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**LIQUIDITY CONSTRAINTS AND LABOR SUPPLY**

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# Liquidity constraints and labor supply

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## Abstract

In this paper we show how liquidity constraints shape Italian households' decisions with regard to supplying their labor. One way to neutralize binding liquidity constraints is by resorting to supplying additional labor, instead of reducing consumption patterns. We estimate whether this channel is at work by using the Survey of Households Income and Wealth (SHIW) sample. In our analysis we are also able to detect whether actual labor supply differs from the desired one. Our results show that liquidity constraints foster female participation in the labor force and increase the intensity in the supply of men's labor.

*Key words:* Labor supply, liquidity constraints, life cycle, desired labor supply.

*JEL:* A, D4, JE.

## 1 Introduction and motivation

Imperfections in how credit markets function have occupied a substantial part of the economic literature to explain why households make suboptimal choices. In the literature of life cycle consumption, liquidity constraints have been identified as one of the main causes for why the life-cycle model fails to explain the consumption behaviour of households (Deaton, 1992). The fact that household consumption tracks income too closely might be imputed to imperfections existing in the credit markets resulting in a lack of availability of credit. Households, expecting an increase in income, will delay an increase consumption until the actual increase in income occurs, because they

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are not allowed to borrow in order to incorporate the anticipated increase. Suboptimal choices are then made as the credit market is far from perfect. Another channel that is likely to be affected by liquidity constraints is the labor market. One way to circumvent the obstacle of being unable to borrow is to simply supply more labor. Working more might (partially) neutralize the credit constraints. 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 stable. However, the role of labor supply might be also important as a way to overcome the effect of liquidity constraints. The underlying hypothesis is that the labor supplied tends to be either full time or nil. While this can be a valid assumption for men, for women this hypothesis is more difficult to prove. The (traditional) second earner has shown a participation in the labor market that is more volatile. Two recent papers by Bottazzi (2004) and Del Boca and Lusardi (2003) analysed whether female participation is affected by having a mortgage in both Italy and the UK. Households who have a mortgage might be more committed and therefore more inclined to participate to the job market in order to have a stable income. This effect is found for both countries with respect to women. Our paper focuses on how financial imperfections might in fact be responsible for an additional labor supply that is provided as a way to mitigate these credit market problems. Liquidity constrained households do not have (full) access to the credit market, and this is likely to distort their choices about how much they consume and how much they work. In line with the literature, we define being liquidity constrained as the impossibility of resorting to debt (or having negative net worth). In order to take into account the dynamics of the Italian labor market and its rigidities, mainly that labor decisions are not entirely shaped by the supply side, we exploit the information about the desired labor supply. In particular, we exploit a unique aspect of the panel dataset in use, the Survey of Household Income and Wealth (SHIW). The SHIW provides the information on the desired participation to the labor market. Our findings suggest that liquidity constraints play an important role in shaping individual labor supply. However, their effect differs according to gender. On one hand, women facing liquidity constraints are more likely to participate in the labor market, while the intensity of their labor supply is less sensitive to credit constraints. On the other hand, the number of hours supplied by constrained men is understandably greater than those supplied by men who are unconstrained. In addition our results shed important light on the female willingness to participate in the labor market. In fact, leaving aside the tightness of the credit market, women are forced to reduce their participation in the labor market

when they have two or more children. However, they show a less pronounced effect of children on their desired participation; this evidence suggests that the rigidity of the labor market with respect to family commitment could be partially responsible for the low participation of mothers (Anxo et al., 2011; Del Boca et al., 2005).

## 2 Conceptual Framework

To conceptualize the problem, we suppose for simplicity that agents live for two periods. In the first period the agent supplies labor and in the second period the agent retires. Utility is derived both from consumption and from leisure. 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. 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 will maximise the following utility function:

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

With  $u' < 0$ ,  $u'' < 0$  and  $u_{c,l} > 0$ .

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 ( $c$ ) and leisure ( $l$ ) are set at their optimal level while in period two, corresponding to retirement, agents devote all their time to leisure ( $L$ ).

Without market imperfections, and ignoring the constraint on hours, 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:

$$\begin{aligned} u'_c(c_1, l_1) - u'_c(c_2, L) &= 0 \\ -wu'_{c_1}(c_1, l_1) + u'_{l_1}(c_1, l_1) &= 0 \end{aligned}$$

The first order condition 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.

If a liquidity constraint is added to the model, agents are forced to borrow below a certain threshold ( $B$ ) as follows:

$$A_2 \geq B$$

If the constraint binds, the first period marginal utility will be higher than in the second period while the intra-period marginal utility of consumption and leisure are kept equal as follows (we denote with the upscript  $C$  the constrained case):

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

The last inequality implies that the marginal utility of consumption in period two is lower than in period one, implying that second period consumption in period two be higher than in the unconstrained case. Consumption in period one is lower than without the constraint as borrowing is limited. If leisure are kept stable in period two as in the unconstrained case, the marginal utility of consumption does not equate that of leisure. To set the marginal utility of leisure equal to 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 more 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 data from the Bank of Italy's SHIW and relies on the 2004 wave. This wave surveys a representative sample of the Italian resident population and covers 8012 households. A household is defined as a group of individuals related by blood, marriage or adoption and sharing the same dwelling—and it is representative of the Italian population.

For the purpose of our analysis, we restrict our sample to individuals who are either the head of household or spouses who are aged between 26 and 35 years, as we want to rule out dynamics of the labor market that are too influenced by retirement choices and therefore less likely to be affected by liquidity constraints in their decisions. The total number of female respondents is 667 while male respondents number 480.

The SHIW dataset collects detailed information on household composition, labor supply, income and wealth. It gathers detailed information on the labor market status of those interviewed, including the number of weeks and average weekly working hours he/she worked in the previous year. In addition, for the 2004 wave only, people who were not employed are asked whether they would have worked; both employed and unemployed are asked the number of working hours they would have offered. This unique piece of information allows us to measure not only the observed supply of labor but also the amount “desired” by the individual. Figures (1) and (2) plot the number of weekly observed and desired working hours<sup>1</sup> for women and for men.<sup>2</sup> Relevant differences in the distribution of observed and desired labor supplies emerge from the graphs. According to Figure (1), 41% of women aged between 26 and 35 do not work, but only 24% desire to be out of the labor force. Indeed, a relevant number of women would have a part-time job (14% and 13% of them desire to work, respectively, 20 and 30 hours per week), but less than 12% of them actually work 20 or 30 hours. This evidence points out that a non-negligible number of unemployed women would enter the labor market and suggests the importance of the availability of part-time jobs in fostering female participation. Turning to men, they seem to desire to work less than they do. Figure (2) shows that only 14% of males work less than 40 hours per week, but 21% of them would work less if they could. On the other end of the scale, 33% of men work more than 40 hours while only 20% would do it if they had a choice. The mismatch between

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<sup>1</sup>Both variables refer to the average of working hours per week computed on the year 2004.

<sup>2</sup>More in details, the variable “*Desired hours*” relies on answers to different questions asked to working or non-working individuals. The respondent is asked whether the unemployed members of the household would be willing to work and, in the case of a positive answer, two additional questions are asked:

- “*Considering the conditions generally obtainable nowadays if he/she worked, given age, education and experience, would he/she be willing to accept: full-time payroll employment for the whole year/ part-time payroll employment for the whole year/ only occasional, seasonal or informal payroll employment/ or only free-lance work or self-employment?*”

- “*How many hours would he/she like to work in this hypothetical job?*”

This piece of information allows us to recover the desired labor supply of members who do not work (we exclude those who declare that they are only willing to work seasonally (19 respondents), since we do not know how many weeks they would work).

