Liquidity constraints and labor supply*

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Abstract

In this paper we shed some light on how restrictions in the financial markets, the so called liquidity constraints, might act in affecting labour supply decisions of Italian workers. One way to neutralize the existence of binding liquidity constraints is simply by supplying additional labor, instead of reducing consumption. We estimate whether resorting to additional labor supply as a smoothing consumption device is at work by using the Survey of Households Income and Wealth (SHIW). The longitudinal dimension of the SHIW dataset allows to control for individual unobserved heterogeneity. We also develop an IV strategy to address the endogeneity of our measure for credit constraints in labor supply equations due to time varying factors.

Our results show that liquidity constraints increase the intensity in the supply of men's labor. Constrained men work, on average, 2-7 hours more than their unconstrained counterpart, depending on their age and on the empirical specification.

keyword Labor supply, liquidity constraints, life cycle, panel data.
JEL: D1, JE.

1 Introduction and motivation

Imperfections in the functioning of credit markets have been advocated as the reason why households are forced to deviate from their optimal plans and make suboptimal choices. In the literature of life cycle/permanent income, liquidity constraints have been identified as one of the main reasons behind the failure of the life-cycle/permanent income model in explaining the consumption behaviour of households (Attanasio and Weber, 2010; Deaton, 1992). The fact

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that household consumption tracks income too closely might be imputed to imperfections existing in the credit markets, resulting in a lack of credit availability. Households foreseeing an increase in income, will be forced to delay the consequent growth in consumption until the actual increase in income occurs; this happening because they are not allowed to borrow so as to incorporate the anticipated income increase. Suboptimal choices are then made, as the credit market is far from being perfect. A large strand of literature has focused on how liquidity constraints can shape households decisions when they are binding, by empirically testing the impact of liquidity constraints on consumption or savings trajectories.[1] Flavin (1981), among others, in a seminal contribution, argues that the significance of predicted changes in income affecting consumption growth is a signal that liquidity constraints are binding. Garcia et al. (1997) show that liquidity constraints are shaping consumption profiles, by highlighting asymmetries in consumption response to income shocks. In other words, if liquidity constraints play a role rather than myopia, consumption should react asymmetrically. Consumption will increase in response to income increases while it should exhibit no sensitivity to income decreases (no one prevents people from saving so as to be able to keep consumption stable when income decreases materialize). Jappelli et al. (1998) show that the probability of being liquidity constrained, using a switching regression model, explains excess sensitivity of consumption.[2]

Another channel likely to be affected by financial market frictions is the labour market, by making labor choices depending on the features of the credit market. One way to circumvent the obstacle of being unable to borrow is to simply supply more labor. Working more might (partially) neutralize the binding credit constraints. At young ages, if future incomes are predicted to be more flourishing than current income, or, put differently, if permanent income is above the current income level, people should borrow to keep constant their living standards. By borrowing, households would be better off and able to keep their consumption at a higher level than the one allowed by current income. Being able to do so is related to an increasing income profile over time, which allows them to repay the loan. Financial institutions may not give loans until current income reaches the average in life, forcing households to cope with suboptimal choices. Along with cutting their expenditures on market goods, constrained households may reduce their leisure, in order to equalize the marginal utility of consumption and leisure and, thus, being better off.

Our paper focuses on this (almost unexplored) channel, and examines how financial imperfections might be responsible for an additional labor supply, which is provided as a way to mitigate credit market imperfections. It addresses new empirical questions: How do impediments to borrow, even if never experienced directly but actually binding, change the hours supplied into the labour market?

[1] A particular aspect of consumption choices that received attention in the economic literature relates to housing consumption. For empirical studies on the effect of credit markets on homeownership see, for instance (Chiuri and Jappelli, 2003) and Trucchi (2015).

[2] For a study investigating how liquidity constraints versus precautionary savings act on consumption see, for instance, Guariglia and Rossi (2002).

Do people respond to borrowing restrictions and impediments by working more to achieve higher level of consumption?

The literature on consumption has largely supposed that saving and borrowing are the only actors at work in smoothing out income fluctuations and keeping consumption constant. The underlying hypothesis is that the quantity of labor supplied tends to be fixed, either full time or nil. But this hypothesis is more difficult to prove. Labor supply may vary both at the intensive and, especially for women, at the extensive margin.[3] Indeed, the role of labor supply might also be important as a way to overcome the effect of liquidity constraints, and additional labour supplied in the market could represent a natural device to overcome the binding liquidity constraint and increase welfare. All in all, the life cycle saving literature has always neglected this possible channel by focusing on saving and borrowing as the only tool to achieve desired consumption. Our paper fills in this important gap in the literature by looking at labour supply as a device to achieve desired consumption under binding liquidity constraints.[4]
Some recent papers examine the link between labor supply and consumption/wealth. They relate to our work inasmuch they relax the assumption of fixed labor supply. However, they investigate different margins, namely how labor supply respond to financial (Benito and Saleheen, 2013; Cheng and French, 2000; van Huizen, 2014; Henley, 2004) or unemployment shocks (Ortigueira and Siassi, 2013), and to which extent it acts as an insurance device against future income (Attanasio et al., 2005) or permanent income risk (Blundell et al., 2008).

Three papers by Fortin (1995); Del Boca and Lusardi (2003) and Bottazzi (2004) analyse female labor supply and examine whether it is affected by having a mortgage in, respectively, Canada, Italy and the UK. They show that women with a greater mortgage commitment are more inclined to participate to the labor market. Similarly, Bottazzi et al. (2007) examine the positive association between mortgage debt and the intensity of labor supply and show greater current mortgage commitments leading to greater labour supply. Our paper departs from these works by looking at the *ex-ante* effect of being restricted in the financial market on the current outcome in the labour market. Our goal is to add evidence in the cross-literature between consumption and labour, which is largely unexplored.

In order to investigate the effect of liquidity constraints on labor supply of Italian workers, we exploit the Survey on Household Income and Wealth (SHIW), a panel dataset collected by the Bank of Italy. Our variable of main interest is the potential of being restricted in the credit market. We alternatively use the definition of liquidity constraint and borrowing constraint as the impossibility to go underwater, even if optimally it would be coherent to do so. Being liquidity constrained is not observable as it is related to the optimality of borrowing, which is, by definition, not observable. This variable could be better described as a latent variable than an actual one. Indeed, being liquid-

[3]The participation in the labor market of the (traditional) second earner is more volatile than the (male) breadwinner (Boeri et al., 2005; Tella and MacCulloch, 2005).

[4]From a different perspective, Bertola and Lo Prete (2015) rely on country-level data and show the financial and the labour market to be interrelated.

ity constrained implies the inability to go negative with total asset, despite the optimal plan requiring so. Even if unobserved, the pre-condition to be liquidity constrained is to show a minimal amount of wealth, despite this condition being only necessary and not sufficient (indeed for many households with zero asset it could just be optimal to have zero value). As a proxy for our variable we use different types of indicators to measure whether households are constrained by credit market imperfections and restrictions (variables' description is illustrated more in details in Section 3 and B). First, we construct an indicator comparing the permanent level of income to the current one, so as to capture the stage of an individual within his/her life-cycle. Individuals with current income below its permanent level would optimally borrow (or dissave) to smooth their consumption over the life-cycle. Thus, we define liquidity constrained individuals as those with current income below its permanent level, who can neither borrow to anticipate future earnings' increase nor, alternatively, rely on accumulated wealth to sustain higher expenditure levels. A second indicator we build, in line with the literature, is by generating a dummy variable equal to one if the individual was prevented from resorting to debt by financial institutions (Jappelli et al., 1998) and/or exhibits lack of financial assets (Zeldes, 1989; Johnson et al., 2006). We examine the impact of liquidity constraints on the intensity of labor supply and participation to the labor market, for women and men. Since both liquidity constraints and labor market decisions can be correlated with unobserved individual characteristics, we use a fixed effect estimation strategy, which does not restrict the individual unobserved heterogeneity to be uncorrelated with the explanatory variables. Besides individual unobserved heterogeneity, reverse causality and the correlation of liquidity constraints with time-specific unobservables, particular labor demand shocks, may bias (downward) our results. To deal with these issues, we develop an instrumental variable estimator, which exploits the availability of alternative tools, notably the possibility of resorting to borrowing within the family, to sustain consumption expenditures.

Our findings suggest that liquidity constraints play an important role in shaping male labor supply. Men facing liquidity constraints increase the intensity of their labor supply, in the following year, by 2-7 hours per week (about 4-17% of the sample mean) depending on their age and the specification. We also find evidence of a response of participation to liquidity constraints for young women.

In order to shed light on the channels through which individuals increase their labor supply, we analyse the impact of binding liquidity constraints on the number of overtime working hours supplied by male workers and on the number of jobs he had during the year, the latter variable capturing the probability of either changing the job or having more than one job at the same time. Albeit only for some indicators for biding liquidity constraints we find some evidence that both mechanism are at work in our sample for young respondents.

We also examine potential asymmetries in the reaction of labor supply between individuals who become liquidity constrained and those who switch from the constrained to the unconstrained status. Our results are consistent with the effect of financial market imperfections to be greater for the former group of

respondents.

The rest of the paper is organized as follows. Section 2 outlines the theoretical framework and derives the testable implication. Data and the empirical strategy are described, respectively, in Sections 3 and 4. Section 5 illustrates the main findings for men and women and Section 6 concludes.

2 Conceptual Framework

To conceptualize the problem, we suppose for simplicity that agents live for two periods ($t = 1, 2$). In the first period the agent supplies labor and in the second period the agent retires. In each period, utility is derived both from consumption (c_t) and from leisure (l_t). However, the amount of leisure can be chosen only during the working life (period one) while during retirement it is exogenously fixed, as all the time available is devoted to leisure ($l_2 = L$). The conceptual framework we use is a standard utility maximisation context where each individual maximises her utility under the budget constraint. For the sake of simplicity we also set to zero the interest rate and the subjective discount rate. Agents maximise the following utility function:[5]

$$U = \sum_{t=1}^{2} u(c_t, l_t) = u(c_1, l_1) + u(c_2, L)$$

with decreasing and concave marginal utility of c and l and a positive cross derivative ($u'_x < 0$, $u''_x < 0, x = c_t, l_t$). Supposing that the initial asset is zero and bequests are also zero, the following intertemporal budget constraint applies:

$$w(1 - l_1) + Y_r = c_1 + c_2$$

where w is the wage rate and Y_r is income at retirement. In period one consumption and leisure are set at their optimal level while in period two, corresponding to retirement, agents devote all their time to leisure.

