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### BACKGROUND PAPER

# THE RISE IN FEMALE PARTICIPATION IN COLOMBIA: CHILDREN, EDUCATION OR MARITAL STATUS

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# **The Rise in Female Participation in Colombia: Fertility, Marital Status or Education?**

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## **Abstract**

Colombia has experienced a secular increase in female labor participation, which passed from nearly 47% in 1984 to 65% in 2006. We decompose the evolution of participation into changes in the composition of the population and changes in the participation rates by groups (defined according to the variables that appear most relevant: educational attainment, fertility and marital status). The increase in participation is driven by the increase in the participation rate of women who were married or cohabiting and women with low educational attainment. Fertility status appears less important. Changes in composition are second order effects. When exploring the factors behind the observed changes, we find that the increase in participation is associated to cultural and perception changes (namely, past participation and divorce rates), and to a small degree to changes in legislation. We find no evidence that the increase in participation is correlated with the business cycle.

Keywords: Gender, Labor Force Participation, Colombia

JEL Codes: J16, J21

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## 1. Introduction

Colombia has experienced a secular increase in female labor participation, which is one of the most profound changes observed in the labor market. Participation rates increased from nearly 47% in 1984 to 65% in 2006. Many countries have experienced increases in female labor participation (see for example Elías and Ñopo, 2010, for an analysis of the Latin American experience and Costa, 2000, for a description of the evolution of female participation over the 20th century in the U.S. and other industrialized countries). However, the increase in Colombia's female participation rate has been particularly steep. According to Elías and Ñopo (2010), Colombia displayed the steepest increase in female participation in Latin America. While in 1980 the labor participation rate of Colombian females was the second lowest in the region, only above that of Costa Rica, by 2004 it was the highest in the region, equaled only by Uruguay.

This paper aims at better understanding the specific circumstances of this dramatic change in female participation. We first study the evolution of participation, taking into account the heterogeneity generated by socio-economic characteristics. In particular, we find that education, fertility and marital status are crucial in understanding the observed trends. The increase in the aggregate participation rate may be driven by both increases in the participation rate of specific groups, and changes in the *composition* of women by observed characteristics. Therefore, we study both the evolution of female participation by the aforementioned characteristics, as well as changes in population composition. The groups that exhibited the highest increases in participation are women with children younger than 18, married women and women with cohabiting partners and women with low educational attainment. However, there were also big changes in the composition of the population by these groups, the most important being a significant increase in educational attainment.

We perform two exercises to determine to what extent do changes in the participation rate of particular groups and changes in population composition contribute to the increase in female labor participation. We estimate how the described covariates affect the probability of participation and then perform a decomposition exercise. Both exercises generate similar results: marital status appears to be the strongest driving force in the

participation decision, followed by education. Fertility appears less relevant. Thus, the aggregate increase in female participation is mainly driven by a significant increase in the participation rate of population groups that traditionally had low labor market attachment: women who were married or cohabiting and women who had low educational attainment, regardless of their fertility status. Changes in population composition appear to be a second order effect.

We then explore the reasons behind the observed increase in participation of these specific groups. In particular, we study the effect of institutional factors, such as changes in labor market regulations, the business cycle and changes in culture and perception. We find that lagged participation and divorce rates in a given city are very strong predictors of female participation, while female participation seems independent from the business cycle. Finally, changes in legislation may have a significant but potentially limited effect on female participation.

## **2. Literature Review**

The economic literature has focused on explaining what generated the increase in female participation in the U.S. by associating it with the fertility rate of married women and how fast married women return to work after childbirth; with changes in the opportunity cost of home production<sup>2</sup>; and changes in the wage structure, either in terms of the gender wage gap or the elasticity of the female labor supply to changes in their or their husband's wages. Other papers explore the transition process in itself.

There is a double causality between fertility and female labor participation. When instrumenting fertility with the family sex composition, fertility was found to have a negative effect on female labor supply (see for example Angrist and Evans, 1998 and Carrasco, 2001). Angrist and Evans (1998) find, however, that this channel explains a small fraction of the observed change in female participation between 1980 and 1990. Francesconi (2002) jointly estimates the fertility and labor participation decisions and

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<sup>2</sup> Jones, Manuelli and McGrattan (2003) state that this hypothesis is only valid if we assume complementarity between home and market production.

finds a negative relationship between earnings ability and fertility since high-earners have the lowest marginal utility of children.