Indeed, the following question is asked of working respondents interviewed in person (only for the main job):

- “*At the same hourly earnings, how many hours would you like to work on average per week?*”

We rely on the answer to this question and on the number of hours supplied for other possible jobs to measure the desired labor supply of respondents who are working.

observed and desired labor supply emerges more clearly from Figure (3). More than 40% of men would reduce their labor supply (half of them would work 10 hours less) and only 16% of them would work more. The opposite is observed for women: only 21% of them would work less, but more than one third would increase their labor supply (the 28% of women would supply at least 20 hours more). This heterogeneity across genders is mainly driven by unemployed respondents. Figure (4) shows that all the unemployed men desire to work, while less than half of women would enter in the labor market: almost 20% of unemployed women would work full-time and more than 30% of them would have a part-time job (i.e., would work less than 30 hours per week). Indeed, in contrast, for working men and women the difference between desired and actual working hours is homogeneously distributed (Figure 5).

To investigate the potential effect of credit rationing, we exploit information allowing us to detect liquidity constrained individuals. For this purpose we use three different indicators. The first (variable *Constrained 1*), drawn from the approach by Jappelli et al. (1998), defines liquidity constrained households 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 2004 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?” We are aware that this variable could suffer from potential weak link with the real ability of obtaining credit and capturing the concept of liquidity constraints. We also make use of two additional variables to measure the likelihood of binding liquidity constraints, simply based on the lack of financial assets. According to the standard life-cycle model, a necessary condition for households to be liquidity constrained is to have a zero net worth. In fact a family is defined as liquidity constrained if it would like to have, optimally, negative net worth, given the prospect of increasing future incomes against which a loan could be repaid. We thus define the second measure of liquidity constraints (variable *Constrained 2*) as a dummy variable equal to one whenever an individual owns less than 1000 euros<sup>3</sup> or is constrained according to the first definition. The third measure of constraints (variable *Constrained 2*) captures whether an individual owns less than 1,000 euros.

Descriptive statistics of the sample are reported in Table (1). The aver-

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<sup>3</sup>In households with two members, we compute individual wealth by dividing total household wealth between the two spouses.

age Respondent is roughly 32 years old. Women have slightly more years of education, approximately equal to 11. Wage<sup>4</sup> and wealth<sup>5</sup> variables differ between male and female samples, where females earn at least one euro per hour less than their male counterparts and have a larger amount of wealth. The 80% of female respondents are married and have a working partner, while only 70% of men are married and 40% of them have a working wife. Looking at the household composition, less than 1% of the sample has more than 2 children. Women are almost evenly distributed across the groups with zero, one or two children; the share of men without children is much higher (almost 60%). Turning to our variables of interest, the liquidity constraints variable, the respondents likely to suffer from restrictions in the credit market range from 4% to 29% according to which credit constraint classification is considered. To control for heterogeneity in the economic framework, we also include in the econometric analysis the regional unemployment rate, of people older than 25 and an index that measures the spreading of childcare services.<sup>6</sup> and a dummy variable that captures whether the respondent lives in the North of Italy.

As for working decisions and ambitions, the percentage of working women is almost 60%, and 75% of them would like to work. All men work and want to work.

## 4 Empirical strategy

This paper aims to analyse the effect that liquidity constraints have on labor supply. We examine work participation both in the reported form (whether they work or they don't) and in the desired form (whether they would like to work or they would not). We also contribute beyond the existing literature by considering the desired number of hours along with the reported ones. This information is rather unique as respondents are asked how many hours they would have ideally worked.<sup>7</sup> For a country such as Italy where the

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<sup>4</sup>The wage is the mean wage that is observed in the region where the respondent lives for individual with the same gender and educational level.

<sup>5</sup>Wealth is the logarithm of per capita net wealth. To avoid the problem of the logarithm being undefined, we approximate its value to zero when wealth is equal to zero or negative.

<sup>6</sup>The variable *Childcare* is defined as the percentage of children aged 0-2 who live in a municipality with a nursery school (source: Istat (2004), Interventi e servizi sociali dei comuni singoli e associati).

<sup>7</sup>We are aware that we should be careful in interpreting the desired hour variable as we do not know if people respond to this question considering their actual budget constraint and the setting in which they live, i.e. the ideal number of hours could be conditioned



labor market is rigid (Boeri et al., 2005) and little part-time is present, it is essential to know whether individuals would be better off by supplying more (or less) labor to the market, particularly for women, among whom only 40% are unemployed.

We first start by estimating work participation as:

$$W = Z'\gamma + \delta Lc + u$$

where  $W$  is equal to one if the respondent works (or is willing to work) and zero otherwise;  $Z$  is a matrix of covariates and  $Lc$  is a dummy variable that captures whether the respondent is constrained. In this setting  $Lc$  is considered to be an exogenous variable, equal to one when the household is constrained in the credit market. However, we want to address the potential weakness of the variable defined as such by allowing for endogeneity and we estimate the two variables jointly. Being liquidity constrained could be signal of not working by pushing downwards the coefficient  $\delta$ . If individuals are not working, they are less likely to obtain credit from the bank. Moreover, individuals who have higher preferences for leisure are more likely to be liquidity constrained. To address this endogeneity problem we estimate the likelihood of liquidity constraint as an equation, whose distribution is potentially correlated with the distribution of the work equation.

We thus estimate a two equation system in this form:

$$Lc = X'\beta + \epsilon$$

$$W = Z'\gamma + \delta Lc + u$$

To create the model, the regressors in  $Z$  also the spread between borrowing and lending interest rates in the region of the respondent<sup>8</sup>. The interest rate spread is a measure of imperfection in the financial market, since it reflects the mark-up applied by banks to their cost of funds.<sup>9</sup> This strategy exploits a characteristic feature of the Italian case, that is, the great heterogeneity of regional financial market conditions, that has been documented by Guiso et al. (2004) and Guiso et al. (2007), and exploited by Bertola et al.

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by the available care system, which is also ideal and, thus, not reflecting the true budget constraint. For this reason we use both desired and observed labor supply.

<sup>8</sup>Borrowing and lending interest rates refer, respectively, to short run (up to 18 months) interest charged on all customers and to interest yielded by overall deposits (current and deposit accounts, fixed term deposits, interest-bearing bonds and certificate of deposit). The value of the interest rates is provided by the Bank of Italy on a regional basis.

<sup>9</sup>The spread is correlated with other measures of credit market development, including the banks' branch density and the index built by Guiso et al. (2004).

(2005), Casolaro et al. (2006) and Benfratello et al. (2008). As we are aware that experiencing liquidity constraints depends not only on credit market features but also on individual characteristics, we also interact the interest rate spread variable with the educational level. At each different level of education, in fact, the spread potentially has a different effect. The richness of the Italian SHIW dataset allows us to also investigate the effect of liquidity constraints on the intensive margin, i.e., on the number of reported and desired working hours. To address the issue we estimate the number of hours supplied by workers (i.e., on the subsample of those who participate to the labor market) by the OLS model. The estimating equation is:

$$H = Z'\gamma + \delta Lc + u$$

where  $H$  is the number of (desired or supplied) working hours per week. As for participation, being constrained may be endogenous in the equation above because of a reverse causality (people working more have higher income and, therefore may be more likely to be granted a loan) or omitted variables (such as preferences, intertemporal discount rate). To address the issue we estimate the model

$$Lc = X'\beta + \epsilon$$

$$H = Z'\gamma + \delta Lc + u$$

by maximum likelihood (Maddala, 2005), under the assumption that the error terms  $u$  and  $\epsilon$  are distributed as a bivariate normal.

