drawn from the Bank of Italy Survey on Household Income and Wealth (SHIW) over the period 2004-2012 to include the effects of the Great Recession. Italy lends itself particularly well to our empirical investigation for three main reasons. First, the role of intra-family transfers is especially relevant, since "children" live with their parents until well into their thirties, hence benefiting from (as well as potentially contributing to) parental income and wealth. The Italian case is not, however, isolated, since the extended co-residence of parents and their adult children (and/or elderly) is typical of Southern Europe, widespread in most Eastern European countries, and not negligible in some North-Western countries, such as the UK, Ireland and Austria (Iacovou and Skew, 2011). Thus, our findings can lead to broader generalisations. Second, Italians are more able to smooth consumption and less bound by credit constraints because they are savers (even though the observed level of savings has substantially decreased in the last decade) and they have very low private debt and a high homeownership rate, therefore portfolio controls may play an important role. Finally, the low stock market participation of Italian households (Guiso and Jappelli, 2009) meant that the majority of them were shielded from huge capital losses due to the financial turmoil (Brandolini et al., 2012), therefore labour income shocks may have a stronger effect.[1]

[1] It is also worth mentioning that one quarter of total household income comes from pensions and other public transfers which have not been touched by the crisis – except for a two year freeze of indexation for pensions up to

Our contribution is twofold. First, we study not just spousal reaction to a household income shock, but also the reaction of any other household member so as to capture broader family ties and changes in the family structure. Because of the rigidity of the Italian labour market, we consider an increase in labour supply at the extensive margin, so our estimation sample consists only of inactive household members, mainly housewives/ homemakers and students, who may have an (extra) incentive to participate in the labour market once another household member experienced an income shock. Since students may enter the labour force independently of the income shock when they finish studying, besides controlling for age and education, we carry out a robustness check and split the sample according to the two main inactive categories. Secondly, among portfolio controls, we specifically account for the role played by portfolio illiquidity due to housing. We both estimate the impact of portfolio illiquidity itself on the probability of increasing labour supply, and we assess whether the role of portfolio illiquidity differs between households hit and those not hit by an income shock.

Our results show a significant positive association between transition probabilities into the workforce or employment and household income shocks, especially during the recession. The probability of a transition into employment or into the workforce is concave in age and higher in the presence of an income shock. As for portfolio controls, we find a significant difference (mostly in terms of intercept, but also of slope) between the level of illiquidity and labour market participation for households hit/not hit by a shock.

The rest of the paper is organized as follows. Section 1 provides an overview of the related empirical and theoretical literature; Section 2 describes the dataset and provides some descriptive statistics that motivate our research question. Section 3 illustrates the empirical analyses and discusses results. Sensitivity analyses and robustness checks are presented in Section 4. Last Section concludes.

1. Literature Review and Conceptual Framework

When studying mechanisms to cope with income drops within a household, it is important to consider intra-household transfers, which may take the form of monetary transfers as well as

three times the minimum value – therefore families in which an older member is present can benefit from his or her pension (Brandolini et al. 2012).

labour supply reactions of another household member. The idea that one inactive household member may increase his or her labour supply to compensate for the unemployment of another household member is generally referred to as the "added worker effect", a concept which dates as far back as the 1940s (Humphrey, 1940) and has received large attention by the economic literature. Most authors focus on couples and the wife's response to husband's job loss, while only a few consider the reaction of other members, and the results are still mixed. For instance, Maloney (1991) finds no evidence of an added worker effect for US couples, since the husband's (temporary) unemployment does not lower the wife's reservation wage. Conversely, Gong (2010) finds a positive effect of husband's job loss both on wife's participation and on working hours for a sample of Australian women; since it is harder for women who are out of the labour force to enter the market than for women already working to increase their hours, the study finds a stronger effect on the intensive margin. Bryan and Longhi (2013) find little evidence in support of a "household insurance" mechanism for British couples in case of unpredicted job loss. More specifically, the authors compare booms and recession periods and find that, even though job searches increase in response to job loss during a recession, they are not necessarily successful.

Household members' reactions likely depend on the level and availability of public transfers. Cullen and Gruber (2000) and Bingley and Walker (2001) highlight the importance of unemployment insurance and the incentives embedded in the system. Using US data, Cullen and Gruber estimate that spouses would increase their total hours of work by 30 per cent in response to an income shock if unemployment insurance did not exist. Bingley and Walker use UK data to exploit the 1996 welfare reform, which replaced the existing system of unemployment benefits with the Job Seeker's Allowance, and found similar effects. A couple of studies, Skoufias and Parker (2005) and Beylis (2012), deal with similar issues using Mexican data. The authors claim that because in Mexico, like in other developing countries, labour markets are still hierarchical in terms of gender with married women often seen as secondary workers, the access to credit is poor, and unemployment insurance is non-existent, wives are more likely to increase their labour supply in response to their husbands' job loss; indeed, both articles find a large and significant added worker effect. Benito and Saleheen (2012) consider the impact of a financial rather than income shock and find a positive response in terms of labour supply, mainly at the intensive margin, for a sample of British households.

Portfolio features may well play a role in determining labour transitions. Blundell et al. (1997) give the theoretical background to relate wealth and labour market transitions positing that a higher level of wealth decreases the probability of a transition from non-employment into employment. Bloemen (2002) presents an empirical study for the Netherlands on the relation between wealth and labour market transitions, where to define wealth he uses the levels of net assets, and finds a negative relationship between wealth at the beginning of the period and the probability to remain employed/transit into employment. Another strand of literature looks at the connection between mortgage commitments and female labour supply (e.g. Del Boca and Lusardi, 2003 and Fortin, 1995) and finds a positive relationship.

A few recent studies, which fit within the literature on household financial fragility, investigate the role of portfolio composition and intra-family monetary transfers in determining the ability to cope with financial shocks that may be due to temporary and unexpected income drops. Lusardi et al (2011) use a self-assessed measure of financial fragility and study US households' ability to come up with $2,000 in 30 days, compare their coping ability with that of households in seven other industrialized countries and also look at a "pecking order" of coping mechanisms (savings, family/friends, traditional credit, work more, selling possession). Brunetti et al. (2012) propose a novel characterization of financial fragility that is not necessarily linked to indebtedness and is free of subjectivity bias and use it to assess the importance of household portfolio illiquidity in determining difficulties to cope with unexpected expenditure needs, thereby including temporary income losses.

With respect to the literature on the "added worker effect", we study not just spousal reaction to a household income shock, but the reaction of any other household member so as to capture broader family ties and changes in the family structure, which are happening in many European countries. Indeed, the share of young adults, 18 to 34 year olds, living with their parents has been steadily increasing not just in Southern Europe, but also in several European countries where traditionally children gain their independence at younger ages (i.e. the UK, France or the Netherlands[2]); hence we may look for an added worker effect also among older children. With respect to the literature on wealth and labour transitions, we account for portfolio composition

[2] Source: EU-SILC; EUROSTAT data.

and, specifically, we control for the role played by portfolio illiquidity due to housing, in line with some of the literature on household financial fragility.

2. Data and Descriptive Statistics

2.1 Sample Selection and descriptive statistics

Our investigation draws from the Survey on Household Income and Wealth (SHIW) waves 2004-2012. The SHIW is a biannual survey, conducted by the Bank of Italy on a representative sample of the Italian population and includes a wealth of information on socio-demographic variables, a detailed description of households' assets and work histories. We kept only individuals present in at least two waves, so that we can exploit the panel component, and we restrict our sample to individuals aged between 15 and 65; however, we control for the presence of children under the age of five within the household, as well as for the presence of adults aged 65 and over.

In this Section we present a few descriptive statistics of household income, first at an aggregate level and then distinguishing between households hit and not hit by an income shock as defined below.

2.2 Changes in total household income and its components

In order to understand the income dynamics during the period considered, we first calculate the mean level of total household disposable income and its separate components for each wave. All income definitions are given in Appendix A.

From table 1 we notice how payroll and pension income follow the same trend as total household disposable income, peaking in 2008, experiencing a large drop in 2010 and then decreasing again, but less than in the previous period[3]. Conversely, income from self-employment shows a decreasing trend from the beginning of the period in 2004 till 2012. Transfer income is decreasing before 2008, and increasing right after, which can be seen as a sign of the economic crisis. Property income and income from financial assets show an unstable trend. Property

[3] Please note that our sample does not include people aged over 65, so the variation in pension income is not meant to be representative for the entire Italian population.

income appears to represent a high portion of total household disposable income, but it has to be recalled that it consists of two components: while actual rents increase in the last biennium, imputed rents decline markedly between 2010 and 2012, possibly reflecting people's negative expectations on the housing market. Income from financial assets in 2010 is shown as negative because interests paid, most likely on mortgages, are higher than interests earned.