Without market imperfections, and ignoring the constraint on participation, the marginal utility of consumption is kept equal over time, as well as the marginal utility of consumption in period one is set equal to the marginal utility of leisure. The first order conditions are as follows:

$$u'_{c_1}(c_1, l_1) - u'_{c_2}(c_2, L) = 0$$

$$-wu'_{c_1}(c_1, l_1) + u'_{l_1}(c_1, l_1) = 0.$$

The first equation implies the usual smoothness of consumption marginal utility across time, while the second implies the equality between marginal utility of consumption and leisure, within the same period, scaled by the wage.

[5] More details about the model assumptions and solution are provided in A.

If a liquidity constraint is added to the model, agents are forced to borrow below a certain threshold, i.e. assets at the beginning of period two (A_2) must be greater than the threshold B ($B \leq 0$):

$$A_2 \geq B.$$

Necessary condition for this constraint to be binding is the expectation of increasing future income, namely current income being below its permanent level. If the constraint binds, wealth is equal to B, namely below or equal to zero, and individuals have no choice but reducing their consumption in period one. Marginal utility is higher in the first period than in the second one, while consumption and leisure are set such as the intra-period marginal utility of consumption and leisure are equal. Thus, consumption and labor supply are characterized as follows (we denote with the upscript C the constrained case):

$$u'^{C}_{c_1}(w(1-l^C)+B, l^C) = \frac{u'^{C}_{l_1}(w(1-l^C)+B, l^C)}{w} > u'^{C}_{c_2}(c_2^C, L).$$

The last inequality indicates that the marginal utility of consumption in period two is lower than in period one, implying that consumption in period two is higher than in the unconstrained case. Consumption in period one is lower than without the constraint as borrowing is limited. If leisure is kept stable in period one as in the unconstrained case, the marginal utility of consumption does not equate that of leisure. To equalize the marginal utility of leisure and consumption within period one, the agent has the only option to work more and reduce leisure.

Our testable implication is, thus, that the more the constraint becomes binding, the stronger is the incentive to work more for the economic agent, as the only available way to offset the limited access to credit. The rest of the paper is centered on testing whether this prediction holds true.

3 Data

The empirical analysis is based on the Bank of Italy's Survey on Household Income and Wealth (SHIW) and relies on data for the years 2000-2010. The SHIW dataset is a representative sample of the Italian resident population and covers about 8,000 households in each wave. It is collected every two years and contains a panel component: in each wave, part of the sample has consisted of households that were interviewed in previous surveys (approximately 4000 households). The identification strategy we use in the empirical analysis posits some data restrictions. First, in order to use the fixed-effect estimator, we need individuals to be observed at least twice. Second, in using a lagged measure of liquidity constraints we lose the first time period. Therefore, for the purpose of this analysis, we can rely on an unbalanced panel covering 5 waves, ranging from 2002 to 2010. We extend the dimension of the dataset used for the permanent/life cycle income variable generation (see above in this Section for

further details), for which we use additional waves of the SHIW dataset, from 1991 onwards, so as to exploit all possible information about individual labor earnings over the life cycle.

For the purpose of our analysis, we restrict our sample to individuals who are either the head of household or his/her spouse, and who are aged between 26 and 45 years. Households younger than 25 are excluded since there should be some form of selection in the choice of household formation, this selection being particularly relevant in Italy where most young adults live with their parents. We focus on individuals in the first phase of their life-cycle (younger than 45) and, thus, potentially exposed to liquidity constraints, as want to rule out dynamics of the labor market that are less likely to be affected by liquidity constraints. The sample of female respondents used to investigate their participation to the labor market consists of 4085 observations. To analyze the impact of liquidity constraints on the intensive margin of male labor supply, we restrict to the sample of working respondents, which includes 2836 observations. On average, each respondent in our sample is observed almost four times in the time span we consider.
The SHIW dataset collects detailed information on household composition, income, wealth and the labor market status of the household members, including the number of weeks and average weekly working hours they worked in the previous year. The core part of the empirical analysis examines the extensive margin, namely the average number of hours per week supplied by the worker over the same time frame. In order to shed light on the mechanisms through which the increase in labor supply takes place, we investigate the effect of liquidity constraints on the number of hours over time and on the number of jobs during the reference year. We also look at the impact of liquidity constraints on labor force participation of women.

Indicators for binding liquidity constraints

To investigate the potential effect of credit rationing, we exploit information allowing us to detect liquidity constrained individuals. The construction of the liquidity constrained variable is crucial to our analysis and conceptually challenging. As a matter of fact, financial constraint is more capturing the inability of resorting to debt even if from an optimal standpoint it would be the rational choice to do, given that future prospects of income would be better than the current one. For this purpose, we build up seven indicators (see B for a detailed variables' description). The first one relies on self-reported variables and captures whether the household would like to borrow but credit market frictions prevent her/him from doing it (variable *Constrained 1*). It is drawn from the approach by Jappelli et al. (1998), which defines liquidity constrained households as those who either: a) applied to a financial company to ask for a loan and the application was rejected; or b) wanted to apply for a loan but decided against because of fear of rejection. This variable could suffer from potential weak link with the real ability of obtaining credit and capturing the concept of liquidity constraints. Instead, it may express heterogeneous levels of information about

how the credit market function and about the probability of getting the loan or different levels of confidence. Thus, we make use of additional variables to measure the likelihood of binding liquidity constraints. The second measure we use is based on the lack of financial assets. According to the standard life-cycle, a necessary condition for households to be liquidity constrained is owning zero financial assets. In fact, an individual is defined liquidity constrained if she would like to have, optimally, negative wealth given the prospect of increasing future incomes upon which to borrow. We thus define the second measure of liquidity constraints (variable *Constrained 2*) as a dummy variable equal to one whether an individual owns less than 1000 euro or is constrained according to the first definition. The third indicator (variable *Constrained 3*) takes value one whether wealth is lower than one thousand euro and is zero otherwise.

One neat prediction of the standard life cycle/permanent income theory is that individuals in early stages of their careers would like to borrow (optimally) to anticipate future income increase. Put differently, if current income is below the average one, the so called permanent income, individuals should optimally borrow. Therefore, another group of indicators for being liquidity constrained are based on the necessary condition of current income being below the permanent one.

Key to permanent income variable is how to measure expected future earnings.[6] We assume individuals formulate their expectations on the earnings of "reference" individuals, namely workers with the same gender and educational level observed in the previous 10 years and living in the same area of the respondent (the relevant labor market). Under this assumption, we use the observed value of income of the reference individuals at different ages to infer the expected value of earnings of the respondent over her/his working life.[7] A graphical representation of the expected value of earnings over the working period is depicted in Figure 1. The left and right panels plot, respectively, the life-cycle annual earnings of women and men living in northern Italy, in 2004. The expected life-cycle earning path is increasing and concave in age, and it becomes relatively flat (or even decreasing for low educated respondents) after the age of 45-50. Moreover, for each education level, women expect to earn less than their male counterpart at every point of the life-cycle, with a gap that is larger for highly educated workers. Turning to retirement, women and men are assumed to retire, respectively, at the age of 55 and 60 and to live until the age of 80; the replacement rate of retirement benefits with respect to the last wage is set to 80%.

We use these information and an interest rate of 2% to compute the present

[6] Details on the procedure used to measure expected future earnings are provided in Appendix B.

[7] More precisely, we use the 1991-2010 waves of the SHIW and we regress labor income on age, age squared, education level and dummies for the geographical area of residence. In order to allow the age profile of earnings to be different for different level of education, we add the interaction of age with education dummies. For each year in the sample, we use information on income of respondents in the current wave and previous four ones (10 years basis). The predicted value of income of the "reference" individuals at different ages provides a measure of expected income over the life-cycle.

value of expected future and current labor income at time t (H_t). Permanent income is calculated according to the formula (Deaton, 1992):

$$y^P = \frac{r}{1+r}\left[1 - \frac{1}{(1+r)^{(T-t)}}\right]^{-1}[H_t + A_t],$$

where the interest rate r is set at 2%, t is the age of the respondent and the lifetime horizon T is equal to 80. Individual resources consists of the present value of expected future labor income (H_t) and wealth (A_t),which includes total assets net of liabilities. Since illiquid assets are not fungible, real estate may not be used as a tool to smooth consumption. For this reason, we use an alternative definition of permanent income, based on future earnings and financial assets and excluding real estate.

Liquidity constrained individuals are defined as those whose current income is below their permanent one (whose optimal consumption is, thus, higher than their current earnings), but they cannot rely on borrowing or accumulated wealth to sustain higher expenditure levels. Therefore, the fourth indicator for being liquidity constrained takes value one if current income is below the permanent one *and* the respondent has been denied credit or was discouraged from applying. The value of permanent income includes, respectively, total and financial wealth in variables *Constrained 4* and *Constrained 6*. Finally, the variables *Constrained 5* and *Constrained 7* capture whether earnings are lower than permanent income (respectively, with and without real estate) *and* net wealth is less than one thousand euro. Labor market frictions may hamper the instantaneous adjustment of labor supply, which may take time to respond to binding liquidity constraints. Therefore, in the empirical analysis, we examine the response of labor supply to liquidity constraints measured one period ahead. Descriptive statistics and correlations of the liquidity constraints indicators are shown in Table 1.

To illustrate the correlation between labor supply and liquidity constraints, Figure 2 plots the distribution of the intensity of male labor supply for different age bands, distinguishing between constrained and unconstrained workers (according to the lagged value of the first definition: *Constrained 1*).[8] The distribution of working hours of unconstrained men (dashed line) has a peak around 40 hours per week (full-time) for all the age groups considered. Instead, the density function for the constrained sample (solid line) is flatter for all the age groups, and it is skewed on the right, with skewness increasing with age. The density of men working more than 40 hours is substantially higher among constrained men, this being coherent with a reaction of the intensity of labor supply to binding liquidity constraints. Below the full-time schedule, the density function for the youngest constrained respondents (26-30) lies behind the density for unconstrained one. Similarly, the distribution of working hours displays a concentration around 20 hours per week when older workers are included in the sample. This evidence is consistent with individuals working less than 40

[8]Similar distributional graphs can be obtained using the other definitions for liquidity constraints. They are not shown but are available from the authors on request.

hours per week being liquidity constrained *because* they are not fully employed. Turning to the link between liquidity constraints and female participation to the labor market, the (unconditional) correlation between the lagged value of our indicators and participation takes negative values for all the age groups and definitions,[9] with values ranging between -0.33 and -0.03. This evidence is consistent with credit constraints being less likely to be binding for employed women, further sustaining the need to address endogeneity in labor supply equations.

