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The Frisch Elasticity in Labor Markets with High Job Turnover

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ABSTRACT

The Frisch Elasticity in Labor Markets with High Job Turnover*

We estimate Frisch elasticity in a labor market with high job turnover. In a context where only around 18% of the employed labor force has formal and stable jobs, we perform a fixed effects estimation as proposed by MaCurdy (1981) with a Heckman correction for selection into unemployment. We identify the positive slope of the labor supply using firms' size as an instrumental variable for wages. We use Peruvian data from the Permanent Employment Survey of Lima. We find that neglecting wage endogeneity implies a downward sloping labor supply, while the job turnover bias, not accounting for job turnover, overestimates Frisch elasticity. We estimate Frisch elasticity at around 0.38, which indicates fairly adjustable wages and little reaction of hours of work to wage variations. Moreover, we find that the Frisch elasticity is decreasing in income and tended to increase in the last decade.

JEL Classification: E24, J22, J24, J41, J60, J63

Keywords: labor supply, Frisch elasticity, hours of work, job turnover

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1 Introduction

The Frisch elasticity of labor supply measures the variation of hours of work caused by a variation of wages, when the marginal utility of wealth is kept constant. This elasticity is very important for economic analysis because it determines the reaction of hours worked, and therefore distributive effects, to fiscal policy interventions, taxation or money transfers, as well as the severity of recessions, in particular responses of employment, and therefore of output, to productivity shocks.

In the present paper we estimate the Frisch elasticity in a labor market with a high degree of informality and with high job turnover, as it is the Peruvian labor market: 58% of all jobs are informal and approximately 19% of the employed changes jobs every quarter. Moreover, the proportion of long-term formal jobs (lasting for over 5 years) represents only 18% of the employed. In this context, we find that the job turnover bias is quite important; not accounting for job turnover biases the estimated Frisch elasticity upward. Once we account for fixed effects, wage endogeneity, selection into employment and job turnover, our estimate of this elasticity is relatively low, 0.38. We also find that the Frisch elasticity is heterogenous by income and exhibits a decreasing trend over time. This finding indicates a relatively flexible labor market in that wages are fairly adjustable and that it has become more flexible over time, from 2002 to 2011.

Several studies have estimated the Frisch elasticity of the labor market, mainly for the U.S. and the European economy. Blundell and MaCurdy (1999) perform an empirical and theoretical review of several elasticities of the labor supply, including the Frisch elasticity. The methods used range from the estimation using aggregate data (Lucas and Rapping 1969, Hall, 1980, Cho and Cooley 1994), cross-sectional and panel data (MaCurdy 1981, Heckman and MaCurdy 1982, Altonji 1986, Pencavel 1986, Blundell and MaCurdy 1999). Recent studies use more sophisticated formulations of this elasticity, taking into consideration the case of credit constraints (Domeij and Floden, 2006), human capital (Imai and Keane, 2004), or decisions on intensive and extensive participation not made by individual, but by the household. Another branch of literature has studied the

discrepancy between the estimates of this elasticity that use microeconomic data, which are relatively small, with those that use aggregate data, which are much larger (Chang and Kim 2006). These two quantifications have been reconciled realizing that small elasticities of heterogenous workers can be aggregated into larger ones, once the extensive margin, the participation decision, is taken into account. Thus, large values of parameterizations for this elasticity are sensible to study the business cycle in a representative agent framework. However, Chetty et al. (2011) find low values of this labor supply elasticity even when the extensive and intensive margin are considered. They suggest to calibrate representative agent macro models using a Frisch elasticity of aggregate hours of 0.75. Values larger than 1, common in macroeconomic analysis, would be inconsistent with the available microeconomic evidence.