Regarding the effect of changes in the opportunity cost of home production, Greenwood, Seshadri and Yorukoglu (2005) suggest that the increase in female participation during the 20th Century in the U-S. can broadly be explained by the decrease in the adoption cost of the home production technology, mainly appliances. In addition to technological improvements in the production of nonmarket goods, Jones, Manuelli and McGrattan (2003) test two hypotheses to explain the increase in the participation rate of married women in the U.S: the decrease in the gender wage gap and the potential inferiority of non-market goods in understanding this change. According to their model, only the decrease in the gender wage gap has a high explanatory power.

Blau and Kahn (2005) explore whether the increase in participation can be explained by changes in the wage structure. They find that a substantial fraction of the observed increase in female labor participation is due to rapid changes in the supply during the 80's and 90's, and to a 50% decrease in the own wage elasticity together with a decrease in the elasticity to the husband's wage.

More recently, Attanasio, Low y Sánchez Marcos (2008) propose a life-cycle model to explain the differences in labor participation of women born in the 30's, 40's and 50's in the U.S. Labor participation depends on child costs relative to earnings, returns to experience and the depreciation rate of human capital when out of the labor market. The calibration suggests that the increase in female labor participation is most likely driven by changes in the cost of children relative to lifetime earnings. Fogli and Veldkamp (2007) propose a model to explain the actual transition in the participation rates of mothers with children under 5 years of age in the U.S.: both the 'S' shape (sharp increase, followed by deceleration and a slight decrease) and geographical variation. In their model, women learn about the effects of maternal employment on children by observing nearby employed women. As information accumulates, the effects of maternal employment become less uncertain, and more women participate. When the participation rate approaches the optimum (the real benefit of working), the increase in participation slows down.

In Latin America, Elías and Ñopo (2010) characterize the increase in the labor participation of married women in 14 countries and then decompose the evolution into

components associated with changes in the composition of the population and with changes in the participation rates by groups. They find that composition effects are relatively unimportant while the bulk of the increase in participation can be explained by the increase in the participation rate of specific groups of the population.

For the Colombian case, there is little literature in the topic. Arango and Posada (2007) estimate the determinants of labor participation for married women in Colombia in a life-cycle model, and find using a pseudo-panel that the main determinants are past participation decisions, the education level, labor income taxes, having children between 1 and 2 years of age, and having an unemployed in the household. The closest paper to ours is Robbins, Salinas and Araceli (2009) who study, in a life-cycle model, the potential effect of increases in female wages on the observed increase in female labor participation in the country. Also using a pseudo-panel, they find that both the intertemporal and the uncompensated elasticities are positive but small in magnitude, so the evolution of female wages does not have a good explanatory power.

This paper contributes to the literature in several ways. First, we study the increase in female participation and identify education level, marital status and fertility as crucial covariates in characterizing the increase in participation, while previous papers focused mainly on married women. Second, we decompose the aggregate increase in participation into changes in the participation rates of particular subgroups and changes in the composition of the population, which is new in the country to the best of our knowledge. This generates two findings that are not obvious. On the one hand, in contrast with the observed trends in the U.S. where the bulk of the increase in female participation has been driven by mothers of young children, in Colombia women's fertility appears less relevant than marital status and education in explaining participation. On the other, we find that changes in the population composition, such as the increase in education, are a second order effect. Finally, we are the first paper to explore a variety of channels through which this increase in participation took place. We relate the changes in labor legislation oriented to women with evolution of the participation rate and find, to our surprise, that the bulk of the increase is unaffected by such legislations, and seem rather driven by changes in culture and perception.

### **3. Data Description**

Since we are interested in the evolution of female participation over the last two decades, we use data available from the Colombian Household Survey (CHS), a repeated cross-section survey carried out by the National Statistics Department (DANE). The CHS collects information on demographic and socio-economic characteristics. In this paper we analyze women between the ages of 18 and 65 in the 10 largest cities<sup>3</sup> for the period between 1984 and 2006<sup>4</sup>.