Previous empirical literature has shown the female labor force participation 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, to allow the effect of the explaining factors to differ according to gender, all the models for women and men are estimated separately.<sup>10</sup>

## 5 Results

In this session we analyse, respectively, labor market participation and the intensive margin of labor supply. We start our analysis by focusing on the dichotomous variable of working status, as shown in Tables (2), where we report the estimation results relative to the probit models. As the entire sample of male respondents participate in the labor market, we focus on

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<sup>10</sup>The participation model has been estimated only on the women's sample, since all men currently work and want to work.

variations in female participation. In the first three columns of the two tables, the dependent variable has a value of one if the respondent works and zero otherwise; the last three columns show the estimated results of desired participation (i.e., the probability that a woman is willing to work). Both models are estimated using, alternatively, the three definitions of liquidity constraints. We first start by focusing on our main variable of interest, as shown in Table (2), which is the impact on employment of being liquidity constrained. Credit market restrictions are significantly and negatively affecting reported participation (albeit only in two definitions of liquidity constraints) while they show no significant impact on the desired one. We are, however, aware that being liquidity constrained is endogenous and likely to be negatively correlated with the dependent variable of employment. Thus the negative sign could be driven by the negative correlation between being liquidity constrained and participation in the labor market. To address the issue we use a more general model, where unobservable variables that may drive participation are allowed to be correlated to the variable “Constrained”. The estimation of the bivariate probit model, which is our preferred model, is shown in Table (3). As a general result, each regressor, if significant, tends to impact desired and observed hours with the same sign. More educated women are more heavily represented in the labor market: one additional year of education increases the likelihood of working by around 2-3 percentage points. This result holds true when controlling for hourly wage, which, in turn, is only significant in shaping observed participation rather than the desired (with a positive and concave marginal effect). Thus, the participation of more educated women may be driven by their positive attitude to work and, possibly, by the stronger demand for high-skill workers. The presence of one child does not seem to affect substantially the working decisions of mothers, while having two or more children acts as deterrent to employment in all specifications: a woman with 3 or more children compared to a woman without children, all else being equal, will participate in the labor market with a 23-25 percentage point lower probability. When we look at the mothers desired participation, this value reduces to 11%. This result is worthy of note. Almost half of the negative effect of motherhood on female participation can be attributed to labor supply factors and, possibly, to the mother’s difficulties of finding a job after a childbirth. It is therefore important that labor market policies be centred around family friendly conditions in order to attract more women to the labor market. The availability of childcare significantly affects labor market decisions, even while it does not influence the willingness to participate. The availability of childcare reduces the negative impact of having children, albeit without offsetting it. Having

a child, even when childcare is widespread, still creates a negative effect on a woman's participation in the labor market. It is worth noting that childcare services play a significant role in encouraging mother's work: All else being equal, a woman who lives in a region with fewer widespread services (Campania) is less likely to work than is a woman who lives where services are the most widespread (Valle d'Aosta or Emilia Romagna). The gap is more than 20 percentage points. Thus, two relevant policy implications follow these findings. Policies that are designed to encourage hiring mothers and those that promote the spreading of childcare services would be helpful to promote female participation in the labor market. In order to control for labor market conditions, we also include the regional unemployment rate, that has a relevant effect on both observed and desired participation: An increase in the unemployment rate by 1 percentage point reduces the probability of a woman working by 2 percentage points. All else being equal, women who live in northern Italy are more likely to work, but across regions, there is no significant difference in the level of desired participation. Thus, this effect is not likely to capture heterogeneity in the attitude of women (and their husbands) but, rather, differences in the labor demand side with respect to sector composition; more generally, it could reveal a difference in the attitudes of the employers. Turning to our main variable of interest, liquidity constraints, our findings show that, after controlling for the endogeneity of being liquidity constrained, women who are liquidity constrained do work more and wish to do so (albeit in the observed participation, the variable is significant in one specification only): being constrained increased the probability of participating by 20-23 percentage points. Moreover, our identifying variables for being liquidity constrained, the spread of interest rates and their interaction with the years of education, appears strongly significant as a factor explaining the restrictions in the credit market, at least for some education levels. Where the markets are more efficient, and thus have a lower the interest rate spread, the probability of being liquidity constrained is also lower. The coefficient of the correlation between the error terms has a negative sign, as expected, but is not significant.

We now turn to the intensity of the labor supply by splitting our sample between female and male respondents and focus on both observed and desired hours of work. Tables 4 and 5 show the OLS estimates of actual and desired working hours for women and men. Looking at the impact of being credit constrained, its negative and significant effects may be driven by its endogeneity. Thus we concentrate on our preferred model, which allows for the correlation between the two variables, hours of work and being liquidity constrained. The results for women are reported in Table 6. Interestingly,

age, wage and having a working partner vary in their impact according to whether observed hours or desired hours are being considered. While the market values experience (proxied by age) and more hours are supplied as age rises, the same rise is not found in the desired hours, where age is not significant. Conversely, wage levels do affect desired hours, but not observed hours. With higher wages, women would like to work more. However, the corresponding effect in the observed hours is not found to be significant. This effect potentially indicates that the labor market is not able to accommodate women's desired intensity to work. Although having a working partner has a deterrent effect on both working and the desire to work, this effect is significant for desired hours only. The wellness of the family seems to be a driving factor for men to work more, as shown in (7), while the same relationship does not hold for women, who, with the exception of one specification, are not affected by monetary variables in their decision of how many hours to work. This evidence might be signalling a network effect for which wealth could act as a proxy (Capuano, 2011). Better off families are usually associated with better social networks and therefore access to better jobs. This is especially true in countries such as Italy where social mobility is extremely low. The difference in the impact of demographic variables between men and women is worthy of note. The presence of children has the opposite sign according to the gender of the respondent, similarly to the findings in Bloemen et al. (2010). For men, more children are associated with more working hours, albeit this is significant in one instance only, women with more than one child supply less hours to the labor market. While women with one child do not differ in the intensity of labor that they supply from women who are childless, having more than two children decreases the hours worked by almost four hours per week. This result reflects the typical spread of roles inside households where the male is the breadwinner, based on the specialization of husband and wife, into market and non-market activities, respectively. The financial market restrictions are never significant in explaining the hours worked by women. If anything, liquidity constraints are negatively correlated with additional hours worked by women. Thus the mechanism of resorting to additional work in order to offset the binding liquidity constraints is not at work. Looking at men, the evidence supports the opposite conclusion. Liquidity constraints do act as an enhancing factor promoting the choice to work additional hours for male respondents. A more efficient labor market would reduce some hours of work for men, who have to supply artificially high hours to the labor market to overcome financial restrictions. Contrary to men, the evidence shows that more women would like to participate more in the labor market

and more intensively if labor market offered more flexibility to women with large families.

## 6 Conclusions

This paper adds to the literature by exploring whether labor supply decisions might be driven by inefficiencies in the financial markets. Financial markets and labor markets can be strongly related, and reforms affecting one market are likely to also have an impact on the other one. Using a conceptual framework of the life cycle model enriched with the possibility of choosing the labor supply in one period of life, we argue that a more binding liquidity constraint is likely to increase the labor supply. This is because one way to overcome credit frictions is to work more hours to earn more income. 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 endogeneity of being liquidity constrained, this channel is at work for female participation in the labor market, while credit market restrictions are responsible for additional hours worked by men, but not by women. A more efficient financial market would reduce the number of hours worked by men. Some women do work as a consequence of the credit restriction, while many of them are left out of the labor market against their desire, as a consequence of having children. In sum, we find that liquidity constraints play an important role in choices to work more hours particularly for men, but that these labor supply choices are made very differently by men and women.