In table 2 we show the wave-on-wave variation of the income variables to highlight the potential impact of the recession. Indeed, between 2008 and 2010 we observe the first and largest drop in both payroll income and total household disposable income (-5.9 per cent and -5.4 per cent respectively), and the negative trend continues into the following biennium (-1.7 per cent and -2.4 per cent respectively). Between 2010 and 2012 payroll income decreases less than total household disposable income, possibly reflecting the large negative variation in income from self-employment (-12.2 per cent).

Table 1: Aggregate household income and its components (CPI adjusted 2012 prices, in €)

€	2004	2006	2008	2010	2012
Payroll Income	19,941	21,068	21,344	20,077	19,740
Self-employment Income	6,515	6,493	6,219	6,030	5,463
Self-employment Income	*5,623*	*5,702*	*5,424*	*5,328*	*4,676*
Entrepreneurial Income	*892*	*791*	*795*	*703*	*787*
Pension Income	4,508	4,601	5,199	4,527	4,462
Pensions	*4,493*	*4,532*	*5,158*	*4,515*	*4,439*
Arrears	*16*	*69*	*41*	*12*	*23*
Transfer Income[(a)]	223	199	179	267	424
Property Income	7,547	7,236	7,378	7,587	7,012
Actual Rents	*502*	*307*	*346*	*384*	*400*
Imputed Rents	*7,044*	*6,929*	*7,032*	*7,203*	*6,611*
Income from Financial Assets	-30	108	-44	-327	45
Total Household Disposable Income	38,832	39,712	40,308	38,130	37,203
Obs	6,305	8,227	8,682	8,714	6,818

(a) We have not reported the sub-categories gifts, alimonies and other transfers.
Source: SHIW 2004-2012, data weighted using household sampling weights.

Table 2: Percentage change in aggregate household income and its components (CPI adjusted 2012 prices)

	2004-2006	2006-2008	2008-2010	2010-2012
Delta Payroll Income	5.7%	1.3%	-5.9%	-1.7%
Delta Self-employment Income	-0.4%	-4.2%	-3.0%	-9.4%
Self-employment Income	*1.4%*	*-4.9%*	*-1.8%*	*-12.2%*
Entrepreneurial Income	*-11.3%*	*0.6%*	*-11.6%*	*12.0%*
Delta Pension Income	2.1%	13.0%	-12.9%	-1.4%
Pensions	*0.9%*	*13.8%*	*-12.5%*	*-1.7%*
Arrears	*343.6%*	*-40.7%*	*-70.5%*	*89.7%*
Delta Transfer Income[(a)]	-11.0%	-9.9%	48.8%	59.0%
Delta Property Income	-4.1%	2.0%	2.8%	-7.6%
Actual Rents	*-38.8%*	*12.5%*	*11.0%*	*4.3%*
Imputed Rents	*-1.6%*	*1.5%*	*2.4%*	*-8.2%*
Delta Income from Financial Assets[(b)]	-459.1%	-140.8%	642.6%	-113.8%
Delta Total Household Disposable Income	2.3%	1.5%	-5.4%	-2.4%
Obs[(c)]	6,208	6,691	6,875	6,802

(a) We have not reported the sub-categories gifts, alimonies and other transfers.
Note: Since we are calculating variations, observations from the first year are missing. All delta variables are calculated as the % variation from the previous wave $(x_t-x_{t-1})/x_{t-1}$.
Source: SHIW 2004-2012, data weighted using household sampling weights.

Aggregate measures, however, do not take into account an important source of heterogeneity: some households experienced an income shock and some did not. Therefore, we want to see to what extent the variation in household income follows a different pattern for the two groups.

2.3 Defining households hit by an income shock

In order to identify households hit by an income shock, we build a binary variable equal to one if at least one household member transited from employment into unemployment, at least one household member started receiving some kind of income support (income from redundancy benefits, mobility benefits and unemployment benefits) or both, and zero otherwise. We consider the receipt of work-related benefits as an income shock, since in Italy many workers of firms suffering from severe reductions in their activity receive redundancy or mobility benefits, but are still classified as employed, even though the probability of working again may be low. Because redundancy/mobility benefits cover only a percentage of the initial wage, family income is reduced and therefore other family members may react by searching for a job.

Between 2012 and 2010, 11.7 per cent of the families in our sample were hit by a shock compared to 4.9 per cent in 2004-2006. More specifically, a transition from employment into unemployment is present in roughly 7.2 per cent of families in 2012, compared to 4.4 per in 2004-2006; while 6.2 per cent of families in 2012 report at least one member who started receiving benefits, as opposed to 1.2 per cent in 2004-2006 (see table 3). The categories do not totally overlap, since we have households in which only one of the two shocks (unemployment or benefits) is presents, and households in which both of them are present at the same time.

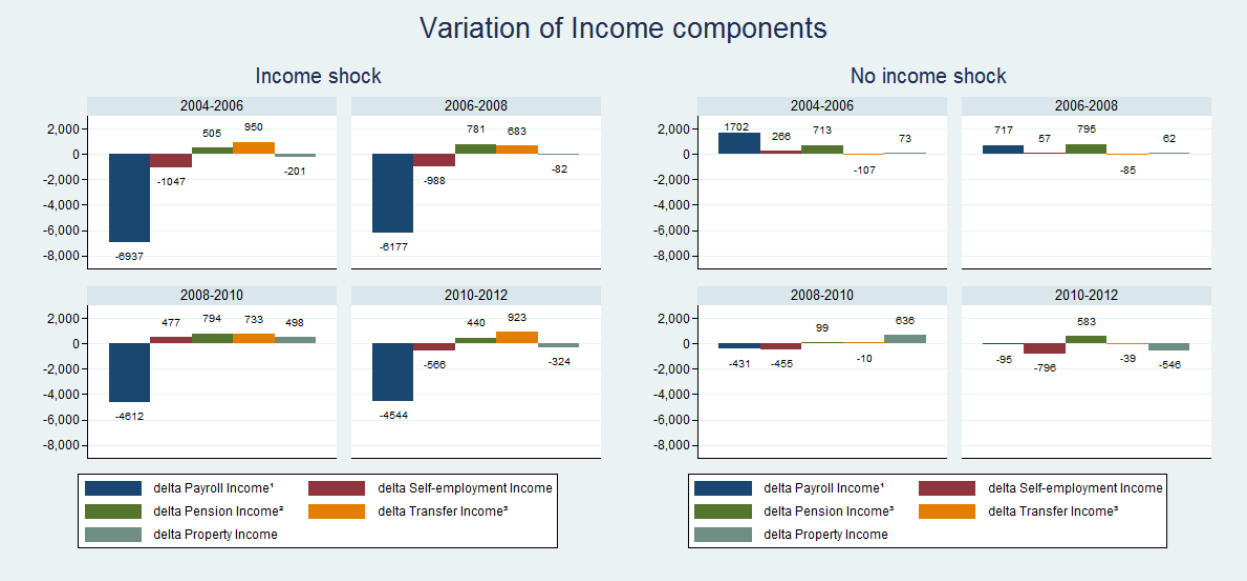
Table 3: Individuals living in households which experienced / did not experience an income shock, by year

	2004-2006	**2006-2008**	**2008-2010**	**2010-2012**
Income shock (composite) between t and t-1	4.9%	6.1%	5.8%	11.7%
Only one shock: lost work	*4.4%*	*4.7%*	*3.3%*	*7.2%*
Only one shock: benefits	*1.2%*	*1.9%*	*3.2%*	*6.2%*
Obs	*7,650*	*8,262*	*8,292*	*6,361*

Source: SHIW 2004-2012, data weighted using household sampling weights.

Figure 1 shows the average income variation for households hit and not hit by an income shock. Predictably, payroll and self-employment income show large negative variations in all periods for households hit by a shock (except for a small positive variation in self-employment income between 2008 and 2010), while the variation in transfer income for this group is always positive. Since the beginning of the recession the variation in payroll and self-employment income becomes negative, albeit small, also for households not hit by an income shock.

Figure 1: Variation in household income components (in CPI adjusted euros, by wave and income shock)



[1] *Only wage, no fringe benefits.*
[2] *Only pensions, no arrears*
[3] *Only financial assistance (no gifts or alimonies)*
Source: Our elaborations from SHIW 2004-2012.

