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THESIS:

*Changes in female labor supply in Argentina: 2003-2009*

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### **Abstract**

This paper examines the extent to which married women's labor supply elasticities have changed over the period 2003-2009. We analyze female labor force participation and labor supply in Argentina. While male elasticities tend to be little, we find evidence of larger substitution effects on women's labor supply. Female response to changes in own wages and non labor income is considerably more sensitive than male's response. We also get some evidence of a decline in female wage elasticities over time.

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## Changes in female labor supply in Argentina: 2003-2009

### I. Introduction

Female labor supply decisions affect other important life choices such as marriage, fertility, and divorce, as well as family income distribution and wage differentials between men and women. Besides, changes in women's labor force participation account for the most significant changes in labor markets at an aggregate level.

Estimates of labor supply elasticities are of key interest to policy-makers, since the responsiveness of labor force participation and supply to changes in wages, incomes, and tax rates factor into the amount of revenue that tax increases will raise and tax decreases will cost. There exists a vast literature centered on male and female labor supply elasticities.<sup>1</sup> Male elasticities tend to be little, suggesting small responsiveness of men's labor supply to changes in wages. Empirical work suggests that women's labor supply is considerably more sensitive to their own wages than is men's (Blau and Kahn (2004) and Heim (2005)). In this regards, higher female labor supply elasticities mean that changes in income tax rates will have bigger effects and consequently, responses to wage subsidy programs or tax rates cuts would be greater.

Given the traditional division of labor in the family, women usually decide among market work, home production and leisure, while men substitute primarily between market work and leisure (Mincer 1962). Hence, changes in market wages are expected to have larger substitution effects on women's labor supply. Even more, under this traditional gender roles division, women are usually perceived as secondary earners within the family and so, they are likely to be more affected by their spouses' wages and other non labor family income. Since the traditional division of labor is breaking down and women and men more equally share home and market responsibilities, women's labor supply elasticity is expected to approach men's over time. We would expect an eventual decline in married women's own wage elasticity and some decline in their responsiveness to family non labor income. These expectations constitute the research focus of this paper.

This paper examines the extent to which married women's labor supply elasticities have changed over the period 2003-2009. We analyze female labor force participation and labor supply in Argentina between the second semester of 2003 and 2009. In the next section, the data set and estimation methods are described. Next, we analyze female labor force participation, estimating labor force participation probit models. Then, we estimate the wage regressions and marginal returns to education for married women. In the fifth section we estimate female labor supply regressions, with special attention to the changes in labor supply elasticities over the period 2003-2009, and we compare these results with those for men. The final section presents concluding remarks.

## **II. Data and Estimation Method**

We use information from the Permanent Household Survey (EPH, as per the Spanish acronym) for the second semester of 2003 and 2009, for the total of urban conglomerates, which surveyed 23,132,938 y 24,364,333 individuals, respectively.<sup>ii</sup> We focus on the case of married women in line with the labor supply tradition, which emphasizes that consumption decisions and hence, labor participation and supply, are taken in a family context. In this regards, married women comprise the majority of the prime-age female population. Besides, the family context of labor supply is best tested on a sample of married women, where we can observe spouse-related variables.

Following other author as Mroz (1987), we circumvent our analysis to the case of married women (legally married or de facto) between 25 and 55 years old, in order to focus on labor supply behavior in prime working years, avoiding issues related to school/university attendance and retirement. Besides, we restrict the sample to the case of women head of household or married to the head of the household in order to have a homogeneous sample. Annex 1 and Annex 2 describe the samples used for labor force and labor supply regressions.

We follow the "second generation" methods reviewed in Killingsworth (1983), or Mroz (1987) corrected methodology. The reduced form labor participation probit is as follows:

$$P_i^* = \alpha_0 + \alpha_1 A_i + \alpha_2 Z_i + \varepsilon_i$$

$$P_i = \begin{cases} 1 & \text{if } P_i^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

Where  $P_i$  denotes labor force participation. In general,  $P_i^*$  is considered an unobserved measure of the difference in utility between working and not working. An individual works if the utility of working (labor income received minus home/leisure time foregone) is greater than the utility from not working.  $A_i$  denotes non labor income, which includes non-labor income of the household such as property income, subsidies, pensions, etc., and also labor earnings of other household members, particularly the husband. The vector  $Z_i$  contains other variables that affect the participation decision: the number of kids less than six years old in the household (kl6), the number of children in school age, between six and eighteen years old (k6a18), experience<sup>iii</sup> and its square (experience<sup>2</sup>), years of education (yearse) or dummy variables for education levels, unemployment rate, and a dummy indicating whether the person lives in a city with more than 500,000 inhabitants (cit).

Since we observe a significant group of women with positive labor force participation who do not report wages (318,673 women, representing about 20.7% of the total sample of working married women in data set 2003, and 370,900 women or 20.5% of the 2009 sample), we decided to estimate a biprobit model of the joint probability of labor force participation ( $Y1=LFP$ ) and valid wage reporting ( $Y2=ReportW$ ) to avoid potential biases in the estimations. In a biprobit with partial observability model  $Y1$  and  $Y2$  are defined by separate probit models and, if  $Y1 = 1$ , both  $Y1$  and  $Y2$  are observed, but if  $Y1 = 0$ , then only  $Y1*Y2$  is observed. Our biprobit with partial observability model is:

$$Y1 = LFP = \begin{cases} 1: \text{Woman works} & \rightarrow \begin{cases} Y2 = \text{ReportW} = 1: \text{Reports a valid wage} \\ Y2 = \text{ReportW} = 0: \text{Does not report a valid wage} \end{cases} \\ 0: \text{Woman does not work} & \rightarrow Y2 = \text{ReportW} = 0: \text{Does not report a valid wage} \end{cases}$$

The set of regressors includes: number of kids less than 6 years old, number of kids between 6 and 18 years old, potential experience and its square, family non labor income in real terms<sup>iv</sup> ( $A\_real$ ), a dummy variable for big urban areas, the regional rate of unemployment, and education dummies, which indicate the highest education level achieved with respect to the omitted variable incomplete primary education or less.

Next, we run a selection corrected wage regression for those women observed working positive hours who report monthly earnings:

$$\ln w_i = \ln w_0 + \beta_1 s_i + \beta_2 X_i + \beta_3 X_i^2 + \beta_4 Z_i + u_i$$

Since the dependent variable (hourly wage, in logs) is observed only if the wife participates in the labor market, estimates that only consider the group of working women with valid wages produce inconsistent results. Estimates derived from self-selected samples may be biased due to correlations between the independent variable and the stochastic disturbance induced by the sample selection rule. For this reason, following Heckman (1979) we use the estimates of the biprobit estimation of labor force participation and valid wage reporting to calculate the inverse mills ratios, which we incorporate as regressors in the wage equation, in order to correct the selectivity bias.

In our case, the dependent variable ( $\ln w_i$ ) is the natural logarithm of hourly wage at the main occupation in real terms. The variable  $s_i$  indicates educational attainment (years of schooling or dummies of educational level),  $X_i$  measures potential work experience. The vector  $Z_i$  includes two dummy variables for length of employment at current job (Tenure5 = one to five years, Tenure6 = more than five years) and the Inverse Mills ratios (IMR1 and IMR2). Finally,  $u_i$  is a random error term (for which it is usually assumed a distribution with zero mean and constant variance) that captures unobserved effects by the researcher (tastes, preferences, ability, etc.).

In the fourth stage, we propose a simple model of labor supply for married women, in which husband's behavior is considered exogenous. Our basic measure of labor supply is monthly hours in the main occupation ( $H$ ). At this point we should note that our data set does not contain a measure of the wage rate ( $w$ ) computed independently from hours of work. Since we only observe monthly earnings ( $E$ ), the wage rate must be calculated as  $w = E/H$ , which may lead to spurious correlation between the variables. Borjas (1980) indicates that as long as hours of work and earnings are correctly measured, no problem would arise in the labor supply estimation using the previous wage rate. However, if hours of work are incorrectly measured, the

appearance of hours on both sides of the equation leads to downward biases in the estimates. As pointed out by Borjas, measures of the wage rate calculated by dividing monthly earnings by monthly hours usually suffer from the “division bias”. Although this problem has been acknowledged in the literature<sup>9</sup>, it has been ignored in much empirical work. Since our data set only provides weekly hours of work (hours worked during the survey reference week) and monthly earnings (earnings during the reference month), we need to convert weekly work hours into a monthly variable, so that both variables are measured in the same time unit. This conversion could amplify the potential measurement error in hours of work.

Borjas shows that in a bivariate model such as  $\ln H^* = \alpha + \beta \ln W^* + \eta^*$ , where  $H^*$  suffers from measurement error, and this error is assumed to be uncorrelated with  $H$ ,  $E$ , and  $\eta$ , if  $H^* = Hv$ , then

$$p \lim \hat{\beta} = [\sigma_w^2 / (\sigma_w^2 + \sigma_v^2)] \beta - [\sigma_v^2 / (\sigma_w^2 + \sigma_v^2)]$$

where  $\sigma_w^2$  is the variance of the true log wage rate and  $\sigma_v^2$  is the variance of the errors in the log of hours worked. As the probability limit of  $\hat{\beta}$  is a weighted average of the true  $\beta$  and -1, the greater the proportion of the variance in the observed wage rate that is due to error, the more likely the estimated coefficient will be closer to -1.

To avoid the division bias we can substitute for  $w = E/H$  in our labor supply equation

$$\ln h_i = \alpha + \beta \ln w_i + \delta A_i + \gamma' Z_i + e_i$$

Solving for  $\ln h$  this transformation yields to our selection correction labor supply equation:

$$\ln h_i = \frac{\alpha}{(1+\beta)} + \frac{\beta}{(1+\beta)} \ln E_i + \frac{\delta}{(1+\beta)} A_i + \frac{\gamma}{(1+\beta)}' Z_i + \frac{e_i}{(1+\beta)}$$

Where  $h_i$  indicates wife<sub>i</sub>'s number of monthly hours worked in her main occupation,  $\ln E_i$  is the natural logarithm of monthly earnings in that activity (in real terms),  $A_i$  is her non-labor income (in real terms),  $Z_i$  is a set of control variables, and  $e_i$  is the stochastic error. The vector  $Z_i$  includes the wife's age, number of children under six years at home and number of children between six and eighteen years old, education

dummies, potential experience, the dummy of large cities, the unemployment rate in the region and the Inverse Mills Ratios calculated from the biprobit estimation of labor force participation and wage reporting. Assuming that  $E$  is free of measurement error, it could be argued that the estimates of  $\beta/(1+\beta)$ , and hence of  $\beta$ , are consistent since the error in  $H$  appears only on the left hand side of the previous equation. However, as mentioned by Borjas, if this is the true behavioral relation,  $\ln E$  is endogenous and simultaneous equation techniques must be used. Hence, we will use instrumental variables.

If we estimate the labor supply function using ordinary least square (OLS) only for those women with positive work hours,  $\beta$ 's OLS estimates are inconsistent since:

$$E(h/h > 0) = X\beta + E(e/X, h > 0) = X\beta + \alpha\phi(-X\beta)/\phi(X\beta/\sigma) = X\beta + \alpha\lambda$$

With

$$X\beta = \alpha_0 + \alpha_1 \ln w + \alpha_2 A + \alpha_3' Z$$

And

$$E(e/X, h > 0) \neq 0$$

In other words, the selection bias problem can be viewed as omitting an explanatory variable that is correlated with other regressors. As first noted by Heckman (1979), instead of estimating the true vector  $\beta$ , OLS estimates provide  $\frac{\partial E(h/h > 0)}{\partial X_j^i} = \beta_j + \frac{\partial E(e/h > 0)}{\partial X_j^i}$ .

Following Heckman, we use  $\lambda$  as an additional regressor in the labor supply equation using OLS for the sample of women with positive working hours, i.e. ignoring those women that do not participate in the labor market. We use the Inverse Mills Ratios previously calculated as regressors in the labor supply equation, in order to correct for selection bias.

On the other hand, the wage equation also suffers from selection bias, since we only observe wages for working women. The error term of the wage equation ( $u_i$ ) is probably correlated with the error term of the hours equation ( $e_i$ ), which represents non observed factors affecting labor supply. This means that

$\sigma_{eu} \text{cov}(e, u) \neq 0$  and hence, the wage variable of the labor supply equation is endogenous and correlated with the error term  $u$ . Hence, we estimate the wage equation using instrumental variables, correcting for selection using the Inverse Mills Ratios.

Using estimates from this stage, hours elasticities will be calculated as

**Total wage hours elasticity:**  $\varepsilon_w^h = \beta$

**Non labor income hours elasticity:**  $\varepsilon_A^h = \delta * \bar{A}$

where  $\beta$  and  $\delta$  denote the estimated coefficients on log real monthly earnings (E) and non labor income (A), respectively, and  $\bar{A}$  denotes mean non labor income. Using the Slutsky equation in terms of elasticities, we can calculate the substitution wage elasticity as: **Substitution wage hours elasticity:**  $\varepsilon_w^h - \varepsilon_A^h * \frac{\bar{w}h}{\bar{A}}$

### III. Labor Force Participation

The gender gap in labor force participation seems to have slightly declined over the period under analysis, mainly driven by a small increase in female labor force participation. Even though the gender gap in labor force participation is relative high, it shows a marginal improvement from about 37% during the second half of 2003 to less than 35.5% in the second semester of 2009 (see Table 1). Labor force participation for married men between 25 and 55 years old (that are head or married to the head of the household) is high (at about 97%) and did not change significantly over the period. Labor force participation for married women in the same age group, also head or married to the head of household, is significantly lower than their male counterparts. We observe a one percentage point increase in women's labor force participation between 2003 and 2009 (from about 61% to almost 62%).

**Table 1: Male and female labor force participation**

Labor force participation	II Sem. 2003	II Sem. 2009
Male	97.52%	97.31%
Female	60.84%	61.84%
<b>Gender gap</b>	<b>36.68%</b>	<b>35.47%</b>

Source: Own estimates based on EPH, Instituto Nacional de Estadísticas y Censos (INDEC).

#### III.a. Female Labor Force Participation Estimations

In this section we estimate the following labor force participation probit model:



$$P_i = \begin{cases} 1 & \text{if } P_i^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

where  $P_i$  denotes labor force participation and  $P_i^*$ , unobserved measure of the difference in utility between working and not working, is given by:

$$P_i^* = \alpha_0 + \alpha_1 A_i + \alpha_2 Z_i + \varepsilon_i$$

$A_i$  denotes non labor income (in real terms), which includes non-labor income of the household (property income, subsidies, pensions, etc.) and also labor earnings of other household members, particularly the husband. The vector  $Z_i$  contains other variables that affect the participation decision such as the number of kids less than six years old in the household (kl6), the number of children in school age (six to eighteen years old - k6a18), experience and its square, years of education (yearse) or dummy variables for education levels, unemployment rate, and a dummy indicating whether the person lives in a city with more than 500,000 inhabitants (cit).

We are especially interested in the marginal effect of independent variables on the probability that wife participates in the labor market. The marginal effect measures the change in the expected value of the dependent variable to an infinitesimally small change in one of the independent variables, holding constant the other regressors. In Annex 4 we present some methodological considerations regarding ways of calculating marginal effects.

Given that labor force participation and fertility are joint decisions, we use the presence of kids in the household as a control in the participation regressions. Since fertility decisions responded mainly to preferences, it seems likely that women that prefer small families would have greater labor force participation and labor supply, and that their human capital investment (education and experience) would be higher. Besides, since the effect of kids in the household varies with the age of the children, we distinguish two groups: kids in school age (between six and eighteen years old) and younger children below school age (less than six). The variable kl6, number of kids less than six years old in the household, directly affects the reservation wage, increasing it, and hence, reducing the propensity to participate. And, if the housewife decides to enter the labor market, this variable would negatively affect the number of work hours.<sup>vi</sup> So, it

seems reasonable that a higher propensity to have children would be accompanied by a lower valuation of time allocated to labor market and human capital investment. In all of the proposed labor force participation specifications, we find that this variable has a negative coefficient, being significant at 1%. The average marginal effect of this variable is -0.04 in 2003, meaning that if the number of children increases by 1, the probability of participation decreases by approximately 4%. The negative effect of this variable on labor force participation intensified in 2009: the average marginal effect raises to -0.08. That is, if the number of children increases to 1, the probability of participation decreases by about 8%.

The variable k6a18 also tries to capture the effect of the previous variable (kl6). We expect the effect of this variable on labor force participation to be lower since women with children attending to school could enter the labor market or, if already working, they may increase their labor supply. In the case of the second half of 2003 this effect is very small ranging from -0.007 to 0.005. This may be because while women's reservation wage decreases as children are older, household consumption needs increase, forcing housewives to work more hours. Therefore, the total effect could be zero as both effects offset each other. The variable k6a18 is significant at 1% in all regressions for the second half of 2009 and the marginal effect for the average of specifications (-0.028) has the expected sign and is less than the marginal effect of the variable kl6 (-0.08)

In the case of education, we expect a positive effect on labor participation. Since EPH data set does not provide information on the number of years of education, indicating only the maximum educational level attained, we use two alternative measures of education level, described in the table that follows. First, we use the variable years of education (yourse), which computes the average number of years for the highest level achieved (complete or incomplete). Alternatively, we use dummy variables that indicate the highest educational level achieved (complete and incomplete) in relation to the omitted variable incomplete primary education or less.