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Table 1: Summary statistics

Variable	Obs	Mean	Std. Dev.
<b>Women</b>			
Age	667	31.760	2.646
Age sq.	667	1015.69	164.694
Years education	667	11.360	3.539
Mean wage	667	7.746	2.024
Mean wage sq.	667	64.094	36.442
Married	667	0.807	0.395
Log net wealth	667	9.328	3.265
Working partner	667	0.813	0.391
1 Child	667	0.288	0.453
2 Children	667	0.304	0.460
3+ Children	667	0.076	0.266
Unempl. Rate 25+	667	6.963	4.263
Childcare	667	69.328	18.569
Nord	667	0.453	0.498
Constrained 1	667	0.042	0.201
Constrained2	667	0.258	0.438
Constrained 3	667	0.226	0.419
Observed particip.	667	0.589	0.492
Desired partic.	570	0.753	0.432
Observed hours	667	19.769	18.764
Desired hours	564	23.727	15.917
Observed hours (if $h > 0$ )	393	33.552	11.601
Desired hours (if $h > 0$ )	425	31.610	9.372
<b>Men</b>			
Age	480	31.863	2.652
Age sq.	480	1022.238	165.152
Years education	480	11.175	3.529
Mean wage	480	8.967	2.886
Mean wage sq.	480	88.728	86.280
Married	480	0.706	0.456
Log net wealth	480	8.848	3.570
Working partner	480	0.392	0.489
1 Child	480	0.265	0.442
2 Children	480	0.179	0.384
3+ Children	480	0.040	0.195
Unempl. Rate 25+	480	6.454	4.033
Childcare	480	71.000	17.148
Nord	480	0.508	0.500
Constrained 1	480	0.058	0.235
Constrained2	480	0.290	0.454
Constrained 3	480	0.246	0.431
Observed particip.	480	1.000	0.000
Desired partic.	388	1.000	0.000
Observed hours	480	42.603	12.233
Desired hours	388	40.303	10.571

Table 2: Probit on participation: women

	Observed			Desired		
Age	-0.244 (0.511)	-0.258 (0.508)	-0.292 (0.508)	0.104 (0.592)	0.084 (0.586)	0.062 (0.588)
Age sq.	0.005 (0.008)	0.005 (0.008)	0.006 (0.008)	-0.002 (0.009)	-0.001 (0.009)	-0.001 (0.009)
Years education	0.058* (0.030)	0.045 (0.030)	0.043 (0.030)	0.077** (0.036)	0.071* (0.036)	0.066* (0.036)
Mean wage	0.430** (0.207)	0.446** (0.212)	0.446** (0.213)	0.015 (0.207)	0.008 (0.209)	0.013 (0.211)
Mean wage sq.	-0.019* (0.011)	-0.019* (0.011)	-0.019* (0.011)	0.002 (0.011)	0.002 (0.011)	0.003 (0.011)
Married	-0.231 (0.263)	-0.200 (0.262)	-0.198 (0.261)	-0.357 (0.323)	-0.328 (0.322)	-0.320 (0.320)
Log net wealth	-0.009 (0.019)	-0.025 (0.020)	-0.028 (0.020)	-0.034 (0.021)	-0.041* (0.021)	-0.045** (0.022)
Working partner	-0.372 (0.257)	-0.425* (0.257)	-0.442* (0.257)	-0.797*** (0.295)	-0.827*** (0.298)	-0.849*** (0.298)
1 Child	-0.031 (0.152)	-0.006 (0.152)	-0.004 (0.151)	0.018 (0.187)	0.026 (0.186)	0.030 (0.186)
2 Children	-0.450*** (0.158)	-0.435*** (0.159)	-0.427*** (0.159)	-0.456** (0.183)	-0.448** (0.183)	-0.437** (0.182)
3+ Children	-0.641** (0.258)	-0.626** (0.264)	-0.618** (0.265)	-0.429* (0.255)	-0.419 (0.256)	-0.413 (0.257)
Unempl. rate 25+	-0.058** (0.027)	-0.051* (0.027)	-0.048* (0.027)	-0.065** (0.028)	-0.063** (0.028)	-0.060** (0.028)
Childcare	0.008* (0.005)	0.008* (0.005)	0.008* (0.005)	0.004 (0.005)	0.004 (0.005)	0.004 (0.005)
Nord	0.301* (0.165)	0.268 (0.167)	0.261 (0.167)	-0.197 (0.201)	-0.212 (0.201)	-0.215 (0.200)
Constrained 1	0.296 (0.274)			0.350 (0.311)		
Constrained 2		-0.384*** (0.142)			-0.139 (0.155)	
Constrained 2			-0.479*** (0.155)			-0.258 (0.165)
Constant	0.528 (7.983)	1.010 (7.921)	1.563 (7.920)	-0.254 (9.301)	0.236 (9.208)	0.644 (9.243)
N	667	667	667	572	572	572

**Notes:** \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table 3: Participation with endogenous constraints: women