Descriptive statistics of the outcome variables and the covariates in our sample are reported in Table 2, for men and women. The percentage of constrained respondents ranges between 3% to 26%, depending on the definition considered. Men work, on average, 42 hours per week and almost 2 hours are overpaid; 3.5% of them report more than one job during the reference year. Turning to female participation, 60% of women in our sample supply a positive number of working hours.

4 Empirical strategy

This paper aims to analyze the effect that liquidity constraints have on labor supply. We examine the intensive margin, namely the number of working hours for working respondents, and the extensive margin, namely the probability of working.

We start by estimating the number of hours supplied by workers (i.e., on the subsample of those who supply a positive number of hours). The estimating equation is:

$$W_{it} = Z'_{it}\gamma + \delta LC_{it-1} + c_i + u_{it} \tag{1}$$

where W_{it} is the number of working hours supplied by individual i in period t and Z_{it} is a matrix of covariates (some of them are measured in period t-1).[10] The error term consists of the individual unobserved heterogeneity (c_i) and an idiosyncratic component (u_{it}); γ and δ are the coefficients to be estimated. LC_{it-1} is equal to one when the household is constrained in the credit market. As adjusting labour supply is likely to take a while, the increase in labor supply may not be instantaneous and, therefore, our measure for being liquidity constrained is lagged by one wave. We start estimating the correlation between being liquidity constraints and the intensity of labor supply using standard OLS techniques.

The OLS estimate of δ in equation 1 may be biased. The reasons are threefold. The first reason is related to individual unobservables. If individual characteristics that foster the intensity of labor supply (preferences for leisure, the

[9] The only exception is the correlation between participation and the lag of *Constrained 1*, taking value 0.085 for women aged 26-30.

[10] More precisely, Z_{it} includes age and age squared, hourly wage and its squared value, a dummy for being married or cohabiting with a partner, two dummies for the number of children (one, two or more; the reference category is no kids), the lagged value of the spouse's working status, of his/her labor income and of net wealth and, finally, year dummies.

intertemporal discount rate or factors that shape the workers productivity, like a permanent disability) are correlated to the likelihood of being liquidity constrained, the OLS estimate of the δ is biased. Since we expect these unobserved factors to reduce the intensity of labor supply and to increase the probability of being constrained (or vice versa), the OLS estimate of the δ would be biased downward. In order to address this issue, we rely on the panel component of our dataset and we estimate equation 1 using a fixed effect panel estimator, that does not require any restriction on the correlation between individual unobserved heterogeneity and the regressors, notably LC_{it-1}. Another threat to the causal interpretation of our estimates is the presence of time varying factors that are correlated with the dependent variable and the indicator for binding credit constraints. Hence, LC_{it-1} may be endogenous in the estimating equation because of idiosyncratic shocks, such as an injury, which may be affecting both the labor supply and individuals' income/wealth or their access to the credit market. Similarly, our indicator for liquidity constraints may capture volatility in income or other time-varying factors that we do not observe but the bank does when deciding to give a loan (e.g. the worker may be on a temporary contract or have fluctuations in hours). Moreover, there may be a reverse causality issue. The estimate of the equation above is biased if individuals are liquidity constrained *because* they are working less. These channels push downwards the coefficient δ and, thus, the fixed effect estimator of δ provides a lower bound for the true causal effect. The use of a lagged indicator for liquidity constraints (LC_{it-1}), however, weakens the relevance of both these mechanisms, namely the omitted variable and the reverse causality ones. The third issue is measurement error in LC_{it-1}, that may further bias the estimate of the δ downward.

We handle these issues by following an instrumental variable procedure in the framework of a fixed effect estimator to estimate equation 1. Let us describe the rationale behind the instruments. The possibility of resorting to the informal credit by relatives is likely to have an effect on the binding of the formal channel to obtain credit, while it has no direct impact on the labour supply. If individuals can rely on alternative (informal) loans rather than resorting to formal borrowing on the credit market, they are less likely to be affected by credit market imperfections. Put differently, the more the alternatives available to resort to additional financial resources when needed (informal credit) the less likely the liquidity constraints will be binding.

Therefore, the probability of being liquidity constrained is higher for respondents whose partner is less likely to be credit constrained or endowed with less (liquid) wealth. More in detail, the instruments we use are a dummy variable that captures whether the spouse is liquidity constrained, and the age of the spouse, that is expected to be positively correlated with her/his wealth.[11] Since the endogenous variable is lagged by one period, the instruments refer to the wave before the interview. Exclusion restrictions hinge on the assumption that,

[11] By construction, we cannot use these instruments for the measures of LC_{it-1} that are constant within the family, namely for variables *Constrained 1*, *Constrained 2* and *Constrained 3*.

conditional on the other covariates,[12] the instruments are not correlated with the dependent variable other than through LC_{it-1}. In other words, once the direct effect of the spouse's labor earnings are controlled for, the indicator for the partner being constrained is assumed not to affect individual labor supply other than through the availability of a source of informal borrowing.[13] The availability of multiple instruments for liquidity constraints allows us to run an over-identification test, to verify the causal interpretation of our findings.

We also explore whether liquidity constraints affect the extensive margin, namely the likelihood of working a positive number of hours. We estimate the following equation:

$$P_{it} = +Z'_{it}\gamma + \delta LC_{it} + c_i + u_{it} \tag{2}$$

where P_{it} is equal to one if the respondent works and zero otherwise. LC_{it} is the indicator for liquidity constraints and Z_{it} is a set of control variables.[14] Similarly to the intensive margin, we address the endogeneity issue first by using a fixed effect technique and, second, by using an instrumental variable procedure within the fixed effect framework.

Previous empirical literature has shown the female labor supply to be more volatile and more sensitive to household debt (Del Boca and Lusardi, 2003), while men's labor supply is, indeed, rather rigid. Thus, we allow the effect of the explaining factors to differ according to gender (we estimate the equation for working hours interacting our indicator for liquidity constraints with a gender dummy and, then, we estimate it separately for women and men). Since almost all men currently work or are unemployed, the participation model has been estimated only on the women's sample.

[12] It is worth noting that the set of regressors includes a dummy variable for being married/cohabiting with a spouse, logarithm of household wealth, labor market participation of the spouse and his/her labor income. Since the indicator for liquidity constraints (and the instruments) binding is lagged by one period, the latter three variables refer to the wave before the interview. These variables would capture the possible impact of earnings of the partner on allocation of time and duties within the couple and, in turn, on labor supply decisions of the respondent.

[13] In principle, individuals may rely on informal borrowing from members of the extended family, beyond the spouse. In line with this argument, we estimate the IV model in the fixed effect framework by adding to the vector of instruments a dummy taking value one if the respondent or his/her spouse have siblings (results are not reported but available from the authors on request). This additional instrument is significant at the 10% level in the first stage for only two definitions of liquidity constraints, and results in Table 5 are robust to this specification. This finding is consistent with family networks playing a role in providing informal loans, that is, however, less important with respect to the spouse, who is the primary source of financial support.
The SHIW dataset does not collects parental information that are exogenous in the labour supply equation and vary over time (that is a necessary condition for identification in a fixed effect setting).

[14] More precisely, Z_{it} includes age and age squared, hourly wage and its squared value, a dummy for being married or cohabiting with a partner, two dummies for the number of children (one, two or more; the reference category is no kids), the lagged value of the spouse's working status, of his/her labor income and of net wealth, regional unemployment rate and, finally, year dummies.

5 Results

We start our analysis by focusing on the intensity of the labor supply of men. We first estimate equation 1 using OLS. We then extend the analysis to allow for the individual fixed effect and, lastly, we also control for the endogeneity of the liquidity constraint variable. OLS, fixed effect and instrumental variable estimate results are shown, respectively, in Tables 3, 4 and 5. To examine the heterogeneity in the reaction of the intensity of labor supply over the life cycle, we report, for each specification, the estimate results for different age groups. In all the tables, the coefficients estimated for individuals aged 26-35 (upper panel), 26-40 (medium panel) and 26-45 (lower panel).[15]

Starting with OLS results (Table 3), the estimated effect of liquidity constraints' indicators have a negative sign, reducing working hours by up to three, for workers younger than 40, and to four if we look at the complete sample. As endogeneity is not taken into account, however, we claim that reverse causality mechanism could be at work in this specification, leading to the negative sign.

Table 4 reports the estimate results for the specification where the panel dimension is taken into account via the fixed effect estimation technique, which is ideal as it wipes out individual unobserved time invariant characteristics that could be driving the endogeneity. Under this specification, we now detect a positive and significant effect of binding liquidity constraints on hours supplied in the labour market. Constrained men increase their intensity of labour supply by up to seven hours, for the aged between 26 and 40. For this age range we indeed find the highest effect of binding liquidity constraints. Younger men also resort to additional labour, while when we extend to middle age up to the of 45 the effect reduces and vanishes for most specifications. We interpret this result as more difficult to reshape labour decision after the age of forty.

We then move to an additional extension, where we control for the possible endogeneity of liquidity constraints, beyond what is captured by unobserved heterogeneity (Table 5). Hence, unobserved time varying shocks, such as an injury, may affecting both the labor demand or supply and the worker's access to the credit market. Similarly, the error term may include volatility in income or other time-varying factors that we do not observe but the bank does when deciding to give a loan (e.g. the worker may be on a temporary contract or have fluctuations in hours). These time-varying unobservables, along with measurement error, may bias downward the results shown in Table 4. Fixed-effect estimates provide, therefore, a lower bound for the true causal effect in the case where unobserved time-varying factors are negatively correlated with the intensity of labor supply and positively linked with the indicator for binding liquidity constraints (or vice versa). However, using a lagged indicator for liquidity constraints is expected to weaken the omitted variable and the reverse causality issues. Table 5 illustrates the IV results described in Section 2, while estimate results from the first stage are shown in Table A-5 in C. As expected,

[15]The estimated coefficients of the complete set of regressors, for men aged 26-40, are reported in Tables A-2-A-4 in C. Similar tables for the other age groups are available from the author upon request.

once the endogeneity issue is wiped away, the effect of credit constraints is more sizeable, for each age group. Constrained men aged between 26 and 35 work up to more than 7 hours more than their unconstrained counterpart (17% of the average). The effect of liquidity constraints increases with respect to fixed-effect estimates when older workers are included in the sample, but the coefficients are not precisely estimated and they turn out not to be significant at standard significance level. Turning to the instruments, Table A-5 shows that they have the expected sing and are significant in the first stage equation. Moreover, F-statistic from weak identification test (reported in each panel of Table 5) shows that the instrument is not weak in (almost) all the estimate.[16] Looking at the over-identification test, the Hansen J statistic does not reject the null hypothesis of exogeneity of the instruments at all conventional levels of significance.