In this paper, we address another important source of upward bias, which is job turnover. Workers accept jobs of relatively short duration in a context of a relatively large informal sector, as it occurs in a developing economy. Thus, transitions between different types of employment determine a large variation in returns to human capital and, hence, in income over time. In a context of high job turnover, specific human capital is lost faster, which does have an effect in the estimation of the labor supply elasticity. We correct for endogeneity of hourly wages using a two-stage procedure in which the Mincer equation for hourly wages is the first-stage estimation, with education, experience, firm size and other socio-demographic variables as covariates. Because of the significant job turnover in the Peruvian labor market and to the high variability in hours worked hours and income, we also allow the returns to education, experience and other returns to change over time We identify of the positive slope of the labor supply from variables that are closely related to the labor demand, mainly firm's productivity captured by firms' size: large firms are more productive and demand more hours of work.

A high labor turnover diminishes the returns to human capital, as the accumulated specific human capital is depreciated when a worker changes jobs (Jovanovic 1979). Only in the case of mobility between similar jobs, human capital is relatively portable and it

can be argued that human capital returns are relatively constant over time. Otherwise, a high labor market volatility and little portability of human capital implies that a worker performance will be severely affected by job turnover. In the context that we analyze, the Peruvian economy, a very high job turnover (as documented by Chacaltana 2002) generates disincentives to job training, implying lower productivity and therefore lower accumulation of human capital (Chacaltana and Garcia 2001). And certainly, a high job turnover, which may not just happen in developing economies, but also in developed economies, particularly in times of crisis, has to be considered seriously when estimating the labor supply, to avoid an overestimation of the Frisch elasticity

Additionally, so far there are very few estimates of the Frisch elasticity for the Latin American economies, and none for Peru.[1] This is an important gap in the literature given the increasing importance of this parameter in stochastic general equilibrium models used in the design and evaluation of economic policy. These models are specific to the Latin American economies and capture the essential features, such as dollarization; for instance, the MEGA-D, a macroeconomic model for the Peruvian economy.

The rest of this paper is organized as follows. Section 2 presents the formal derivation of the labor supply curve; in Section 3 we explain the sources of information and descriptive statistics relevant to the study. Section 4 presents the econometric procedure used to estimate the Frisch elasticity; in Section 5 we discuss the results and, finally, Section 6 summarizes our main findings.

2 Model

We derive the labor supply curve from a simple neo-classical model of partial equilibrium. Households choose the optimal path of consumption, savings and hours worked as a result

[1] There are estimates of Frisch elasticity for some Latin American countries, Argentina, Brazil, Paraguay and Uruguay (González and Sala, 2011). These estimates come from aggregate data and another methodology, so that they are hardly comparable with the results reported in the present paper. In the Peruvian context, Yamada (2008) and Céspedes (2011) have studied the labor supply, but they have not analyzed Frisch elasticity.

of maximizing the present value of their instantaneous utility in which consumption is separable from leisure. The formal problem of these households at a specific time is represented by the following recursive representation :

$$V(a) = \max_{\{c,a',h\}} \left\{ \frac{c^{1-\sigma}}{1-\sigma} - B\frac{h^{1+\frac{1}{\psi}}}{1+\frac{1}{\psi}} + \beta EV(a') \right\},$$

subject to:

$$c + a' \leq wh + (1+r)a.$$

where a' denotes household wealth in the next period, c denotes consumption and h are hours of work. The hourly wage rate of labor is w and the interest rate is r. The value function is $V(a)$ and depends on household wealth, which is the relevant state variable in each period. The risk aversion parameter is σ, while ψ is the Frisch elasticity of labor supply, B is a parameter that measures the disutility of labor, and β is the subjective discount factor of workers.

The policy rules for the control variables of the above problem are derived from the first order conditions (FOC) of the following objective function:

$$L = \frac{c^{1-\sigma}}{1-\sigma} - B\frac{h^{1+\frac{1}{\psi}}}{1+\frac{1}{\psi}} + \beta V(a') + \lambda[wh + (1+r)a - c - a'].$$

FOC:

$$\begin{aligned} c &: c^{-\sigma} = \lambda, \\ a' &: \beta EV'(a') = \lambda, \\ h &: Bh^{1/\psi} = \lambda w. \end{aligned}$$