**Table 2: Alternative measures of education level**

Education Level	Yearse	Dummy Variables
Without education	0	
Primary education incomplete (1 / 6 years)	3.5	<b>Primary Education_incomplete or less = 1</b>
Primary education complete (7 years)	7	<b>Primary Education_complete = 1</b>
Secondary education incomplete (8 / 11 years)	9.5	<b>Secondary Education_incomplete = 1</b>
Secondary education complete (12 years)	12	<b>Secondary Education_complete = 1</b>
University education incomplete (13 / 16 years)	14.5	<b>University Education_incomplete = 1</b>
University education complete (17 or more years)	17	<b>University Education_complete = 1</b>

In the specifications that employ the variable years of education (yearse), we find the expected positive sign coefficient and that this variable is statistically significant at 1% in all cases. The average marginal effect of this variable is about 0.03 (0.028 in 2003 and 0.031 in 2009), indicating that if the wife incorporates an additional year of education, labor force participation probability increases by about 3%.

If instead we use dummy variables for education, we find that the complete primary education dummy has a negative coefficient, being significant at 1% in all specifications. The average marginal effect of this variable is -0.04 in 2003 and -0.03 in 2009, indicating that the probability of participating in the labor market decreases by approximately 4% when the woman completes primary school in 2003 and by about 3% in 2009. The dummy variable for incomplete secondary school is statistically significant (at 1%) in all specifications for both periods. The coefficient accompanying the variable is negative in the regressions for 2003 and the average marginal effect is -0.009. The coefficient turns positive in the regressions for 2009 and the average marginal effect amounts to 0.011. The dummy for complete secondary education is statistically significant in all the regressions. Its coefficient is negative in the regressions for 2003 and the average marginal effect is -0.005. Its coefficient is positive in the specifications for 2009 and the average marginal effect is 0.058. The dummy variable for incomplete university education has positive coefficient and is significant in all cases (at 1%). The average marginal effect for 2003 regressions is 0.091 and it climbs to 0.106 in 2009. Finally, the dummy for complete university education has positive coefficient and is significant at 1% in all cases. The average marginal effect of a complete university education is 0.32 in 2003 and it grows to 0.34 in 2009 specifications. This means that the probability of participation increases by about 32% (2003) / 34% (2004) when the women complete their higher education.

From the foregoing, we conclude that the marginal effects of education on labor force participation would not be linear in the specifications for 2003. Indeed, only university education would have a positive effect on the decision to work. On the other hand, the regressions for 2009 show that, except for complete primary education, the education dummies have positive and increasing marginal effects.

Unlike Mroz (1987), who uses real experience as a regressor, we do not have this variable in our dataset and hence, we employ potential experience. Being built as "*age minus years of education minus 6*", our variable is not actual experience since women generally have interrupted careers (Mincer and Ofek, 1980). This is probably an endogenous variable of choice for women who self-select into the work force at different periods, accumulating the desired number of years of experience. We found that this variable is statistically significant (at 1%) in all specifications for 2003 and 2009. Similarly, we observe that the sign of the coefficients depends on the education variables used in the regression. The coefficients were positive when we used education dummies and the average marginal effect of this variable was 0.006 in 2003 and 0.003 in 2009, meaning that if the potential experience increases by one year, the probability of participation augments by about 0.6-0.3%, respectively. If instead, we include the variable years of education in the regression, the variable experience presents negative sign, with the average marginal effect at about -0.003 (2003) / -0.002 (2009). This could reflect the fact that potential experience is constructed using years of education, so those specifications including both experience and years as explanatory variables, would present some multicollinearity, though not perfect.

The variable experience squared is used to corroborate the hypothesis of diminishing marginal effect of experience on labor force participation. That is to say, while labor force participation increases as women gain experience, it does it at a decreasing rate. The average marginal effect of this variable, when combined with education dummies, is -0.0002 in 2003 and -0.0001 in 2009. When combined with years, the marginal effect of experience climbs to 0.0001 in 2003 and 0.00001 in 2009. We find that  $\text{experience}^2$  is statistically significant (1%) in all the regressions.

In general, women are considered an additional worker, providing secondary incomes to the household. Hence, their employment decisions are more affected by changes in household income, and in particular by husband's income. Therefore, we follow Mroz (1987) and incorporate non-labor income (A) as an explanatory variable. At this point, it should be noted that our labor supply model is not exactly the conventional model of family labor supply described by Killingsworth and Heckman (1986), which extends the individual analysis to the case of a single decision unit, the family.<sup>vii</sup> This model allows cross-substitution effects between family members since changes in the labor income of one of the members of the household affect the labor supply of other members of the family. In our particular case, the family labor supply model is similar to that proposed by Leuthold (1968), where the labor supply decisions are made in a context quite similar to the analysis of a duopoly. That is, each individual member of the family maximizes its utility, which depends only on own leisure consumption and household consumption (not, as in the previous case, on leisure consumption of each of the other members) subject to the family budget constraint (identical to Killingsworth and Heckman's labor supply model). In this case, unlike the conventional model of family labor supply, there are no cross-substitution effects and the effect of changes in the wages of other household members is reflected only through an indirect income effect, via non-labor income (A).<sup>viii</sup> We find that the variable real non-labor income (A\_real) has a negative coefficient and it is significant at 1% in all specifications for both periods. The average marginal effect of non labor income on wife's labor force participation is very small, close to -0.00003 for both years.

We also include three alternative variables that try to capture the effect of unemployment on female labor participation. In the case of the unemployment rate in the region where woman lives, we find both positive and negative coefficients for 2003 and only positive coefficients for 2009. This variable is significant at 1% and the marginal effect varies between -0.003 and 0.005 in 2003 and it increases to 0.008/0.011 in 2009. This means that if the unemployment rate increases by 1%, the probability of participating in the labor market also increases by about 1% in 2009. In this case, unlike Mroz, where discouragement effect primes, unemployment would encourage wives to enter the job market, perhaps to compensate for the lack of job of the spouse or other household members. In order to capture this effect we use the region's unemployment rate for men

between 25 and 55 years old. We find that this variable is significant at 1% in all cases and its coefficient is positive. The average marginal effect of male unemployment on female labor participation is 0.007 in 2003 and 0.013 in 2009, indicating that if the husband's unemployment rate increases by 1%, the probability of female labor market participation rises by almost 1% and 1.3% in 2003 and 2009, respectively. Alternatively, we use the unemployment rate in the agglomerate where the wife lives. We find that this variable is accompanied by a negative coefficient, with an average marginal effect of -0.008 in 2003 and -0.004 in 2009.

In the next tables we present the results of the labor force participation regressions discussed above (see Tables 3 and 4). It should be noted that the coefficients indicate the marginal effects of changes in explanatory variables on the probability of working.

**Table 3: Labor Force Participation Regressions – II Semester 2003**

Labor Force Participation: Marginal Effects (II Sem 2003)																
Dependent Variable	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP
<b>Explanatory Variables</b>																
<b>k16</b> <i>(p_value)</i>	-0.037 (0.000)	-0.044 (0.000)	-0.036 (0.000)	-0.044 (0.000)	-0.036 (0.000)	-0.044 (0.000)	-0.037 (0.000)	-0.036 (0.000)	-0.037 (0.000)	-0.044 (0.000)			-0.037 (0.000)	-0.044 (0.000)	-0.037 (0.000)	-0.044 (0.000)
<b>k6a18</b> <i>(p_value)</i>	0.004 (0.000)	-0.006 (0.000)	0.005 (0.000)	-0.005 (0.000)	0.004 (0.000)	-0.006 (0.000)	0.003 (0.000)	0.005 (0.000)	0.004 (0.000)	-0.007 (0.000)			0.003 (0.000)	-0.007 (0.000)	0.004 (0.000)	-0.005 (0.000)
<b>Experience</b> <i>(p_value)</i>	-0.003 (0.000)	0.007 (0.000)	-0.003 (0.000)	0.006 (0.000)	-0.003 (0.000)	0.006 (0.000)	-0.003 (0.000)	-0.003 (0.000)	-0.003 (0.000)	0.007 (0.000)	0.028 (0.000)	0.006 (0.000)	-0.003 (0.000)	0.007 (0.000)	-0.003 (0.000)	0.006 (0.000)
<b>Experience<sup>2</sup></b> <i>(p_value)</i>	0.0001 (0.000)	-0.0002 (0.000)	0.0001 (0.000)	-0.0002 (0.000)	0.0001 (0.000)	-0.0002 (0.000)	0.0001 (0.000)	0.0001 (0.000)	0.0001 (0.000)	-0.0002 (0.000)	-0.0012 (0.000)	-0.0001 (0.000)	0.0001 (0.000)	-0.0002 (0.000)	0.0001 (0.000)	-0.0002 (0.000)
<b>Education (years)</b> <i>(p_value)</i>	0.028 (0.000)		0.028 (0.000)		0.028 (0.000)		0.027 (0.000)	0.028 (0.000)	0.028 (0.000)		0.000 (0.000)		0.028 (0.000)		0.028 (0.000)	
<b>Unemployment by region</b> <i>(p_value)</i>	0.005 (0.000)	0.005 (0.000)			-0.002 (0.000)	-0.003 (0.000)										
<b>Unemployment by agglomerate</b> <i>(p_value)</i>							-0.008 (0.000)						-0.008 (0.000)	-0.007 (0.100)		
<b>Unemployment Men 25-55</b> <i>(p_value)</i>								0.005 (0.000)							0.013 (0.000)	0.002 (0.000)
<b>cit</b> <i>(p_value)</i>	-0.052 (0.000)	-0.059 (0.000)							-0.034 (0.000)	-0.041 (0.000)			-0.004 (0.000)		-0.047 (0.000)	
<b>A_real</b> <i>(p_value)</i>	-0.00002 (0.000)	-0.00003 (0.000)	-0.00002 (0.000)	-0.00003 (0.000)	-0.00002 (0.000)	-0.00003 (0.000)	-0.00002 (0.000)	-0.00002 (0.000)	-0.00002 (0.000)	-0.00002 (0.000)			-0.00002 (0.000)	-0.00003 (0.000)	-0.00002 (0.000)	-0.00003 (0.000)
<b>Age</b> <i>(p_value)</i>																
<b>Age<sup>2</sup></b> <i>(p_value)</i>																
<b>Primary Education_complete</b> <i>(p_value)</i>		-0.041 (0.000)		-0.041 (0.000)		-0.041 (0.000)					-0.041 (0.000)	-0.029 (0.000)		-0.042 (0.000)		-0.041 (0.000)
<b>Secondary Education_incomplete</b> <i>(p_value)</i>		-0.009 (0.000)		-0.008 (0.000)		-0.008 (0.000)					-0.009 (0.000)	0.008 (0.000)		-0.010 (0.000)		-0.008 (0.000)
<b>Secondary Education_complete</b> <i>(p_value)</i>		-0.004 (0.002)		-0.004 (0.012)		-0.004 (0.004)					-0.005 (0.001)	0.017 (0.000)		-0.008 (0.000)		-0.003 (0.018)
<b>University Education_incomplete</b> <i>(p_value)</i>		0.092 (0.000)		0.093 (0.000)		0.092 (0.000)					0.091 (0.000)	0.111 (0.000)		0.084 (0.000)		0.094 (0.000)
<b>University Education_complete</b> <i>(p_value)</i>		0.318 (0.000)		0.320 (0.000)		0.318 (0.000)					0.317 (0.000)	0.338 (0.000)		0.307 (0.000)		0.320 (0.000)
<b>N° observations</b>	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652	2,893,652
<b>Mean dependent variable</b>	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532	0.532
<b>Pseudo R2</b>	0.043	0.061	0.042	0.060	0.042	0.060	0.044	0.042	0.043	0.061	0.039	0.056	0.044	0.062	0.043	0.060
<b>Log likelihood</b>	-1,914,029	-1,878,041	-1,915,619	-1,880,233	-1,915,540	-1,880,039	-1,911,415	-1,915,500	-1,914,414	-1,878,435	-1,922,454	-1,888,831	-1,911,400	-1,876,405	-1,913,600	-1,880,199

Source: Own estimates based on EPH, INDEC.

**Table 4: Labor Force Participation Regressions – II Semester 2009**

Labor Force Participation: Marginal Effects (II Sem 2009)																
Dependent Variable	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP	LFP
<b>Explanatory Variables</b>																
<b>k16</b>	<b>-0.075</b>	<b>-0.081</b>	<b>-0.075</b>	<b>-0.081</b>	<b>-0.075</b>	<b>-0.080</b>	<b>-0.075</b>	<b>-0.075</b>	<b>-0.075</b>	<b>-0.081</b>			<b>-0.075</b>	<b>-0.081</b>	<b>-0.075</b>	<b>-0.081</b>
<i>(p_value)</i>	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			(0.000)	(0.000)	(0.000)	(0.000)
<b>k6a18</b>	<b>-0.025</b>	<b>-0.031</b>	<b>-0.026</b>	<b>-0.032</b>	<b>-0.025</b>	<b>-0.031</b>	<b>-0.026</b>	<b>-0.025</b>	<b>-0.025</b>	<b>-0.031</b>			<b>-0.025</b>	<b>-0.032</b>	<b>-0.025</b>	<b>-0.031</b>
<i>(p_value)</i>	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			(0.000)	(0.000)	(0.000)	(0.000)
<b>Experience</b>	<b>-0.002</b>	<b>0.003</b>	<b>-0.002</b>	<b>0.003</b>	<b>-0.002</b>	<b>0.003</b>	<b>-0.002</b>	<b>-0.002</b>	<b>-0.002</b>	<b>0.003</b>	<b>0.035</b>	<b>-0.001</b>	<b>-0.002</b>	<b>0.003</b>	<b>-0.002</b>	<b>0.003</b>
<i>(p_value)</i>	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<b>Experience<sup>2</sup></b>	<b>0.00002</b>	<b>-0.00013</b>	<b>0.00001</b>	<b>-0.00014</b>	<b>0.00002</b>	<b>-0.00013</b>	<b>0.00001</b>	<b>-0.00226</b>	<b>0.00001</b>	<b>-0.00013</b>	<b>-0.00521</b>	<b>0.00002</b>	<b>0.00001</b>	<b>-0.00014</b>	<b>0.00001</b>	<b>-0.00013</b>
<i>(p_value)</i>	(0.000)	(0.000)	(0.013)	(0.000)	(0.000)	(0.000)	(0.062)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
<b>Education (years)</b>	<b>0.031</b>		<b>0.031</b>		<b>0.031</b>		<b>0.031</b>	<b>0.031</b>	<b>0.031</b>		<b>0.000</b>		<b>0.031</b>		<b>0.031</b>	
<i>(p_value)</i>	(0.000)		(0.000)		(0.000)		(0.000)	(0.000)	(0.000)		(0.000)		(0.000)		(0.000)	
<b>Unemployment by region</b>	<b>0.008</b>	<b>0.008</b>			<b>0.011</b>	<b>0.011</b>										
<i>(p_value)</i>	(0.000)	(0.000)			(0.000)	(0.000)										
<b>Unemployment by agglomerate</b>							<b>-0.002</b>						<b>-0.009</b>	<b>-0.001</b>		
<i>(p_value)</i>							(0.000)						(0.000)	(0.000)		
<b>Unemployment Men 25-55</b>								<b>0.017</b>							<b>0.007</b>	<b>0.015</b>
<i>(p_value)</i>								(0.000)							(0.000)	(0.000)
<b>cit</b>	<b>0.018</b>	<b>0.014</b>							<b>0.039</b>	<b>0.035</b>			<b>0.070</b>		<b>0.032</b>	
<i>(p_value)</i>	(0.000)	(0.000)							(0.000)	(0.000)			(0.000)		(0.000)	
<b>A_real</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>			<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>	<b>-0.00003</b>
<i>(p_value)</i>	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			(0.000)	(0.000)	(0.000)	(0.000)
<b>Primary Education_complete</b>		<b>-0.030</b>		<b>-0.030</b>		<b>-0.030</b>				<b>-0.029</b>		<b>0.003</b>		<b>-0.030</b>		<b>-0.030</b>
<i>(p_value)</i>		(0.000)		(0.000)		(0.000)				(0.000)		(0.000)		(0.000)		(0.000)
<b>Secondary Education_incomplete</b>		<b>0.011</b>		<b>0.011</b>		<b>0.011</b>				<b>0.011</b>		<b>0.050</b>		<b>0.011</b>		<b>0.011</b>
<i>(p_value)</i>		(0.000)		(0.000)		(0.000)				(0.000)		(0.000)		(0.000)		(0.000)
<b>Secondary Education_complete</b>		<b>0.058</b>		<b>0.058</b>		<b>0.058</b>				<b>0.059</b>		<b>0.119</b>		<b>0.057</b>		<b>0.058</b>
<i>(p_value)</i>		(0.000)		(0.000)		(0.000)				(0.000)		(0.000)		(0.000)		(0.000)
<b>University Education_incomplete</b>		<b>0.106</b>		<b>0.106</b>		<b>0.106</b>				<b>0.106</b>		<b>0.174</b>		<b>0.105</b>		<b>0.106</b>
<i>(p_value)</i>		(0.000)		(0.000)		(0.000)				(0.000)		(0.000)		(0.000)		(0.000)
<b>University Education_complete</b>		<b>0.336</b>		<b>0.332</b>		<b>0.335</b>				<b>0.336</b>		<b>0.403</b>		<b>0.330</b>		<b>0.333</b>
<i>(p_value)</i>		(0.000)		(0.000)		(0.000)				(0.000)		(0.000)		(0.000)		(0.000)
<b>Nº observations</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>	<b>3,134,186</b>
<b>Mean dependent variable</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>	<b>0.577</b>
<b>Pseudo R2</b>	<b>0.076</b>	<b>0.090</b>	<b>0.075</b>	<b>0.089</b>	<b>0.076</b>	<b>0.090</b>	<b>0.075</b>	<b>0.076</b>	<b>0.076</b>	<b>0.090</b>	<b>0.063</b>	<b>0.075</b>	<b>0.077</b>	<b>0.089</b>	<b>0.076</b>	<b>0.090</b>
<b>Log likelihood</b>	<b>-1,969,756</b>	<b>-1,939,748</b>	<b>-1,971,903</b>	<b>-1,941,608</b>	<b>-1,969,940</b>	<b>-1,939,865</b>	<b>-1,971,773</b>	<b>-1,970,931</b>	<b>-1,970,319</b>	<b>-1,940,311</b>	<b>-1,998,322</b>	<b>-1,972,270</b>	<b>-1,968,426</b>	<b>-1,941,535</b>	<b>-1,970,218</b>	<b>-1,940,854</b>

Source: Own estimates based on EPH, INDEC.