These data does not allow identification of each woman's own children, except in cases in which the woman happens to be the head of household, the spouse of the head of household or the domestic servant of the household. Using a sub-sample that only includes these women would introduce a serious bias in our estimations since being the head of household, the domestic servant or the spouse of the head of household is not a random event. In order to partially solve this problem we opted for the full sample of women, using children in the household as a proxy for the children of women who are not heads of households, spouses of the heads of households or domestic workers<sup>5</sup>.

### **4. The Evolution of Female Labor Participation in Colombia**

In the past three decades Colombian women have attained major changes regarding fertility, education and labor market participation. Fertility (measured by the Total Fertility Rate) has decreased from 3,2 in 1986 to 2,4 in 2005 (Flórez, C., Soto, V., 2007). There was a reversal of the education gap: women have higher completion rates for primary,

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<sup>3</sup> Barranquilla, Bucaramanga, Bogotá, Manizales, Medellín, Cali, Pasto, Villavicencio, Pereira and Cúcuta.

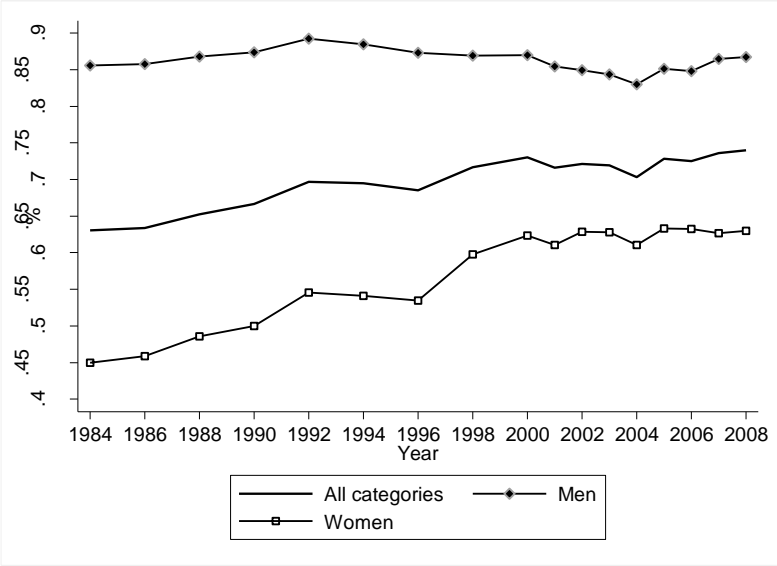
<sup>4</sup> There was a change in the Survey's methodology starting 2007, and therefore the data are not strictly comparable and it is unclear how to make them comparable at this point. Thus, the period under study ends in 2006.

<sup>5</sup> In order to test if this solution was appropriate, we estimated participation rates for different demographic groups (e.g women with children, women with college) employing the Quality of Life Survey (QLS). The QLS differs from the CHS in that in the QLS it is possible to identify each and every child for each woman in the household. We used three different sample sizes in our calculations: a full sample of women with their real number of children, a full sample of women using the children habiting in the household as a proxy of their own children and finally a sub-sample of women composed by heads of heads of households, spouses of the heads of households or domestic servant with their real number of children. Our results show that employing a full sample of women using the children habiting in the household as a proxy of their own children introduces less bias in the calculations than using a sub-sample.

secondary and even college education than men. In addition, the gap in female-male participation in the labor market has declined substantially. Even though progress has been slower than with education and health, as in other countries, Colombia displayed the steepest increase in female participation in Latin America in the last three decades (Elías and Ñopo, 2010). It is therefore an interesting case-study.

Whereas the male participation has been stable, above 85%, females have substantially increased their labor market participation from nearly 47% in 1984 to around 65% in 2006 (See Figure 1). Despite the increase in female participation rates, their current participation rate still remains significantly lower than that of males. The bulk of the increase in the female participation rate was observed during the 1980's and 90's, whereas in the 2000's the participation remained fairly stable.

**Figure 1. Participation rates (Men vs. women)**



Even though we have documented a substantial change in the extensive margin – participation rates-, there have not been major changes in the intensive margin –hours of work-. The mean hours of work for women decreased a little for most groups during the period of study (Table 1).