Using the envelope theorem, we obtain $V'(a) = \lambda(1+r)$, which allows us to appreciate that the Lagrange multiplier is the marginal utility of wealth. The equation $Bh^{1/\psi} = \lambda w$ summarizes the labor supply equation that relates the hours worked by the hourly wage

and other relevant parameters and variables of the model. After some simplifications we have a log-linear representation of this equation:

$$\ln(h) = \psi \ln(w) + \psi \ln(\lambda) - \psi \ln(B). \tag{1}$$

From this equation we obtain directly the Frisch elasticity of labor supply, as the response of hours worked to variations of wages[2] keeping the wealth effect λ constant: $\lambda = \bar{\lambda}$, that is,

$$\left.\frac{\partial \ln(h)}{\partial \ln(w)}\right|_{\lambda=\bar{\lambda}} = \psi.$$

By some transformations of Equation (1) (See Blundell and MaCurdy 1999 and Appendix), one can eliminate the components that are unobserved to the researcher, as the Lagrange multiplier, and obtain an easily estimable reduced form that relates observable variations in hours of work to variations in the hourly wage rate:

$$\Delta \ln h = \overline{h} + \psi \Delta \ln w + e. \tag{2}$$

We will estimate this reduced form equation, accounting for idiosyncratic effects, selection into employment, and endogenous wages. We will pay special attention to the effect of job turnover on this estimation.

3 Data

The data come from the Permanent Survey of Employment (EPE) conducted monthly by the National Institute of Statistics and Informatics (INEI). The EPE is a specialized survey of 683409 workers followed from 2002 until 2011 in 43 districts in the province of Lima and 6 districts of El Callao. It contains labor market variables such as wages, hours of work, age, experience, occupation, economic sector, among other variables. The

[2]From this equation one can also derive the Marshallian or Hicksian elasticities of labor supply, holding, respectively, income and utility constant.

main feature of EPE is that it has a rotating short panel design, i.e., each month there is a re-interview for a fraction of the respondents who were interviewed three months earlier. The panel partially rotates each quarter so that individuals are interviewed twice in two consecutive quarters. In this study, we construct an unbalanced quarterly panel from the second quarter of 2001 until late 2011. We select 28.5% of the total number of individuals (194496 individuals) for which we have two consecutive observations for the same individual. That way we keep. After we select out individuals that do not report hours worked, the final selected sample consists of 352 000 observations corresponding to approximately 176 000 individuals. Overall, the characteristics of the sample during the decade under study are no significantly different from the full sample.

[Table 1 here]

Table 1 shows descriptive statistics for each of the variables used in the labor supply estimations. The average main income of 1065 soles per month, or equivalently 6.3 soles per hour. The total income is 1106 soles per month, or 6.5 soles per hour. On average they work 47.5 hours a week. Because the survey does not report hourly wages, we estimate them dividing monthly income over hours of work per week.[3] The minimum wage is on average 568 soles per month, that is, around 54% of the average main income. Around 65% of firms have at most 10 workers, while 23% has 100 or more workers. The male population is approximately 52% of the total, and the proportion of formal employment is approximately 42%. The proportion of wage-earners is 53%, while the participation rate is approximately 70%, and the unemployment rate of 11.9%.

In terms of job mobility, around 2.4% of the people in the sample is always unemployed, while 54.6% is always employed. Approximately 19.3% of the employed change jobs between two consecutive quarters.[4] This group includes workers who travel for short

[3]There is no reason to believe that the hourly wage estimated in this fashion is biased. If we assume that there is measurement error in the estimate of hours of work and in monthly income, then the ratio between these two amounts could amplify or maybe eliminate a measurement error in hourly wages. It all depends of the correlation between their respective measurement errors. A positive correlation could cancel out these measurement errors.

[4]Job mobility is defined as the proportion of workers that change jobs in two consecutive quarters. We

periods of unemployment or inactivity, or those who change jobs directly without passing through unemployment or inactivity. This indicator has shown a stable trend during the decade for which comparable data are available, so that labor mobility has remained relatively stable during the recent years of economic growth experienced by the Peruvian economy.

4 Estimation

To estimate Equation (2), as it has been documented by the literature on the labor supply, there are some considerations that must be adequately met in order to obtain an accurate estimate.