	Observed			Desired		
<b>Participation</b>						
Age	-0.287 (0.512)	-0.246 (0.498)	-0.212 (0.511)	-0.024 (0.660)	0.125 (0.523)	0.247 (0.575)
Age sq.	0.006 (0.008)	0.005 (0.008)	0.005 (0.008)	0.001 (0.011)	-0.002 (0.008)	-0.004 (0.009)
Years education	0.054* (0.030)	0.077** (0.038)	0.068* (0.037)	0.072** (0.034)	0.122*** (0.033)	0.106** (0.044)
Mean wage	0.413** (0.202)	0.362 (0.231)	0.399* (0.214)	0.014 (0.190)	-0.107 (0.187)	-0.052 (0.213)
Mean wage sq.	-0.018* (0.010)	-0.017 (0.011)	-0.018* (0.011)	0.002 (0.010)	0.005 (0.009)	0.004 (0.011)
Married	-0.275 (0.257)	-0.266 (0.264)	-0.235 (0.264)	-0.441 (0.295)	-0.426 (0.297)	-0.380 (0.316)
Log net wealth	-0.002 (0.018)	0.012 (0.042)	-0.001 (0.033)	-0.020 (0.020)	0.026 (0.055)	-0.002 (0.049)
Working partner	-0.352 (0.249)	-0.274 (0.311)	-0.323 (0.287)	-0.667** (0.292)	-0.407 (0.518)	-0.597 (0.407)
1 Child	-0.053 (0.148)	-0.073 (0.163)	-0.052 (0.158)	-0.016 (0.177)	-0.111 (0.192)	-0.064 (0.203)
2 Children	-0.437*** (0.155)	-0.464*** (0.155)	-0.467*** (0.159)	-0.404** (0.175)	-0.475*** (0.183)	-0.514*** (0.184)
3+ Children	-0.643*** (0.248)	-0.615** (0.258)	-0.640** (0.255)	-0.435* (0.233)	-0.378 (0.242)	-0.446* (0.244)
Unempl. Rate 25+	-0.052** (0.027)	-0.060** (0.026)	-0.060** (0.027)	-0.054** (0.027)	-0.076*** (0.026)	-0.078*** (0.030)
Childcare	0.008* (0.005)	0.010** (0.005)	0.009* (0.005)	0.003 (0.005)	0.006 (0.005)	0.005 (0.005)
Nord	0.279* (0.166)	0.359** (0.174)	0.334* (0.173)	-0.177 (0.191)	-0.037 (0.228)	-0.116 (0.219)
Constrained 1	1.663* (0.905)			1.881*** (0.571)		
Constrained2		0.598 (0.838)			1.256* (0.651)	
Constrained 3			0.295 (0.685)			0.761 (0.856)
Constant	1.195 (8.023)	0.288 (7.806)	-0.085 (8.026)	1.373 (10.252)	-1.769 (8.100)	-3.013 (9.178)
<b>Constrained</b>						
Age	0.406 (0.804)	-0.054 (0.549)	-0.432 (0.579)	0.240 (1.173)	-0.391 (0.632)	-0.754 (0.610)
Age sq.	-0.007 (0.013)	0.001 (0.009)	0.007 (0.009)	-0.004 (0.019)	0.006 (0.010)	0.012 (0.010)
Years education	0.361* (0.198)	-0.117 (0.120)	-0.348*** (0.122)	0.325 (0.212)	-0.070 (0.130)	-0.382** (0.167)
Mean wage	0.014 (0.280)	0.148 (0.199)	0.174 (0.222)	-0.103 (0.284)	0.307 (0.231)	0.328 (0.252)
Mean wage sq.	-0.008 (0.013)	-0.004 (0.011)	-0.006 (0.013)	0.001 (0.015)	-0.011 (0.012)	-0.013 (0.015)
Married	0.425 (0.370)	0.239 (0.279)	0.073 (0.299)	0.683 (0.448)	0.375 (0.319)	0.180 (0.335)
Log net wealth	-0.049** (0.021)	-0.108*** (0.019)	-0.108*** (0.020)	-0.036* (0.019)	-0.109*** (0.020)	-0.113*** (0.023)
Working partner	-0.045 (0.262)	-0.332 (0.259)	-0.396 (0.269)	-0.132 (0.292)	-0.464 (0.316)	-0.583** (0.287)
1 Child	0.107 (0.280)	0.262 (0.178)	0.318 (0.195)	0.094 (0.272)	0.299 (0.193)	0.412* (0.215)
2 Children	-0.049 (0.254)	0.238 (0.182)	0.392** (0.200)	-0.179 (0.263)	0.323 (0.205)	0.512** (0.228)
3+ Children	0.228 (0.311)	0.106 (0.245)	0.290 (0.259)	0.122 (0.303)	0.094 (0.251)	0.333 (0.274)
Unempl. Rate 25+	-0.049 (0.067)	0.002 (0.032)	0.022 (0.033)	-0.065 (0.052)	0.020 (0.033)	0.041 (0.033)
Childcare	0.007 (0.008)	-0.002 (0.005)	-0.001 (0.005)	0.006 (0.009)	-0.002 (0.006)	-0.000 (0.006)
Nord	0.151 (0.283)	-0.395** (0.187)	-0.571*** (0.210)	-0.038 (0.277)	-0.241 (0.208)	-0.348 (0.238)
Spread	94.191** (42.780)	28.500 (24.769)	-16.846 (25.976)	88.729* (48.971)	41.319* (21.502)	-14.031 (34.585)
Spread*educ.	-6.535* (3.532)	-0.033 (1.995)	3.882* (2.074)	-6.109* (3.686)	-1.408 (2.325)	3.932 (2.934)
Constant	-12.816 (12.091)	0.435 (8.686)	8.618 (9.111)	-9.332 (19.428)	4.251 (9.441)	12.780 (9.655)
N	667	667	667	572	572	572
$\rho$	-0.685	-0.562	-0.437	-0.890	-0.866	-0.600

Notes: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table 4: Working hours: women (OLS)

	Observed hours			Desired hours		
Age	13.727** (5.465)	13.774*** (5.320)	13.180** (5.394)	3.677 (3.884)	3.570 (3.846)	3.320 (3.855)
Age sq.	-0.225** (0.087)	-0.226*** (0.085)	-0.216** (0.086)	-0.060 (0.062)	-0.059 (0.062)	-0.055 (0.062)
Years education	-0.049 (0.329)	-0.174 (0.340)	-0.175 (0.344)	-0.111 (0.247)	-0.184 (0.253)	-0.195 (0.253)
Mean wage	2.048 (2.260)	1.889 (2.284)	1.570 (2.300)	3.482** (1.425)	3.568** (1.429)	3.548** (1.428)
Mean wage sq.	-0.133 (0.106)	-0.121 (0.107)	-0.105 (0.107)	-0.193*** (0.070)	-0.194*** (0.070)	-0.193*** (0.070)
Married	-2.125 (2.639)	-2.269 (2.421)	-2.469 (2.433)	1.958 (1.737)	2.254 (1.701)	2.235 (1.693)
Log net wealth	0.365 (0.259)	0.238 (0.248)	0.263 (0.250)	-0.013 (0.146)	-0.071 (0.148)	-0.084 (0.150)
Working partner	-3.790 (2.881)	-3.802 (2.651)	-3.780 (2.664)	-4.290** (1.800)	-4.635*** (1.761)	-4.730*** (1.757)
1 Child	-0.277 (1.407)	-0.040 (1.396)	-0.074 (1.408)	-4.027*** (1.126)	-3.883*** (1.123)	-3.852*** (1.133)
2 Children	-4.230** (1.636)	-3.897** (1.594)	-3.760** (1.596)	-6.689*** (1.225)	-6.550*** (1.226)	-6.467*** (1.232)
3+ Children	-3.827 (3.102)	-4.019 (2.793)	-3.718 (2.816)	-8.246*** (1.810)	-7.996*** (1.840)	-7.921*** (1.831)
Unempl. rate 25+	0.066 (0.310)	0.083 (0.311)	0.135 (0.312)	0.200 (0.193)	0.227 (0.197)	0.249 (0.197)
Childcare	0.063 (0.056)	0.053 (0.055)	0.065 (0.055)	0.042 (0.037)	0.037 (0.038)	0.037 (0.038)
Nord	-0.334 (1.526)	-1.033 (1.451)	-1.071 (1.460)	0.479 (1.213)	0.361 (1.218)	0.378 (1.219)
Constrained 1	-4.999** (2.403)			1.272 (2.272)		
Constrained 2		-6.962*** (1.584)			-1.945 (1.249)	
Constrained 3			-7.181*** (1.817)			-2.432* (1.319)
Constant	-182.775** (86.596)	-178.582** (84.523)	-169.782** (85.689)	-36.508 (60.486)	-33.154 (59.959)	-29.152 (60.103)
N	393	393	393	425	425	425

**Notes:** \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table 5: Working hours: men (OLS)

	Observed hours			Desired hours		
Age	-1.465 (6.127)	-1.976 (6.196)	-2.052 (6.155)	-3.658 (5.974)	-4.221 (6.181)	-4.260 (6.167)
Age sq.	0.024 (0.097)	0.032 (0.098)	0.033 (0.098)	0.052 (0.095)	0.061 (0.098)	0.062 (0.098)
Years education	0.287 (0.342)	0.275 (0.340)	0.193 (0.338)	0.426 (0.327)	0.462 (0.320)	0.384 (0.316)
Mean wage	-0.173 (0.937)	-0.165 (0.931)	-0.047 (0.925)	-0.762 (0.881)	-0.840 (0.864)	-0.719 (0.862)
Mean wage sq.	0.007 (0.019)	0.007 (0.019)	0.004 (0.019)	0.020 (0.018)	0.022 (0.018)	0.019 (0.018)
Married	0.630 (1.864)	0.573 (1.877)	0.690 (1.860)	-0.399 (2.243)	-0.472 (2.245)	-0.438 (2.248)
Log net wealth	0.262 (0.183)	0.192 (0.180)	0.107 (0.173)	0.178 (0.150)	0.162 (0.165)	0.054 (0.155)
Working partner	-0.122 (1.429)	-0.190 (1.415)	-0.494 (1.430)	0.397 (1.763)	0.456 (1.740)	0.216 (1.740)
1 Child	1.566 (1.550)	1.716 (1.551)	1.811 (1.556)	2.663 (1.747)	2.757 (1.742)	2.881 (1.750)
2 Children	1.964 (1.728)	2.170 (1.740)	2.275 (1.743)	1.590 (1.742)	1.699 (1.745)	1.810 (1.759)
3+ Children	2.879 (2.333)	2.840 (2.287)	2.565 (2.279)	4.085* (2.106)	4.228** (2.085)	4.260** (2.043)
Unempl. rate 25+	-0.354 (0.265)	-0.356 (0.265)	-0.320 (0.266)	-0.153 (0.223)	-0.169 (0.226)	-0.137 (0.227)
Childcare	-0.075 (0.053)	-0.077 (0.054)	-0.082 (0.053)	-0.051 (0.042)	-0.049 (0.043)	-0.055 (0.042)
Nord	1.396 (1.664)	1.271 (1.662)	1.087 (1.660)	1.571 (1.666)	1.559 (1.673)	1.331 (1.668)
Constrained 1	2.689 (3.423)			3.400 (3.462)		
Constrained 2		-1.165 (1.598)			0.193 (1.439)	
Constrained 3			-3.482** (1.524)			-2.276* (1.220)
Constant	65.804 (95.174)	75.618 (96.270)	78.354 (95.792)	104.597 (91.482)	114.134 (94.842)	116.614 (94.850)
N	480	480	480	410	410	410