### III.b. Joint Probability of Labor Force Participation and Valid Wage Reporting

The set of regressors includes number of kids less than 6 years old, number of kids between 6 and 18 years old, potential experience and its square, family non labor income in real terms, a dummy variable for big urban areas, the regional rate of unemployment, and education dummies. We used LIMDEP version 8 (Greene 1995) for the computations. Estimation results (see Tables 5 and 6) show positive and statistically significant (at 5%) correlation coefficients between labor force participation (LFP) and reporting a valid wage (ReportW) in both sampled years.

**Table 5: Estimation Results for the II Semester 2003**

+-----+-----+-----+-----+-----+-----+					
FIML Estimates of Bivariate Probit Model					
Maximum Likelihood Estimates					
<b>Dependent variables</b>		<b>LFP REPORTW</b>			
Weighting variable	PONDERA				
Number of observations	11527				
Iterations completed	38				
Log likelihood function	-10436.83				
Meng & Schmidt Partial Observability Model					
+-----+-----+-----+-----+-----+-----+					
Variable	Coefficient	Standard Error	b/St.Er.	P[ Z >z]	Mean of X
+-----+-----+-----+-----+-----+-----+					
<b>Index equation for LFP</b>					
KL6	-.13579231	.01806213	-7.518	.0000	.44891844
K6A18	-.00603978	.00854339	-.707	.4796	1.22852644
EXPERIENCE	.00132190	.00064806	2.040	.0414	22.6591141
EXPERIENCE <sup>2</sup>	-.00012374	.350275D-04	-3.533	.0004	635.272863
A	-.574347D-04	.112983D-04	-5.084	.0000	743.605076
UNEMPLOYMENT	.01261385	.00455180	2.771	.0056	15.3119423
CIT	-.15435346	.03643066	-4.237	.0000	.78238915
PRIMARY_COMP	-.08104854	.04583224	-1.768	.0770	.24973582
SECONDARY_IN	.00506227	.05092217	.099	.9208	.16643447
SECONDARY_COMP	.01165598	.04992350	.233	.8154	.21008197
UNIVERSITY_IN	.23624812	.06004913	3.934	.0001	.09066132
UNIVERSITY_COMP	.88648242	.05469290	16.208	.0000	.20061585
<b>Index equation for REPORTW</b>					
EXPERIENCE	.00752047	.00642133	1.171	.2415	22.6591141
EXPERIENCE <sup>2</sup>	-.00042276	.00014699	-2.876	.0040	635.272863
A	.00018658	.276098D-04	6.758	.0000	743.605076
UNEMPLOYMENT	.03845035	.00919929	4.180	.0000	15.3119423
CIT	-.40675736	.05481671	-7.420	.0000	.78238915
PRIMARY_COMP	-.14327561	.06862435	-2.088	.0368	.24973582
SECONDARY_IN	-.16229525	.07574967	-2.143	.0322	.16643447
SECONDARY_COMP	-.51334093	.07959342	-6.450	.0000	.21008197
UNIVERSITY_IN	-.33768746	.09114949	-3.705	.0002	.09066132
UNIVERSITY_COM	-.01104751	.10527965	-.105	.9164	.20061585
<b>Disturbance correlation</b>					
<b>RHO (1,2)</b>	<b>.77842148</b>	<b>.06755984</b>	<b>11.522</b>	<b>.0000</b>	

Source: Own estimates based on EPH, INDEC.

**Table 6: Estimation Results for the II Semester 2009**

-----+-----					
FIML Estimates of Bivariate Probit Model					
Maximum Likelihood Estimates					
<b>Dependent variable</b>		<b>LFP REPORTW</b>			
Weighting variable		PONDERA			
Number of observations		10497			
Iterations completed		37			
Log likelihood function		-9299.738			
Meng & Schmidt Partial Observability Model					
-----+-----					
Variable	Coefficient	Standard Error	b/St.Er.	P[ Z >z]	Mean of X
-----+-----					
<b>Index equation for LFP</b>					
KL6	-.22148477	.02070224	-10.699	.0000	.42528459
K6A18	-.08548099	.01158771	-7.377	.0000	1.14093452
EXPERIENCE	.00811119	.00620093	1.308	.1909	20.8568770
EXPERIENCE <sup>2</sup>	-.00035540	.00013788	-2.578	.0099	581.359685
A	-.333722D-04	.559835D-05	-5.961	.0000	2378.81594
UNEMPLOYMENT	.02401233	.00953640	2.518	.0118	8.34366414
CIT	.03610565	.04404517	.820	.4124	.81899447
PRIMARY_COMP	-.06443559	.05790135	-1.113	.2658	.21360251
SECONDARY_IN	.03899630	.06243926	.625	.5323	.14727875
SECONDARY_COMP	.15874927	.05987921	2.651	.0080	.23114040
UNIVERSITY_IN	.28068428	.06580545	4.265	.0000	.10988340
UNIVERSITY_COMP	.97313452	.06245988	15.580	.0000	.24275139
<b>Index equation for REPORTW</b>					
EXPERIENCE	.01406898	.00865648	1.625	.1041	20.8568770
EXPERIENCE <sup>2</sup>	-.00059137	.00019546	-3.026	.0025	581.359685
A	.00016002	.117393D-04	13.631	.0000	2378.81594
UNEMPLOYMENT	.03182986	.01573838	2.022	.0431	8.34366414
CIT	-.25234749	.07056536	-3.576	.0003	.81899447
PRIMARY_COMP	.29883381	.10479071	2.852	.0043	.21360251
SECONDARY_IN	.24399369	.10815112	2.256	.0241	.14727875
SECONDARY_COMP	.02768712	.09612327	.288	.7733	.23114040
UNIVERSITY_IN	.07471415	.10340839	.723	.4700	.10988340
UNIVERSITY_COMP	.03163820	.10692140	.296	.7673	.24275139
<b>Disturbance correlation</b>					
<b>RHO(1,2)</b>	<b>.50248075</b>	<b>.10202423</b>	<b>4.925</b>	<b>.0000</b>	

Source: Own estimates based on EPH, INDEC.

#### IV. Wage Regressions for Married Women

The human capital theory suggests that the natural logarithm of the wage rate is, in its most basic form, a function of the individual's education and labor market experience. Mincer (1974) proposes the following wage equation:

$$\ln w_i = \ln w_0 + \beta_1 s_i + \beta_2 X_i + \beta_3 X_i^2 + u_i$$

where,  $\ln w_i$  is the natural logarithm of the wage rate of individual  $i$ ,  $s_i$  indicates the years of schooling,  $X_i$  measures work experience and  $u_i$  is a random error term (for which it is usually assumed a distribution with zero mean and constant variance) that captures the unobserved effects by the researcher (tastes, preferences,

ability, etc.). In this equation,  $\ln w_0$  is the wage rate of an individual without education (expressed in natural logarithm) and  $\beta_1$  is the rate of return to education. In addition, the human capital theory suggests that the coefficients  $\beta_2$  and  $\beta_3$ , measuring the returns to work experience, are positive in the first case and negative in the second.

As the dependent variable is observed only if the wife works, estimates that only consider the group of working women produce inconsistent results. For this reason, following Heckman (1979), we use estimations from the previous section (Join probability of labor force participation and valid wage reporting) to calculate the inverse mills ratios. And we incorporate them as regressors in the wage equations, in order to correct the selectivity bias. Next we present the results of OLS estimation of Mincer's wage equation including the following regressors: years of education (yearse) or alternatively, dummies of highest educational level (complete or not); potential experience and its square<sup>ix</sup>; two dummies indicating length of actual employment (Tenure5 = one to five years, Tenure6 = more than five years); and the Inverse Mills ratios (IMR1 and IMR2).

The first specification uses years of education, experience and its square, and the Inverse Mills ratios as regressors. The coefficient of the variable years of education measures the marginal return of education on wages. This coefficient is positive and significant (at 5%) in both years, implying that an additional year of schooling increases wife's earnings by about 13.5% in 2003 and 12% in 2009. The coefficients of experience and experience squared attempt to measure the return to on the job training. As suggested by the human capital theory, the coefficient accompanying potential experience is positive and significantly different from zero (at 10% in 2003 and at 5% in 2009). The variable experience squared is not significant in the regression for 2009 and, although significant in 2003, its coefficient is positive, contrary to what we expected a priori.

In the second specification, which adds two dummy variables for job tenure as regressors, we find that tenure dummies are significantly different from zero (at 1%, except for Tenure5 in 2003), with positive coefficients which grow with length of employment. As expected, we find that real earnings increase with job tenure.

In the last two regressions we use dummy variables for education, instead of number of years of schooling (as used in the first two specifications). We find that the coefficients accompanying the education dummies are positive, statistically significant at 1%, and they increase with higher education level achieved. The marginal return to complete primary education -with respect to incomplete primary or less- is about 0.22 (2003) - 0.25 (2009), indicating that wife's real wage increases by 22-25% when she completes her primary education. The marginal effect of incomplete secondary education is about 0.43 (2003) - 0.44 (2009), which means that wives with incomplete secondary education earn 43-44% more than those with incomplete primary education or less. The marginal effect of complete secondary education amounts to 0.73 (2003) - 0.66 (2009), i.e., the wage gap between women with complete secondary education and those with incomplete primary or less is about 73% in 2003 and 66% in 2009. In the case of incomplete university education, the marginal effect of this variable on the wife's wage is between 1.14 (2003) and 1.02 in 2009. Finally, in the case of complete university education, the marginal effect on the wife's labor income rises to about 164% in 2003 and 149% in 2009.

It should be noted that while marginal returns to low education levels (incomplete secondary school or less) registered small improvements in 2009 (compared to 2003), marginal returns to higher educational levels (complete secondary school or more) declined in 2009. We find a similar trend for men (see Annex 3). A possible explanation for this finding is that since 2003 wage increases for private sector workers under collective bargaining agreements (mainly workers with high school education or less) have been proportionally higher than wage rises granted to workers in the formal private sector outside collective agreements (this group includes the core of college graduates). Another interesting finding is that marginal returns increase with education. When computing the difference between the coefficients of two consecutive complete levels of education, we find that the marginal return rate to complete primary school (with respect to incomplete primary) would reach 5.4% in 2003 and it would climb to 6.2% in 2009. The marginal return rate of complete secondary school, with respect to complete primary, increases to 10.3% in 2003 and 8.3% in 2009. Finally, the marginal return rate of complete university education, with respect to complete secondary education, would be at 18.1% in 2003 and at 16.5% in 2009.

**Table 7: Marginal Returns to Education**

Marginal Effect	W/ respect to Incomplete Primary or less	W/ respect to previous level	Annual, w/ respect to previous level	Annual, w/ respect to previous completed level	W/respect to Incomplete Primary or less	W/ respect to previous level	Annual, w/ respect to previous level	Annual, w/ respect to previous completed level
	II Semester 2003				II Semester 2009			
Complete Primary	0.22	0.22	0.05	5.4%	0.25	0.25	0.06	6.2%
Incomplete Secondary	0.43	0.22	0.09		0.44	0.19	0.08	
Complete Secondary	0.73	0.30	0.12	10.3%	0.66	0.23	0.09	8.3%
Incomplete University	1.14	0.41	0.16		1.02	0.35	0.14	
Complete University	1.64	0.49	0.20	18.1%	1.49	0.47	0.19	16.5%

Source: Own estimates based on EPH, INDEC.

The coefficients accompanying the variable experience are positive and significant in both years, amounting about 0.22 in the specification without tenure dummies and falling to 0.12-0.16 when adding tenure dummies as regressors. The coefficients of experience squared are not statistically significant in the regressions for 2003 but they turn negative and significant in 2009. Again, when we add dummies for tenure as regressors in the regressions with education dummy variables, we find that tenure dummies are significantly different from zero (except for the coefficient accompanying Tenure5 in the 2003 sample), with positive coefficients which grow with the length of employment.

**Table 8: Wage Regressions**

Dependent variable Regressors	ln(real wage)							
	II Semester 2003				II Semester 2009			
yearse	0.1346	0.1208			0.1209	0.1095		
(p-value)	(0.000)	(0.000)			(0.000)	(0.000)		
prim_com			0.2169	0.1812			0.2471	0.2527
(p-value)			(0.000)	(0.001)			(0.000)	(0.000)
secu_inc			0.4344	0.3767			0.4376	0.4250
(p-value)			(0.000)	(0.000)			(0.000)	(0.000)
secu_com			0.7303	0.6240			0.6645	0.6047
(p-value)			(0.000)	(0.000)			(0.000)	(0.000)
univ_inc			1.1424	0.9887			1.0164	0.9353
(p-value)			(0.000)	(0.000)			(0.000)	(0.000)
univ_com			1.6369	1.4626			1.4909	1.3773
(p-value)			(0.000)	(0.000)			(0.000)	(0.000)
experience	0.0085	-0.0006	0.0220	0.0124	0.0155	0.0101	0.0215	0.0156
(p-value)	(0.085)	(0.900)	(0.000)	(0.017)	(0.001)	(0.026)	(0.000)	(0.001)
experience <sup>2</sup>	0.0003	0.0004	-0.0001	0.0000	-0.0001	0.0000	-0.0003	-0.0002
(p-value)	(0.017)	(0.000)	(0.464)	(0.661)	(0.394)	(0.825)	(0.014)	(0.094)
tenure5		-0.0275		-0.0211		0.0707		0.0679
(p-value)		(0.390)		(0.507)		(0.009)		(0.012)
tenure6		0.2213		0.2193		0.2157		0.2060
(p-value)		(0.000)		(0.000)		(0.000)		(0.000)
IMR1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
(p-value)	(0.012)	(0.005)	(0.010)	(0.004)	(0.310)	(0.319)	(0.355)	(0.361)
IMR2	-0.3551	-0.3382	-0.4115	-0.3927	-0.3776	-0.3449	-0.4774	-0.4360
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.4697	-0.2705	0.2034	0.3438	-0.0539	0.0456	0.6056	0.6269
(p-value)	(0.000)	(0.000)	(0.006)	(0.000)	(0.411)	(0.499)	(0.000)	(0.000)
Number of observations	961,711	961,711	961,711	961,711	1,307,461	1,307,461	1,307,461	1,307,461
Dependen var. mean	1.262	1.262	1.262	1.262	1.537	1.537	1.537	1.537
Adjusted R <sup>2</sup>	0.276	0.290	0.290	0.304	0.298	0.309	0.314	0.324
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Own estimates based on EPH, INDEC.

## V. Labor Supply Estimation

We propose a simple model of labor supply for married women, in which husband's behavior is considered exogenous. Thus, wife's labor supply is given by:

$$\ln h_i = \alpha + \beta \ln w_i + \delta A_i + \gamma' Z_i + e_i$$

Where  $h_i$  indicates wife's number of hours worked per month in her main occupation,  $\ln w_i$  is the natural logarithm of real wage rate in that activity<sup>x</sup>,  $A_i$  is her non labor income (in real terms),  $Z_i$  is a set of control variables, and  $e_i$  is the stochastic error. The vector  $Z_i$  includes the wife's age, number of children under 6 years and number of children between 6 and 18 years old, education dummies, potential experience, a dummy for large cities, the unemployment rate in the region and the Inverse Mills Ratios.