**Table 1. Average weekly hours worked  
Population between 18-65 years of age. 10 largest cities.**

	<b>1984</b>	<b>2006</b>	<b>Change</b>
<b>Married/Cohabiting Men</b>	51.405	53.391	4%
<b>Single/Widowed/Divorced Men</b>	47.558	49.786	5%
<b>Married/Cohabiting Women</b>			
Without children under 18	46.06	42.44	-8%
Youngest child is 6-17	42.37	42.93	1%
Youngest child is 0-5	42.93	42.61	-1%
<b>Single/Widowed/Divorced Women</b>			
Without children under 18	48.29	44.55	-8%
Youngest child is 6-17	46.20	44.05	-5%
Youngest child is 0-5	46.68	44.82	-4%

There has been moderate change in the distribution of women working part-time vs. working full-time as Table 2 shows. Whereas 56% of women worked full time in 1984, 48% did in 2006. The difference, 8 percentage points, shifted from full to part-time work. In 2006, roughly one in every 4 women worked part time. The distribution of hours worked by men displayed substantial changes. The percentage of men working full time decreased over the period of study (from 59% to 46%). Some of these men are now working part time and the majority shifted to over-time jobs.

**Table 2. Percentage of individuals working part, full and over-time by gender**

	<b>1984</b>	<b>2006</b>	<b>Difference</b>
% Women working part-time	18%	24%	***
% Men working part-time	7%	10%	***
% Women working full-time	56%	48%	***
% Men working full-time	59%	46%	***
% Women working over-time	26%	27%	
% Men working over-time	34%	44%	***

Note: part time : <35 hours/week, over-time : >48 hours/week

There were no major changes regarding the gender distribution by occupation or economic sector over this time period, which contrasts with the steep increase in female participation. Despite the fact that there have been major changes regarding the participation rate of women, there has not been substantial variation in sectoral or

occupational segregation. The most integrated sectors are finance and trade and the most integrated occupations are professionals, managers and sales people. These groups amount to one quarter of total employment, which is an indication of the high segregation levels by occupation and sector.

According to the International Labor Organization (ILO), Colombia's Duncan<sup>6</sup> Index for occupational<sup>7</sup> segregation in 2008 was around 43%. This would place Colombia in the 8<sup>th</sup> place out of 128 countries from highest to lowest Duncan Standardized Index. According to ILO data the Duncan Index has also increased with time, while in 1984 was around 31% in 2008 it increased up to 43%.

## **5. The Relative Role of Marital Status, Education and Fertility**

¿What is driving the dramatic increase in female participation rates? Three characteristics appear crucial in understanding the evolution of female participation: marital status (married/cohabiting vs. single/widowed/divorced), education level (low, medium, high)<sup>8</sup> and fertility (without children under 18, with children younger than 5, with children between 6 and 17 years of age). The participation rate within each category (married/cohabiting women, for example) is defined as the ratio between the labor force within each group over the total number of women by cohort. These rates can be understood as a measure of the probability of participating in the labor market conditional on belonging to any of the mentioned categories. Figure 2 shows the evolution of the participation rates of women by fertility, marital status and education categories.

Panel 2A shows the evolution in participation for women disaggregated by fertility. Women with children under 18 years of age increased their participation rates the most; the participation rate for women with children below 5 is lower than the rate for women with children between 6 and 17 years of age for the most part of the analyzed period.

Women who were married or cohabiting display the greatest increase in the labor participation rate. Panel 2B shows that at the beginning of the period the difference in