One of the intuitions we draw from Figure 1 is that the severe loss in payroll income for households hit by a shock is far from being compensated by an equivalent increase in other types of income, especially transfer income. It is therefore plausible to expect, among reactions at the household level, an increase in the labour supply.

3. Empirical Strategy

Since we are interested in the reaction to a household income shock from previously inactive household members, we start by defining who is considered *inactive*. We build a binary variable equal to 1 if the individual was a housewife/homemaker, a student, a voluntary worker or if he or she lived of independent means (i.e. rentier) when he or she first enters our sample. Pensioners or recipients of non-work-related benefits are excluded. Since we have an unbalanced panel, the first year does not correspond to 2004, but can be any successive year.[4] As we can see in table 4, roughly 52.2 per cent of the people who were inactive at time 1 were students, 47.3 per cent were

[4] A technical note: the first year of inactivity cannot be 2012 because in that case the individual would only be present for one period and would be dropped from our estimation sample.

housewives and only 0.5 per cent were either rentiers or voluntary workers. Given these numbers, we carry out a robustness check on the two categories housewives and students in Section 4.

We then define the dependent variable $Employed_{it}$ as a dichotomous variable taking the value of 1 if the individual *i* transited from out of the workforce into employment at time *t* and zero otherwise; if at time t+1, the individual who experienced the transition remains in employment, the binary variable takes the value of 1. If the same individual transits out of employment (at t+1), the binary variable takes the value of zero. This gives us a total of 986 observations (for 587 individuals). Because a transition into employment is likely to be more difficult during a recession, we also define a second dependent variable, $Active_{it}$, as a dichotomous variable taking the value of 1 if the individual transited from out of the workforce into the workforce (i.e. either employed or actively seeking work) at time t or if he or she remained part of the workforce after a transition, and zero otherwise, for a total of 2,005 observations (for 1,162 individuals).

Even though the percentage of women who are inactive in the first year is 2.7 times higher than the percentage of men in the same situation (73 per cent vs. 27 per cent), only 14 per cent of these women experience a transition into the workforce as opposed to 25 per cent of men (see Table 4).

Table 4: Estimation sample and employment transitions, by gender

	Male		Female		All		% of
	Obs	Indiv.	Obs	Indiv.	Obs	Indiv.	Female out of All
Inactive at t= 1	2,041	951	5,584	2,556	7,625	3,507	*73%*
of which students	2,009	937	1,953	948	3,962	1,885	*49%*
of which housewives	4	2	3,618	1,603	3,622	1,605	*100%*
of which voluntary workers	23	10	10	4	33	14	*30%*
of which rentiers	5	2	3	1	8	3	*38%*
Transited into employment	411	238	575	349	986	587	*58%*
Transited into workforce	878	476	1,127	686	2,005	1,162	*56%*
Remained inactive	1,123	685	4,260	2,180	5,383	2,865	*79%*
Success rate into employment		25%		14%			
Success rate into workforce		50%		27%			

Source: Own elaborations from SHIW data.
Note: totals do not add up since the same individual may experience more than one transition. For instance, the same individual can start out of the workforce, remain out for a year, and then transit into the workforce/employment.

We estimate the following equation as a static probit model:

$$y_{it} = 1\{\beta_1 IncomeShock_{ijt} + \gamma x_{ijt} + \varepsilon_{it} \geq 0 \mid Inactive_{i1} = 1\} \mid \quad (1.1)$$

where

y_{it} is $Employed_{it}$ in a first specification, or $Active_{it}$ in a second specification; $Income\ shock_{ijt}$=1 if the individual i is part of a household j in which at least one member has suffered an income shock (either became unemployed or received income support or both) from time t onwards; x_{it} is a vector of covariates to control for heterogeneity; ε_{it} the error, which we assume to be normally distributed, and $inactive_{i1}$=1 if individual i at time 1 is *inactive*.

The vector of covariates x includes a dummy variable equal to one if the individual is a female, a second order polynomial in age, dummies for marital status (couple as the baseline), a dummy for the presence of children under the age of 5 within the household and one for the presence of an individual aged 65 and over, household size, dummy for head of household, dummies for high and medium educational attainment (low education as the baseline), year and geographical dummies. A detailed list of all variables used, their definition and summary statistics of the estimation sample are provided in Appendix B.

Since we are using a panel, our sample contains several observations on the same individuals which are not independent of each other. We control for it by clustering standard errors at the individual level.

3.1 The role of income shocks

Table 5 highlights the role of an income shock and reports the results from regression (1.1) in the two specifications, whereby in the first the dependent variable is the probability of becoming employed and in the second the probability of becoming active.[5]

[5] Since our regressor of interest, Income Shock, is a binary variable, interpreting the marginal effects (at means) is straightforward: the coefficient is just the difference between the predicted probabilities of a transition, conditional on other covariates, for households hit by a shock and households not hit by a shock, holding all other variables at their means. So the MEM for Yshock = Pr(Y = 1|X, Yshock = 1) – Pr(y=1|X, Yshock = 0).

These results confirm our intuition that households hit by a shock respond by increasing labour supply, as the probability of a transition is 7.7 percentage points higher compared to households that were not hit by an income shock. The effect is even stronger if we consider the probability of a transition into the workforce, with individuals living in a household hit by an income shock 9.3 percentage points more likely to become active than individuals living in households in which nobody suffered an income shock. Despite the fact that most individuals who transit from inactivity into either employment or the workforce are women, their relative success rate - as measured by the percentage of women who experience a transition over total women out of the workforce - compared to men is much lower (Table 4), therefore it is not surprising to find a negative sign on the marginal effect for the female dummy. From Table 5, we also see that the probability of a transition increases with age (in a concave fashion) and is higher for people who are not married. It is also significantly increasing with years of education (at the same age) and for those who live in the Northern area of Italy, where the number of job opportunities is greater.

Table 5: Probability of a transition from out of the workforce into the workforce

Pr(Y=1)	**Y=1: Employed**		**Y=1: Active**	
	Coeff	**MEMs**	**Coeff Y***	**MEMs**
Income shock	0.240***	0.077***	0.235***	0.093***
	(0.07)	(0.02)	(0.06)	(0.02)
Demographics				
Female	-0.316***	-0.095***	-0.321***	-0.127***
	(0.07)	(0.02)	(0.06)	(0.02)
Age	0.180***	0.009***	0.201***	0.009***
	(0.02)	(0.00)	(0.02)	(0.00)
Age squared[(a)]	-0.002***		-0.003***	
	(0.00)		(0.00)	
Single	0.696***	0.203***	1.029***	0.386***
	(0.14)	(0.04)	(0.13)	(0.05)
Divorced	0.454*	0.121	0.938***	0.351***
	(0.24)	(0.08)	(0.21)	(0.08)
Widow(er)	0.478	0.128	0.786**	0.291**
	(0.38)	(0.12)	(0.32)	(0.13)
With children aged <5 in HH	0.023	0.007	-0.092	-0.036
	(0.12)	(0.04)	(0.10)	(0.04)
At least one over 65 in HH	-0.049	-0.015	0.142*	0.056*
	(0.09)	(0.03)	(0.07)	(0.03)
Household size	-0.054*	-0.016*	-0.020	-0.008
	(0.03)	(0.01)	(0.02)	(0.01)
Head	0.175**	0.053**	0.108	0.043
	(0.08)	(0.03)	(0.07)	(0.03)
Graduate	0.296***	0.089***	0.514***	0.203***
	(0.10)	(0.03)	(0.09)	(0.03)
Secondary Education	0.229***	0.069***	0.222***	0.088***
	(0.07)	(0.02)	(0.06)	(0.02)
Resident in the Centre	-0.171**	-0.060**	0.050	0.020
	(0.08)	(0.03)	(0.07)	(0.03)
Resident in the South	-0.589***	-0.179***	-0.094*	-0.037*
	(0.06)	(0.02)	(0.05)	(0.02)
Cons	-4.278***		-4.700***	
	(0.39)		(0.35)	
Year	YES		YES	
# observations	7,822		7,822	
# individuals	3,582		3,582	
Pseudo R^2	0.120		0.173	
P value	0.000		0.000	
χ^2	321.87		816.96	

*Clustered robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.

[(a)] The marginal effect of Age includes the effect of age squared.