First, we need to address the usual problem of endogeneity of wages in Equation (2), as wages are not completely independent from e. In order to solve this problem, we use instrumental variables (IV). MaCurdy (1981) and the recent literature suggest using wage growth lags as adequate instruments. As we observe these lags in previous periods, they turn out to be independent from the current errors, and due to the persistence of income, they are good instruments in most applications. This strategy, however, does not apply to our research because we only observe wage growth and not its lags. Blundell and MaCurdy's (1999) method requires the availability of long panels that follow income variations for several periods.

The estimation strategy used in this paper consists of instrumenting the hourly wage instead of its growth. We use as instruments the regressors of a Mincer equation, that is, education, experience, etc. In the estimation of Equation (2) we account for fixed effects[5]

use two criteria to identify whether a worker maintained the same job in two consecutive periods: if the worker was employed in both quarters and if the duration of the job of the second quarter is longer than three months. We also considered a more restrictive criterion: if s/he was in the same economic sector and maintains the same occupational category in two consecutive quarters. With these two additional criteria results only change marginally, so that they do not seem to be too sensitive to the criteria used to defined job mobility.

[5]The fixed effect estimation eliminates characteristics of individuals that do not change over time, such as gender, education, etc.. In our specification wage variations are accounted for by changes in returns to these variables.

and allow parameters of the Mincer equation to change over time, thereby accounting for job mobility, in that job destruction reduces specific human capital accumulation (Jovanovic 1979, Kambourov and Manovskii 2009a, Kambourov and Manovskii 2009b), high job mobility may influence changes in wages. We also find that the selection into employment is important and, accordingly, we introduce a Heckman correction term in the wage equation.

Equation (3) shows the formal representation of the wage equation. We include a dummy variable distinguishing workers who keep their jobs and those who have experienced job mobility. We also consider that returns to education and experience change over time according to workers' job mobility

$$\begin{aligned} log(w_{it}) &= \beta_0 + \sum_{j=2003}^{2011} \beta_{Rj} D_j D_{Rit} + \sum_{j=2003}^{2011} \beta_{sj} D_j S_{it} + \sum_{j=2003}^{2011} \beta_{sRj} D_j D_{Rit} S_{it} \\ &+ \sum_{j=2003}^{2011} \beta_{xj} D_j X_{it} + \sum_{j=2003}^{2011} \beta_{xRj} D_j D_{Rit} X_{it} \\ &+ \beta_{x2} X_{it}^2 + \beta_{sex} sex_i + \sum_{k=1}^{4} \beta_T D_{Titk} + \beta_w \overline{w}_t + \mu_{it} \end{aligned} \tag{3}$$

where S denotes years of education, X denotes potential experience, D_j are dummy variables for each year, D_R denotes job mobility: $D_R = 1$, if the worker does not stay in the same job in two consecutive quarters, D_T are dummy variables for different firm sizes, $\overline{w}$ denotes minimum wage, and $sex = 1$ denotes a male worker. Job mobility in this representation is assumed to be exogenous, capturing the fact that in the Peruvian labor market the main reason for leaving a job is that a worker is laid off by a firm, a circumstance that a worker cannot control. The Peruvian economy during the last decade is characterized by an abundant labor force, so that firms have the final word on hiring and firing workers Hence, job mobility in Peru is high, as documented by Chacaltana and Garcia (2001). We include the minimum wage as a covariate in the wage equation, because of its importance in workers' income dynamics in Peru (as shown by Céspedes

and Sánchez 2012).

To identify the slope of the labor supply curve the main variable that displaces demand is firm size, as larger firms tend to be more productive and workers in these firms tend to work more hours than in smaller firms, as shown by Peruvian data. We checked for the sensitivity of our labor supply estimates to the instruments used. We excluded firms' size from the wage equation and found out that the slope of the labor supply, the Frisch elasticity in our case, became negative or close to zero, or had little statistical significance. That is, firms' size is the most important exogenous source of variation to identify Frisch elasticity.