Looking at the impact of the other variables (see Tables A-2-A-5 in C), the marginal effect of wage is negative and concave, consistent with the income effect dominating the substitution effect for low levels of wage. Also wealth turns out to have a negative impact on the intensity of labor supply (that is significant at the 10% level in the fixed effect estimates in Table A-3 in C). We interpret this finding as wealthier individuals having a higher reservation wage.

Workers may increase the intensity of their labor supply through different channels. Liquidity constrained individuals may increase (or change) the jobs[17] or add overtime working hours so as to overcome the binding financial constraints. As the SHIW dataset collects these information, we use the estimators described in Section 4 to estimate the impact of binding liquidity constraints on extra hours of work (only for employee workers) and having more than one job variable. Fixed effect and IV results for these two margins are reported, respectively, in Tables 6 and 7. Fixed effect estimates in Table 6 show that only for very strictly binding liquidity constraints (wealth less than 1000) young workers react by increasing their overpaid work. This effect could be imprecisely estimated also because of the reduced size of the sample, that includes only employees. We also find a positive effect of liquidity constraints on the number of jobs, albeit it is not significant in all the specifications. This is consistent with an impact of financial distress on the having a second job and/or of changing job, possibly a job with long hours. We are aware, though, that increasing the number of jobs is not that easy to change, particularly in a country like Italy, where labour market features are very rigid. Our results show that over time work can represent a "spot" reaction to financial distress (measured by little buffer stock available), as well as searching for an additional job.

In principle, imperfections in the credit market may lead to asymmetric responses to liquidity constraints. In order to examine this issue, we build up two auxiliary variables. The first one ("*Switch U to C*") is a dummy taking value

[16] Staiger and Stock (1997) indicate a rule of thumb suggesting that the F-statistic should be greater than 10 to rule out weak identification problems.

[17] We cannot disentangle whether the respondent has more than one job at the same time, or changed his job during the reference year.

one if the respondent was unconstrained and switches to constrained status; the second variable ("*Switch C to U*") is equal to one when switching from the constrained to the unconstrained status. To examine asymmetric responses, we use, alternatively, these two variables as regressors in the equations for labor supply.[18] Fixed effect estimate results are reported in Table A-6 in C. The upper panel in Table A-6 shows the effect of switching from unconstrained to constrained status, by age bands.[19] Even if the estimated coefficients are not significant at the 10% level, possibly because of the small sample size,[20] their magnitude is similar to average effect (see Table 4). Turning to the lower panel, namely the effect of switching from constrained to unconstrained status, the estimated coefficients have, as expected, a negative sign. The absolute value of the magnitude is, however, lower than the average. Even if the small sample size and the significance of the estimated coefficients do not allow to draw conclusive results, these findings are consistent with the existence of asymmetries in the response of labor supply to liquidity constraints. More precisely, the link between financial and labor markets seems to be stronger for individuals who *become* liquidity constrained.

As for women, the dynamics of the interaction between financial constraints and the intensity of labour supply is less clear cut. In the specifications where individual effect and endogeneity are taken into account, liquidity constraints are weakly explaining the hours supplied, and, if they do, they have a negative sign.[21] We interpret this evidence as suggesting that female intensity of labour supply is more restricted than that of men. While men all work, women participation to the labour market is often discontinuous and volatile; moreover, once in the labour market, it is likely that their supplied hours are not as flexible as desired. Put differently, changing status in the labour market by moving from not-working to working might dilute the actual impact that financial constraints have on the extensive margin; the actual impact being at work only when a worker is settled in the labour market. With respect to gender, to conclude, we also estimate the effect of liquidity constraints on labour supply on a pooled sample, so as to detect the sign of the interaction of the gender (female) dummy variable and the liquidity constraint variable in order to exploit the larger dimension of the sample. Results for the fixed effect estimate are reported in Table A-1 in C. They show that liquidity constraints are increasing the hours supplied at the baseline, which is represented by the male sample, while the impact of liquidity constraints on women is completely offset, by becoming non significantly different from zero.[22] The evidence that

[18] Descriptive statistics for the sample of working men (aged 26-45) are shown in Table A-7.

[19] The small sample size prevents us from estimating this model for respondents aged less than 35.

[20] Using (the lagged value of) the dummy variable for switching require the respondent to be observed three times: the year when labor supply is measured (t), the wave when liquidity constraint is measured ($t-1$) and, in addition with respect to the baseline regressions, wave ($t-2$) that is used to build the switching variable.

[21] These results are not reported here but are available on request.

[22] The test of the null hypothesis that the effect of liquidity constraints on female working

women's intensity of the labour supply is little intertwined with the financial market is confirmed by different specifications. Again, we interpret this result as evidence that labour market for women is less flexible for women than for men, implying that women can rely less on the labour market to overcome the possible financial restrictions to loan requests.

We continue our analysis by focusing on the working status variable. In this analysis we neglect male sample, as all male respondents either are working or are looking for a job. We thus focus on variations in female participation: Estimate results based on an IV fixed effect estimator are reported in Table 8.[23] Liquidity constraints significantly increase participation of women younger than 36, by 18-22% (31-38% of the sample mean). The effect is lower and not significant if we include older women. This latter finding is consistent with participation decision of relatively older women being driven by factors related to family composition and, thus, less sensible to liquidity constraints.

5.1 Discussion

Wrapping up the gist of the paper, we want to test how much the labour supply device might act as a smoother to the consequences of credit limitations in the financial market. It has to be stressed that credit limitations are not equivalent to low level of financial (liquid) wealth, despite the two being strongly correlated. Showing little wealth could in fact both signalling poverty or credit rationing. However, even if the two are difficult to distinguish as they are observationally equivalent, credit restrictions would act on the non poor only. Detecting who is credit rationed, despite the variable being "intangible" is thus a difficult task. We argue that we were able to detect the binding credit constraints, or restrictions, in the market by building up several indicators capturing the low wealth but also the potentials to obtain higher level of income in the future. Let us remind again that existing credit constraints might not be relevant if not binding. This is the case of poor people with low wealth. Liquidity constraints bind only for people who would optimally borrow, but they are impeded to do so. As a consequence, the only alternative to overcome the financial bareer is to work additionally. As for the direct and indirect effect of wealth (through the liquidity constraints channel), we argue that the effect of the indicators for liquidity constraints is net of the direct impact of wealth, which is captured by the wealth measure included in the set of regressors.

Constrained workers may increase the intensity of their labor supply by

hours (the sum of LC_{it} and its interaction with the female dummy) is equal to zero, allow to reject the null hypothesis at the 10% level of significance when considering definitions 4 and 6 for the youngest group (aged 25-30). The impact of liquidity constraints on working hours supplied by women is not significant at the 5% level for any definition and age group, and it is never significant at standard significance levels when we use an IV estimator.

[23] If we do not address the endogeneity due to time-varying factors, namely using the fixed-effect estimator, the effect of liquidity constraints on participation does not turn out to be significant in any specification. For this reason we do not report these results, that are available on request.

changing job, possibly a job with long working hours. We argue, however, that this is a short term reaction driven by the willingness of increasing the intensity of labor supply combined with the rigidity in the working schedule (that may not allow overtime hours), rather than a programmatic choice that involves long term job career decisions. By controlling for individual fixed effect, which includes ability, tastes and other individual characteristics that may determine choices about job career and sector of employment, we argue that we rule out this channel.
Similarly, if individuals select into sectors with high job training, they would exhibit high permanent income and low current one, being, thus, more likely to be liquidity constrained. We claim this channel is ruled out. Controlling for the employment sector (public/private) and the type of job (self-employment) does not change the results, thus ruling out the possibility that some sectors at high job training intensity could drive the results.[24] Moreover, the individual unobserved heterogeneity possibly includes tastes for different types of jobs or career perspectives.

Our results are hence suggesting that frictions in the credit markets are not diluted and confounded with other factors, as discussed above, and show an important impact on the labour supply.

6 Conclusions

This paper contributes to the literature by adding a bridge between the financial and the labour market. We explore whether labor supply decisions might be driven by inefficiencies in the financial markets such as restriction to credit. Financial markets and labor markets are strongly related, and reforms affecting one market are likely to also have an impact on the other one. Using the conceptual framework of the life cycle model enriched with the possibility of choosing the labor supply in the working phase of life, we argue that the presence of more binding liquidity constraints are likely to increase the labor supply. This is because one way to overcome credit frictions is to work more hours so as to earn additional income, necessary to accomplish consumption smoothing. In our paper we test this hypothesis by using the SHIW dataset provided by the Bank of Italy. Our findings suggest that, after controlling for the correlation of unobserved heterogeneity with the regressors and the endogeneity of being liquidity constrained, this channel is certainly at work for the intensity of labor supply of men. In addition, constrained women are more likely to work, two years after liquidity constraints has been detected, by 18-22 percentage points.

[24] These results are available from the authors on request.