3.2 The role of income shocks at different ages

In order to better understand the role of age in explaining transitions into employment or into the workforce in the presence of a family income shock, we look at interactions. Because we are

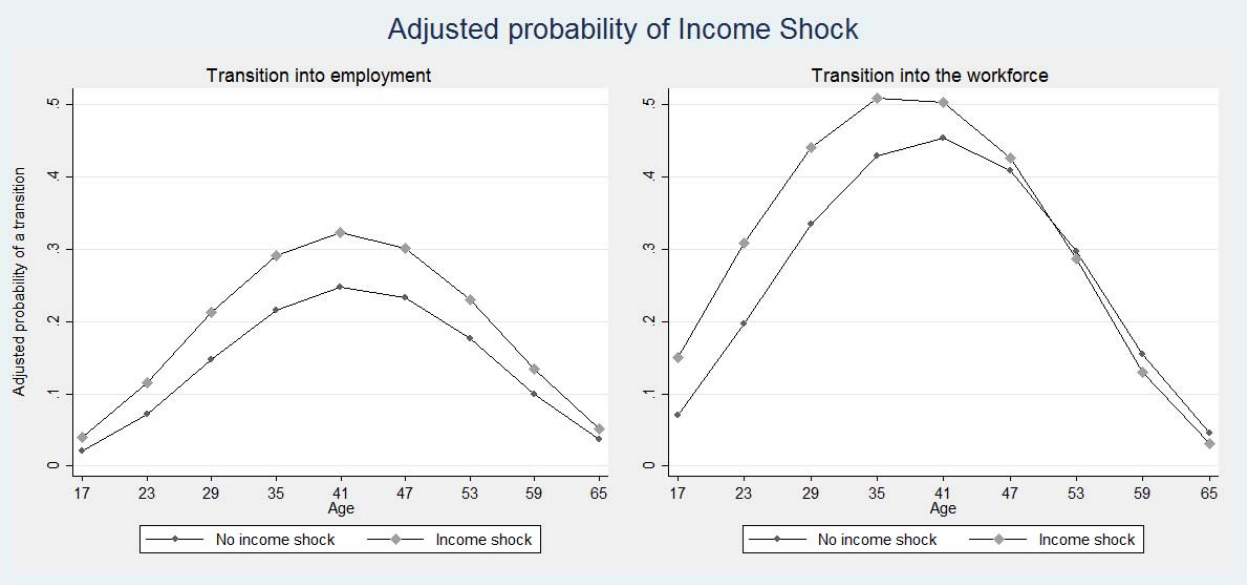
estimating a nonlinear model, the best way to represent the effect of income shock and age is to show the marginal effects at representative values (of age). Table 6 shows that the income shock induces a change in labour supply also for middle ages, and not only for the younger people (e.g. students), who might have natural transitions into the workforce when they finish their studies. However, while in the case of the transition into employment the effect of the shock is significant for all age classes until 53 years, when looking at transitions to the workforce, it ceases to be relevant some years earlier.

Table 6: Probability of a transition from out of the workforce into workforce interacting income shock and age

Marginal effect of income shock at representative ages		
Pr(Y=1)	**Y=1: Employed**	**Y=1: Active**
Income Shock at age 17	0.019*	0.079***
	(0.01)	(0.02)
Income Shock at age 23	0.044**	0.112***
	(0.02)	(0.03)
Income Shock at age 29	0.066***	0.106***
	(0.02)	(0.03)
Income Shock at age 35	0.076***	0.079***
	(0.03)	(0.03)
Income Shock at age 41	0.075***	0.049*
	(0.03)	(0.03)
Income Shock at age 47	0.068**	0.018
	(0.04)	(0.03)
Income Shock at age 53	0.054	-0.011
	(0.04)	(0.04)
Income Shock at age 59	0.035	-0.024
	(0.03)	(0.03)
Income Shock at age 65	0.015	-0.015
	(0.02)	(0.01)
Year	YES	YES
Demographics	YES	YES
# observations	7,822	7,626
# individuals	3,582	3,507

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.
All models include the following controls: dummy variable equal to one if the individual is a female, a second order polynomial in age, dummies for marital status (couple as the baseline), a dummy for the presence of children under the age of 5 within the household, a dummy for the presence of an adult aged 65 or over in the household, household size, dummy for head of household, dummies for high and medium educational attainment (low education as the baseline), year and geographical dummies.

Figure 2 : Differential adjusted probabilities of a transition into the workforce at representative values of age, by Income Shock



Source: Own elaboration from estimates.

Using the estimated coefficients, Fig. 2 plots how the adjusted probabilities of a transition into employment or into the workforce change with age (Fig. 2), with and without an income shock. Figure 2 clearly shows that the probability of a transition into employment or into the workforce is concave in age and higher in the presence of an income shock (except for transition into the workforce of people above 50).

3.3 Accounting for portfolio features

Portfolio features may well play a role in determining the decision of inactive household members to become active when an income shock is suffered by somebody in the family, in analogy with the literature on wealth and labour market transitions recalled in Section I.

In order to control for such potential portfolio effects, we add 3 extra controls to equation (1.1). The first is related portfolio illiquidity and is meant to capture the role of housing, which represents the dominant asset in the average Italian household portfolio. To this end, in line with Brunetti et al. (2012) we define "illiquidity due to housing" as the ratio of the value of the first home over total (gross) wealth so that the indicator ranges from 0 to 1. Following the empirical

literature on wealth and labour transitions, we control for the amount of financial assets and liabilities measured in 10,000 euros. Financial assets include deposits, government and other securities and trade credits or credit due from other households; financial liabilities include liabilities to banks and financial companies (incl. mortgages), trade debt and debts towards other households.

We then estimate the following equation:

$$y_{it} = 1\{\beta_1 IncomeShock_{ijt} + \gamma x_{ijt} + \lambda W_{jt-1} + \varepsilon_{it} \geq 0 \mid inactive_{i1} = 1\} \mid \quad (1.2)$$

where y_{it}, $Income\ shock_{ijt}$, x_{it} are the variables we have already specified, and W_{jt} is a vector of portfolio controls lagged by one period, including the illiquidity index. Note that portfolio controls are at household and not individual level.

Table 7 (second and fourth columns) shows that even after including portfolio controls the results remain stable, since individuals living in a household hit by a shock are still significantly more likely to transit both into employment (+8.5 ppts) and into the workforce (+9.1ppts). If we focus on the direct effect of portfolio controls, we see that they are not significant in explaining transition into employment, but they are relevant in explaining the decision to become active. As expected, the level of financial assets in the previous period reduces the probability of entering the workforce, which is consistent with the literature on wealth and labour market transitions (Blundell et. al, 1997; Stancanelli, 1999; Bloemen, 2002). The negative sign of the coefficient of the degree of illiquidity due to housing could be explained in principle by two main reasons, both discouraging participation: housing provides income or collateral for consumer credit (Benito, 2009) and/or owning a house hinders job mobility (see Battu et al. 2008).

Table 7: Probability of a transition from out of the workforce into the workforce with portfolio controls

Pr(Y=1)	Y=1: Employed		Y=1: Active	
	MEMs	**MEMs**	**MEMs**	**MEMs**
Income shock	0.077***	0.085***	0.093***	0.091***
	(0.02)	(0.02)	(0.02)	(0.02)
Demographics				
Female	-0.095***	-0.095***	-0.127***	-0.122***
	(0.02)	(0.02)	(0.02)	(0.02)
Age / Age squared[(a)]	0.009***	0.009***	0.009***	0.010***
	(0.00)	(0.00)	(0.00)	(0.00)
Single	0.203***	0.199***	0.386***	0.397***
	(0.04)	(0.04)	(0.05)	(0.05)
Divorced	0.121	0.115	0.351***	0.302***
	(0.08)	(0.08)	(0.08)	(0.09)
Widow(er)	0.128	0.105	0.291**	0.245
	(0.12)	(0.14)	(0.13)	(0.15)
With children aged <5 in HH	0.007	0.012	-0.036	-0.029
	(0.04)	(0.04)	(0.04)	(0.04)
At least one over 65 in HH	-0.015	-0.015	0.056*	0.058*
	(0.03)	(0.03)	(0.03)	(0.03)
Household size	-0.016*	-0.016*	-0.008	-0.006
	(0.01)	(0.01)	(0.01)	(0.01)
Head	0.053**	0.057**	0.043	0.048*
	(0.03)	(0.03)	(0.03)	(0.03)
Graduate	0.089***	0.091***	0.203***	0.213***
	(0.03)	(0.03)	(0.03)	(0.04)
Secondary Education	0.069***	0.070***	0.088***	0.093***
	(0.02)	(0.02)	(0.02)	(0.02)
Resident in the Centre	-0.060**	-0.057**	0.020	0.019
	(0.03)	(0.03)	(0.03)	(0.03)
Resident in the South	-0.179***	-0.173***	-0.037*	-0.045**
	(0.02)	(0.02)	(0.02)	(0.02)
Wealth				
Illiquidity due to housing at t-1	-	-0.021	-	-0.050**
	-	(0.02)	-	(0.02)
Financial assets (in 10,000€) at t-1	-	0.000	-	-0.003**
	-	(0.00)	-	(0.00)
Financial liabilities (in 10,000€) at t-1	-	0.003	-	0.000
	-	(0.00)	-	(0.00)
Year	YES	YES		YES
# observations	7,822	7,625	7,822	7,625
# individuals	3,582	3,507	3,582	3,507
Pseudo R^2	0.120	0.120	0.173	0.175
P value	0.000	0.000	0.000	0.000
χ^2	321.87	322.54	816.96	799.65

*Clustered robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.