5 Results

In Table 2 we report the results of estimating the labor supply, Equation (2, by fixed effects and with instrumental variables, a correction for self-selection, and job turnover in Equation (3).[6] Estimating it by ordinary least squares (OLS) accounting for fixed effects results in a negative coefficient, while an instrumental variable (IV) estimation makes the slope positive at 0.422. Adding a Heckman correction for selection to the IV estimation sets this elasticity at 0.427. If we additionally account for job turnover, the Frisch elasticity is estimated at a lower value: 0.390 by an IV estimation and 0.380 by an IV estimation with selection correction. Thus, neglecting job turnover would imply an over-estimation of 11% of the Frisch elasticity.

[Table 2 here]

Additionally, we perform the estimation with two different definitions of hourly wages. This exercise is pertinent because the EPE does not report the hourly wage directly, but total monthly income and total monthly income of the main job, as well as the number

[6] To evaluate the relevance of the fixed effect method, we performed a Hausman test. The result of this test suggests that there is a significant correlation between fixed effects and the corresponding lags from Equation (2). As the random effects estimators are consistently inferior than the corresponding fixed effects estimators, we choose the latter.

of hours worked per week. We build two indicators of hourly wages dividing total income or income in the main job over the total number of hours. We do not find big differences in the estimated values of the Frisch elasticity.

5.1 The role of labor mobility in the dynamics of the hourly wage

We test the hypothesis that wage dynamics is influenced by labor mobility. This hypothesis is represented by Equation (4), which evaluates the statistical significance of differences to the returns to education and experience, distinguishing between those stable jobs and those subject to labor mobility:

$$Ho : \beta_{Rj} = \beta_{sRj} = \beta_{xRj} = 0, \tag{4}$$

for every $j = 2003, ..., 2011$. The test is performed for the two indicators of hourly wages and we obtain similar results: the test reports a *p-value* of 0.0007 ($F = 2.54$), which confirms that labor mobility is a statistically significant determinant of the dynamics of hourly wages.

5.2 Heterogenous Frisch elasticities

The evidence suggests that the Frisch elasticity is heterogeneous according to different groups of workers. We also find that this parameter shows a decreasing trend in the last decade. In Table 3 we show the results for the two definitions of hourly wages, total income and income at the main job, dividing results by income percentiles and for several sub-periods.

[Table 3 here]

We estimate the elasticity by income percentiles and find that workers who earn a higher income have a lower Frisch elasticity. A likely explanation for this finding is that

the higher an individual's income, the more she values leisure time and therefore her hours worked are less sensitive to increases in wages. On the contrary, workers who earn less value leisure time less and are more willing to work more hours to earn a higher income.

To capture the dynamics of the Frisch elasticity during the decade, we estimated it for several sub-samples of intervals of two years. Results show that this elasticity has declined monotonically during the decade of study, from 0.45 to 0.29 in one decade, which suggests that wages in the Peruvian labor market have become more flexible. Displacements of the labor demand with an inelastic labor supply imply small increases of hours worked and larger increases in hourly wages.[7]

In sum, an unbiased estimation of the Frisch elasticity needs to account for endogenous wages, selection into employment and job turnover. We test for the importance of job turnover and find out that it is a statistically significant determinant of hourly wages. We also find that the Frisch elasticity if higher for workers of lower income and that this elasticity has been declining over time.

6 Conclusions

This paper studies the Frisch elasticity of the labor supply in an economy with high job mobility, in which approximately 50% of workers change jobs. We implement the fixed effect estimator proposed by MaCurdy (1999). We identify the slope of the labor supply curve accounting for endogenous wages with firm size as an exogenous source of variation for the labor demand. We also control for selection into employment using a Heckman correction term.

We find that not accounting for the endogeneity of wages implies an important underestimation of the Frisch elasticity, and moreover, a negative value, while neglecting

[7] This evidence can explain the dynamics of wages in a decade when the Peruvian economy registered a high increase in productivity, by suggesting that increases in wages in the economy also come from intrinsic changes in the labor supply.

selection and job mobility leads to its overestimation. Our estimate for the Frisch elasticity is approximately 0.38, which is relatively low, though similar to the values referred by Chetty et al. (2011). We find that ignoring job turnover biases the Frisch elasticity upward. That is, in economies of high job turnover the Frisch elasticity is found to be actually lower once job turnover is properly accounted for.