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Tables

Table 1: Summary statistics: Indicators for liquidity constraints

Lag of	Constrained 1	Constrained 2	Constrained 3	Constrained 4	Constrained 5	Constrained 6	Constrained 7
2002	0.025	0.178	0.156	0.096	0.017	0.083	0.012
	(0.157)	(0.383)	(0.363)	(0.295)	(0.129)	(0.276)	(0.110)
2004	0.031	0.172	0.147	0.086	0.014	0.081	0.013
	(0.173)	(0.377)	(0.354)	(0.281)	(0.119)	(0.273)	(0.115)
2006	0.035	0.157	0.124	0.074	0.019	0.063	0.015
	(0.185)	(0.364)	(0.330)	(0.261)	(0.135)	(0.244)	(0.120)
2008	0.068	0.217	0.157	0.098	0.044	0.080	0.033
	(0.253)	(0.413)	(0.364)	(0.297)	(0.204)	(0.271)	(0.179)
2010	0.067	0.267	0.215	0.145	0.041	0.124	0.036
	(0.249)	(0.443)	(0.411)	(0.353)	(0.199)	(0.330)	(0.187)
All years	0.045	0.198	0.160	0.100	0.027	0.086	0.022
	(0.208)	(0.399)	(0.367)	(0.300)	(0.163)	(0.281)	(0.147)
Correlation							
	Constrained 1	Constrained 2	Constrained 3	Constrained 4	Constrained 5	Constrained 6	Constrained 7
Constrained 1	1						
Constrained 2	0.4383*	1					
Constrained 3	-0.0043	0.8771*	1				
Constrained 4	0.0035	0.6696*	0.7634*	1			
Constrained 5	0.7662*	0.3358*	0.0069	0.0419*	1		
Constrained 6	0.0110	0.6174*	0.7039*	0.9220*	0.0486*	1	
Constrained 7	0.6878*	0.3015*	0.0193	0.0537*	0.8977*	0.0646*	1

Notes: 5043 observations; working men and women.
Upper panel: Mean values, standard errors in brackets.
Bottom panel: correlations; * indicates that the correlation is different from zero at the 5% level.
Constrained 1: the respondent has been denied credit or was discouraged from applying;
Constrained 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Constrained 3: net wealth less than 1000 euro;
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table 2: Summary statistics

	Men		Women	
	Mean	St. Dev.	Mean	St. Dev.
Covariates				
Age	39.419	4.254	39.071	4.477
Age squared	1571.939	323.819	1546.561	339.071
Wage[b]	10.297	10.151	9.030	2.576
Wage squared[b]	209.034	1804.314	88.170	59.235
Married	0.863	0.344	0.886	0.317
Working partner, lag	0.490	0.500	0.846	0.361
Income partner, lag	7.090	9.494	18.099	15.234
1 Child	0.175	0.380	0.175	0.380
2+ Children	0.315	0.465	0.349	0.477
Log net wealth, lag	16.375	4.510	16.394	4.476
Year 2004	0.190	0.393	0.196	0.397
Year 2006	0.194	0.395	0.196	0.397
Year 2008	0.204	0.403	0.202	0.401
Year 2010	0.191	0.393	0.194	0.395
Indicators for liquidity constraints				
Constrained 1, lag	0.046	0.209	0.044	0.490
Constrained 2, lag	0.225	0.418	0.259	0.438
Constrained 3, lag	0.188	0.391	0.226	0.418
Constrained 4, lag	0.117	0.322	0.197	0.398
Constrained 5, lag	0.028	0.166	0.033	0.179
Constrained 6, lag	0.104	0.305	0.188	0.391
Constrained 7, lag	0.025	0.155	0.029	0.168
Dependent variables				
Working hours	42.071	11.230		
Overpaid hours[a]	1.809	3.468		
More jobs	0.035	0.184		
Participation			0.601	0.490

Notes: 2836 observations for men and 4085 observations for women.
[a]: Only employees: 2152 observations.
[b] Wage is observed wage for working hours and mean wage observed in the region where the respondent lives for individual with the same gender and educational level for participation.

Table 3: OLS estimate of the intensive margin, men (dependent variable: working hours)

Lag of:	Constr. 1	Constr. 2	Constr. 3	Constr. 4	Constr. 5	Constr. 6	Constr. 7
Age: 26-35							
	-0.748	-1.003	-1.382	-1.722	-3.646	-1.806	-3.641
	(3.392)	(1.343)	(1.441)	(1.497)	(3.424)	(1.581)	(3.600)
Age: 26-40							
	2.694*	-1.484**	-2.742***	-2.993***	0.560	-3.073***	0.601
	(1.597)	(0.746)	(0.798)	(0.909)	(2.114)	(0.972)	(2.287)
Age: 26-45							
	0.977	-2.264***	-3.210***	-3.992***	-1.393	-4.000***	-1.438
	(1.065)	(0.530)	(0.570)	(0.649)	(1.406)	(0.696)	(1.593)

Notes: Upper panel (aged 26-35): 539 observations; 1491 medium panel (aged 26-40) observations; bottom panel (aged 26-45) 2836 observations.
$^{*}p < 0.1$,** $p < 0.05$,*** $p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: a constant, age, age squared, mean wage, mean wage squared, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Constrained 1: the respondent has been denied credit or was discouraged from applying;
Constrained 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Constrained 3: net wealth less than 1000 euro;
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table 4: Fixed effect estimate of the intensive margin, men (dependent variable: working hours)

Lag of:	Constr. 1	Constr. 2	Constr. 3	Constr. 4	Constr. 5	Constr. 6	Constr. 7
Age: 26-35							
	-0.150	1.982	2.665*	3.727**	0.768	3.943**	0.981
	(2.054)	(1.502)	(1.602)	(1.551)	(2.124)	(1.715)	(2.442)
Age: 26-40							
	3.821*	2.441**	1.792	2.561**	5.348*	3.199**	6.737*
	(2.111)	(1.051)	(1.153)	(1.289)	(3.049)	(1.368)	(3.699)
Age: 26-45							
	1.524	1.103	0.858	1.037	2.698	1.505*	3.661
	(1.295)	(0.730)	(0.847)	(0.851)	(1.991)	(0.904)	(2.449)

Notes: Upper panel (aged 26-35): 539 observations; 1491 medium panel (aged 26-40) observations; bottom panel (aged 26-45) 2836 observations.
$^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: age, age squared, mean wage, mean wage squared, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Constrained 1: the respondent has been denied credit or was discouraged from applying;
Constrained 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Constrained 3: net wealth less than 1000 euro;
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table 5: Fixed effect IV estimate of the intensive margin, men (dependent variable: working hours)

Lag of:	Constr. 4	Constr. 5	Constr. 6	Constr. 7
Age: 26-35				
	7.313**	0.795	7.340**	-0.084
	(3.196)	(3.187)	(3.541)	(6.059)
F-test	24.875	13.096	19.370	2.713
Hansen J	0.090	0.207	0.243	0.226
(p-value)	(0.764)	(0.649)	(0.622)	(0.634)
Age: 26-40				
	3.338	7.651	3.804	8.710
	(2.427)	(5.127)	(3.022)	(6.818)
F-test	54.301	20.467	37.619	11.568
Hansen J	0.171	0.098	0.218	0.124
(p-value)	(0.679)	(0.754)	(0.641)	(0.725)
Age: 26-45				
	2.024	2.756	1.721	2.905
	(1.702)	(3.132)	(2.102)	(5.135)
F-test	108.468	36.554	64.440	17.113
Hansen J	0.022	0.034	0.010	0.033
(p-value)	(0.883)	(0.853)	(0.919)	(0.857)

Notes: Upper panel (aged 26-35): 539 observations; 1491 medium panel (aged 26-40) observations; bottom panel (aged 26-45) 2836 observations.
$^{*}p < 0.1$,** $p < 0.05$,*** $p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: age, age squared, mean wage, mean wage squared, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table 6: Fixed effect and IV estimate of overtime working hours, men

Lag of:	Constr. 1	Constr. 2	Constr. 3	Constr. 4	Constr. 5	Constr. 6	Constr. 7
				Fixed effect			
Age: 26-35							
	-3.461	1.283	1.645*	1.252	-3.284	1.403	-4.182
	(2.223)	(0.882)	(0.900)	(1.037)	(2.634)	(1.083)	(3.091)
Age: 26-40							
	-0.440	0.203	0.233	0.378	-0.907	0.099	-0.969
	(0.653)	(0.483)	(0.557)	(0.711)	(0.688)	(0.763)	(0.813)
Age: 26-45							
	0.613	0.071	-0.060	0.053	-0.268	-0.134	-0.186
	(0.556)	(0.327)	(0.368)	(0.417)	(0.573)	(0.443)	(0.737)
				IV estimate			
Age: 26-35							
				-0.624	-4.847	-0.703	-9.647
				(2.018)	(3.408)	(2.307)	(6.569)
F-test				11.790	14.408	8.524	2.994
Hansen J				0.002	0.361	0.011	0.220
(p-value)				(0.965)	(0.548)	(0.917)	(0.639)
Age: 26-40							
				-0.249	-1.184	-0.046	-1.905
				(1.180)	(1.578)	(1.537)	(2.392)
F-test				35.254	27.863	22.582	9.854
Hansen J				0.064	0.027	0.077	0.029
(p-value)				(0.800)	(0.869)	(0.78)	(0.866)
Age: 26-45							
				-0.333	1.003	-0.563	1.273
				(0.728)	(1.225)	(0.969)	(2.086)
F-test				77.313	40.205	43.972	13.735
Hansen J				0.378	0.544	0.436	0.536
(p-value)				(0.539)	(0.461)	(0.509)	(0.464)

Notes: Upper panel (aged 26-35): 427 observations; 1155 medium panel (aged 26-40) observations; bottom panel (aged 26-45) 2152 observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: age, age squared, mean wage, mean wage squared, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Constrained 1: the respondent has been denied credit or was discouraged from applying;
Constrained 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Constrained 3: net wealth less than 1000 euro;
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table 7: Fixed effect and IV estimate of probability of having more jobs, men

Lag of:	Constr. 1	Constr. 2	Constr. 3	Constr. 4	Constr. 5	Constr. 6	Constr. 7
				Fixed effect			
Age: 26-35							
	-0.046	0.052	0.074	0.106*	-0.019	0.087	-0.000
	(0.033)	(0.045)	(0.050)	(0.059)	(0.028)	(0.063)	(0.027)
Age: 26-40							
	0.020	0.028	0.038*	0.054*	0.046	0.048	0.064
	(0.039)	(0.022)	(0.022)	(0.031)	(0.058)	(0.034)	(0.071)
Age: 26-45							
	0.020	0.006	0.005	0.014	0.055	0.009	0.067
	(0.025)	(0.013)	(0.013)	(0.016)	(0.037)	(0.017)	(0.047)
				IV estimate			
Age: 26-35							
				0.095	-0.012	0.111	-0.017
				(0.059)	(0.047)	(0.071)	(0.085)
F-test				23.604	11.605	17.882	2.860
Hansen J				0.062	0.007	0.002	0.008
(p-value)				(0.803)	(0.935)	(0.968)	(0.929)
Age: 26-40							
				0.065	0.087	0.083	0.126
				(0.044)	(0.095)	(0.057)	(0.129)
F-test				55.185	20.586	37.775	11.685
Hansen J				0.269	0.297	0.213	0.299
(p-value)				(0.604)	(0.586)	(0.644)	(0.585)
Age: 26-45							
				0.007	0.025	0.021	0.039
				(0.027)	(0.053)	(0.034)	(0.089)
F-test				107.751	36.565	63.758	17.137
Hansen J				1.880	2.052	1.873	2.142
(p-value)				(0.170)	(0.152)	(0.171)	(0.143)