**Notes:** \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table 6: Working hours: women (ML)

Hours	Observed hours			Desired hours		
Age	13.779** (5.360)	13.472** (5.350)	13.303** (5.387)	3.931 (3.860)	3.673 (3.805)	3.677 (3.872)
Age sq.	-0.226*** (0.085)	-0.221*** (0.085)	-0.218** (0.086)	-0.065 (0.062)	-0.061 (0.061)	-0.061 (0.062)
Years education	-0.049 (0.322)	-0.062 (0.338)	-0.115 (0.353)	-0.116 (0.242)	-0.147 (0.268)	-0.129 (0.278)
Mean wage	2.070 (2.246)	1.924 (2.219)	1.741 (2.301)	3.439** (1.406)	3.515** (1.406)	3.483** (1.410)
Mean wage sq.	-0.134 (0.106)	-0.126 (0.105)	-0.115 (0.110)	-0.191*** (0.069)	-0.193*** (0.068)	-0.192*** (0.068)
Married	-2.093 (2.610)	-2.298 (2.566)	-2.389 (2.466)	2.171 (1.751)	2.137 (1.755)	2.073 (1.760)
Log net wealth	0.358 (0.264)	0.386 (0.293)	0.330 (0.319)	-0.022 (0.144)	-0.042 (0.171)	-0.030 (0.189)
Working partner	-3.791 (2.825)	-3.788 (2.802)	-3.783 (2.703)	-4.369** (1.757)	-4.467** (1.815)	-4.399** (1.862)
1 Child	-0.274 (1.378)	-0.268 (1.428)	-0.179 (1.438)	-4.029*** (1.098)	-3.959*** (1.133)	-3.993*** (1.163)
2 Children	-4.247*** (1.609)	-4.113** (1.627)	-3.940** (1.676)	-6.717*** (1.200)	-6.628*** (1.232)	-6.653*** (1.275)
3+ Children	-3.754 (3.272)	-4.209 (3.009)	-3.963 (2.997)	-8.075*** (1.841)	-8.096*** (1.800)	-8.134*** (1.817)
Unempl. Rate 25+	0.066 (0.305)	0.067 (0.304)	0.102 (0.316)	0.190 (0.195)	0.211 (0.202)	0.207 (0.216)
Childcare	0.062 (0.056)	0.064 (0.057)	0.065 (0.054)	0.043 (0.037)	0.040 (0.038)	0.041 (0.038)
Nord	-0.317 (1.526)	-0.492 (1.490)	-0.764 (1.648)	0.468 (1.202)	0.421 (1.162)	0.456 (1.164)
Constrained 1	-5.898 (13.228)			-2.363 (7.853)		
Constrained2		-0.723 (5.412)			-0.920 (2.964)	
Constrained 3			-3.750 (9.064)			-0.483 (3.799)
Constant	-183.546** (84.956)	-178.500** (85.459)	-173.942** (86.780)	-39.843 (59.853)	-35.537 (59.515)	-35.984 (60.730)
<b>Constrained</b>						
Age	0.893 (1.080)	0.264 (0.793)	-0.186 (0.967)	0.679 (1.117)	-0.525 (0.683)	-1.176 (0.753)
Age sq.	-0.015 (0.017)	-0.004 (0.013)	0.003 (0.016)	-0.011 (0.018)	0.008 (0.011)	0.019 (0.012)
Years education	0.356 (0.290)	-0.059 (0.137)	-0.302** (0.147)	0.430 (0.369)	0.007 (0.149)	-0.396** (0.165)
Mean wage	0.623 (0.429)	0.179 (0.323)	-0.007 (0.364)	0.191 (0.386)	0.413 (0.260)	0.455 (0.313)
Mean wage sq.	-0.036* (0.020)	-0.006 (0.015)	0.003 (0.018)	-0.015 (0.021)	-0.016 (0.013)	-0.021 (0.018)
Married	0.613* (0.332)	0.050 (0.402)	-0.214 (0.417)	0.745* (0.408)	0.576 (0.402)	0.286 (0.429)
Log net wealth	-0.070** (0.030)	-0.091*** (0.027)	-0.092*** (0.030)	-0.023 (0.026)	-0.096*** (0.024)	-0.113*** (0.027)
Working partner	-0.026 (0.303)	0.022 (0.401)	0.013 (0.431)	-0.145 (0.330)	-0.709* (0.374)	-0.824** (0.394)
1 Child	0.063 (0.309)	0.228 (0.226)	0.350 (0.270)	0.016 (0.303)	0.318 (0.232)	0.510* (0.263)
2 Children	-0.241 (0.325)	0.157 (0.253)	0.428 (0.278)	-0.095 (0.299)	0.344 (0.243)	0.638** (0.282)
3+ Children	0.478 (0.483)	0.016 (0.456)	0.329 (0.469)	0.246 (0.467)	0.244 (0.349)	0.516 (0.377)
Unempl. Rate 25+	0.009 (0.069)	-0.036 (0.044)	-0.013 (0.047)	-0.056 (0.069)	0.001 (0.038)	0.033 (0.041)
Childcare	-0.008 (0.011)	-0.009 (0.008)	-0.002 (0.010)	-0.000 (0.011)	-0.008 (0.007)	-0.005 (0.007)
Nord	0.258 (0.381)	-0.435* (0.238)	-0.645** (0.264)	-0.019 (0.300)	-0.298 (0.236)	-0.443 (0.290)
Spread	77.747 (62.639)	30.709 (32.849)	-16.557 (33.644)	101.580 (70.019)	60.596* (33.376)	-15.966 (36.144)
Spread*educ.	-7.043 (4.800)	-0.900 (2.437)	3.518 (2.775)	-8.639 (6.742)	-2.955 (2.616)	4.092 (2.907)
Constant	-21.202 (16.397)	-4.654 (12.346)	4.821 (15.136)	-17.349 (16.370)	5.544 (10.821)	19.539 (11.901)
N	393	393	393	425	425	425
$\rho$	0.040	-0.327	-0.181	0.204	-0.071	-0.137

Notes: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Table 7: Working hours: men (ML)