We also also find that this elasticity is heterogeneous in income levels and that in the decade of study it exhibits a decreasing tendency, which suggests that wages are increasingly more sensitive, in relation to hours worked, to increases of labor demand.

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Appendix. Derivation of the reduced form of the labor supply

We describe formally the derivation of the labor supply equation. It is the derivation done by MaCurdy's (1981), described in detail in Blundell and Macurdy (1999). We start with the first order conditions, which are expressed as

$$\begin{aligned} -\sigma \log(c) &= \log \lambda, \\ \log B + \frac{1}{\psi} \log h &= \log \lambda + \log w, \qquad (5) \\ E\lambda' &= \lambda\beta(1+r). \qquad (6) \end{aligned}$$

We define the prediction error of the Lagrange multiplier (in logs):

$$\epsilon_i = \log(\lambda_i) - E_{-1} \log(\lambda_i),$$

with which we obtain an expression for λ :

$$\begin{aligned} \lambda &= \exp\{E_{-1} log(\lambda)\} \exp\{\epsilon\}, \qquad (7) \\ E_{-1}\lambda &= \exp\{E_{-1} log(\lambda)\} E_{-1} \exp\{\epsilon\}. \qquad (8) \end{aligned}$$

Using (7) and (8), we obtain

$$\lambda = \frac{E_{-1}\lambda}{E_{-1} \exp(\epsilon)} \exp\{\epsilon\}.$$

We replace $E_{-1}\lambda = \frac{\lambda_{-1}}{\beta(1+r)}$, which comes out from Equation (6)

$$\lambda = \frac{\lambda_{-1}/(\beta(1+r))}{E_{-1} \exp(\epsilon)} \exp\{\epsilon\}.$$

From this equation we obtain that $\log \lambda$ follows the stochastic process:

$$\begin{aligned} \log \lambda &= \log \lambda_{-1} + \epsilon - \log \left[E_{-1} \exp(\epsilon)\right] - \log \beta(1+r), \\ \log \lambda &= \log \lambda_{-1} + v. \end{aligned} \tag{9}$$

where $v = \epsilon - \log \left[E_{-1} \exp(\epsilon)\right] - \log \beta(1+r)$

The labor supply equation comes from Equation (5)

$$\log h = \psi \log w + \psi \log \lambda + \psi \log B,$$

that in first differences acquires the following form:

$$\Delta \log h = \psi \Delta \log w + \psi \Delta \log \lambda.$$

By replacing $\Delta \log \lambda$ from (9), we obtain

$$\Delta \log h = \overline{h} + \psi \Delta \log w + \psi v.$$

Finally, we obtain the reduced form of the labor supply equation

$$\Delta \log h = \overline{h} + \psi \Delta \log w + e$$

where $e = \psi v$, and $e = \psi v$, $\overline{h}$ denotes a constant that depends of the preference parameters β and r.

Table 1. Descriptive Statistics:
Panel Sample 2002-2011, Metropolitan Lima

	Mean	Median	Standard Error	Min.	Max	Number of obs.
Main monthly income	1065.2	781.3	8.8	1.2	77525.3	203073
Total monthly income	1106.1	794.2	9.3	1.2	77525.3	226213
Main income per hour	6.3	4.0	0.055	0.0	1647.4	200269
Total income per hour	6.5	4.1	0.058	0.0	1695.9	223046
Hours worked per week	47.5	48	0.078	1.0	133.0	241780
Yeas of education	11.7	12	0.024	0.0	19.0	353614
Experience	20.8	17	0.046	0.0	92.0	326987
Minimum wage	568.2			511.3	665.9	
Firm size						
10 or less	65.3%					
<10 - 50]	9.6%					
<50 - 100]	1.7%					
100 or more	23.4%					
Proportion males	52%					
Proportion formal employment	42%					
Proportion wage-earners	53%					
Participation rate	70%					
Unemployment rate	11.9%					
Quarterly labor turnover						
Always unemployed in quarter	2.4%					
Always employed in quarter	54.6%					
Job-to-job turnover in quarter	19.3%					

Source: INEI - Encuesta Permanente de Empleo, EPE 2002-2010.
Notes: Money values are expressed in soles of 2011.