Since our data set does not contain a measure of the wage rate ( $w$ ) computed independently from hours of work, our dependent variable will be the natural logarithm of real monthly earnings at the main occupation. In this way, we avoid the “division bias” generated when measures of the wage rate are calculated by dividing monthly earnings by monthly hours. Hence, we estimate the following labor supply equation:

$$\ln h_i = \frac{\alpha}{(1+\beta)} + \frac{\beta}{(1+\beta)} \ln E_i + \frac{\delta}{(1+\beta)} A_i + \frac{\gamma}{(1+\beta)}' Z_i + \frac{e_i}{(1+\beta)}$$

Or

$$\ln h_i = \alpha_0 + \alpha_1 \ln E_i + \alpha_2 A_i + \alpha_3' Z_i + \tilde{e}_i$$

Given that labor supply equations are estimated using only the subset of working women, i.e. ignoring those women that do not participate in the labor market, we use the Inverse Mills Ratios calculated from section III's estimates, in order to correct for selection bias. On the other hand, the wage equation also suffers from selection bias, since we only observe wages for working women. Hence, we estimate the wage equation using instrumental variables, correcting for selection using the Inverse Mills Ratios.

Annex 2 details the data set used for labor supply regressions in both periods and it describes the main characteristics of the sample. We decided to exclude from the regression sample those women who were family workers without earnings since the data set does not contain information on their labor income. Similarly, we excluded women with employment programs as main occupation given the precariousness of

labor tasks required and income received. Finally, we did not include self employed women working as their own bosses (*patrones*) since in these cases earnings contain not only labor income but also returns to capital hold, and EPH data set does not provide information on capital assets.

We find that the variable real monthly earnings (in logs) is significant at 1% in all the regressions for both years, showing a positive effect of wages on labor supply. This indicates that the substitution effect more than offsets the income effect and consequently, the female labor supply is a positive sloped function of real earnings. It should be noted that the coefficient of real monthly earnings is very sensitive to the equation specification. In fact, this coefficient climbs from about 0.40-0.45 to about 0.67-0.72 when education dummies are included as explanatory variables. As we will see in the next section, wage elasticity will vary greatly according to the regressors included in the labor supply equation.

Following Mroz (1987), we incorporate education and experience as explanatory variables in the labor supply equation. We use two alternative measures of education level: dummy variables for the highest educational level achieved (with respect to the omitted variable incomplete primary education or less), and average number of years of schooling (years). When we introduce dummy variables for education level as regressors in the labor supply equation, we see that only the dummies for university education (incomplete and complete) are statistically different from zero. Besides, we find that the coefficients accompanying the education variables turn out negative. If alternatively, we use years of schooling instead of education dummies, we also find negative coefficients. These findings may respond to the introduction of education variables both as instruments for real earnings in the first step regression and as explanatory variables in the labor supply equation. Since the education variables were already included as instruments of real monthly earnings, which is a crucial explanatory variable for labor supply equations, the effect of education on labor supply would go through a higher coefficient of real earnings<sup>xi</sup> and also through negative coefficients of the education variable as regressors. Although the resulting coefficients of real monthly earnings seem larger when education variables are included in the labor supply regression, the overall effect would decline when taking into account the negative coefficients of the education variables.

The variable experience is significant only when education dummies are included as explanatory variables, but the coefficient is negative. As suggested by Mroz (1987), women's work experience is an endogenous variable that depends on labor supply. In this regards, women who have worked many years and therefore, have considerable work experience, tend to have higher wages and tend to work more in the present. Thus, the difference in the number of years of experience of two women, whose other observable characteristics are identical, reflects a systematic difference in unobservable characteristics that affect labor supply decisions.

As expected, non labor income shows a negative effect on labor supply, though quite small. This implies that women who belong to households with higher income levels would work, on average, fewer hours (assuming that the other individual characteristics are identical). This variable is significant at 1% in all the specifications and its coefficient remains almost unchanged between 2003 and 2009.

The decision to control for the presence of children is based on the following considerations. First, if fertility decisions are based primarily on preferences, it is likely that women that prefer smaller families will have higher labor supply and will invest more in market-related human capital. Hence, if we do not control for the number of children, we might observe a spurious positive correlation between wages and labor supply, reflecting these preferences rather than a true labor supply effect. Secondly, the decision to have children may be part of an overall set of time allocation decisions, including labor supply. In this regards, higher wage offers may induce women to work more and to have fewer children. Hence, controlling for the number of children may help capturing the full effects of wages on labor supply.

We find that the variables measuring the number of children at home (k6a18 and kl6) are not statistically significant in labor supply regressions for the second semester of 2003. However, from the regressions for 2009 we observe that kl6 adversely affects women's labor supply. That is, women with children under school age would work fewer hours. This variable is significant at 5% only in those specifications excluding education and experience as explanatory variables (specification models 1-3). The variable k6a18, number of



children between 6 and 18 years old in the household, also tries to capture the effect of the previous variable (kl6), but we expect lesser effect on labor supply. The effect of this variable on labor force participation is expected to be lower since women with children attending to school could enter the labor market or, if already working, they may increase their labor supply. We find that the coefficient accompanying k6a18 is negative but smaller in absolute value than the coefficient of kl6. Again, k6a18 is significant at 10% only for those specifications excluding education and experience as explanatory variables.

Women's age is significant at 5% and its coefficient shows a negative relationship between labor supply and age. Besides, the effect of age on female labor supply seems to diminish in 2009, when compared to 2003. The effect of unemployment rate on labor supply does not seem statistically different from zero in 2003 but it becomes negative and significant in 2009. This means that in 2009, high unemployment in the region would discourage female labor supply. Finally, the inverse mills ratios incorporated to correct from selection bias are significant in most of the specifications for both years.

**Table 9: Estimation Results for the II Semester 2003**

Dependent variable	lnh							
Regressors	II Semester 2003							
	1	2	3	4	5	6	7	8
lnE	0.449	0.426	0.433	0.666	0.675	0.505	0.672	0.677
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
kl6	0.0054	0.0071	0.0149	0.0493	0.0387	0.0242	0.0358	0.0623
(p-value)	(0.870)	(0.830)	(0.680)	(0.186)	(0.266)	(0.437)	(0.281)	(0.073)
k6a18	0.0037	-0.0023	-0.0018	0.0162	0.0231	0.0088	0.0225	0.0226
(p-value)	(0.760)	(0.853)	(0.884)	(0.188)	(0.056)	(0.432)	(0.062)	(0.072)
A_real	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0002
(p-value)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
cit		-0.034	-0.0351	-0.1501				
(p-value)		(0.274)	(0.264)	(0.000)				
unemployment		-0.011	-0.0108	-0.0023				
(p-value)		(0.083)	(0.080)	(0.720)				
experience			0.0011	-0.0087				
(p-value)			(0.521)	(0.000)				
yearse								-0.0434
(p-value)								(0.000)
prim_com				-0.0768	-0.0448	0.0092	-0.0442	
(p-value)				(0.493)	(0.677)	(0.933)	(0.680)	
secu_inc				-0.2552	-0.1960	-0.1474	-0.1951	
(p-value)				(0.027)	(0.072)	(0.178)	(0.071)	
secu_com				-0.2584	-0.1471	0.0074	-0.1390	
(p-value)				(0.058)	(0.203)	(0.945)	(0.210)	
univ_inc				-0.5292	-0.3905	-0.2071	-0.3781	
(p-value)				(0.000)	(0.001)	(0.062)	(0.001)	
univ_com				-0.8246	-0.6440	-0.4144	-0.6291	
(p-value)				(0.000)	(0.000)	(0.000)	(0.000)	
age					-0.0079	-0.0064	-0.0078	
(p-value)					(0.000)	(0.001)	(0.000)	
IMR1	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
(p-value)	(0.000)	(0.000)	(0.000)	(0.066)	(0.013)			(0.000)
IMR2	-0.2872	-0.2548	-0.2525	0.1405	0.0300			-0.1075
(p-value)	(0.000)	(0.000)	(0.000)	(0.071)	(0.653)			(0.117)
Constant	2.3004	2.6020	2.5334	1.4200	1.3273	2.1397	1.3545	1.3218
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	961,711	961,711	961,711	961,711	961,711	961,711	961,711	961,711
Dependen var. mean	4.642	4.642	4.642	4.642	4.642	4.642	4.642	4.642
Adjusted R <sup>2</sup>	0.315	0.314	0.315	0.326	0.316	0.348	0.316	0.294
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instruments for lnE	A	A	A	A	A	-	B	C

A) Instruments for lnE: prim\_com, secu\_inc, secu\_com, univ\_inc, univ\_com, experience, experience2, tenure5, tenure6, IMR1, IMR2.  
 B) Instruments for lnE: prim\_com, secu\_inc, secu\_com, univ\_inc, univ\_com, experience, experience2, tenure5, tenure6.  
 C) Instruments for lnE: yearse, experience, experience2, tenure5, tenure6, IMR1, IMR2.

Source: Own estimates based on EPH, INDEC.

**Table 10: Estimation Results for the II Semester 2009**

Dependent variable	lnh							
	II Semester 2009							
Regressors	1	2	3	4	5	6	7	8
lnE	0.402	0.401	0.427	0.708	0.717	0.517	0.719	0.697
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
kl6	-0.0842	-0.0880	-0.0707	-0.0386	-0.0349	-0.0406	-0.0281	-0.0306
(p-value)	(0.000)	(0.000)	(0.003)	(0.103)	(0.143)	(0.073)	(0.225)	(0.194)
k6a18	-0.0196	-0.0236	-0.0242	-0.0022	0.0031	-0.0072	0.0060	-0.0064
(p-value)	(0.109)	(0.055)	(0.048)	(0.866)	(0.814)	(0.538)	(0.636)	(0.612)
A_real	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	-0.0001	-0.0001	-0.0002
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
cit		0.086	0.0923	0.0676				
(p-value)		(0.001)	(0.000)	(0.013)				
unemployment		-0.047	-0.0483	-0.0582				
(p-value)		(0.000)	(0.000)	(0.000)				
experience			0.0032	-0.0053				
(p-value)			(0.051)	(0.003)				
yearse								-0.0501
(p-value)								(0.000)
prim_com				-0.1836	-0.1771	-0.0622	-0.1583	
(p-value)				(0.129)	(0.137)	(0.551)	(0.180)	
secu_inc				-0.3265	-0.3045	-0.1754	-0.2899	
(p-value)				(0.012)	(0.017)	(0.113)	(0.022)	
secu_com				-0.3454	-0.3059	-0.1110	-0.3054	
(p-value)				(0.011)	(0.019)	(0.285)	(0.019)	
univ_inc				-0.5849	-0.5351	-0.2933	-0.5358	
(p-value)				(0.000)	(0.000)	(0.007)	(0.000)	
univ_com				-0.8479	-0.7767	-0.4999	-0.8045	
(p-value)				(0.000)	(0.000)	(0.000)	(0.000)	
age					-0.0049	-0.0041	-0.0056	
(p-value)					(0.006)	(0.016)	(0.001)	
IMR1	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
(p-value)	(0.000)	(0.000)	(0.000)	(0.041)	(0.004)			(0.000)
IMR2	-0.5825	-0.6003	-0.6248	-0.1104	-0.1397			-0.3617
(p-value)	(0.000)	(0.000)	(0.000)	(0.306)	(0.153)			(0.000)
Constant	2.6639	3.0088	2.8052	1.4902	1.0664	1.9532	0.9812	1.3220
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Number of observations	1,307,461	1,307,461	1,307,461	1,307,461	1,307,461	1,307,461	1,307,461	1,307,461
Dependen var. mean	4.674	4.674	4.674	4.674	4.674	4.674	4.674	4.674
Adjusted R <sup>2</sup>	0.366	0.372	0.378	0.366	0.351	0.404	0.349	0.348
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instruments for lnE	A	A	A	A	A	-	B	C
A) Instruments for lnE: prim_com, secu_inc, secu_com, univ_inc, univ_com, experience, experience2, tenure5, tenure6, IMR1, IMR2.								
B) Instruments for lnE: prim_com, secu_inc, secu_com, univ_inc, univ_com, experience, experience2, tenure5, tenure6.								
C) Instruments for lnE: yearse, experience, experience2, tenure5, tenure6, IMR1, IMR2.								

Source: Own estimates based on EPH, INDEC.

### V.a. Labor Supply Elasticity

Female labor supply is expected to be more sensitive to their own wage than men's. Since women have closer substitutes for time spent in the labor market than men, it is logical to assume that the substitution effect of changes in the wage rate is higher for female labor supply. However, as the traditional division of roles in the household evolves and the responsibility of women in sustaining the household grows and equals that of her husband, the female labor supply elasticity will become closer to male elasticity. Goldin (1990) argues that increasing divorce rates and rising career orientation of women (as opposed to merely means to earn income),

are also expected to make their labor supply less sensitive to their own wages and to other non labor incomes, particularly to husband’s income. Consequently, we would expect that the income effect and the substitution effect of own wages on married women’s labor supply should exhibit a declining time trend.

We use the labor supply estimations of the previous section to compute own wage labor supply elasticity and non-labor income labor supply elasticity for women and men:

**Total wage hours elasticity:**  $\varepsilon_w^h = \beta$

**Non labor income hours elasticity:**  $\varepsilon_A^h = \delta * \bar{A}$

**Substitution wage hours elasticity:**  $\varepsilon_w^h - \varepsilon_A^h * \frac{\bar{w}\bar{h}}{\bar{A}}$

where  $\beta$  and  $\delta$  denote the estimated coefficients on log real monthly earnings (E) and non labor income (A).

$\bar{A}$  denotes mean non labor income and  $\bar{w}\bar{h} = \bar{E}$ . We summarize our results in the following tables.

**Table 11: Female Labor supply elasticities**

Female Labor Supply Elasticities						
	Total Wage Elasticity		Substitution Wage Elasticity		Non Labor income Elasticity	
	2003	2009	2003	2009	2003	2009
1	0.82	0.67	0.97	0.85	-0.25	-0.28
2	0.74	0.67	0.88	0.84	-0.22	-0.28
3	0.76	0.74	0.90	0.94	-0.22	-0.31
4	2.00	2.42	2.15	2.67	-0.24	-0.40
5	2.08	2.53	2.28	2.81	-0.31	-0.46
6	1.02	1.07	1.11	1.15	-0.14	-0.12
7	2.05	2.56	2.24	2.78	-0.30	-0.36
8	2.10	2.30	2.37	2.66	-0.42	-0.58

Source: Own estimates based on EPH, INDEC.

**Table 12: Male Labor supply elasticities**

Male Labor Supply Elasticities						
	Total Wage Elasticity		Substitution Wage Elasticity		Non Labor income Elasticity	
	2003	2009	2003	2009	2003	2009
1	0.17	0.16	0.26	0.25	-0.04	-0.05
2	0.18	0.15	0.27	0.24	-0.04	-0.05
3	0.17	0.15	0.25	0.24	-0.04	-0.05
4	0.30	0.33	0.34	0.38	-0.02	-0.03
5	0.31	0.35	0.35	0.41	-0.02	-0.04
6	0.41	0.28	0.48	0.34	-0.03	-0.04
7	0.30	0.34	0.35	0.41	-0.02	-0.04
8	0.32	0.37	0.43	0.48	-0.05	-0.06

Source: Own estimates based on EPH, INDEC.

While men’s labor supply is positively affected by their own wages, the responsiveness is relatively small, as previously mentioned work has found. Besides, we do not observe significant changes over 2003-2009. Our first finding is that female response to changes in own wages is significantly stronger than male’s response.

As suggested by previous empirical work (Blau & Kahn 2004 and Heim 2005), we expected that female responses to wages would follow a similar trend to males' responses. We find ambiguous evidence of a constant decline of women's wage elasticities over the period 2003-2009. In this regards, we find that wage elasticity is extremely sensitive to the introduction of education variables as explanatory variables in the labor supply equation. As previously stated, this may respond to the introduction of education variables both as instruments for real earnings in the first step regression and as explanatory variables in the labor supply equation. Since the education variables were already included as instruments of real monthly earnings, which is a crucial explanatory variable for labor supply equations, the effect of education on labor supply inflates the coefficient of real earnings. From the first three specification models, where we exclude education variables as regressors, we get evidence of a decline in female wage elasticities over time. We believe that these estimates are the most accurate. It seems more appropriate not to include education variables as explanatory variables in the labor supply equation, since these variables are already affecting labor supply through real earnings.

On the other hand, if we incorporate education dummies as explanatory variables (specification models 4 and 5), we observe that elasticity coefficients increase significantly, when compared to specifications models 1- 3 for each year. And even more surprisingly, we observe that wage elasticities increase over time. This pattern is observed not only for women but also for men. If instead of education dummies as additional explanatory variables in the labor supply regression we use average years of schooling (specification model 8), we also find that the elasticity coefficient increases between 2003 and 2009, both for men and women. When we run specifications models without selection bias correction including education dummies as explanatory variables (specifications 6 and 7<sup>xii</sup>) we also observe that wage elasticities augment between 2003 and 2009 in the case of women. It should be noted that in the case of men, we get mixed results: wage elasticities decrease over time if we use actual earnings as explanatory variable (instead of instrumental variables), but if we use instrumental variables for labor earnings, elasticity coefficients increase over 2003-2009.