[(a)] The marginal effect of Age includes the effect of age squared.

Since portfolio illiquidity may have a differential effect for households hit/not hit by a shock, we also look at interactions. Table 8 indicates that portfolio illiquidity due to housing plays a role in connection with the income shocks. The intensity of the reaction increases, although mildly, with illiquidity, and more significantly so for people looking for a job. While there is no significant difference at very low illiquidity levels between households hit/not hit by a shock, at higher levels of illiquidity (from 0.2 onwards) households hit by a shock are significantly more likely to transit into employment or into the workforce compared with households in which nobody experienced an income shock. The result is consistent with the literature on household financial fragility: Brunetti et al. (2012) stress portfolio illiquidity due to excessive housing as a source of financial fragility for Italian households.

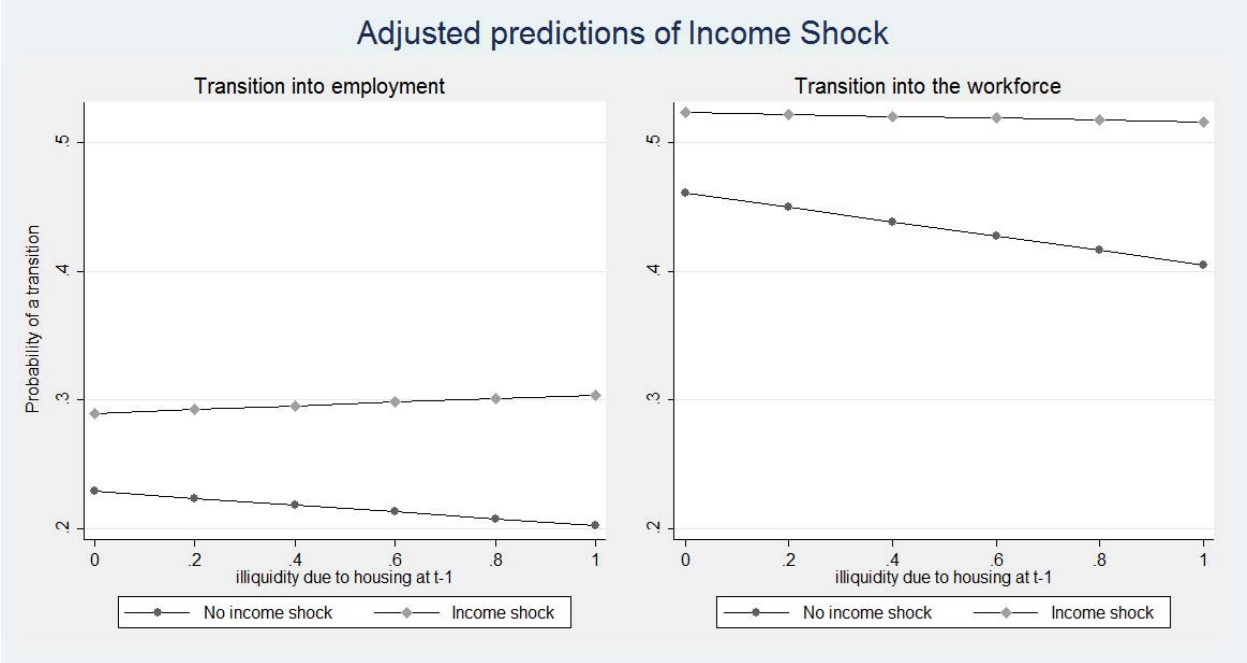
The coefficients for the adjusted predicted probabilities are plotted in Figure 3. We see that, although small, the degree of illiquidity due to housing makes a difference. For individuals living in households not hit by an income shock, the association between illiquidity and the probability of any occupational transition is negative. By contrast, for the other group of individuals, illiquidity does not appear to really matter for transitions into the workforce, while it is mildly but positively associated with the probability of transition into employment. Hence, for people hit by a household income shock, it seems that the effects of housing mentioned above (i.e. collateral for consumer credit as in Benito (2009) or discouraging mobility as in Battu et al., 2008) do not apply.

Table 8: Probability of a transition from out of the workforce into the workforce interacting income shock and illiquidity at t-1

Pr(Y=1)	Y=1: Employed	Y=1: Active
Income Shock at illiquidity=0.0	0.061	0.062
	(0.04)	(0.04)
Income Shock at illiquidity=0.2	0.069**	0.072**
	(0.03)	(0.04)
Income Shock at illiquidity=0.4	0.077***	0.082***
	(0.03)	(0.03)
Income Shock at illiquidity=0.6	0.085***	0.091***
	(0.03)	(0.03)
Income Shock at illiquidity=0.8	0.093**	0.101***
	(0.03)	(0.03)
Income Shock at illiquidity=1.0	0.101***	0.111**
	(0.034)	(0.04)
Year	YES	YES
Demographics	YES	YES
Wealth	YES	YES
# observations	7,626	7,626
# individuals	3,507	3,507

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.
All models include the following controls: dummy variable equal to one if the individual is a female, a second order polynomial in age, dummies for marital status (couple as the baseline), a dummy for the presence of children under the age of 5 within the household, a dummy for the presence of an adult aged 65 or over in the household, household size, dummy for head of household, dummies for high and medium educational attainment (low education as the baseline), year and geographical dummies. Both models also include the indicator for illiquidity due to housing at t-1, financial assets and financial liabilities (in 10,000 €) at t-1.

Figure 3: Differential adjusted probabilities of a transition into the workforce at representative values of (lag) illiquidity due to housing, by Income Shock



Source: Own elaboration from estimates.

3.4 Potential sample selection bias

For our estimation strategy, we kept only individuals who were inactive at time 1, therefore excluding from our sample all individuals who actively looked for a job, as well as those who were at some time employed and subsequently left the workforce. For this reason, we are dealing with a non-randomly selected sample, and we may have reasons to believe that some unobservable characteristics may be correlated with both selection into the estimation sample and the probability of a transition. We thus check for sample selection bias and estimate a standard Heckman selection model (Heckman, 1979) by maximum likelihood. The uncensored sample consists of 23,711 observations for 11,399 individuals.

Our outcome equation is:

$$y_{it} = 1\{\beta_1 IncomeShock_{ijt} + \gamma x_{ijt} + \lambda W_{jt-1} + \varepsilon_{it} \geq 0\} \quad (1.3)$$

While our selection equation is:

$$Inactive_{i1} = 1\{\beta_1 IncomeShock_{ijt} + \gamma x_{ijt} + \lambda W_{jt-1} + \omega z_{ijt} + u_{it} > 0\} \quad (1.4)$$

where ε_{it} and u_{it} are assumed to have a bivariate normal distribution with zero means and correlation ρ. The vector of covariates for the selection equation includes the same regressors present in the equation (1.3), plus an excluded variable that determines selection, but has no direct effect on y_{it} so as to avoid collinearity. The excluded variable z_{ijt} is a dummy equal to 1 if the head of household' mother was working when she was the same age as the head of household. The choice of such variable is consistent with both literature on parental attitudes, learning and beliefs formation (Farré and Vella, 2013; Fogli and Veldkamp, 2011; Fortin, 2005) and literature on intergenerational income mobility and correlation in unemployment (Björklund and Jäntti, 2012; Ekhaugen, 2009).

In table 9 we report the marginal effects for the outcome equation conditional on selection[6] (columns 2 and 4), as well as the marginal predicted probability of selection (columns 3 and 6).