	Observed hours			Desired hours		
Hours						
Age	-0.448 (6.566)	0.339 (6.752)	-0.637 (6.924)	-2.903 (6.167)	-2.463 (6.501)	-4.147 (6.973)
Age sq.	0.008 (0.104)	-0.004 (0.107)	0.011 (0.110)	0.041 (0.098)	0.033 (0.103)	0.059 (0.111)
Years education	0.238 (0.372)	0.593 (0.397)	0.763** (0.389)	0.385 (0.357)	0.740** (0.372)	0.943** (0.374)
Mean wage	-0.083 (1.015)	-0.603 (0.939)	-0.859 (0.973)	-0.668 (1.039)	-1.245 (0.863)	-1.593* (0.877)
Mean wage sq.	0.006 (0.021)	0.017 (0.020)	0.021 (0.020)	0.019 (0.021)	0.032* (0.018)	0.038** (0.018)
Married	0.874 (2.074)	0.339 (1.967)	-0.025 (2.038)	-0.303 (2.375)	-0.382 (2.337)	-0.699 (2.331)
Log net wealth	0.319 (0.221)	0.816** (0.343)	0.825*** (0.232)	0.212 (0.182)	0.875*** (0.293)	0.799*** (0.219)
Working partner	-0.308 (1.482)	1.321 (1.683)	1.766 (1.612)	0.343 (1.790)	1.607 (1.797)	1.911 (1.813)
1 Child	1.281 (1.683)	0.973 (1.734)	0.988 (1.679)	2.530 (1.897)	2.078 (2.048)	2.013 (1.945)
2 Children	1.542 (1.991)	1.268 (1.963)	1.330 (1.952)	1.437 (1.971)	1.008 (2.023)	1.046 (2.009)
3+ Children	2.700 (2.463)	3.983 (2.885)	4.510 (2.925)	3.887* (2.348)	3.399 (2.965)	4.101 (2.939)
Unempl. Rate 25+	-0.316 (0.278)	-0.482* (0.289)	-0.564* (0.302)	-0.135 (0.236)	-0.295 (0.253)	-0.367 (0.266)
Childcare	-0.075 (0.053)	-0.041 (0.059)	-0.041 (0.061)	-0.053 (0.041)	-0.018 (0.052)	-0.018 (0.052)
Nord	1.497 (1.703)	2.399 (1.966)	2.547 (1.886)	1.607 (1.676)	2.762 (2.017)	2.933 (1.966)
Constrained 1	11.301 (16.618)			7.775 (13.592)		
Constrained2		12.800** (5.974)			14.075*** (4.310)	
Constrained 3			14.798*** (2.650)			14.970*** (2.313)
Constant	47.691 (104.172)	25.750 (107.304)	42.156 (107.795)	91.591 (97.611)	73.301 (101.251)	102.133 (107.474)
Constrained						
Age	-0.785 (0.816)	-0.882 (0.642)	-0.709 (0.625)	-0.966 (0.899)	-0.865 (0.706)	-0.410 (0.677)
Age sq.	0.012 (0.013)	0.014 (0.010)	0.012 (0.010)	0.015 (0.014)	0.014 (0.011)	0.007 (0.011)
Years education	0.241 (0.175)	0.104 (0.100)	-0.080 (0.089)	0.211 (0.211)	0.014 (0.101)	-0.201* (0.105)
Mean wage	0.370 (0.362)	0.397* (0.226)	0.265 (0.208)	0.155 (0.389)	0.565** (0.227)	0.480** (0.225)
Mean wage sq.	-0.020 (0.014)	-0.018** (0.009)	-0.009 (0.008)	-0.012 (0.016)	-0.024*** (0.009)	-0.018* (0.010)
Married	-0.378 (0.279)	-0.113 (0.200)	0.082 (0.200)	-0.333 (0.427)	-0.311 (0.226)	-0.206 (0.236)
Log net wealth	-0.051** (0.025)	-0.143*** (0.023)	-0.137*** (0.022)	-0.058** (0.025)	-0.155*** (0.028)	-0.128*** (0.023)
Working partner	0.203 (0.217)	-0.292* (0.171)	-0.323* (0.175)	0.181 (0.249)	-0.217 (0.192)	-0.239 (0.197)
1 Child	0.284 (0.292)	0.246 (0.188)	0.218 (0.191)	0.248 (0.329)	0.279 (0.214)	0.338 (0.224)
2 Children	0.438 (0.285)	0.220 (0.216)	0.141 (0.224)	0.319 (0.338)	0.309 (0.231)	0.358 (0.242)
3+ Children	0.165 (0.495)	-0.260 (0.346)	-0.363 (0.335)	0.365 (0.507)	0.284 (0.339)	0.205 (0.325)
Unempl. Rate 25+	-0.013 (0.053)	0.029 (0.036)	0.032 (0.035)	-0.027 (0.063)	0.027 (0.038)	0.010 (0.035)
Childcare	0.003 (0.009)	-0.007 (0.007)	-0.006 (0.007)	0.008 (0.009)	-0.004 (0.007)	-0.005 (0.006)
Nord	-0.004 (0.303)	-0.375* (0.219)	-0.559*** (0.211)	0.007 (0.333)	-0.284 (0.224)	-0.411** (0.208)
Spread	41.634 (40.006)	32.631 (23.498)	-5.316 (21.064)	42.480 (50.348)	24.449 (22.006)	-5.112 (19.320)
Spread*educ.	-4.113 (3.562)	-3.692** (1.831)	-0.900 (1.613)	-2.774 (3.844)	-1.980 (1.763)	1.066 (1.755)
Constant	7.415 (12.458)	12.327 (10.088)	11.837 (9.819)	10.939 (14.705)	11.459 (11.010)	6.050 (10.449)
N	480	480	480	410	410	410
$\rho$	-0.345	-0.624*	-0.794***	-0.209	-0.718***	-0.890***

Notes: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Estimated coefficients are reported. Standard errors (in brackets) are robust to heteroskedasticity.