One of the main conclusions that can be driven from the previous table is that estimated elasticity is very sensitive to the introduction or deletion of variables from the hours of work equation. In particular, it is very unstable when variables that are important in the prediction of the  $\ln w$  are also included in the hours of work equation. Similar to Blau & Kahn (2004), who find that women's own wage labor supply elasticities steadily declined between 1980 (0.8/0.9) and 2000 (0.4), we find that women's response to their own wages slightly declined, when looking at the estimates from the first three specification models, which seem conceptually more accurate. In fact, we also find a slight contraction in labor supply response to changes in own wages, with total wage elasticity falling from about 0.74/0.82 in 2003 to 0.67/0.74 and substitution wage elasticity falling from 0.88/0.97 to 0.84/0.94 over the period.

The second set of major results for female labor supply concerns the impact of non labor family income.<sup>xiii</sup> Women's labor supply response to changes in non-labor income (A) is negative as expected and smaller in absolute value than wage elasticities. We also find that women's labor supply response to changes in A increases in absolute value over the period under analysis, with the sole exception of specification model 6. Non-labor income labor supply elasticity climbs from about -0.22/-0.42 in 2003 to -0.28/-0.58 in 2009.<sup>xiv</sup> When analyzing men's labor supply responses to changes in family non labor real income we find that non labor income elasticity is negative but much smaller in absolute value than women's. Similarly, male income elasticity also registered a marginal increase (in absolute value) over the period under analysis, climbing from about -0.02/-0.05 in 2003 to about -0.03/-0.06 in 2009.<sup>xv</sup>

## **VI. Concluding remarks**

While male elasticities tend to be little, we find evidence of larger substitution effects on women's labor supply. Female response to changes in own wages is considerably more sensitive to their own wages than male's response. Estimates of labor supply elasticities should be of key interest to policy-makers as the effectiveness of policies intended to encourage labor force participation and labor supply are in part determined by these elasticities. In this regards, higher female labor supply elasticities mean that changes in

income tax rates will have bigger effects and consequently, responses to wage subsidy programs would be greater.

Since the traditional division of labor is breaking down and women and men more equally share home and market responsibilities, we expected to find some evidence of declining married women's own wage elasticity and smaller female responsiveness to family non labor income. We find ambiguous evidence of a constant decline of women's wage elasticities over the period 2003-2009, as wage elasticity estimates turn out extremely sensitive to the introduction or deletion of variables from the hours of work equation. In particular, it is very unstable when variables that are important in the prediction of the  $\ln w$  are also included in the hours of work equation. When looking at the estimates from the first three specification models proposed (which seem conceptually more accurate), we get evidence of a decline in female wage elasticities, with total wage elasticity falling from about 0.74/0.82 in 2003 to 0.67/0.74 and substitution wage elasticity falling from 0.88/0.97 to 0.84/0.94 over the period. Contrary, we do not observe significant changes in males wage elasticities. In terms of political economy implications, declines in elasticities entail that government policies such as income taxes that affect marginal wage rates produce lower disincentives and lower deadweight losses. Conversely, they also imply lower potential from programs designed to increase labor supply, such as marginal tax rate cuts and wage subsidies.

Finally, we find that women's labor supply response to changes in non labor income ( $A$ ) is negative as expected, smaller in absolute value than own wage elasticities and also smaller than men's non-labor income elasticity. Quite surprisingly, we find that women's labor supply response to changes in  $A$  increased in absolute value over the period under analysis.

## ANNEX 1: LABOR FORCE PARTICIPATION SAMPLES

**Table A1.1. Labor Force participation Sample II Semester 2003**

<b>II Semester 2003</b>		
Total Sample	23,132,938	100.0%
10 years old and younger	3,914,070	16.9%
Older than 10	19,218,868	83.1%
Men	9,036,727	39.1%
Women	10,182,141	44.0%
Women 25-55	4,622,928	20.0%
Married Women 25-55	2,893,652	12.5%
<b>Labor force participation Sample</b>	<b>2,893,652</b>	<b>100.0%</b>
Married Women 25-55 that		
Do not work	1,354,142	46.8%
Work	1,539,510	53.2%
Work but do not report valid wage	318,673	11.0%
Work but do not report hours	51,166	1.8%
Work in the excluded categories*	207,960	7.2%
<b>Labor supply Sample</b>	<b>961,711</b>	<b>33.2%</b>

\* We exclude family workers, employment programs and self employed (own boss) workers

Source: EPH, INDEC.

**Table A1.2. Labor force participation sample (working and non-working women): Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
<hr/>						
lfp	11527	2893652	.5320301	.4989947	0	1
hours_mont~y	11527	2893652	63.06703	82.55458	0	504
earnings	11527	2893652	214.4506	446.3213	0	6600
Real_earnin~s	11527	2893652	214.4506	446.3213	0	6600
Ln_Real_ea~s	5076	1220837	5.795618	.9550704	1.609438	8.794825
<hr/>						
A	11527	2893652	743.8962	991.3204	0	38000
A_real	11527	2893652	743.8962	991.3204	0	38000
CPI	11527	2893652	1	0	1	1
kl6	11527	2893652	.4491045	.7041442	0	5
k6a18	11527	2893652	1.228763	1.2831	0	9
<hr/>						
age	11527	2893652	39.90893	8.619769	25	55
yearse	11527	2893652	10.82649	4.272855	0	17
prim_inc_l~s	11527	2893652	.0820904	.2745143	0	1
prim_com	11527	2893652	.2498393	.4329387	0	1
secu_inc	11527	2893652	.1665034	.3725481	0	1
<hr/>						
secu_com	11527	2893652	.210169	.4074462	0	1
univ_inc	11527	2893652	.0906989	.2871929	0	1
univ_com	11527	2893652	.200699	.4005407	0	1
experience	11527	2893652	23.08244	10.15676	2	49
experience <sup>2</sup>	11527	2893652	635.95	494.1891	4	2401
<hr/>						
Tenure4	11527	2893652	.0364004	.1872924	0	1
Tenure5	11527	2893652	.1541623	.3611199	0	1
Tenure6	11527	2893652	.1967503	.3975592	0	1
unemploye~g	11527	2893652	15.31147	2.075353	8.614114	16.66393
unemploye~o	11527	2893652	15.36197	3.34608	1.913462	18.46837
<hr/>						
unemploy~55	11527	2893652	9.34348	.9575218	6.187869	10.16939
cit	11527	2893652	.782299	.4127009	0	1
IMR1	11527	2893652	23.06241	1441.715	-2.728186	93273.77
IMR2	11527	2893652	-1.577665	49.58524	-2909.611	2.945945
Husband_age	11355	2852805	43.12946	10.09219	18	99
<hr/>						
Husband_ye~e	11351	2852095	10.36038	4.020802	0	17



Husband_ho~s	10055	2540143	183.3697	82.62762	0	504
Husband_ea~s	8238	2036923	752.4047	829.7978	0	15000

Source: EPH, INDEC.

Where: **lfp**= labor force participation; **hours\_mont~y**= monthly hours of work at the main occupation; **earnings**= monthly labor earnings from the main occupation (in nominal terms); **Real\_earni~s**= real monthly earnings from the main occupation; **Ln\_Real\_ea~s**= natural logarithm of real monthly earnings; **A**= non labor income; **A\_real**= non labor income in real terms; **CPI**= consumer price index; **kl6**= number of kids less than 6 years old; **k6a18**= number of kids between 6 and 18; **yearse**= years of education; **prim\_inc\_l~s**= dummy variable for incomplete primary education or less; **prim\_com**= complete primary education dummy; **secu\_inc**= incomplete secondary education dummy; **secu\_com**= complete secondary education dummy; **univ\_inc**= incomplete university education dummy; **univ\_com**= complete university education dummy; **experience**= potential work experience; **experience<sup>2</sup>**= potential work experience squared; **Tenure4**= more than 6 months to a year of job tenure; **Tenure5**= more than one year to five years of job tenure; **Tenure6**= more than 5 years of job tenure; **unemployment~g**= rate of unemployment in the region; **unemployment~o**= rate of unemployment in the agglomerate; **unemployment~55**= rate of unemployment in the region for men 25-55 years old; **cit**= dummy indicating whether the person lives in a city with more than 500,000 inhabitants; **IMR1**= Inverse Mills Ratio 1 (labor force participation); **IMR2**= Inverse Mills Ratio 2 (valid wage reporting); **Husband\_ye~e**= Husband's years of education; **Husband\_ho~s**= Husbands' monthly hours of work at the main occupation; and **Husband\_ea~s**= Husband's monthly earnings at the main occupation (in nominal terms).

**Table A1.3. Working sample: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	6215	1539510	1	0	1	1
hours_mont~y	6215	1539510	118.5403	78.95556	0	504
earnings	6215	1539510	403.0798	546.2626	0	6600
Real_earni~s	6215	1539510	403.0798	546.2626	0	6600
Ln_Real_ea~s	5076	1220837	5.795618	.9550704	1.609438	8.794825
A	6215	1539510	746.6776	1105.518	0	38000
A_real	6215	1539510	746.6776	1105.518	0	38000
CPI	6215	1539510	1	0	1	1
kl6	6215	1539510	.418995	.6814204	0	4
k6a18	6215	1539510	1.187596	1.269784	0	9
age	6215	1539510	39.84261	8.461421	25	55
yearse	6215	1539510	11.73576	4.41553	0	17
prim_inc_l~s	6215	1539510	.0694266	.2541987	0	1
prim_com	6215	1539510	.2021591	.4016426	0	1
secu_inc	6215	1539510	.1467233	.3538583	0	1
secu_com	6215	1539510	.1879247	.3906835	0	1
univ_inc	6215	1539510	.0958169	.2943636	0	1
univ_com	6215	1539510	.2979493	.4573939	0	1
experience	6215	1539510	22.10685	10.02226	2	47
experience <sup>2</sup>	6215	1539510	589.1425	471.5929	4	2209
Tenure4	6215	1539510	.0684179	.2524819	0	1
Tenure5	6215	1539510	.2897623	.4536885	0	1
Tenure6	6215	1539510	.3698105	.4827921	0	1
unemployme~g	6215	1539510	15.30034	2.071264	8.614114	16.66393
unemployme~o	6215	1539510	15.11161	3.3857	1.913462	18.46837
unemploym~55	6215	1539510	9.351701	.9531901	6.187869	10.16939
cit	6215	1539510	.7736345	.4185121	0	1
IMR1	6215	1539510	43.83989	1976.405	0	93273.77
IMR2	6215	1539510	-.6647812	7.303205	-299.2807	2.945945
Husband_age	6095	1507995	42.9208	10.16112	18	99
Husband_ye~e	6093	1507459	10.85071	4.17751	0	17
Husband_ho~s	5374	1322654	180.6807	81.9861	0	504
Husband_ea~s	4394	1060937	781.748	932.2001	0	15000

Source: EPH, INDEC.

**Table A1.4. Non-working sample: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	5312	1354142	0	0	0	0
hours_monthly	5312	1354142	0	0	0	0
earnings	5312	1354142	0	0	0	0
Real_earnings	5312	1354142	0	0	0	0
Ln_Real_earnings	0	0				
A	5312	1354142	740.734	842.9946	0	12000
A_real	5312	1354142	740.734	842.9946	0	12000
CPI	5312	1354142	1	0	1	1
k16	5312	1354142	.4833356	.7276707	0	5
k6a18	5312	1354142	1.275566	1.296605	0	7
age	5312	1354142	39.98434	8.796512	25	55
yearse	5312	1354142	9.792755	3.852585	0	17
prim_inc_less	5312	1354142	.0964877	.2952867	0	1
prim_com	5312	1354142	.3040464	.4600457	0	1
secu_inc	5312	1354142	.1889913	.3915385	0	1
secu_com	5312	1354142	.2354583	.4243249	0	1
univ_inc	5312	1354142	.0848803	.2787297	0	1
univ_com	5312	1354142	.090136	.2864035	0	1
experience	5312	1354142	24.19158	10.19568	2	49
experience <sup>2</sup>	5312	1354142	689.165	513.5714	4	2401
Tenure4	5312	1354142	0	0	0	0
Tenure5	5312	1354142	0	0	0	0
Tenure6	5312	1354142	0	0	0	0
unemployment	5312	1354142	15.32412	2.080113	8.614114	16.66393
unemployment_o	5312	1354142	15.64661	3.277619	1.913462	18.46837
unemployment_55	5312	1354142	9.334134	.9624262	6.187869	10.16939
cit	5312	1354142	.7921496	.4058074	0	1
IMR1	5312	1354142	-.5592819	.2896081	-2.728186	-.2849098
IMR2	5312	1354142	-2.615513	72.05437	-2909.611	-.2975425
Husband_age	5260	1344810	43.36344	10.0101	19	99
Husband_yearse	5258	1344636	9.810684	3.762674	0	17
Husband_hours	4681	1217489	186.2909	83.2291	0	504
Husband_earnings	3844	975986	720.5073	700.458	0	9000

Source: EPH, INDEC.

**Table A1.5. Labor Force participation Sample II Semester 2009**

II Semester 2009		
Total Sample	24,364,333	100.0%
10 years old and younger	3,778,564	15.5%
Older than 10	20,585,769	84.5%
Men	9,744,042	40.0%
Women	10,841,727	44.5%
Women 25-55	5,147,927	21.1%
Married Women 25-55	3,134,186	12.9%
<b>Labor force participation Sample</b>	<b>3,134,186</b>	<b>100.0%</b>
Married Women 25-55 that		
Do not work	1,326,212	42.3%
Work	1,807,974	57.7%
Work but do not report valid wage	370,900	11.8%
Work but do not report hours	78,524	2.5%
Work in the excluded categories*	51,089	1.6%
<b>Labor supply Sample</b>	<b>1,307,461</b>	<b>41.7%</b>

\* We exclude family workers, employment programs and self employed (own boss) workers  
Source: EPH, INDEC.

**Table A1.6. Labor force participation sample (working and non-working women): Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	10497	3134186	.576856	.4940814	0	1
hours_mont~y	10497	3134186	71.41749	83.52102	0	504
earnings	10497	3134186	755.1394	1204.07	0	15000
Real_earn~s	10497	3134186	331.6379	528.7967	0	6587.615
Ln_Real_ea~s	4954	1437074	6.227989	.9541411	1.742091	8.792947
A	10497	3134186	2378.816	2351.231	0	57100
A_real	10497	3134186	1044.715	1032.6	0	25076.86
CPI	10497	3134186	2.277	0	2.277	2.277
kl6	10497	3134186	.4252846	.6657929	0	5
k6a18	10497	3134186	1.140935	1.221803	0	10
age	10497	3134186	39.62436	8.392576	25	55
yearse	10497	3134186	11.56379	4.146815	0	17
prim_inc_l~s	10497	3134186	.0553436	.2286605	0	1
prim_com	10497	3134186	.2136025	.4098689	0	1
secu_inc	10497	3134186	.1472788	.3544005	0	1
secu_com	10497	3134186	.2311404	.4215821	0	1
univ_inc	10497	3134186	.1098834	.3127593	0	1
univ_com	10497	3134186	.2427514	.4287664	0	1
experience	10497	3134186	22.03463	9.849957	0	49
experience <sup>2</sup>	10497	3134186	582.5374	461.8468	0	2401
Tenure4	10497	3134186	.0208861	.1430099	0	1
Tenure5	10497	3134186	.1678279	.3737312	0	1
Tenure6	10497	3134186	.2427967	.4287936	0	1
unemploye~g	10497	3134186	8.343664	1.473959	3.300925	9.1038
unemploye~o	10497	3134186	8.389318	2.317213	1.783585	10.81641
unemploy~55	10497	3134186	5.366222	.6890012	3.61746	6.070813
cit	10497	3134186	.8189945	.3850411	0	1
IMR1	10497	3134186	170469.4	3.96e+07	-1.9788	9.21e+09
IMR2	10497	3134186	-30.4789	6768.532	-1688801	1.623453
Husband_age	10497	3134186	42.30574	10.65145	0	98
Husband_ye~e	10380	3107547	10.87335	4.00522	0	17
Husband_ho~s	9485	2848497	182.3843	70.03261	0	504
Husband_ea~s	9495	2857891	1895.925	1869.162	0	50000

Source: EPH, INDEC.