[6] $\Pr(y_{it}=1 \mid Inactive_{i1}=1) = \Pr(y_{it}=1, Inactive_{i1}=1)/\Pr(Inactive_{i1}=1)$.

Table 9: Controlling for potential sample selection bias

Pr(Y=1)	Y=1: Employed			Y=1: Active		
	Probit	**Heckman**	**Sel. eqn**	**Probit**	**Heckman**	**Sel. Eqn**
Income shock	0.085***	0.079***	-0.043***	0.091***	0.089***	-0.043***
	(0.02)	(0.03)	(0.01)	(0.02)	(0.02)	(0.01)
HH Mother working			-0.023***			-0.025***
			(0.01)			(0.01)
Demographics						
Female	-0.095***	-0.067*	0.218***	-0.122***	-0.141***	0.219***
	(0.02)	(0.04)	(0.01)	(0.02)	(0.04)	(0.01)
Age / Age squared[(a)]	0.009***	-0.001*	-0.008***	0.010***	-0.004**	-0.008***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Single	0.199***	0.233***	-0.096***	0.397***	0.407***	-0.096***
	(0.04)	(0.05)	(0.01)	(0.05)	(0.05)	(0.01)
Divorced	0.115	0.135	-0.110***	0.302***	0.316***	-0.110***
	(0.08)	(0.09)	(0.01)	(0.09)	(0.08)	(0.01)
Widow(er)	0.105	0.124	-0.116***	0.245	0.268*	-0.116***
	(0.14)	(0.16)	(0.01)	(0.15)	(0.15)	(0.01)
With children aged <5 in HH	0.012	-0.002	-0.107***	-0.029	-0.023	-0.107***
	(0.04)	(0.04)	(0.01)	(0.04)	(0.04)	(0.01)
At least one over 65 in HH	-0.015	-0.019	-0.018**	0.058*	0.059*	-0.017**
	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.01)
Household size	-0.016*	-0.015	0.018***	-0.006	-0.007	0.018***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)
Head	0.057**	0.062**	-0.038***	0.048*	0.049*	-0.038***
	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.01)
Graduate	0.091***	0.091***	-0.042***	0.213***	0.217***	-0.042***
	(0.03)	(0.03)	(0.01)	(0.04)	(0.04)	(0.01)
Secondary Education	0.070***	0.069***	-0.052***	0.093***	0.098***	-0.051***
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)
Resident in the Centre	-0.057**	-0.057**	0.024***	0.019	0.018	0.024***
	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.01)
Resident in the South	-0.173***	-0.179***	0.065***	-0.045**	-0.048**	0.065***
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)
Wealth						
Illiquidity due to housing at t-1	-0.021	-0.023	0.009	-0.050**	-0.051**	0.009
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)
Financial assets (in 10,000€) at t-1	0.000	0.000	0.000	-0.003**	-0.003**	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Financial liabilities (in 10,000€) at t-1	0.003	0.003	-0.002***	0.000	0.000	-0.002***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year	YES	YES	YES	YES	YES	YES
# observations	7,625	23,711	23,711	7,625	23,711	23,711
# individuals	3,507	11,399	11,399	3,507	11,399	11,399
Pseudo R^2	0.120			0.175		
P value	0.000	0.000	0.000	0.000	0.000	0.000
χ^2	322.54	293.31	293.31	799.65	676.29	676.29
ρ		-0.295				
Wald test (ρ=0) - p value		0.251			0.516	

*Clustered robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.

[(a)] The marginal effect of Age includes the effect of age squared.

The sign, magnitude and statistical significance of all coefficients in the outcome equation, including the one on income shock, are essentially the same as in the pooled probit regressions. Quite interestingly, the only coefficient which loses statistical significance is the one on the female dummy. However, the Wald test for independent equations tells us that the selection mechanism is ignorable, as we cannot reject the null hypothesis of independent equations (χ^2: 1.32; p-value: 0.251 and χ^2: 0.42; p-value: 0.516). As a consequence, we can consider the pooled probit results in column 1 and 3 as our benchmark estimates.

4. Sensitivity analyses and robustness checks

Three are the main types of sensitivity and robustness checks we consider important for our investigation.

First of all, since our investigation period covers both a normal cycle phase and a recessionary one, we want to see whether the results change across these two different periods. To this end, we run regressions over the 2004-2008 and 2008-2012 separately. Results in Table 10 show that the sensitivity of labour supply to the labour conditions of other family members is actually strongly increased in the period of the recession which started in 2008. Indeed, in the first period there is low to no significant effect of an income shock on labour supply before 2008, while the other independent variables keep the same signs already found in Tab. 6. Why such a change in the reaction to an income shock? Before the crisis, the job loss by a family member could be considered as a transitory phenomenon that soon could be reversed, but with the strong increase in the unemployment rate, the probability of finding a new job after losing one is lower, and this pushes other family members to look for a job, so as to increase the joint probability of obtaining income from work for the family as a whole. Similarly, with good general economic conditions the children can remain dependent and inactive even after the parents lose their jobs, but if the condition of unemployment of parents lasts for a long time, some children may be forced to look for a job.

Table 10: Sensitivity analyses - Separate time periods

Pr(Y=1)	Y=1: Employed			Y=1: Active		
	2004-2012 MEMs	2004-2008 MEMs	2008-2012 MEMs	2004-2012 MEMS	2004-2008 MEMs	2008-2012 MEMs
Income Shock	0.085***	0.065*	0.088***	0.091***	0.060	0.104****
	(0.02)	(0.04)	(0.03)	(0.02)	(0.05)	(0.03)
Demographics						
Female	-0.095***	-0.125***	-0.076***	-0.122***	-0.118***	-0.114***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)
Age & Age squared[(a)]	0.009***	0.007***	0.010***	0.010***	0.006**	0.011***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Single	0.199***	0.166***	0.234***	0.397***	0.295***	0.435***
	(0.04)	(0.06)	(0.05)	(0.05)	(0.06)	(0.05)
Divorced	0.115	0.099	0.130	0.302***	0.262*	0.316***
	(0.08)	(0.12)	(0.08)	(0.09)	(0.14)	(0.09)
Widow(er)	0.105	0.027	0.097	0.245	0.043	0.252*
	(0.14)	(0.14)	(0.13)	(0.15)	(0.19)	(0.15)
With children aged <5	0.012	-0.004	-0.003	-0.029	-0.013	-0.050
	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)
At least one over 65 in HH	-0.015	-0.015	-0.011	0.058*	0.053	0.062*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
Household Size	-0.016*	-0.014	-0.014	-0.006	-0.008	-0.001
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Head	0.057**	0.047	0.071**	0.048*	0.054	0.069**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
Graduate	0.091***	0.091**	0.080***	0.213***	0.237***	0.209***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)
Secondary Education	0.070***	0.071***	0.076***	0.093***	0.084***	0.103***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)
Resident in the Centre	-0.057**	-0.038	-0.067**	0.019	-0.001	0.028
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Resident in the South	-0.173***	-0.158***	-0.183***	-0.045**	-0.056**	-0.043*
	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)
Wealth						
Illiquidity due to housing at t-1	-0.021	-0.014	-0.021	-0.050**	-0.060**	-0.051**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)
Financial assets (in 10,000€) at t-1	0.000	0.000	0.000	-0.003**	-0.002	-0.003*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Financial liabilities (in 10,000€) at t-1	0.003	-0.001	0.004*	0.000	-0.001	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year	YES	YES	YES	YES	YES	YES
# observations	7,625	3,590	5,923	7,625	3,590	5,923
# individuals	3,507	2,298	3,105	3,507	2,298	3,105
Pseudo R^2	0.120	0.120	0.121	0.175	0.152	0.180
P value	0.000	0.000	0.000	0.000	0.000	0.000
χ^2	322.54	208.92	282.04	799.65	406.461	657.16

*Clustered robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.

[(a)] The marginal effects of Age include the effect of age squared.

Second, to compare with the literature on the "added worker effect", we distinguish among two very different groups of people: housewives vs. all inactive family members (Table 11). The sample of cases with the dependent variable equal to one shrinks, so the results are less well defined; however, the positive effect of an income shock at the household level turns out to be significant also for this subgroup. It seems therefore that some women have started to look for a job after their husbands have lost theirs. As expected, the probability of a transition is reduced if there are very young children in the family (significant only for a transition into the workforce), and it is higher for the more educated women, who find more convenient and easier to join the workforce. We also see that the probability of a transition, both into employment and into the workforce, increases with the amount of liabilities for the housewives subsample, in line with the literature on female participation and mortgage commitments (Del Boca and Lusardi, 2003 and Fortin, 1995).