Figure 1: Desired and observed hours: women

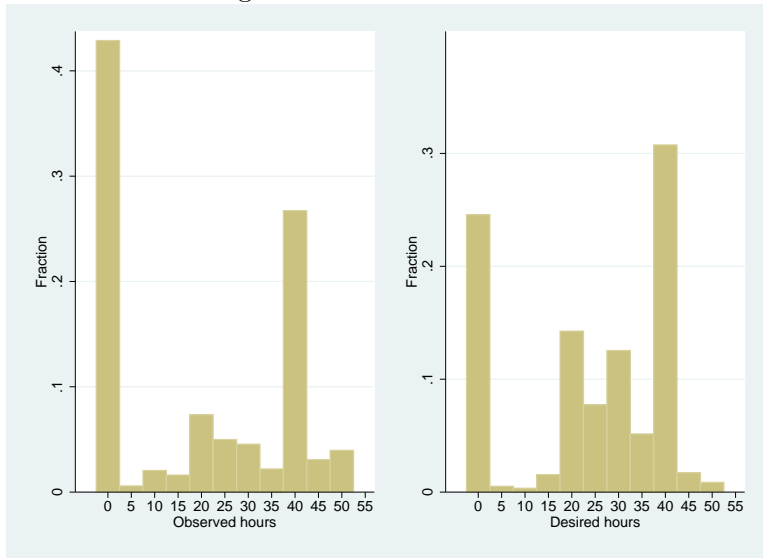


Figure 2: Desired and observed hours: men

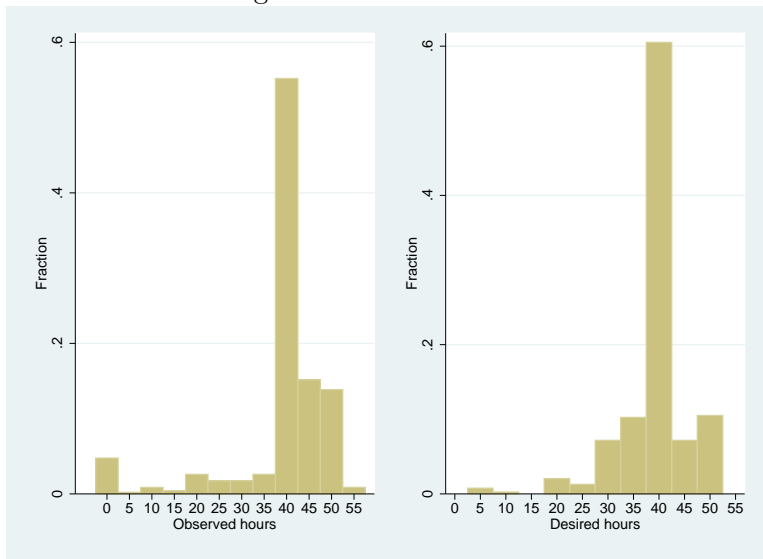




Figure 3: Difference between desired and observed hours

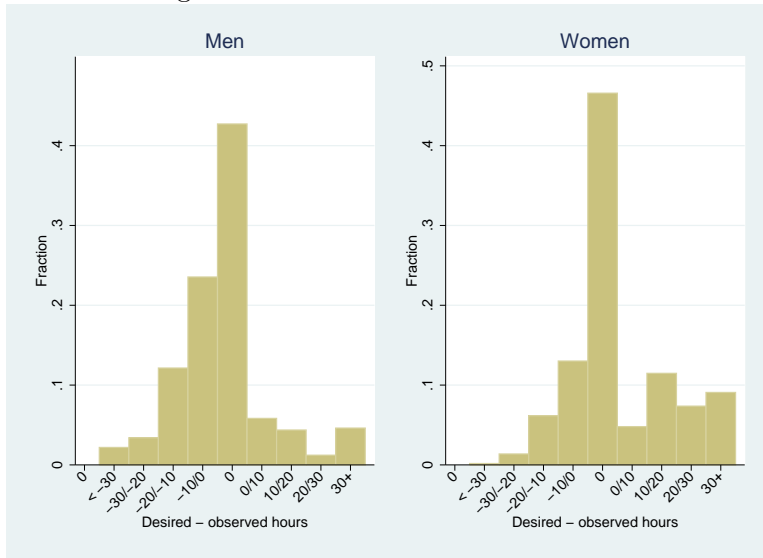


Figure 4: Difference between desired and observed hours: not working respondents

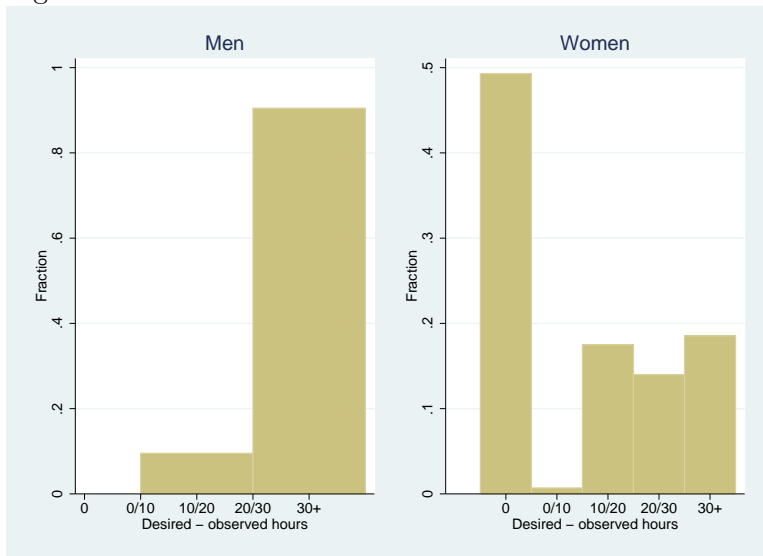
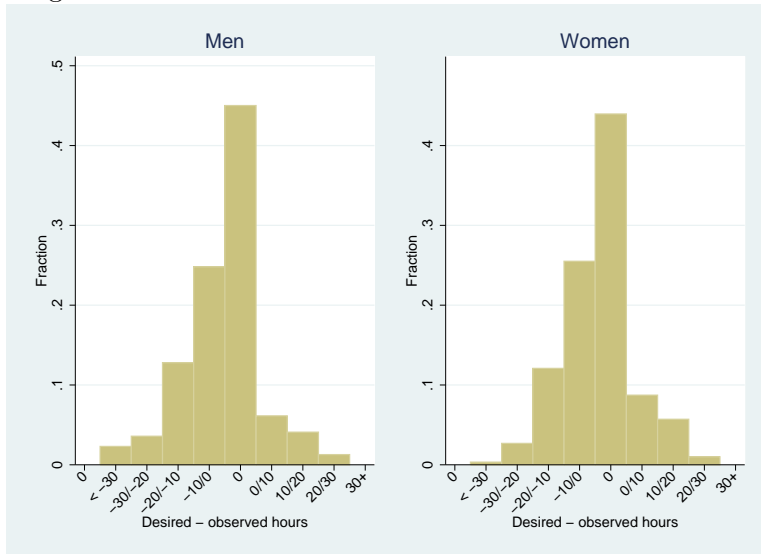


Figure 5: Difference between desired and observed hours: working respondents



## Appendix

Setup of the model:

- two periods;
- in each period individuals choose the level of consumption  $c_t$ ,  $t = 1, 2$ ;
- in  $t = 1$  individuals set their labor supply, i.e. they choose the share of time ( $l_1 \in (0, 1)$ ) to spend for leisure;
- in  $t = 2$  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; leisure at time two is fixed as individuals retire at the beginning of time 2 and they enjoy all free time.
- initial wealth is exogenous and equal to zero and agents die with zero wealth
- For simplicity interest rate and subjective discount rate are set to zero

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 constraint

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

$$c_2 = Y_R + A_2$$

where  $w$  is the wage rate and  $R$  is pension, independent on contributions. The maximization problem can be written as:

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

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  $B$  (non necessarily zero) <sup>11</sup>:

$$A_2 \geq B$$

The Lagrangian multiplier is therefore:

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

The Kuhn-Tucker conditions are:

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

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

$$\lambda A_2 = 0$$

$$\gamma(1 - l_1) = 0$$

The second condition implies, as consequence of the liquidity constraint, that all wealth and income is consumed when the constraint is binding  $c_2 = A_3$ .

Supposing now a positive labor supply (  $\gamma$  equal to zero) we want to focus on the effect of liquidity constraints on the labor supply).

Let  $u_c^C$  the marginal utility of consumption in the constrained case (with  $\lambda$  bigger than zero) we have that the first order conditions with respect to consumption and leisure imply, respectively:

$$u_{c_1}^{NC} = u_{c_2}^{NC}$$

$$u_{c_1}^{NC} = \frac{u_{l_1}^{NC}(c_1, l)}{w}$$

Suppose that the threshold  $B$  increases and liquidity constraints start binding.

$$u_{c_1}^C(c_1, l) > u_{c_2}^C(c_2, L)$$

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

---

<sup>11</sup>Also  $A_3 \geq 0$ : this inequality holds strictly, since there is not a bequest motive for saving.

In this case,  $u_{c_1}^C > u_{c_2}^C$  given that  $\lambda$  is positive, requiring that  $u_{l_1}^C$  be smaller than without liquidity constraints  $u_{l_1}^{NC}$ . From the last inequality we derive that  $c_2$  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 the realisation. Consumption at time one will be necessary lower than without liquidity constraints (a higher consumption at time one would imply additional labor supply as borrowing is restricted implying a lower, instead of a higher, marginal utility of consumption in period one than in period two). The only way to keep marginal utility of consumption equal to that of leisure is thus to increase labor supply by reducing leisure.

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

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