**Table A1.7. Working sample: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	5879	1807974	1	0	1	1
hours_mont~y	5879	1807974	123.8047	74.87817	0	504
earnings	5879	1807974	1309.061	1337.236	0	15000
Real_earn~s	5879	1807974	574.9058	587.2799	0	6587.615
Ln_Real_ea~s	4954	1437074	6.227989	.9541411	1.742091	8.792947
A	5879	1807974	2328.309	2349.818	0	57100
A_real	5879	1807974	1022.533	1031.98	0	25076.86
CPI	5879	1807974	2.277	0	2.277	2.277
kl6	5879	1807974	.3877434	.6325271	0	5
k6a18	5879	1807974	1.010088	1.13358	0	8
age	5879	1807974	39.46222	8.218717	25	55
yearse	5879	1807974	12.57587	4.110836	0	17
prim_inc_l~s	5879	1807974	.0409375	.1981624	0	1
prim_com	5879	1807974	.1583314	.3650825	0	1
secu_inc	5879	1807974	.1211616	.3263427	0	1

secu_com	5879	1807974	.2175081	.4125861	0	1
univ_inc	5879	1807974	.1140166	.3178584	0	1
univ_com	5879	1807974	.3480448	.4763908	0	1
experience	5879	1807974	20.88635	9.707308	2	48
experience <sup>2</sup>	5879	1807974	530.4555	438.6436	4	2304
Tenure4	5879	1807974	.0362068	.1868203	0	1
Tenure5	5879	1807974	.2909356	.4542325	0	1
Tenure6	5879	1807974	.4208965	.493745	0	1
unemploye~g	5879	1807974	8.403163	1.398925	3.300925	9.1038
unemploye~o	5879	1807974	8.318672	2.292461	1.783585	10.81641
unemploy~55	5879	1807974	5.38984	.667577	3.61746	6.070813
cit	5879	1807974	.8333809	.3726671	0	1
IMR1	5879	1807974	295515.1	5.22e+07	.1804995	9.21e+09
IMR2	5879	1807974	-.1989089	4.369316	-165.4549	1.623453
Husband_age	5879	1807974	41.76033	10.56883	0	83
Husband_ye~e	5804	1789652	11.53929	4.002371	0	17
Husband_ho~s	5342	1633650	180.224	69.11345	0	504
Husband_ea~s	5350	1641194	1928.514	1903.177	0	25000

Source: EPH, INDEC.

**Table A1.8. Non-working sample: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	4618	1326212	0	0	0	0
hours_mont~y	4618	1326212	0	0	0	0
earnings	4618	1326212	0	0	0	0
Real_earni~s	4618	1326212	0	0	0	0
Ln_Real_ea~s	0	0				
A	4618	1326212	2447.67	2351.67	0	50000
A_real	4618	1326212	1074.954	1032.793	0	21958.72
CPI	4618	1326212	2.277	0	2.277	2.277
kl6	4618	1326212	.476463	.7054922	0	5
k6a18	4618	1326212	1.319312	1.311968	0	10
age	4618	1326212	39.8454	8.619957	25	55
yearse	4618	1326212	10.18405	3.782083	0	17
prim_inc_l~s	4618	1326212	.0749827	.263392	0	1
prim_com	4618	1326212	.2889515	.4533244	0	1
secu_inc	4618	1326212	.1828833	.3866127	0	1
secu_com	4618	1326212	.2497248	.4329006	0	1
univ_inc	4618	1326212	.1042488	.3056161	0	1
univ_com	4618	1326212	.0992089	.2989746	0	1
experience	4618	1326212	23.60004	9.828419	0	49
experience <sup>2</sup>	4618	1326212	653.5388	482.799	0	2401
Tenure4	4618	1326212	0	0	0	0
Tenure5	4618	1326212	0	0	0	0
Tenure6	4618	1326212	0	0	0	0
unemploye~g	4618	1326212	8.262551	1.567008	3.300925	9.1038
unemploye~o	4618	1326212	8.485627	2.347371	1.783585	10.81641
unemploy~55	4618	1326212	5.334025	.7159989	3.61746	6.070813
cit	4618	1326212	.799382	.4005061	0	1
IMR1	4618	1326212	-.5136615	.190084	-1.9788	0
IMR2	4618	1326212	-71.75845	10405.69	-1688801	0
Husband_age	4618	1326212	43.04928	10.71962	0	98
Husband_ye~e	4576	1317895	9.969034	3.828324	0	17
Husband_ho~s	4143	1214847	185.2895	71.15513	0	504

Husband_ea~s		4145	1216697	1851.966	1821.584	0	50000
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Source: EPH, INDEC.

When comparing the labor force participation samples for 2003 and 2009 we observed that the mean number of kids (both under school age and between 6 and 18) is higher in the case of women that do not participate in the labor market (compared to the group with positive participation) in both years. In this regards, one would expect a negative relationship between the number of children and the labor force participation decision. As per education, we observe that the working group shows higher education, both in terms of years (1.95 more years on average in 2003 and 2.4 in 2009) and in terms of complete university level. Regarding age, we do not observe a significant difference between these two groups. We observe that average experience of working women is lower than average experience of non-working wives. But this is probably due to the fact that our variable measures potential experience (built as “age - yearse - 6”) and working women have higher average education. Consequently, we may find a negative relationship between work experience and labor force participation. Finally, we find that mean family non labor income (A) is similar for both groups (working and non working women), being marginally higher for working women in 2003 but slightly lower in 2009.

When comparing the whole sample for both years, we find that the average number of kids under school age in the household registered a small drop between 2003 and 2009 (-5.6%). Similarly, the average number of kids in school age registered a 7.7% contraction. We also find a small increase in average years of education, climbing from about 10.8 in 2003 to 11.6 years in 2009. The increase in the education level is also observed when comparing the incidence of population with low education (incomplete secondary school or less) which decreases from 8% in 2003 to 5.5% in 2009. At the same time the percentage of the sample with higher education (complete secondary school and more) shows an increase from about 50% in 2003 to about 58% in 2009.

## ANNEX 2: LABOR SUPPLY SAMPLES

**Table A2.1. Labor Supply Sample Second Semester 2003: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	3959	961711	1	0	1	1
hours_mont~y	3959	961711	128.0017	74.41343	4	504
earnings	3959	961711	555.1249	577.9715	5	6000
Real_earn~s	3959	961711	555.1249	577.9715	5	6000
Ln_Real_ea~s	3959	961711	5.904124	.970046	1.609438	8.699514
A	3959	961711	873.7146	1095.935	0	15000
A_real	3959	961711	873.7146	1095.935	0	15000
CPI	3959	961711	1	0	1	1
kl6	3959	961711	.4030972	.6608187	0	4
k6a18	3959	961711	1.066425	1.176193	0	7
age	3959	961711	39.87535	8.469788	25	55
yearse	3959	961711	12.06307	4.392302	0	17
prim_inc_l~s	3959	961711	.0606409	.2387006	0	1
prim_com	3959	961711	.1847509	.3881444	0	1
secu_inc	3959	961711	.1422922	.3493937	0	1
secu_com	3959	961711	.1846303	.3880464	0	1
univ_inc	3959	961711	.1005552	.3007768	0	1
univ_com	3959	961711	.3271305	.4692246	0	1
experience	3959	961711	21.81228	10.18872	2	47
experience <sup>2</sup>	3959	961711	579.5593	476.7099	4	2209
Tenure4	3959	961711	.053906	.2258607	0	1
Tenure5	3959	961711	.2338436	.4233274	0	1
Tenure6	3959	961711	.4234848	.4941732	0	1
unemployme~g	3959	961711	15.26674	2.120495	8.614114	16.66393
unemployme~o	3959	961711	14.9515	3.397087	1.913462	18.46837
unemploym~55	3959	961711	9.333561	.9906818	6.187869	10.16939
cit	3959	961711	.7625191	.4255931	0	1
IMR1	3959	961711	69.41694	2500.37	.223042	93273.77
IMR2	3959	961711	.6342797	.3499506	.0054333	2.763932
Husband_age	3874	937463	42.78051	10.09834	19	99
Husband_ye~e	3872	936927	11.17506	4.146985	0	17
Husband_ho~s	3420	826542	179.409	77.92416	0	476
Husband_ea~s	3098	746079	825.378	929.6358	0	15000

Source: EPH, INDEC.

**Table A2.2. Labor Supply Sample Second Semester 2009: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	4442	1307461	1	0	1	1
hours_mont~y	4442	1307461	128.1216	66.89368	4	504
earnings	4442	1307461	1617.063	1264.069	13	15000
Real_earn~s	4442	1307461	710.1724	555.1466	5.709267	6587.615
Ln_Real_ea~s	4442	1307461	6.211031	.9527554	1.742091	8.792947
A	4442	1307461	2625.872	2218.515	0	57100
A_real	4442	1307461	1153.216	974.3148	0	25076.86
CPI	4442	1307461	2.277	0	2.277	2.277
kl6	4442	1307461	.3821789	.6234039	0	5
k6a18	4442	1307461	1.045302	1.14021	0	8
age	4442	1307461	39.15383	8.147549	25	55
yearse	4442	1307461	12.30322	4.123194	0	17
prim_inc_l~s	4442	1307461	.0442239	.2056153	0	1

prim_com		4442	1307461	.1719906	.3774148	0	1
secu_inc		4442	1307461	.1321776	.3387218	0	1
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secu_com		4442	1307461	.2163827	.4118245	0	1
univ_inc		4442	1307461	.1199753	.3249692	0	1
univ_com		4442	1307461	.3152499	.4646676	0	1
experience		4442	1307461	20.85061	9.719419	2	48
experience <sup>2</sup>		4442	1307461	529.1937	438.1326	4	2304
-----							
Tenure4		4442	1307461	.0415814	.199653	0	1
Tenure5		4442	1307461	.2958673	.456483	0	1
Tenure6		4442	1307461	.394489	.4887957	0	1
unemploye~g		4442	1307461	8.340072	1.454698	3.300925	9.1038
unemploye~o		4442	1307461	8.277623	2.313046	1.783585	10.81641
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unemploym~55		4442	1307461	5.359343	.6874322	3.61746	6.070813
cit		4442	1307461	.8219893	.3825648	0	1
IMR1		4442	1307461	408641.8	6.14e+07	.1804995	9.21e+09
IMR2		4442	1307461	.4629409	.2165794	1.12e-14	1.623453
Husband_age		4442	1307461	41.31015	10.75966	0	83
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Husband_ye~e		4380	1291448	11.26413	4.004508	0	17
Husband_ho~s		4021	1179110	179.4112	69.17882	0	480
Husband_ea~s		4023	1180963	2213.505	1767.48	0	25000
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Source: EPH, INDEC.

When comparing the labor supply samples from 2003 and 2009 data sets we observe:

- A tiny reduction in the number of kids in the household (both under and above 6 years old), as well as smaller standard deviations of these figures.
- That the average number of years of education remained relatively unchanged between both periods, slightly above 12 years (equivalent to complete primary school).
- That the proportion of women with less than primary school education fell from about 6.1% of the sample in 2003 to 4.4% in 2009.
- Similarly, the participation of women with complete primary school declined from about 18.5% in 2003 to about 17.2% in 2009.
- Housewives with incomplete secondary education comprised about 14.2% of the sample in 2003 and about 13.2% in 2009.
- On the other hand, the group of women with complete secondary school rose from 18.5% in 2003 to almost 22% in 2009.
- Likewise, the number of women with incomplete university education climbed from 10% of the 2003 sample to 12% in 2009.
- The share of housewives with university degree did not improve between 2003 (32.7%) and 2009 (31.5%), registering a tiny decline.

From the previous results we can conclude that the share of wives with low education (incomplete secondary school or less) declined between 2003 and 2009, driven by an increase in the proportion of women with higher education (secondary school or incomplete university studies). Nevertheless, the proportion of wives with the highest education level (complete university studies) followed a backwards trend between 2003 and 2009.

- Given that the average age and average years of schooling did not suffer significant changes during 2003-2009, potential experience remained relatively stable between both years (21.8 years in 2003 and 20.9 in 2009).
- As per job tenure, we observe a contraction in the participation of women with less than a year job tenure (Tenure4), from about 5.4% in 2003 to 4.2% in 2009; an increase in the share of housewives with 1 to 5 years of job tenure (Tenure5), from 23.4% in 2003 to 29.6% in 2009; and a contraction in the group with more than 5 years of work experience (Tenure6) from 42.3% in 2003 to 39.5% in 2009.
- Regarding unemployment, regional disparities seem to have decreased in 2009 (from a gap of about 8% in 2003 to almost 6% in 2009).
- The share of women living in big cities increased from 76% in 2003 to 82% in 2009.
- We find that real non labor incomes registered a 32% average increase since 2003. Similarly, real monthly labor earnings (at the main occupation) grew an average 28%.
- The number of monthly working hours at the main occupation did not change between 2003 and 2009, amounting to an average of 128 hours per month.
- Husband's variables (age, years of education, and number of working hours) did not show significant changes between the two periods under analysis.



### ANNEX 3: MEN

#### D) LABOR FORCE PARTICIPATION SAMPLES FOR MARRIED MEN

**Table A3.1. Labor Force participation Sample II Semester 2003**

II Semester 2003		
Total Sample	23,132,938	100.0%
10 years old and younger	3,914,070	16.9%
Older than 10	19,218,868	83.1%
Women	10,182,141	44.0%
Men	9,036,727	39.1%
Men 25-55	4,160,587	18.0%
Married Men 25-55	2,789,541	12.1%
<b>Labor force participation Sample</b>	<b>2,789,541</b>	<b>100.0%</b>
Married Men 25-55 that		
Do not work	244,157	8.8%
Work	2,545,384	91.2%
Work but do not report valid wage	567,679	20.4%
Work but do not report hours	56,286	2.0%
Work in the excluded categories*	180,765	6.5%
<b>Labor supply Sample</b>	<b>1,740,654</b>	<b>62.4%</b>

\* We exclude family workers, employment programs and self employed (own boss) workers

Source: EPH, INDEC.

**Table A3.2. Labor force participation sample (working and non-working men): Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	10938	2789541	.9124741	.282617	0	1
hours_mont~y	10938	2789541	166.304	94.37629	0	504
reportw	10938	2789541	.7089715	.4542574	0	1
earnings	10938	2789541	541.1981	767.8213	0	15000
Real_earnin~s	10938	2789541	541.1981	767.8213	0	15000
Ln_Real_ea~s	7858	1977705	6.295106	.8413819	0	9.615806
A	10938	2789541	362.2894	669.3135	0	39200
A_real	10938	2789541	362.2894	669.3135	0	39200
CPI	10938	2789541	1	0	1	1
kl6	10938	2789541	.5181125	.7439923	0	5
k6a18	10938	2789541	1.21936	1.281133	0	8
age	10938	2789541	40.88719	8.56445	25	55
yearse	10938	2789541	10.35888	3.988219	0	17
prim_inc_l~s	10938	2789541	.0800167	.2713315	0	1
prim_com	10938	2789541	.2790409	.4485482	0	1
secu_inc	10938	2789541	.1986563	.399007	0	1
secu_com	10938	2789541	.2002265	.4001881	0	1
univ_inc	10938	2789541	.1025853	.3034304	0	1
univ_com	10938	2789541	.1394742	.3464565	0	1
experience	10938	2789541	24.52831	9.691245	2	49
experience <sup>2</sup>	10938	2789541	695.5496	486.9538	4	2401
Tenure4	10938	2789541	.0511127	.2202377	0	1
Tenure5	10938	2789541	.2510352	.4336286	0	1
Tenure6	10938	2789541	.4741246	.4993528	0	1
unemploye~g	10938	2789541	15.33286	2.071599	8.614114	16.66393
unemploye~o	10938	2789541	15.40604	3.342562	1.913462	18.46837
unemploym~55	10938	2789541	9.346478	.9522566	6.187869	10.16939
cit	10938	2789541	.7861756	.4100231	0	1
IMR1	10938	2789541	.1402387	8.887533	-16.1814	1225.532
IMR2	10938	2789541	-1136.798	198510.2	-3.48e+07	15.94507

Source: EPH, INDEC.

**Table A3.3. Labor Force participation Sample II Semester 2009**

<b>II Semester 2009</b>		
Total Sample	24,364,333	100.0%
10 years old and younger	3,778,564	15.5%
Older than 10	20,585,769	84.5%
Women	10,841,727	44.5%
Men	9,744,042	40.0%
Men 25-55	4,720,428	19.4%
Married Men 25-55	2,991,340	12.3%
<b>Labor force participation Sample</b>	<b>2,991,340</b>	<b>12.3%</b>
Married Men 25-55 that		
Do not work	191,577	6.4%
Work	2,799,763	93.6%
Work but do not report valid wage	570,142	19.1%
Work but do not report hours	57,314	1.9%
Work in the excluded categories*	119,507	4.0%
<b>Labor supply Sample</b>	<b>2,052,800</b>	<b>68.6%</b>

\* We exclude family workers, employment programs and self employed (own boss) workers  
Source: EPH, INDEC.