Table 2. Labor supply estimation: Dependent Variable is hours of work per week(in logs)

							Controlling for Turnover			
	OLS		IV		IV-Heckman		IV		IV-Heckman	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef	t
FE estimator										
Δlog (w)	-0.470	-177.6	0.422	21.0	0.427	21.0	0.390	20.2	0.380	19.0
Constant	2.890	598.0	4.490	122.6	4.463	126.1	4.499	130.1	4.444	131.3
First stage (IV)										
D_R(Job Turnover)							0.421	17.9	0.421	19.2
Education			0.092	15.5	0.092	170.3	0.099	143.8	0.098	160.2
Education $\times$ D_R							-0.036	-21.4	-0.036	-23.9
Experience			0.015	40.1	0.009	16.1	0.014	35.8	0.009	13.3
Experience $\times$ D_R							-0.001	-3.7	-0.002	-4.1
Experience^2			-0.1e-3	-16.5	-0.1e-4	-1.3	-0.1e-3	-14.2	5.2e-6	0.4
Sex (1=man)			0.186	55.8	0.139	25.5	0.169	47.9	0.118	20.4
Firm size (*Dummy*)										
<10 - 50]			0.245	46.3	0.244	42.7	0.251	44.8	0.250	41.7
<51 - 100]			0.393	34.5	0.393	31.5	0.394	32.9	0.393	30.8
< 101 - more			0.402	101.6	0.402	96.9	0.400	95.9	0.399	92.7
Mínimum wage			1.019	32.5	0.878	25.8	0.999	30.3	0.843	23.4
Dummy for quarter										
Q2			0.029	5.9	0.031	6.5	0.014	2.8	0.017	3.3
Q3			0.029	6.0	0.032	6.7	0.014	2.8	0.017	3.4
Q4			0.021	4.1	0.020	4.1	0.015	2.9	0.015	2.9
Constant			-5.160	-93.4	-4.769	-72.0	-5.182	-89.0	-4.6750	-67.4
Year (dummy)			Yes		Yes			Yes		Yes
Selection Equation										
# children< 0 - 3]					-0.020	-4.1			-0.027	-4.1
# children <3 - 6]					0.022	3.9			0.017	4.3
# children <6 -16>					-0.009	-3.5			-0.016	-4.7
Experience					0.049	106.3			0.055	108.9
Experience^2					-0.001	-149.3			-0.001	-149.2
Sex (1=man)					0.453	84.4			0.484	80.7
Household head					0.477	73.6			0.525	80.3
Constant					-0.215	-15.6			-0.395	-27.1
Year (dummy)					Yes				Yes	
Mill's Ratio					-0.140	-11.0			-0.144	-11.9
Nobs.		200269		209155		209155		176003		176003
Prob > F		0		0		0		0		0
R^2: *overall*		0.0673		0.0101		0.0073		0.0007		0.0002

Note: The instrumented variable is main income per hour.
Source: INEI - Encuesta Permanente de Empleo, EPE 2002-2010.

Table 3. Estimates of Frisch elasticity by several categories

	Main income		Total income	
	Frisch Elasticity	Standard error	Frisch Elasticity	Standard error
Mean	**0.380**	**0.02**	**0.383**	**0.02**
Income Ranges				
I poorer	0.41	0.03	0.40	0.03
II	0.33	0.02	0.33	0.02
III	0.29	0.02	0.29	0.02
IV	0.24	0.02	0.24	0.02
V richer	0.30	0.03	0.30	0.03
Period				
2002-2004	0.43	0.03	0.45	0.03
2005-2007	0.40	0.02	0.40	0.02
2008-2009	0.36	0.03	0.36	0.03
2010-2011	0.29	0.03	0.29	0.03

Source: INEI - Encuesta Permanente de Empleo, EPE 2002-2010.