Table 11: Sensitivity analyses - All out of the workforce vs. housewives only

Pr(Y=1)	Y=1: Employed		Y=1: Active	
	All inactive[(a)] MEMs	Only Housewives (part of a couple) MEMs	All Inactive[(a)] MEMS	Only Housewives (part of a couple) MEMs
Income Shock	0.085***	0.037**	0.091***	0.037**
	(0.02)	(0.02)	(0.02)	(0.02)
Demographics				
Female	-0.095***	Omitted	-0.122***	Omitted
	(0.02)		(0.02)	
Age & Age squared[(a)]	0.009***	-0.005***	0.010***	-0.007***
	(0.00)	(0.00)	(0.00)	(0.00)
Single	0.199***	Omitted	0.397***	Omitted
	(0.04)		(0.05)	
Divorced	0.115	Omitted	0.302***	Omitted
	(0.08)		(0.09)	
Widow(er)	0.105	Omitted	0.245	Omitted
	(0.14)		(0.15)	
With children aged <5	0.012	-0.022	-0.029	-0.044*
	(0.04)	(0.02)	(0.04)	(0.02)
At least one over 65 in HH	-0.015	-0.015	0.058*	-0.011
	(0.03)	(0.02)	(0.03)	(0.02)
Household Size	-0.016*	-0.007	-0.006	-0.007
	(0.01)	(0.01)	(0.01)	(0.01)
Head	0.057**	0.022	0.048*	0.030**
	(0.03)	(0.01)	(0.03)	(0.01)
Graduate	0.091***	0.049	0.213***	0.087**
	(0.03)	(0.04)	(0.04)	(0.04)
Secondary Education	0.070***	0.020	0.093***	0.029*
	(0.02)	(0.02)	(0.02)	(0.02)
Resident in the Centre	-0.057**	-0.012	0.019	-0.007
	(0.03)	(0.02)	(0.03)	(0.02)
Resident in the South	-0.173***	-0.072***	-0.045**	-0.076***
	(0.02)	(0.02)	(0.02)	(0.02)
Wealth				
Illiquidity due to housing at t-1	-0.021	-0.019	-0.050**	-0.012
	(0.02)	(0.02)	(0.02)	(0.02)
Financial assets (in 10,000€) at t-1	0.000	0.000	-0.003**	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Financial liabilities (in 10,000€) at t-1	0.003	0.006***	0.000	0.005**
	(0.00)	(0.00)	(0.00)	(0.00)
Year	YES	YES	YES	YES
# observations	7,625	3,429	7,625	3,429
# individuals	3,507	1,515	3,507	1,515
Pseudo R^2	0.120	0.080	0.175	0.092
P value	0.000	0.000	0.000	0.000
χ^2	322.54	78.86	799.65	125.92

*Clustered robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.

(a) *"All out of the workforce" includes: housewives, well offs, students and voluntary workers.*

(b) The marginal effects for Age include the effect of age squared.

In order to ensure that the effect of an income shock is robust even for the other half of the sample (see table 4), we run the same regression keeping only students. The results (available upon request) confirm the robustness of our previous estimates, since students living in households hit by an income shock are significantly more likely to enter the labour force than students living in households not hit by a shock. Results are consistent with the age effect discussed in previous section.

Finally, we split the variable *Income shock*$_{jt}$ into its two components, job loss and income support (redundancy/mobility/unemployment benefits), to disentangle possibly different or even opposite effects. Theoretically, if the loss of income due to unemployment (or underemployment) of one household member is compensated by publicly provided benefits, the need for another household member to enter the labour force would be lower, hence we might expect a negative sign. However, if the level or duration of benefits is not sufficient to compensate for the loss of income, then other household members may still react by increasing their labour supply, hence we might have a positive sign[7].

Table 12 shows the results from separating the two income shocks. The precision of the estimates is lower than before since the number of cases where the dependent variable takes unitary value is lower than before, but the effects of both income shocks remain positive and significant, and also close in value.

[7] In building the first measure of composite income shock, we use the inclusive meaning of "or", i.e. the binary indicator is equal to 1 if at least one lost work, at least one is on benefits, or both and it is equal to zero only when none of these events occurs. Here the variable "two shocks" is equal to 1 only if both shocks are present at the same time, and zero in all other instances, resulting in a very small number of observations.

Table 12: Probability of a transition into employment - Separate shocks

Pr(Y=1)	Y=1: Employed			Y=1: Active		
	MEMs	**MEMs**	**MEMs**	**MEMS**	**MEMs**	**MEMs**
One shock: lost work	0.061**		0.059**	0.090***		0.090***
	(0.03)		(0.03)	(0.03)		(0.03)
One shock: benefits		0.056*	0.056*		0.114***	0.113***
		(0.03)	(0.03)		(0.04)	(0.04)
Two shocks: work+benefits			0.013			-0.002
			(0.05)			(0.05)
Demographics						
Female	-0.098***	-0.096***	-0.097***	-0.124***	-0.122***	-0.122***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Age & Age squared[(a)]	0.009***	0.009***	0.009***	0.010***	0.010***	0.010***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Single	0.202***	0.200***	0.203***	0.395***	0.398***	0.398***
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Divorced	0.115	0.117	0.116	0.300***	0.305***	0.303***
	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)	(0.09)
Widow(er)	0.107	0.111	0.108	0.249*	0.249*	0.248*
	(0.14)	(0.14)	(0.14)	(0.15)	(0.15)	(0.15)
With children aged <5	0.012	0.010	0.013	-0.027	-0.030	-0.025
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
At least one over 65 in HH	-0.016	-0.018	-0.015	0.057*	0.055*	0.059*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Household Size	-0.015*	-0.014	-0.016*	-0.007	-0.004	-0.007
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Head	0.056**	0.059**	0.057**	0.048*	0.051*	0.049*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Graduate	0.089***	0.087***	0.089***	0.214***	0.208***	0.215***
	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Secondary Education	0.070***	0.068***	0.071***	0.094***	0.090***	0.095***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Resident in the Centre	-0.058**	-0.055**	-0.058**	0.019	0.021	0.019
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Resident in the South	-0.175***	-0.166***	-0.175***	-0.048**	-0.038*	-0.049**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Wealth						
Illiquidity due to housing at t-1	-0.020	-0.022	-0.021	-0.049**	-0.053**	-0.050**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Financial assets (in 10,000€) at t-1	0.000	0.000	0.000	-0.003**	-0.003**	-0.003**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Financial liabilities (in 10,000€) at t-1	0.003	0.003	0.003	0.000	-0.001	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year	YES	YES	YES	YES	YES	YES
# observations	7,625	7,625	7,625	7,625	7,625	7,625
# individuals	3,507	3,507	3,507	3,507	3,507	3,507
Pseudo R^2	0.120	0.119	0.121	0.173	0.173	0.174
P value	0.000	0.000	0.000	0.000	0.000	0.000
χ^2	322.54	326.72	327.54	792.56	802.76	803.90

*Clustered robust standard errors in parentheses; * p<0.01, ** p<0.005, *** p<0.001*

The marginal effects (MEMs) are calculated at the average values of the covariates in the sample.

The fact that the coefficient on *benefits* is positive and statistically significant brings some evidence against a discouraging effect of unemployment insurance on the job search of other household members. This is in opposition to the findings of Cullen and Gruber (2000) and Bingley and Walker (2001), but in line with their reasoning since it reflects the different incentives embedded in the Italian welfare system. Indeed, the duration of basic unemployment insurance in Italy is limited (one of the shortest among OECD countries together with the UK) and the level of unemployment benefits does not depend on the income of other members, but depends solely on contributions, and therefore may not lead to relevant perverse incentives; the regression with both shocks present at the same time does not provide a significant result, due to the very limited number of cases.

We also checked for sensitivity to functional form by estimating equation (1.2) by logit and linear probability model, and we obtained very similar results (table not reported, but available on request).

5. Concluding remarks

Understanding the mechanisms through which households can adjust to an income shock, especially in periods of recession, is of great economic relevance. In this paper we focus on one possible reaction, namely a potential increase in labour supply. We estimate whether inactive individuals living in households in which one member suffered an income shock are more likely to move into the workforce. In a lifecycle setting, the labour supply of secondary workers is affected by credit constraints, so we also take into account financial wealth and liabilities, as well as a measure of portfolio illiquidity due to housing.