**Table A3.4. Labor force participation sample (working and non-working men): Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	9898	2991340	.9359561	.2448434	0	1
hours_mont~y	9898	2991340	171.3428	80.59083	0	504
reportw	9246	2799763	.7963606	.4027256	0	1
earnings	9898	2991340	1763.155	1828.861	0	50000
Real_earnin~s	9898	2991340	774.3325	803.1887	0	21958.72
Ln_Real_ea~s	7783	2229621	6.724765	.6974941	2.578339	9.99692
A	9898	2991340	1254.171	1686.829	0	56100
A_real	9898	2991340	550.7997	740.8119	0	24637.68
CPI	9898	2991340	2.277	0	2.277	2.277
kl6	9898	2991340	.4761054	.689619	0	5
k6a18	9898	2991340	1.123419	1.224558	0	10
age	9898	2991340	40.55801	8.277577	25	55
yearse	9898	2991340	10.93095	3.896001	0	17
prim_inc_l~s	9898	2991340	.0577206	.2332262	0	1
prim_com	9898	2991340	.2334071	.4230205	0	1
secu_inc	9898	2991340	.1905661	.3927674	0	1
secu_com	9898	2991340	.2461485	.4307879	0	1
univ_inc	9898	2991340	.1106197	.3136764	0	1
univ_com	9898	2991340	.161538	.368045	0	1
experience	9898	2991340	23.62706	9.490195	2	49
experience <sup>2</sup>	9898	2991340	648.2924	464.6303	4	2401
Tenure4	9898	2991340	.0341579	.1816439	0	1
Tenure5	9898	2991340	.2722178	.4451239	0	1
Tenure6	9898	2991340	.5272533	.4992819	0	1
unemploye~g	9898	2991340	8.346926	1.472714	3.300925	9.1038
unemploye~o	9898	2991340	8.397603	2.317131	1.783585	10.81641
unemploy~55	9898	2991340	5.36739	.6885194	3.61746	6.070813
cit	9898	2991340	.8190597	.3849882	0	1
IMR1	9898	2991340	9.881328	1409.591	-14.42009	211155.6
IMR2	9898	2991340	-33.52586	694.9628	-50008.32	14.00891

Source: EPH, INDEC.

**Table A3.5. Join probability of labor force participation and valid wage reporting: II Semester 2003**

+-----+-----+-----+-----+-----+					
FIML Estimates of Bivariate Probit Model					
Maximum Likelihood Estimates					
<b>Dependent variables</b>		<b>LFP REPORTW</b>			
Weighting variable		PONDERA			
Number of observations		10938			
Iterations completed		33			
Log likelihood function		-8086.235			
Meng & Schmidt Partial Observability Model					
+-----+-----+-----+-----+-----+					
Variable	Coefficient	Standard Error	b/St.Er.	P[ Z >z]	Mean of X
+-----+-----+-----+-----+-----+					
<b>Index equation for LFP</b>					
KL6	.06757536	.02681479	2.520	.0117	.51811248
K6A18	.00221068	.01401687	.158	.8747	1.21936046
EXPERIENCE	.04004550	.00908747	4.407	.0000	24.5283104
EXPERIENCE <sup>2</sup>	-.00095742	.00018120	-5.284	.0000	695.549648
A	-.00027150	.335681D-04	-8.088	.0000	362.289436
UNEMPLOYMENT	.05805546	.00787112	7.376	.0000	15.3328637
CIT	-.07777152	.05105498	-1.523	.1277	.78617558
PRIMARY_COMP	.13794506	.06443621	2.141	.0323	.27904089
SECONDARY_IN	.30629760	.07139106	4.290	.0000	.19865634
SECONDARY_COMP	.35807133	.07382705	4.850	.0000	.20022649
UNIVERSITY_IN	.43229750	.08493562	5.090	.0000	.10258534
UNIVERSITY_COMP	.77936033	.09095777	8.568	.0000	.13947420
<b>Index equation for REPORTW</b>					
EXPERIENCE	.00887540	.00647066	1.372	.1702	24.5283104
EXPERIENCE <sup>2</sup>	-.00063094	.00013547	-4.657	.0000	695.549648
A	.00045096	.534821D-04	8.432	.0000	362.289436
UNEMPLOYMENT	.08874587	.00716441	12.387	.0000	15.3328637
CIT	-.48921064	.04975903	-9.832	.0000	.78617558
PRIMARY_COMP	-.00792394	.05893632	-.134	.8930	.27904089
SECONDARY_IN	-.15360149	.06547939	-2.346	.0190	.19865634
SECONDARY_COMP	-.38125871	.06888944	-5.534	.0000	.20022649
UNIVERSITY_IN	-.42834495	.07762429	-5.518	.0000	.10258534
UNIVERSITY_COM	-.71093773	.08589642	-8.277	.0000	.13947420
<b>Disturbance correlation</b>					
<b>RHO(1,2)</b>	<b>.62653068</b>	<b>.13931700</b>	<b>4.497</b>	<b>.0000</b>	

Source: Own estimates based on EPH, INDEC.

**Table A3.6. Join probability of labor force participation and valid wage reporting: II Semester 2009**

Normal exit from iterations. Exit status=0.

+-----+-----+-----+-----+-----+					
FIML Estimates of Bivariate Probit Model					
Maximum Likelihood Estimates					
<b>Dependent variable</b>		<b>LFP REPORTW</b>			
Weighting variable		PONDERA			
Number of observations		9898			
Iterations completed		36			
Log likelihood function		-6618.158			
Meng & Schmidt Partial Observability Model					
+-----+-----+-----+-----+-----+					
Variable	Coefficient	Standard Error	b/St.Er.	P[ Z >z]	Mean of X
+-----+-----+-----+-----+-----+					
<b>Index equation for LFP</b>					
KL6	.06104464	.03352361	1.821	.0686	.47610536
K6A18	.01798471	.01772137	1.015	.3102	1.12341860
EXPERIENCE	.06709968	.00972211	6.902	.0000	22.3963408
EXPERIENCE <sup>2</sup>	-.00152551	.00020519	-7.435	.0000	646.241507
A	-.457694D-04	.110596D-04	-4.138	.0000	1254.17099
UNEMPLOYMENT	.08018461	.01544146	5.193	.0000	8.34692588
CIT	-.11487627	.07330294	-1.567	.1171	.81905969
PRIMARY_COMP	.28532536	.08286015	3.443	.0006	.23340710

SECONDARY_IN	.24938111	.08681877	2.872	.0041	.19056610
SECONDARY_COMP	.51052310	.08921690	5.722	.0000	.24614855
UNIVERSITY_IN	.51335483	.10237696	5.014	.0000	.11061966
UNIVERSITY_COMP	.69564532	.10476456	6.640	.0000	.16153797

**Index equation for REPORTW**

EXPERIENCE	.03557470	.00696191	5.110	.0000	22.3963408
EXPERIENCE <sup>2</sup>	-.00103083	.00014997	-6.873	.0000	646.241507
A	.00022443	.169404D-04	13.248	.0000	1254.17099
UNEMPLOYMENT	.05458847	.01162570	4.695	.0000	8.34692588
CIT	-.25505261	.05325861	-4.789	.0000	.81905969
PRIMARY_COMP	.24076727	.06942956	3.468	.0005	.23340710
SECONDARY_IN	.25519710	.07346853	3.474	.0005	.19056610
SECONDARY_COMP	.02505839	.07144807	.351	.7258	.24614855
UNIVERSITY_IN	-.15471633	.07765189	-1.992	.0463	.11061966
UNIVERSITY_COM	-.29499767	.07547737	-3.908	.0001	.16153797

**Disturbance correlation**

<b>RHO(1,2)</b>	<b>.69800347</b>	<b>.09925357</b>	<b>7.033</b>	<b>.0000</b>
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Source: Own estimates based on EPH, INDEC.

**II) WAGE AND LABOR SUPPLY REGRESSIONS FOR MARRIED MEN**

**Table A3.7. Labor Supply Sample Second Semester 2003: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	6914	1740654	1	0	1	1
hours_mont~y	6914	1740654	191.1881	73.84375	4	504
ln_hours	6914	1740654	5.156196	.5015299	1.386294	6.222576
wage	6914	1740654	4.46252	5.017292	.0083333	104.1667
wage_real	6914	1740654	4.46252	5.017292	.0083333	104.1667
lnwage_real	6914	1740654	1.182985	.771353	-4.787492	4.645992
reportaw	6914	1740654	1	0	1	1
earnings	6914	1740654	757.6863	736.5561	1	15000
Real_earnin~s	6914	1740654	757.6863	736.5561	1	15000
Ln_Real_ea~s	6914	1740654	6.339182	.7827025	0	9.615806
A	6914	1740654	377.2169	587.7893	0	6600
A_real	6914	1740654	377.2169	587.7893	0	6600
CPI	6914	1740654	1	0	1	1
kl6	6914	1740654	.5585337	.7510784	0	5
k6a18	6914	1740654	1.216991	1.286144	0	7
age	6914	1740654	39.94329	8.492504	25	55
yearse	6914	1740654	10.31945	3.898235	0	17
prim_inc_l~s	6914	1740654	.0732506	.2605663	0	1
prim_com	6914	1740654	.2883554	.4530301	0	1
secu_inc	6914	1740654	.2042026	.4031468	0	1
secu_com	6914	1740654	.2003075	.4002594	0	1
univ_inc	6914	1740654	.1034996	.3046323	0	1
univ_com	6914	1740654	.1303843	.3367501	0	1
experience	6914	1740654	23.62384	9.704814	2	49
experience <sup>2</sup>	6914	1740654	652.2554	477.8179	4	2401
Tenure4	6914	1740654	.0555222	.2290133	0	1
Tenure5	6914	1740654	.276407	.4472529	0	1
Tenure6	6914	1740654	.534703	.4988303	0	1
unemploye~g	6914	1740654	15.30738	2.109964	8.614114	16.66393
unemploye~o	6914	1740654	15.31566	3.383814	1.913462	18.46837
unemploy~55	6914	1740654	9.338748	.9763069	6.187869	10.16939
cit	6914	1740654	.7723402	.4193522	0	1
IMR1	6914	1740654	.2799334	11.22588	.0333563	1225.532
IMR2	6914	1740654	.9954829	1.095478	.0005603	15.94507

Source: EPH, INDEC.

**Table A3.8. Labor Supply Sample Second Semester 2009: Summary Statistics**

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
lfp	7101	2052800	1	0	1	1
hours_mont~y	7101	2052800	187.8944	62.07456	4	504
ln_hours	7101	2052800	5.168286	.4077391	1.386294	6.222576
wage	7101	2052800	13.44735	11.67362	.2840909	283.3333
wage_real	7101	2052800	5.905731	5.126755	.1247654	124.4327
lnwage_real	7101	2052800	1.544648	.679376	-2.08132	4.823765
reportaw	7101	2052800	1	0	1	1
earnings	7101	2052800	2291.991	1527.564	30	40000
Real_earni~s	7101	2052800	1006.584	670.8669	13.17523	17566.97
Ln_Real_ea~s	7101	2052800	6.712934	.6701721	2.578339	9.773776
A	7101	2052800	1347.616	1655.229	0	21120
A_real	7101	2052800	591.8382	726.9341	0	9275.362
CPI	7101	2052800	2.277	0	2.277	2.277
kl6	7101	2052800	.5055997	.6992525	0	5
k6a18	7101	2052800	1.135629	1.235792	0	9
age	7101	2052800	39.77338	8.220691	25	55
yearse	7101	2052800	10.79494	3.797976	0	17
prim_inc l~s	7101	2052800	.0554199	.2288142	0	1
prim_com	7101	2052800	.2414609	.4279992	0	1
secu_inc	7101	2052800	.2006542	.400518	0	1
secu_com	7101	2052800	.2517971	.4340758	0	1
univ_inc	7101	2052800	.1056235	.3073768	0	1
univ_com	7101	2052800	.1450443	.3521703	0	1
experience	7101	2052800	22.97844	9.459349	2	48
experience <sup>2</sup>	7101	2052800	617.4756	456.1776	4	2304
Tenure4	7101	2052800	.0388528	.1932576	0	1
Tenure5	7101	2052800	.3129072	.4637096	0	1
Tenure6	7101	2052800	.5501398	.4975147	0	1
unemploye~g	7101	2052800	8.29061	1.505145	3.300925	9.1038
unemploye~o	7101	2052800	8.340477	2.340487	1.783585	10.81641
unemploy~55	7101	2052800	5.336371	.7002751	3.61746	6.070813
cit	7101	2052800	.8076763	.3941537	0	1
IMR1	7101	2052800	14.48274	1701.595	.0356389	211155.6
IMR2	7101	2052800	1.319736	1.5372	9.60e-08	14.00891

Source: EPH, INDEC.

**Table A.3.9: Wage regressions for married men**

Dependent variable Regressors	ln(real wage)							
	II Semester 2003				II Semester 2009			
yearse (p-value)	0.1102 (0.000)	0.1000 (0.000)			0.0865 (0.000)	0.0810 (0.000)		
prim_com (p-value)			0.1645 (0.000)	0.1144 (0.001)			0.1694 (0.000)	0.1467 (0.000)
secu_inc (p-value)			0.3655 (0.000)	0.2788 (0.000)			0.3233 (0.000)	0.2876 (0.000)
secu_com (p-value)			0.6240 (0.000)	0.5110 (0.000)			0.5482 (0.000)	0.4933 (0.000)
univ_inc (p-value)			0.9811 (0.000)	0.8548 (0.000)			0.7636 (0.000)	0.6941 (0.000)
univ_com (p-value)			1.5100 (0.000)	1.3622 (0.000)			1.1648 (0.000)	1.0903 (0.000)
experience (p-value)	0.0222 (0.000)	0.0144 (0.000)	0.0339 (0.000)	0.0267 (0.000)	0.0260 (0.000)	0.0213 (0.000)	0.0332 (0.000)	0.0286 (0.000)
experience <sup>2</sup> (p-value)	-0.0002 (0.053)	-0.0001 (0.292)	-0.0004 (0.000)	-0.0004 (0.000)	-0.0004 (0.000)	-0.0004 (0.000)	-0.0006 (0.000)	-0.0005 (0.000)
Tenure5 (p-value)		0.1526 (0.000)		0.1615 (0.000)		0.1313 (0.000)		0.1391 (0.000)
Tenure6 (p-value)		0.3797 (0.000)		0.3931 (0.000)		0.2679 (0.000)		0.2742 (0.000)
IMR1 (p-value)	-0.0003 (0.701)	-0.0001 (0.884)	-0.0003 (0.694)	-0.0001 (0.882)	0.0000 (0.709)	0.0000 (0.761)	0.0000 (0.682)	0.0000 (0.736)
IMR2 (p-value)	-0.0318 (0.000)	-0.0285 (0.001)	-0.0686 (0.000)	-0.0667 (0.000)	-0.0206 (0.000)	-0.0181 (0.001)	-0.0362 (0.000)	-0.0340 (0.000)
Constant (p-value)	-0.3418 (0.000)	-0.3509 (0.000)	0.1787 (0.001)	0.1397 (0.013)	0.2945 (0.000)	0.2470 (0.000)	0.6913 (0.000)	0.6230 (0.000)
Number of observations	1,740,654	1,740,654	1,740,654	1,740,654	2,052,800	2,052,800	2,052,800	2,052,800
Dependen var. mean	1.183	1.183	1.183	1.183	1.545	1.545	1.545	1.545
Adjusted R <sup>2</sup>	0.223	0.260	0.244	0.283	0.185	0.204	0.195	0.214
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Own estimates based on EPH, INDEC.

**Table A.3.10. Marginal returns to Education for married men**

Marginal Effect	W/ respect to Incomplete Primary or less	W/ respect to previous level	Annual, w/ respect to previous level	Annual, w/ respect to previous completed level	W/ respect to Incomplete Primary or less	W/ respect to previous level	Annual, w/ respect to previous level	Annual, w/ respect to previous completed level
	II Semester 2003				II Semester 2009			
Complete Primary	0.16	0.16	0.04	4.1%	0.17	0.17	0.04	4.2%
Incomplete Secondary	0.37	0.20	0.08		0.32	0.15	0.06	
Complete Secondary	0.62	0.26	0.10	9.2%	0.55	0.22	0.09	7.6%
Incomplete University	0.98	0.36	0.14		0.76	0.22	0.09	
Complete University	1.51	0.53	0.21	17.7%	1.16	0.40	0.16	12.3%

Source: Own estimates based on EPH, INDEC.