Notes: Upper panel (aged 26-35): 539 observations; 1491 medium panel (aged 26-40) observations; bottom panel (aged 26-45) 2836 observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: age, age squared, mean wage, mean wage squared, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Constrained 1: the respondent has been denied credit or was discouraged from applying;
Constrained 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Constrained 3: net wealth less than 1000 euro;
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table 8: Fixed effect IV estimate of the extensive margin, women

Lag of	Constr. 4	Constr. 5	Constr. 6	Constr. 7
Age: 26-35				
	0.045	0.184*	-0.035	0.222*
	(0.098)	(0.104)	(0.106)	(0.130)
F-test	55.395	20.496	36.291	12.414
Hansen J	0.001	0.002	0.002	0.004
(p-value)	(0.972)	(0.964)	(0.964)	(0.952)
Age: 26-40				
	-0.022	0.110	-0.054	0.154
	(0.046)	(0.078)	(0.050)	(0.113)
F-test	125.145	72.434	82.184	32.408
Hansen J	0.656	0.566	0.786	0.539
(p-value)	(0.418)	(0.452)	(0.375)	(0.463)
Age: 26-45				
	-0.007	0.086	-0.040	0.106
	(0.033)	(0.055)	(0.040)	(0.077)
F-test	248.910	99.608	147.320	56.100
Hansen J	1.495	1.632	1.567	1.643
(p-value)	(0.221)	(0.201)	(0.211)	(0.200)

Notes: Upper panel (aged 26-35): 927 observations; 2247 medium panel (aged 26-40) observations; bottom panel (aged 26-45) 4085 observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: age, age squared, mean wage, mean wage squared, regional unemployment rate, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Figures

Figure 1: Expected life-cycle earnings

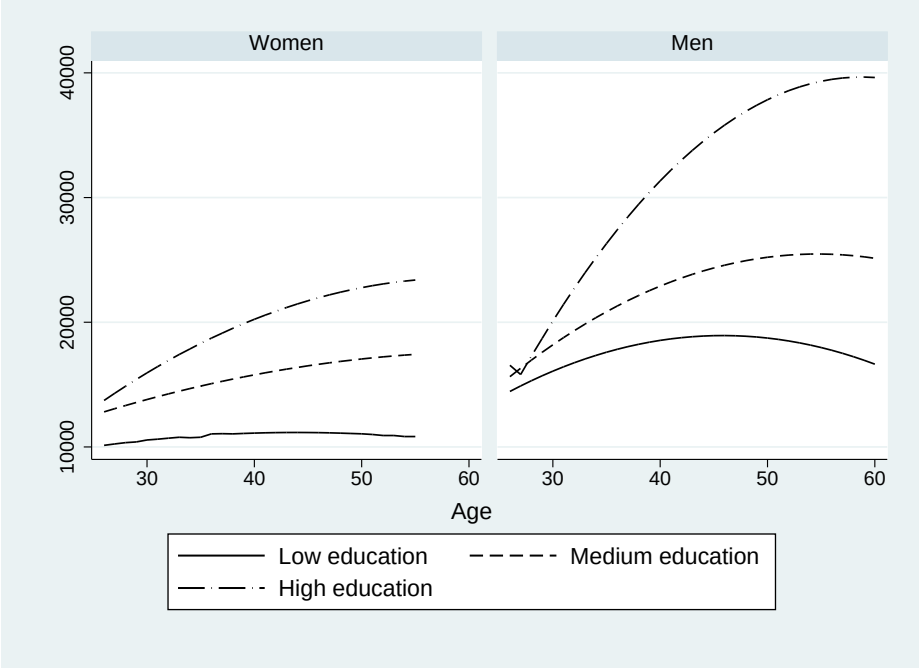
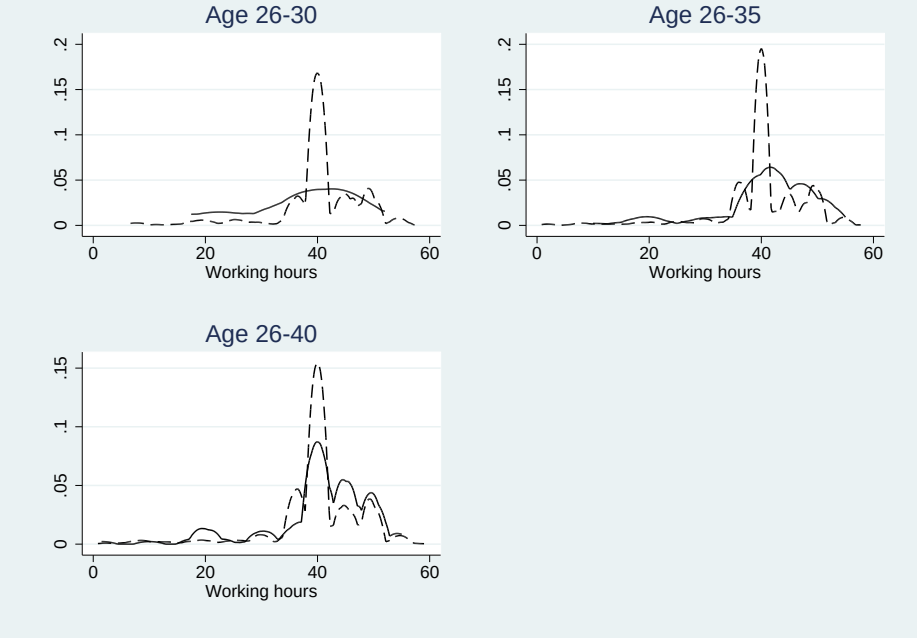


Figure 2: Working hours of constrained and unconstrained men



Notes: Constrained workers: solid line; unconstrained workers: dashed line.
Constrained and unconstrained individuals are defined according to the variable *Constrained 1*. Constrained respondents are, therefore, those who have been denied credit or were discouraged from applying.

A The model

Individual's optimization problem takes place in a two period setting. In each period individuals choose the level of consumption (c_t, $t = 1, 2$). In the first period individuals set their labor supply, i.e. they choose the share of time ($l_1 \in (0, 1)$) to spend for leisure, while in period $t = 2$ individuals retire ($l_2 = L$). Wealth (A_t) is timed at the beginning of the period while consumption (c_t) and leisure (l_t) are set at the end of each period. We assume initial wealth to be exogenous and equal to zero and agents to die with zero wealth ($A_3 = 0$). For simplicity, interest rate and subjective discount rate are set to zero.

Within this framework, individuals maximize the utility function

$$U = \sum_{t=1}^{2} u(c_t, l_t) = u(c_1, l_1) + u(c_2, L)$$

subject to the budget constraints

$$A_2 = w(1 - l_1) - c_1$$

$$c_2 = Y_r + A_2,$$

where w is the wage rate and Y_r is income at retirement, irrespectively on contribution paid. The last condition holds strictly since there is not a bequest motive.
The maximization problem can be written as:

$$\max_{A_2, l_1} U = u[w(1 - l_1) - A_2, l_1] + u[A_2 + Y_r, L].$$

Two additional constraints must hold. The participation constraint

$$(1 - l_1) \geq 0$$

and the liquidity constraint, according to which wealth cannot be less than an exogenous threshold B (not necessarily zero, but $B \leq 0$):

$$A_2 \geq B.$$

The Lagrangian function for this maximization problem is, therefore:

$$L = u[w(1 - l_1) - A_2, l_1] + u[A_2 + Y_r, L] + \lambda[A_2 - B] + \gamma[1 - l_1]$$

and implies the following Kuhn-Tucker conditions:

$$\frac{\partial L}{\partial A_2} = u'_{c_1}(c, l) - u'_{c_2}(c, l) + \lambda = 0$$

$$\frac{\partial L}{\partial l_1} = -w u'_{c_1}(c, l) + u'_{l_1}(c, l) - \gamma = 0$$

$$\lambda[A_2 - B] = 0$$

$$\gamma[1 - l_1] = 0$$

where u'_x is the marginal utility with respect of x. If liquidity constraint are binding, assets at the end of period one are equal to the borrowing threshold ($A = B$), meaning zero or negative savings in the first period and $c_2 = Y_r - B$.

Supposing now a positive labor supply (γ equal to zero), we want to focus on the effect of liquidity constraints on the labor supply. To this purpose, we compare optimal consumption and labor supply choices of unconstrained and constrained individuals.

In the unconstrained case (λ equal to zero), the first order conditions with respect to consumption and leisure imply, respectively:[25]

$$u^{NC}_{c_1}(c_1, l) = u^{NC}_{c_2}(c_2, L)$$

$$u^{NC}_{c_1}(c_1, l) = \frac{u^{NC}_{l_1}(c_1, l)}{w}.$$

Suppose that the threshold B increases and liquidity constraints start binding. Given that λ is positive, the Kuhn-Tucker conditions imply that

$$u^{C}_{c_1}(w(1 - l) + B, l) > u^{C}_{c_2}(Y_r - B, L)$$

and

$$u^{C}_{c_1}(w(1 - l) + B, l) = \frac{u^{C}_{l_1}(w(1 - l) + B, l)}{w}.$$

Combining the two above equations we obtain

$$u^{C}_{c_1}(w(1 - l) + B, l) = \frac{u^{C}_{l_1}(w(1 - l) + B, l)}{w} > u^{C}_{c_2}(c_2, L).$$

From the last inequality we derive that c_2^C is higher than without capital imperfection (where the inequality holds as an equality), as consumers cannot borrow money and, thus, they have to consume the income increase after its realisation. All else equal, consumption at time one will be necessary lower than without liquidity constraints. The only way to keep marginal utility of consumption equal to that of leisure in period one is, thus, to increase labor supply by reducing leisure.[26]

If liquidity constraints bind, labor supply increases as it acts as a channel to partially smooth marginal utility of consumption across times.

Similarly, individuals who, in absence of liquidity constraints, decide, optimally, not to participate to the labor market ($\gamma > 0$) may supply a positive number of working hours ($l < 1$) when the credit constraint switches to binding, in order to smooth consumption.

[25] Let u^{NC}_x and u^{C}_x denote, respectively, the marginal utility with respect of x in the unconstrained and constrained case.

[26] In principle, consumption at time one could be kept at the same level of the unconstrained case by resorting on additional labor supply. But in this case, the equality between marginal utility of consumption and labor in period one cannot be fulfilled.

B Description of the main variables.