After accounting for demographic and portfolio controls, our results show that households hit by a shock respond by increasing labour supply, as the probability of a transition into employment is 8.5 percentage points higher compared to households which were not hit by an income shock. The effect is stronger if we consider the probability of a transition into the workforce, with individuals living in a household hit by an income shock 9.1 percentage points more likely to become active than individuals living in households in which nobody suffered an income shock. Despite the fact that most individuals who transit from inactivity to either employment or to the workforce are women, their relative success rate compared to men is much lower. The

probability of a transition into employment or into the workforce is concave in age and higher in the presence of an income shock. It is also significantly increasing with years of education and for those who live in the Northern area of Italy, where the number of job opportunities is greater.

As for portfolio controls, they are not significant in explaining transitions into employment. However, they are relevant in explaining the decision to become active. As expected, the level of financial assets reduces the probability of entering the workforce, because households' savings can be used to compensate for the reduction in disposable income. While the relationship is negative for both household groups (hit and not hit), households hit by a shock are less affected by their portfolio illiquidity, with a substantially higher probability of a transition both into employment and into the workforce compared to households not hit by a shock at all illiquidity levels.

Overall, we do not find a trade-off between unemployment benefits and labour supply of secondary earners, which suggests that the Italian unemployment insurance system does not provide distortionary incentives on other family members, while we cannot rule out the possibility that the receipt of a subsidy might have a disincentive effect on the direct beneficiary.

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Appendix A – Income definitions

Payroll Income refers to the income of payroll workers, including fringe benefits.

Self-employment Income includes both income from self-employment and entrepreneurial income. SE income refers to the members of a profession, individual entrepreneurs, self-employed workers, workers on atypical contracts and owners or employees in a family business. Entrepreneurial income refers to owners, working shareholders or partners in a business or firm.

Pension Income includes pensions and arrears.

Transfer Income includes financial assistance (i.e. income from redundancy benefits, mobility benefits and unemployment benefits), scholarships, alimonies and gifts (both paid and received).

Property Income includes actual and imputed rents from Real Estate. The variable "Imputed rents" is defined as the amount homeowners would receive in case they decided to rent out the property. It refers both to the house they live in (either owned, in usufruct or rent free) and to any second homes the household might own.

Income from Financial Assets includes interest on deposits, interest on government securities, income from other securities.

Appendix B – Variables' description and summary statistics

SHIW DATA:
https://www.bancaditalia.it/statistiche/indcamp/bilfait

Variable	Description
Y_{it} (Employed)	Binary variable equal to 1 if the individual transited from out of the workforce into employment at time t and/or he/ she remained employed after a transition, and zero otherwise
Y_{it} (Active)	Binary variable equal to 1 if the individual transited from out of the workforce into the workforce at time t and/or he/ she remained employed after a transition, and zero otherwise
Inactive	Binary variable equal to 1 if the individual was a housewife/homemaker, student, voluntary worker or rentier at time 1
Income shock (composite)	Binary variable equal to 1 if the individual i is part of a household j in which at least one member has suffered an income shock (either became involuntarily unemployed or received income support or both) from time *t* onwards
One shock: lost work	Binary variable equal to 1 if the individual i is part of a household j in which at least one member has transited from employment into unemployment from time *t* onwards
One shock: benefits	Binary variable equal to 1 if the individual *i* is part of a household *j* in which at least one member has started receiving income support from time *t* onwards
Female	Binary variable equal to 1 if the individual is a female, 0 if male
Age / Age ^{2}	Integer variables representing the age of the individual (values between 15 and 65) and its squared term.
Marital status	Discrete variable equal to: 1 if the individual is married (baseline) 2 if the individual is single 3 if the individual is divorced 4 if the individual is widow(er)
With children <5	Binary variable equal to 1 if at least one child under the age of 5 is present in the household
At least one over 65 in HH	Binary variable equal to 1 if at least one adult over the of 65 is present in the household
Graduate	Binary variable equal to 1 if the individual has a degree (3 years or more at university), 0 otherwise
Second. Education	Binary variable equal to 1 if the individual has secondary education, 0 otherwise
Household Size	Discrete variable ranging from 1 to 12 representing the number of household components
Head of Household	Binary variable equal to one if the individuals is responsible for the financial decision making, 0 otherwise
Area	Discrete variable equal to: 1 If individual resident in the North of Italy (baseline) 2 If individual resident in the Centre of Italy 3 If individual resident in the South of Italy
Illiquidity at t-1	Continuous variable ranging from 0 to 1 and is equal to the value of the first home over total (gross) wealth. The variable is lagged by one period
Fin. Assets at t-1 (in 10,000s)	Financial assets include deposits, government and other securities and trade credits or credit due from other households. The variable is continuous, rescaled (divided by 10,000) and lagged by one period
Fin. Liabilities at t-1 (in 10,000s)	Financial liabilities include liabilities to banks and financial companies (incl. mortgages), trade debt and debts towards other households. The variable is continuous, rescaled (divided by 10,000) and lagged by one period

Summary statistics of the estimation sample

	All[(a)]		Employed[(b)]		Active[(c)]		No transitions[(d)]	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Income shock (composite) [(e)]	0.13	*0.33*	0.17	*0.38*	0.16	*0.37*	0.11	*0.31*
One hh member lost work[(e)]	0.11	*0.31*	0.12	*0.33*	0.13	*0.34*	0.10	*0.30*
One hh member on benefits[(e)]	0.04	*0.19*	0.06	*0.23*	0.06	*0.23*	0.03	*0.17*
Female	0.73	*0.44*	0.59	*0.49*	0.57	*0.50*	0.79	*0.41*
Age	34.24	*14.77*	31.84	*11.80*	29.44	*10.67*	35.88	*15.78*
Single	0.52	*0.50*	0.64	*0.48*	0.72	*0.45*	0.45	*0.50*
Divorced	0.01	*0.09*	0.01	*0.12*	0.02	*0.12*	0.00	*0.07*
Widow(er)	0.00	*0.06*	0.00	*0.05*	0.00	*0.06*	0.00	*0.05*
With children <5	0.07	*0.26*	0.05	*0.22*	0.05	*0.22*	0.08	*0.26*
At least one over 65 in HH	0.11	*0.32*	0.09	*0.28*	0.10	*0.30*	0.12	*0.32*
Household Size	3.72	*1.05*	3.61	*1.03*	3.77	*1.03*	3.70	*1.05*
Head of Household	0.13	*0.34*	0.17	*0.37*	0.12	*0.32*	0.13	*0.34*
Graduate	0.10	*0.30*	0.18	*0.39*	0.21	*0.40*	0.06	*0.24*
Second. Education	0.44	*0.50*	0.52	*0.50*	0.52	*0.50*	0.40	*0.49*
Centre	0.16	*0.37*	0.19	*0.40*	0.18	*0.38*	0.16	*0.36*
South	0.49	*0.50*	0.30	*0.46*	0.45	*0.50*	0.50	*0.50*
Illiquidity at t-1	0.57	*0.39*	0.56	*0.39*	0.57	*0.39*	0.57	*0.39*
Fin. Assets at t-1 (in 10,000s)	2.32	*6.21*	2.87	*7.27*	2.40	*6.35*	2.30	*6.24*
Fin. Liabilities at t-1 (in 10,000s)	1.03	*2.95*	1.29	*3.30*	1.04	*3.03*	1.03	*2.95*
Obs	*7,620*		*984*		*2,002*		*5,381*	

Source: SHIW 2004-2012, pooled sample. Data weighted using sampling weights.

(a) Includes all individuals who were inactive when they entered the survey.

(b) Includes all individuals who were inactive when they entered the survey and transited into employment.

(c) Includes all individuals who were inactive when they entered the survey and transited into the workforce, but did not necessarily found employment.

(d) Includes all individuals who were inactive when they entered the survey and remained inactive.

(e) The household member who suffered a shock, lost work or is on benefits cannot be the one who transited.

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N° 5/01	Vincenzo Andrietti	Occupational Pensions and Interfirm Job Mobility in the European Union. Evidence from the ECHP Survey
N° 4/01	Peter Diamond	Towards an Optimal Social Security Design
N° 3/00	Emanuele Baldacci Luca Inglese	Le caratteristiche socio economiche dei pensionati in Italia. Analisi della distribuzione dei redditi da pensione (only available in the Italian version)
N° 2/00	Pier Marco Ferraresi Elsa Fornero	Social Security Transition in Italy: Costs, Distorsions and (some) Possible Correction
N° 1/00	Guido Menzio	Opting Out of Social Security over the Life Cycle