**Table A.3.11. Labor Supply Estimation: II Semester 2003**

Dependent variable	lnh							
Regressors	II Semester 2003							
	1	2	3	4	5	6	7	8
lnE	0.147	0.152	0.143	0.232	0.234	0.292	0.233	0.245
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
kl6	0.0147	0.0147	0.0105	0.0067	0.0074	0.0105	0.0078	0.0224
(p-value)	(0.205)	(0.204)	(0.394)	(0.574)	(0.533)	(0.380)	(0.513)	(0.047)
k6a18	0.0025	0.0023	0.0028	0.0008	0.0020	0.0030	0.0020	0.0027
(p-value)	(0.692)	(0.713)	(0.653)	(0.897)	(0.751)	(0.628)	(0.746)	(0.665)
A_real	-0.0001	-0.0001	-0.0001	0.0000	0.0000	-0.0001	0.0000	-0.0001
(p-value)	(0.000)	(0.000)	(0.000)	(0.011)	(0.008)	(0.000)	(0.000)	(0.000)
cit		0.047	0.0459	-0.0017				
(p-value)		(0.004)	(0.006)	(0.925)				
unemployment		-0.009	-0.0089	-0.0055				
(p-value)		(0.011)	(0.017)	(0.132)				
experience			-0.0008	-0.0039				
(p-value)			(0.445)	(0.002)				
yearse								-0.0109
(p-value)								(0.005)
prim_com				0.0376	0.0513	0.0365	0.0516	
(p-value)				(0.351)	(0.193)	(0.319)	(0.190)	
secu_inc				0.0363	0.0610	0.0359	0.0630	
(p-value)				(0.435)	(0.154)	(0.342)	(0.142)	
secu_com				-0.0018	0.0332	-0.0008	0.0379	
(p-value)				(0.972)	(0.469)	(0.983)	(0.413)	
univ_inc				-0.1507	-0.1054	-0.1474	-0.0996	
(p-value)				(0.015)	(0.052)	(0.000)	(0.068)	
univ_com				-0.2775	-0.2244	-0.2771	-0.2096	
(p-value)				(0.000)	(0.001)	(0.000)	(0.001)	
age					-0.0039	-0.0040	-0.0036	
(p-value)					(0.002)	(0.000)	(0.002)	
IMR1	0.0007	0.0007	0.0007	0.0005	0.0005			0.0008
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			(0.000)
IMR2	-0.0374	-0.0422	-0.0406	0.0059	0.0057			-0.0351
(p-value)	(0.000)	(0.000)	(0.000)	(0.494)	(0.450)			(0.000)
Constant	4.2862	4.3703	4.4384	3.9025	3.8365	3.5102	3.8359	3.7734
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	1,740,654	1,740,654	1,740,654	1,740,654	1,740,654	1,740,654	1,740,654	1,740,654
Dependen var. mean	5.156	5.156	5.156	5.156	5.156	5.156	5.156	5.156
Adjusted R <sup>2</sup>	0.120	0.123	0.119	0.168	0.168	0.174	0.167	0.155
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instruments for lnE	A	A	A	A	A	-	B	C
A) Instruments for lnE: prim_com, secu_inc, secu_com, univ_inc, univ_com, experience, exp2, Tenure5, Tenure6, IMR1, IMR2.								
B) Instruments for lnE: prim_com, secu_inc, secu_com, univ_inc, univ_com, experience, exp2, Tenure5, Tenure6.								
C) Instruments for lnE: yearse, experience, exp2, Tenure5, Tenure6, IMR1, IMR2.								

Source: Own estimates based on EPH, INDEC.

**Table A.3.12. Labor Supply Estimation: II Semester 2009**

Dependent variable	lnh							
	II Semester 2009							
Regressors	1	2	3	4	5	6	7	8
lnE	0.134	0.130	0.131	0.246	0.258	0.219	0.256	0.268
(p-value)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
kl6	0.0034	0.0025	0.0027	-0.0065	-0.0044	-0.0042	-0.0039	0.0062
(p-value)	(0.721)	(0.789)	(0.780)	(0.506)	(0.652)	(0.670)	(0.690)	(0.510)
k6a18	0.0054	0.0045	0.0045	0.0029	0.0046	0.0043	0.0047	0.0045
(p-value)	(0.388)	(0.470)	(0.484)	(0.651)	(0.467)	(0.499)	(0.454)	(0.463)
A_real	-0.0001	-0.0001	-0.0001	0.0000	0.0000	0.0000	-0.0001	-0.0001
(p-value)	(0.000)	(0.000)	(0.000)	(0.026)	(0.009)	(0.000)	(0.000)	(0.000)
cit		0.017	0.0167	0.0002				
(p-value)		(0.169)	(0.169)	(0.984)				
unemployment		-0.013	-0.0129	-0.0167				
(p-value)		(0.001)	(0.001)	(0.000)				
experience			0.0000	-0.0026				
(p-value)			(0.963)	(0.016)				
yearse								-0.0143
(p-value)								(0.001)
prim_com				0.0312	0.0362	0.0471	0.0361	
(p-value)				(0.519)	(0.442)	(0.278)	(0.442)	
secu_inc				0.0133	0.0232	0.0412	0.0234	
(p-value)				(0.803)	(0.648)	(0.340)	(0.644)	
secu_com				-0.0365	-0.0171	0.0106	-0.0130	
(p-value)				(0.522)	(0.750)	(0.798)	(0.808)	
univ_inc				-0.1355	-0.1104	-0.0775	-0.1036	
(p-value)				(0.034)	(0.063)	(0.100)	(0.082)	
univ_com				-0.2475	-0.2142	-0.1641	-0.2009	
(p-value)				(0.001)	(0.002)	(0.000)	(0.004)	
age					-0.0024	-0.0022	-0.0023	
(p-value)					(0.025)	(0.033)	(0.028)	
IMR1	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
(p-value)	(0.000)	(0.000)	(0.000)	(0.091)	(0.023)			(0.000)
IMR2	-0.0221	-0.0213	-0.0214	0.0072	0.0041			-0.0168
(p-value)	(0.001)	(0.001)	(0.001)	(0.337)	(0.584)			(0.012)
Constant	4.3337	4.4537	4.4484	3.7809	3.5879	3.8167	3.5983	3.5823
(p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	2,052,800	2,052,800	2,052,800	2,052,800	2,052,800	2,052,800	2,052,800	2,052,800
Dependen var. mean	5.168	5.168	5.168	5.168	5.168	5.168	5.168	5.168
Adjusted R <sup>2</sup>	0.093	0.093	0.094	0.125	0.119	0.122	0.119	0.106
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instruments for lnE	A	A	A	A	A	-	B	C

A) Instruments for lnE: prim\_com, secu\_inc, secu\_com, univ\_inc, univ\_com, experience, exp2, Tenure5, Tenure6, IMR1, IMR2.  
 B) Instruments for lnE: prim\_com, secu\_inc, secu\_com, univ\_inc, univ\_com, experience, exp2, Tenure5, Tenure6.  
 C) Instruments for lnE: yearse, experience, exp2, Tenure5, Tenure6, IMR1, IMR2.

Source: Own estimates based on EPH, INDEC.



## ANNEX 4: METHODOLOGICAL COMMENTS REGARDING MARGINAL EFFECTS

### COMPUTATION

There are two ways of computing marginal effects of independent variables on the dependent variable, which in our case is the probability that wife participates in the labor market. For continuum variables, marginal effects measure the change in the expected value of the dependent variable  $[E(y)]$  to an infinitesimally small change in one of the independent variables, holding other regressors constant. Given the following regression model:

$$E(y) = F(\beta x)$$

$\beta x$  represents the linear combination of parameters and variables, and  $F(\cdot)$  is the cumulative distribution function that relates the values of  $\beta x$  with the interval  $[0,1]$ . One way is computing the average change (discrete or partial) for each of the observations (say a sample with  $n$  observations) in order to get the **average marginal effect (AME)**. Hence, the average marginal effect for continuous variable is given by the following expression:

$$AME = \beta_i \frac{1}{n} \sum_{k=1}^n f(\beta x^k)$$

Where  $\beta x^k$  indicates the value of the combination of parameters and variables for the  $k$ -th observation and  $f(\cdot)$  is the derivative of  $F(\cdot)$  with respect to  $\beta x$ .

The other option consists of computing the marginal effect at some fixed value of the independent variables. In general, sample means are used to obtain the marginal effect on the sample average. Let  $\bar{x}$  be the vector of means for the explanatory variables, the **marginal effect on sample means (MEM)**, for variable  $x_i$  is given by:

$$MEM = \beta_i f(\beta \bar{x})$$

The main argument for the calculation of average marginal effects (AME) is based on the fact that nonexistent observations are used when employing sample means to calculate the marginal effects on sample means

(MEM). That is, MEM computes the marginal effect for the average individual, which may not exist or may not be representative. Thus, computing AME would be more appropriate, allowing a more realistic interpretation of estimation results. Since Stata commands *mf* and *dprobit* compute MEM, we follow Bartus (2005) and use the command *margeff8* to obtain AME. This command computes the marginal effect (of each independent variable) for each of the observations and then reports the average marginal effects for each variable. Besides, this command computes standard errors of marginal effects using the Delta Method.

For dummy variables, marginal effects evaluated at sample means would not be correct, since the means of these variables represent nonexistent observations and not actual observations. In this case:

$$AME = \frac{1}{n} \sum_{k=1}^n [F(\beta x^k | x_i^k = 1) - F(\beta x^k | x_i^k = 0)]$$

$$MEM = F(\beta \bar{x} | x_i = 1) - F(\beta \bar{x} | x_i = 0)$$

Moreover, it should be noted that the computation of AME or MEM can produce incorrect results when the regression model includes several dummy variables that indicate different categories of a single underlying variable. That is, when there are categorical variables with more than two categories among explanatory variables. Typically a set of dummy variables is used, with one dummy for each category of that variable. In our particular case, the education dummies indicate different categories of the same underlying categorical variable: educational level. In these cases, the Stata commands for computing marginal effects (*mf compute* and *dprobit*) turn out inadequate since while computing marginal effects for each categorical dummy variable, other non relevant observations are considered (the other categories). Instead, the command *margeff8* provides an option to work with categorical dummy variables, setting conditions for each of the variables from a list of dummies corresponding to the same categorical variable and then, it uses these conditions to calculate the marginal effects of the dummy variable. Let  $x$  be a categorical variable with  $K + 1$  categories ( $K > 1$ ). In this case,  $x$  is not included in the regression, but instead a set of  $K$  dummy variables is used:  $D_1, D_2, \dots, D_K$ . The option *dummies* of *margeff8* allows specifying this situation and hence, one can get correct results when estimating the marginal effects of each of these categorical dummy variables.

## References

- Bartus, Tamás (2005), *Estimation of marginal effects using margeff*, revised version of manuscript submitted to *Stata Journal*.
- Blau, Francine D. and Kahn, Lawrence M. (2007), *Changes in the Labor Supply Behavior of Married Women: 1980-2000*, *Journal of Labor Economics*, Vol. 25 Issue 3: 393-438.
- Blundell, Richard and Meghir, Costas (1987), *Bivariate Alternatives to the Tobit Model*, *Journal of Econometrics* 34(1/2): 179-200.
- Blundell, Richard and MaCurdy, Thomas (1999), *Labor Supply: A Review of Alternative Approaches*, *Handbook of Labor Economics*, Vol. 3, ed. Ashenfelter, O. and Card, D. New York: North-Holland: 1559-1695.
- Borjas, George (1980), *The Relationship between Wages and Weekly Hours of Work: The Role of Division Bias*, *Journal of Human Resources*, Vol. 15, No. 3: 409-423.
- Bound, John et al (1994), *Evidence of the Validity of Cross-Sectional and Longitudinal Labor Market Data*, *Journal of Labor Economics*, Vol. 12, No. 3: 345-368.
- Card, David (1999), *The causal effect of education on earnings*, *Handbook of Labor Economics*, Vol. 3, ed. Ashenfelter, O. and Card, D. New York: North-Holland: 1801-1863.
- Connelly, Rachel and Kimmel, Jean (2003), *Marital status and full/part-time work status in child care choices*, *Applied Economics* 35: 761-777.
- Devereux, Paul J. (2004), *Changes in Relative Wages and Family Labor Supply*, *Journal of Human Resources* 39: 696-722.
- Eckstein, Zvi and Wolpin, Kenneth (1989), *Dynamic Labor Force Participation of Married Women and Endogenous Work Experience*, *Review of Economic Studies* 56: 375-390.
- Golding, Claudia (1990), *Understanding the Gender Gap*, New York: Oxford University Press.
- Hausman, Jerry A. (1985), *Taxes and Labor Supply*, *Handbook of Public Economics*, ed. Auerbach, A. J. and Feldstein, M. Amsterdam: North-Holland.
- Heckman, James J. (1979), *Sample Selection Bias as a Specification Error*, *Econometrica* 47: 153-162.
- Heckman, James J. (1993), *What Has Been Learned About Labor Supply in the Past Twenty Years?*, *American Economic Review* 83: 116-121.
- Heim, Bradley T. (2004), *The Incredible Shrinking Elasticities: Married Female Labor Supply, 1979-2003*, Working Paper, Duke University.
- Juhn, Chinhui (1992), *Decline of Male Labor Market Participation: The Role of Declining Market Opportunities*, *Quarterly Journal of Economics*, Vol. 107, No. 1: 79-121.
- Juhn, Chinhui and Murphy, Kevin M. (1997), *Wage Inequality and Family Labor Supply*, *Journal of Labor Economics* 15 Part I: 72-97.
- Killingsworth, Mark R. (1983), *Labor Supply*, Cambridge: Cambridge University Press.

- Killingsworth, Mark R. and Heckman, James J. (1986), *Female Labor Supply: A Survey*, *Handbook of Labor Economics*, Vol. 1, ed. Ashenfelter, O. and Layard, R. New York: North-Holland: 103-204.
- Leuthold, Jane H. (1968), *An Empirical Study of Formula Income Transfers and the Work Decision of the Poor*, *The Journal of Human Resources*, Vol. 3, No. 3, University of Wisconsin Press: 312-323.
- Mincer, Jacob (1962), *Labor Force Participation of Married Women: a Study of Labor Supply*, in *Aspects of Labor Economics*, National Bureau of Economic Research, Princeton University Press: 63-79.
- Mincer, Jacob (1974), *Schooling, Experience, and Earnings*, Columbia University Press.
- Mincer, Jacob and Ofek, Haim (1980), *Interrupted Work Careers*, NBER Working Paper 479.
- Mroz, Thomas A. (1987), *The Sensitivity of an Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions*, *Econometrica* 55: 765-799.
- Pencavel, John (1986), *Labor Supply of Men: A Survey*, *Handbook of Labor Economics*, ed. Ashenfelter, O. and Layard, R. New York: North-Holland: 3-102.
- Pessino, Carola (1996), *Returns to Education in Greater Buenos Aires 1986-1993: From Hyperinflation to Stabilization and Beyond*, CEMA, *Cuadernos de Economía*, Año 33, No. 99: 205-226.
- Poirier, Dale (1980), *Partial Observability in Bivariate Probit Models*, *Journal of Econometrics* 12 (2):209-217.
- Vella, Francis (1988), *Estimating Models with Sample Selection Bias: A Survey*, *Journal of Human Resources*, Vol. 33, No. 1: 127-169.
- Willis, Robert J. (1986), *Wage determinants: a survey and Reinterpretation of human capital Earnings functions*, *Handbook of Labor Economics*, Vol. I, ed. Ashenfelter, O. and Layard, R. Amsterdam: North-Holland.

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<sup>i</sup> Hausman (1985), Pencavel (1986), Killingsworth and Heckman (1986), Blundell and MaCurdy (1999) offer surveys of this literature.

<sup>ii</sup> We excluded the following conglomerates in the data base for the second semester of 2009: San Nicolás-Villa Constitución, Rawson-Trelew, and Viedma-Carmen de Patagones, since they were not surveyed in EPH 2003.

<sup>iii</sup> Our data base does not contain an actual work experience variable. Hence, we employ potential experience, built as "*age minus years of education minus 6*".

<sup>iv</sup> All monetary variables were deflated by a private estimate of the consumer price index for Greater Buenos Aires. Official figures produced by INDEC tend to underestimate consumer price inflation.

<sup>v</sup> Bound et al (1995) also show that when hours worked are regressed on the ratio of earnings to hours worked, measurement errors in hours are an important component of the error in the wage rate, and the resulting bias may be severe.

<sup>vi</sup> We will check this hypothesis later when we estimate labor supply regressions.

<sup>vii</sup> In that model, the family maximizes its utility function (quasi-concave and twice differentiable, with leisure of each member of the family and total household consumption as arguments) subject to a budget constraint, which sets that total family income (sum of exogenous non labor income and labor income of each of its members) should not be exceeded by the total consumption expenditure of the family.

<sup>viii</sup> Furthermore, it should be noted that our model also differs from the family bargaining models, in which both husband and wife base their participation decisions, labor supply and consumption on their own income, since household income is shared among all members.

<sup>ix</sup> Since the variable potential experience is constructed from the variables age and years of education, these three variables cannot be used simultaneously as regressors in the wage equation, because of perfect multicollinearity.

<sup>x</sup> Wages in this specification thus combine income and substitution effects.

<sup>xi</sup> Tables 9 and 10 show that the coefficients accompanying real earnings increase significantly in the specification models 4 to 8, when education variables are incorporated as regressors in the labor supply equation.

<sup>xii</sup> In specification model 6 we use observed real monthly earnings as explanatory variable. Instead, in specification model 7 we use the same instrumental variables for real monthly earnings as in previous specifications, with the exception of the Inverse Mills ratios.

<sup>xiii</sup> It should be noted that our findings are not comparable with those obtained by Blau & Kahn (2004), who analyze the responses of female labor supply to husband's wages.

<sup>xiv</sup> This result is mainly driven by an increase in the mean real non labor income used to compute the elasticity:  $\bar{A}$  registered a 32% increase between 2003 (AR\$ 873.7) and 2009 (2003AR\$1153).

<sup>xv</sup> Again, this augment was due to an increase in the mean real non labor income used to compute the elasticity:  $\bar{A}$  registered a 57% increase between 2003 (AR\$ 377) and 2009 (2003AR\$592).