Dependent variables

- *Working hours*: The average number of working hours (per week) supplied over the year. For each job declared by the respondent, we exploit information on the average number of working hours per week and on the number of months the respondent was employed in that specific job. Combining these information for all the jobs of the respondent, we compute the total number of hours worked over the reference year and, thus, their weekly average. We exclude from the sample respondents who worked on a temporary basis, as we are not able to compute how many hours they worked, and we exclude outliers from our sample (namely, individuals who declare to work, on average, more than 120 hours per week).
- *Overtime*: The weekly average of overtime working hours supplied by the employees. We build this variable following the same procedure used for *Working hours*. Its value is missing for self-employed respondents.
- *More jobs*: Dummy variable that takes the value of one if the respondent worked a positive number of hours in more than one job during the reference year.
- *Participation*: Dummy variable equal to one if the respondent worked a positive number of hours during the reference year.

Liquidity constraints indicators

- *Constrained 1*: the respondent (or someone in the household) has been denied credit or was discouraged from applying. More precisely, liquidity constrained households are defined as those who either: a) applied to a bank or a financial company to ask for a loan or a mortgage and the application was rejected; or b) answer positively to the following question "In [year] did you or any other member of your household consider the possibility of applying to a bank or a financial company for a loan or a mortgage but then change your mind thinking that the application would be rejected?".
- *Constrained 2*: the respondent is liquidity constrained according to at least one definition among *Constrained 1* and *Constrained 3*.
- *Constrained 3*: Individual net wealth is below the threshold of 1000 euro. Net wealth includes all assets in the household's portfolio, net of liabilities. Information on wealth are collected at the household level. When the respondent is married or cohabiting, we assume each partner to hold 50% of the value.
- *Constrained 4*: net wealth is less than 1000 euro (definition 3) and current income is lower than the permanent one.

- *Constrained 5*: the respondent has been denied credit or was discouraged from applying (according to definition 1) and current income is lower than the permanent one.

- *Constrained 6*: net wealth is less than 1000 euro (definition 3) and current income is lower than the permanent one (excluding real assets).

- *Constrained 7*: the respondent has been denied credit or was discouraged from applying (according to definition 1) and current income is lower than the permanent one (excluding real assets).

The last four definitions are based on the comparison between current and permanent income. The former is the net annual labor income earned by the interviewed. Permanent income at time t (year of the interview) is related to total resources according to the formula (Deaton, 1992):

$$y^P = \frac{r}{1+r}\left[1 - \frac{1}{(1+r)^{(T-t)}}\right]^{-1}\left[H_t + A_t\right],$$

where the interest rate r is set at 2%, t is the age of the respondent and the lifetime horizon T is equal to 80. Individual resources consists of the present value of expected future labor income (H_t) and wealth (A_t), that includes total assets net of liabilities for variables *Constrained 4* and *Constrained 5* and financial assets for variables *Constrained 6* and *Constrained 7*. For married or cohabiting respondents, we assume each partner to hold 50% of household's wealth (that is collected at the household level). To compute permanent income is, thus, crucial how to measure expected future earnings. To this purpose, we assume earnings' expectations to be based on earnings of "reference" individuals, namely workers with the same gender and educational level observed in the previous 10 years and living in the same area of the respondent (the relevant labor market). Under this assumption, we use SHIW data and we regress (the real value of) individual labor income on a set of covariates, separately for women and men. The sample includes working age respondents, namely men aged 26-60 and women aged 26-55, observed in the wave of the interview or during the previous four waves (10 years). The covariates are two dummies for education (medium and high education; the reference category is low education), age, age squared, and two dummies for the geographical area (Central and Southern Italy; the reference category is northern Italy). In order to allow the age profile of income to be different for different education levels, we also include the interaction between age and education. We use predictions of the above earning equation to infer the value of expected earnings for each year of the working life.[27] Women and men are assumed to retire, respectively, at the age of 55 and 60 and to live until the age of 80. The replacement rate of retirement benefits with respect to the last wage is set to 80% and retirement benefits are assumed to be constant in

[27] Consider, for instance, a men aged 40 living in northern Italy in 2010. To compute the expected value of permanent income, we use 2002-2010 SHIW waves and estimate the income equation described above. We use the estimate results to predict his earnings for ages 41-60.

real terms. The present value of future earnings and pension benefits at the age of the interview (H_t) is calculated assuming the interest rate to be 2%.

Covariates

- *Age*: Age of the respondent.
- *Wage*: Hourly wage of the respondent, calculated as labor income divided by the number of working hours. In the participation equation, wage is the (weighted) mean wage of individuals with the same gender and educational level observed in the same time span in the region where the respondent lives.
- *Married*: Dummy equal to one if the respondent is married or cohabiting with a partner and zero otherwise.
- *Working partner, lag*: Dummy taking value one if the partner (if any) supplied a positive number of working hours the previous period.
- *Income partner, lag*: Labor income of the partner (in thousand euros 2010), lagged value (one period).
- *1 Child; 2+ Children*: Dummy variables equal to one if the respondent has, respectively, one or more children; the reference category is no children.
- *Log net wealth, lag*: Lagged value of the logarithm of per capita net wealth (in thousand euros 2010). To avoid the problem of the logarithm being undefined, we approximate its value to zero when wealth is equal to zero or negative.

Instrumental variables

- *Age of the spouse, lag*: Age of the spouse/cohabiting partner, measured the previous period.
- *Spouse constr. [num], lag*: Dummy taking value one if the partner (if any) was constrained according to the same definition (*[num]*) the previous period.

C Additional Tables

Table A-1: Fixed effect estimate of the intensive margin, women and men (dependent variable: working hours)

Lag of:	Constr. 1	Constr. 2	Constr. 3	Constr. 4	Constr. 5	Constr. 6	Constr. 7
Age: 26-30							
Constrained	0.832	2.502*	3.106*	4.322***	1.355	4.480***	2.278
	(2.685)	(1.489)	(1.605)	(1.562)	(1.991)	(1.724)	(2.054)
Constrained*Female	-2.702	-3.747*	-5.005**	-7.924***	-4.585	-8.398***	-4.624
	(2.685)	(2.029)	(2.415)	(2.471)	(4.007)	(2.761)	(4.345)
Age: 26-35							
Constrained	3.679*	2.438**	1.842	2.589**	5.037	3.211**	6.642*
	(2.156)	(1.070)	(1.160)	(1.313)	(3.125)	(1.387)	(3.722)
Constrained*Female	-2.966	-2.015	-2.016	-3.711	-4.211	-3.313	-5.232
	(2.758)	(1.569)	(1.866)	(2.583)	(4.006)	(2.718)	(4.759)
Age: 26-40							
Constrained	1.383	1.025	0.822	1.025	2.551	1.480	3.538
	(1.304)	(0.727)	(0.844)	(0.854)	(1.998)	(0.906)	(2.449)
Constrained*Female	-1.537	-1.182	-1.062	-1.643	-3.702	-2.922*	-4.911
	(1.980)	(1.086)	(1.282)	(1.703)	(2.931)	(1.695)	(3.655)

Notes: Upper panel (aged 26-35): 1015 observations; 2677 medium panel (aged 26-40) observations; bottom panel (aged 26-45) 5043 observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: a constant, age, age squared, mean wage, mean wage squared, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Constrained 1: the respondent has been denied credit or was discouraged from applying;
Constrained 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Constrained 3: net wealth less than 1000 euro;
Constrained 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Constrained 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Constrained 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Constrained 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table A-2: OLS estimate of the intensive margin, men 26-40 (dependent variable: working hours)

Constrained 1, lag	2.694*						
	(1.597)						
Constrained 2, lag		-1.484**					
		(0.746)					
Constrained 3, lag			-2.742***				
			(0.798)				
Constrained 4, lag				-2.993***			
				(0.909)			
Constrained 5, lag					0.560		
					(2.114)		
Constrained 6, lag						-3.073***	
						(0.972)	
Constrained 7, lag							0.601
							(2.287)
Age	1.366	1.317	1.292	1.081	1.348	1.008	1.331
	(1.845)	(1.845)	(1.846)	(1.858)	(1.849)	(1.859)	(1.848)
Age sq.	-0.016	-0.016	-0.016	-0.013	-0.016	-0.012	-0.016
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Wage	-0.700***	-0.716***	-0.730***	-0.720***	-0.700***	-0.720***	-0.700***
	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)
Wage sq.	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	-0.731	-0.463	-0.254	-0.528	-0.693	-0.581	-0.691
	(0.935)	(0.944)	(0.951)	(0.926)	(0.938)	(0.926)	(0.938)
Working partner, lag	-1.396	-1.610*	-1.815**	-1.544*	-1.402	-1.508*	-1.400
	(0.861)	(0.871)	(0.870)	(0.851)	(0.867)	(0.851)	(0.867)
Income partner, lag	0.045	0.043	0.039	0.039	0.046	0.040	0.046
	(0.046)	(0.046)	(0.045)	(0.045)	(0.046)	(0.045)	(0.046)
1 Child	0.600	0.556	0.632	0.638	0.550	0.635	0.551
	(0.953)	(0.947)	(0.941)	(0.939)	(0.953)	(0.939)	(0.953)
2+ Children	0.345	0.208	0.309	0.240	0.235	0.214	0.235
	(0.901)	(0.896)	(0.894)	(0.893)	(0.902)	(0.894)	(0.902)
Log net wealth, lag	0.072	0.024	-0.001	0.019	0.061	0.014	0.061
	(0.070)	(0.073)	(0.072)	(0.071)	(0.070)	(0.071)	(0.070)
Year 2002	2.129**	2.082**	2.049**	2.082**	2.119**	2.045**	2.122**
	(0.845)	(0.847)	(0.848)	(0.848)	(0.846)	(0.847)	(0.846)
Year 2006	0.508	0.488	0.408	0.445	0.543	0.389	0.544
	(0.798)	(0.799)	(0.798)	(0.798)	(0.800)	(0.800)	(0.799)
Year 2008	0.399	0.389	0.343	0.369	0.415	0.352	0.417
	(0.975)	(0.973)	(0.971)	(0.973)	(0.973)	(0.973)	(0.973)
Year 2010	-1.555	-1.386	-1.353	-1.338	-1.484	-1.383	-1.481
	(0.993)	(0.986)	(0.975)	(0.970)	(0.996)	(0.972)	(0.994)
Constant	19.832	22.094	23.374	26.509	20.369	27.911	20.641
	(32.578)	(32.540)	(32.538)	(32.838)	(32.641)	(32.859)	(32.629)

Notes: Males aged aged 26-40; 1491 medium panel observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table A-3: Fixed effect estimate of the intensive margin, men 26-40 (dependent variable: working hours)

Constrained 1, lag	3.821*						
	(2.111)						
Constrained 2, lag		2.441**					
		(1.051)					
Constrained 3, lag			1.792				
			(1.153)				
Constrained 4, lag				2.561**			
				(1.289)			
Constrained 5, lag					5.348*		
					(3.049)		
Constrained 6, lag						3.199**	
						(1.368)	
Constrained 7, lag							6.737*
							(3.699)
Age	1.744	1.646	1.696	1.762	1.919	1.793	1.519
	(2.756)	(2.678)	(2.672)	(2.668)	(2.709)	(2.666)	(2.730)
Age sq.	-0.038	-0.036	-0.033	-0.033	-0.036	-0.033	-0.029
	(0.037)	(0.036)	(0.036)	(0.036)	(0.037)	(0.036)	(0.037)
Wage	-1.165***	-1.149***	-1.144***	-1.152***	-1.165***	-1.149***	-1.165***
	(0.172)	(0.170)	(0.172)	(0.173)	(0.173)	(0.171)	(0.174)
Wage sq.	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Married	5.201	4.932	5.218	5.144	5.648	5.026	5.730*
	(3.279)	(3.218)	(3.298)	(3.265)	(3.442)	(3.241)	(3.450)
Working partner, lag	-0.806	-0.729	-0.942	-0.913	-0.857	-0.964	-0.915
	(1.816)	(1.854)	(1.956)	(1.955)	(1.808)	(1.968)	(1.804)
Income partner, lag	-0.021	-0.004	0.015	0.012	-0.004	0.013	-0.001
	(0.070)	(0.073)	(0.075)	(0.075)	(0.071)	(0.076)	(0.071)
1 Child	-0.920	-1.059	-1.210	-1.247	-1.170	-1.258	-1.084
	(1.353)	(1.351)	(1.367)	(1.366)	(1.366)	(1.364)	(1.358)
2+ Children	-2.120	-2.215	-2.435	-2.493	-2.286	-2.481	-2.295
	(1.563)	(1.634)	(1.663)	(1.653)	(1.574)	(1.644)	(1.567)
Log net wealth, lag	-0.183*	-0.157*	-0.172*	-0.170*	-0.183*	-0.157*	-0.174*
	(0.094)	(0.089)	(0.089)	(0.088)	(0.093)	(0.086)	(0.093)
Year 2002	-2.773	-2.788*	-2.241	-2.036	-2.157	-1.855	-1.910
	(1.893)	(1.583)	(1.448)	(1.529)	(1.467)	(1.559)	(1.538)
Year 2006	3.308*	3.408**	2.835**	2.668*	2.745**	2.685*	2.606*
	(1.842)	(1.546)	(1.384)	(1.456)	(1.393)	(1.486)	(1.466)
Year 2008	4.080	4.100	2.932	2.601	2.746	2.464	2.471
	(3.699)	(3.050)	(2.749)	(2.921)	(2.783)	(2.982)	(2.931)
Year 2010	4.505	4.471	2.776	2.271	2.528	2.048	2.153
	(5.367)	(4.401)	(3.962)	(4.224)	(4.004)	(4.318)	(4.254)
Constant	36.942	37.981	32.931	30.738	28.534	29.111	33.933
	(55.364)	(52.185)	(51.416)	(51.882)	(52.086)	(52.016)	(52.947)

Notes: Males aged aged 26-40; 1491 medium panel observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table A-4: IV fixed effect estimate of the intensive margin, men 26-40 (dependent variable: working hours)

Constrained 4, lag	3.338			
	(2.427)			
Constrained 5, lag		7.651		
		(5.127)		
Constrained 6, lag			3.804	
			(3.022)	
Constrained 7, lag				8.710
				(6.818)
Age	1.738	1.951	1.784	1.424
	(2.589)	(2.657)	(2.587)	(2.665)
Age sq.	-0.033	-0.037	-0.033	-0.028
	(0.035)	(0.036)	(0.035)	(0.036)
Wage	-1.152***	-1.170***	-1.149***	-1.168***
	(0.162)	(0.164)	(0.161)	(0.164)
Wage sq.	0.006***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Married	5.039	5.716	4.939	5.801
	(3.627)	(3.835)	(3.614)	(3.832)
Working partner, lag	-0.848	-0.742	-0.934	-0.853
	(1.959)	(1.709)	(1.943)	(1.702)
Income partner, lag	0.012	-0.011	0.014	-0.004
	(0.080)	(0.076)	(0.080)	(0.076)
1 Child	-1.268	-1.166	-1.273	-1.056
	(1.290)	(1.320)	(1.287)	(1.312)
2+ Children	-2.495	-2.199	-2.480	-2.239
	(1.626)	(1.545)	(1.617)	(1.538)
Log net wealth, lag	-0.163	-0.177	-0.150	-0.168
	(0.109)	(0.118)	(0.108)	(0.119)
Year 2002	-2.031	-2.203	-1.817	-1.869
	(1.509)	(1.431)	(1.542)	(1.515)
Year 2006	2.705*	2.831**	2.711*	2.623*
	(1.452)	(1.378)	(1.479)	(1.450)
Year 2008	2.639	2.863	2.461	2.470
	(2.849)	(2.686)	(2.894)	(2.852)
Year 2010	2.289	2.665	2.017	2.137
	(4.122)	(3.848)	(4.195)	(4.136)

Notes: Males aged aged 26-40; 1491 medium panel observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table A-5: First stage estimates, men 26-40 (dependent variable:constrained)

Dep. var.:lag of	Constr. 4	Constr. 5	Constr. 6	Constr. 7
Age of spouse, lag	-0.006**	0.000	-0.006**	-0.000
	(0.003)	(0.001)	(0.003)	(0.001)
Spouse constr. 4, lag	0.559***			
	(0.054)			
Spouse constr. 5, lag		0.577***		
		(0.091)		
Spouse constr. 7, lag			0.477***	
			(0.055)	
Spouse constr. 6, lag				0.454***
				(0.094)
Age	-0.051	-0.007	-0.056	0.053
	(0.076)	(0.047)	(0.076)	(0.044)
Age sq.	0.000	0.000	0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Wage	0.003	0.001	0.002	0.002
	(0.003)	(0.002)	(0.003)	(0.001)
Wage sq.	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Married	0.115	-0.027	0.130*	-0.035
	(0.076)	(0.043)	(0.076)	(0.042)
Working partner, lag	-0.023	-0.033	0.010	-0.018
	(0.052)	(0.034)	(0.051)	(0.031)
Income partner, lag	0.002	0.002	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
1 Child	0.024	0.023	0.026	-0.001
	(0.037)	(0.024)	(0.037)	(0.023)
2+ Children	0.014	-0.010	0.008	-0.012
	(0.040)	(0.023)	(0.040)	(0.022)
Log net wealth, lag	-0.005	-0.002	-0.008***	-0.003
	(0.003)	(0.002)	(0.003)	(0.002)
Year 2002	-0.079	0.032	-0.122*	-0.010
	(0.064)	(0.050)	(0.063)	(0.038)
Year 2006	0.055	-0.046	0.043	-0.012
	(0.062)	(0.051)	(0.061)	(0.037)
Year 2008	0.111	-0.071	0.142	-0.009
	(0.122)	(0.100)	(0.119)	(0.074)
Year 2010	0.195	-0.101	0.249	-0.023
	(0.178)	(0.148)	(0.174)	(0.108)

Notes: Males aged aged 26-40; 1491 medium panel observations.
$^{*}p < 0.1$,** $p < 0.05$,*** $p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table A-6: Fixed effect estimate of the intensive margin, men (dependent variable: working hours)

Lag of:							
Switch U to C	Def. 1	Def. 2	Def. 3	Def. 4	Def. 5	Def. 6	Def. 7
Age: 26-40							
	3.504	3.200	1.882	2.993	5.403	4.217	8.420
	(3.443)	(2.556)	(2.584)	(2.789)	(5.513)	(3.374)	(7.405)
Age: 26-45							
	2.557	1.910	1.187	1.903	3.484	2.605	5.234
	(1.855)	(1.270)	(1.340)	(1.400)	(3.049)	(1.619)	(3.970)
Lag of:							
Switch C to U	Def. 1	Def. 2	Def. 3	Def. 4	Def. 5	Def. 6	Def. 7
Age: 26-40							
	-0.687	-1.595	-1.399	-1.155	1.881	-0.823	1.859
	(1.855)	(1.497)	(1.715)	(2.104)	(2.938)	(2.444)	(3.357)
Age: 26-45							
	-2.897	-1.612*	-0.962	-0.345	1.514	-0.302	2.440
	(1.948)	(0.963)	(0.947)	(1.119)	(2.183)	(1.145)	(2.877)

Notes: Upper panel (aged 26-40) 615 observations; bottom panel (aged 26-45) 1327 observations.
$^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$.
Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.
Also included: age, age squared, mean wage, mean wage squared, dummies for: being married, having one child, having 2 or more children, year dummies, the lag of: a dummy for having a working partner, income of the spouse, log of net wealth.
Def. 1: the respondent has been denied credit or was discouraged from applying;
Def. 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Def. 3: net wealth less than 1000 euro;
Def. 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Def. 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Def. 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Def. 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).

Table A-7: Descriptive statistics: switching dummies

Lag of Switch U to C							
	Def.1	Def.2	Def.3	Def.5	Def.6	Def.8	Def.9
Mean	0.041	0.111	0.086	0.072	0.026	0.020	0.064
St. Dev.	(0.199)	(0.314)	(0.280)	(0.259)	(0.158)	(0.)	(0.245)
Lag of Switch C to U							
	Def.1	Def.2	Def.3	Def.5	Def.6	Def.8	Def.9
Mean	0.029	0.093	0.077	0.065	0.014	0.012	0.061
St. Dev.	(0.167)	(0.291)	(0.266)	(0.246)	(0.11)	(0.109)	(0.239)

Notes: Men aged 26-45: 1327 observations.
Def. 1: the respondent has been denied credit or was discouraged from applying;
Def. 2: the respondent has been denied credit or was discouraged from applying or net wealth less than 1000 euro;
Def. 3: net wealth less than 1000 euro;
Def. 4: net wealth is less than 1000 euro and current income is lower than the permanent one.
Def. 5: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one.
Def. 6: net wealth is less than 1000 euro and current income is lower than the permanent one (excluding real assets).
Def. 7: the respondent has been denied credit or was discouraged from applying and current income is lower than the permanent one (excluding real assets).