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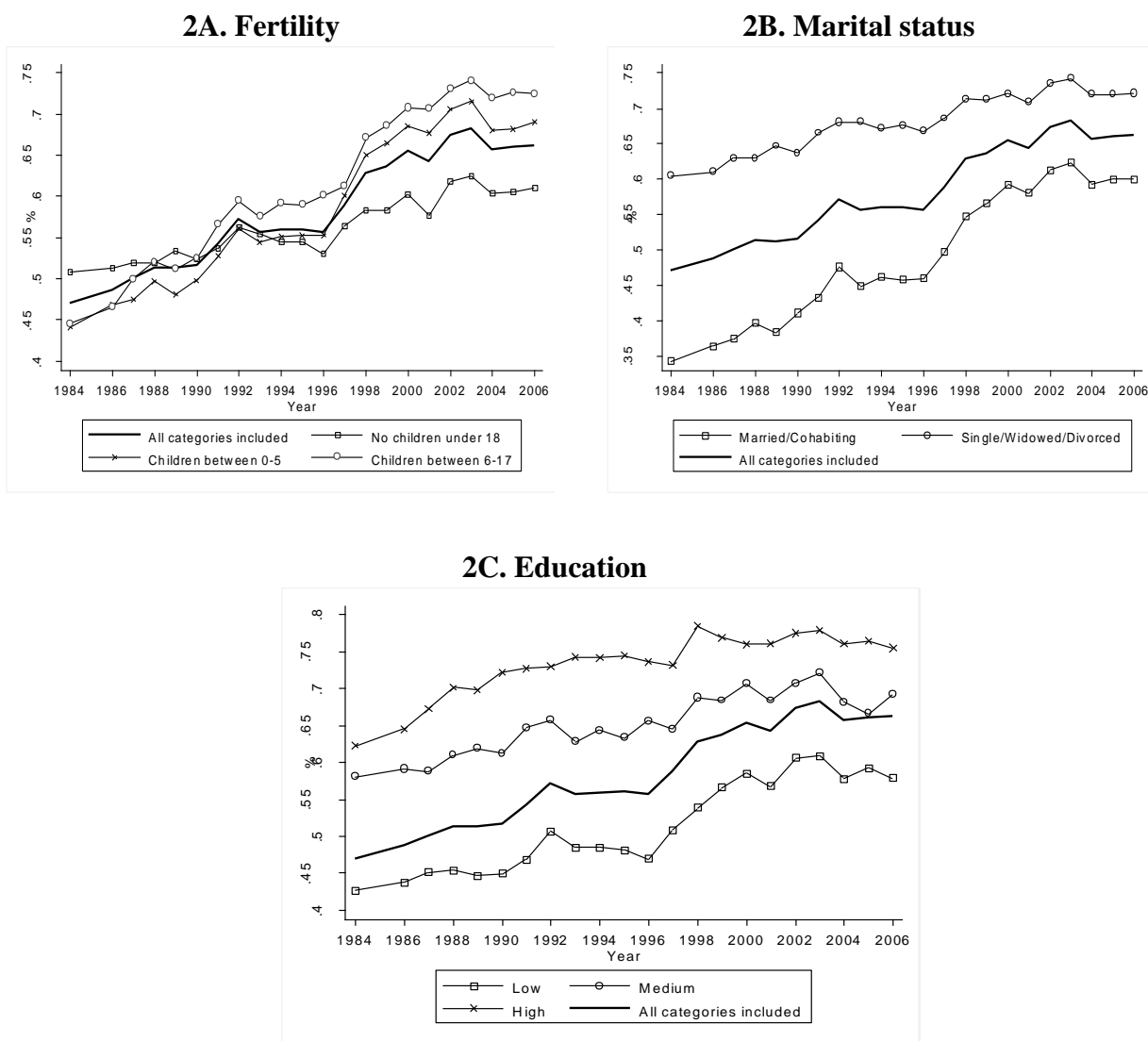
<sup>6</sup> The index ranges from 0 (complete integration) to 100 (complete segregation).

<sup>7</sup> This Duncan Index reported by ILO was constructed using 6 occupation categories: producers, managers, professionals, clerics, services and agriculture.

<sup>8</sup> Low: incomplete secondary education or less. Medium: completed secondary but no tertiary. High: Some tertiary education or more.

participation rates for women married or cohabiting and single or divorced women was around 26 percentage points; by the end of the period, the gap was only 12 percentage points. Therefore, three main groups have increased their participation. The significant increase in female participation rates has mostly been driven by women *with low educational attainment*, and by women who are *married or cohabiting*. Women *with children* have also increased their participation, but to a lesser degree.

**Figure 2. Changes in participation rates**



The higher the education level, the higher the participation rates. However, as Panel 3C shows, the *increase* in participation rate was the highest for women who belong to the low education group, followed by women with medium education.

Therefore, three main groups have increased their participation. The significant increase in female participation rates has been mostly driven by women *with children*, women *with low educational attainment*, and by women who are *married or cohabiting*.

Two types of changes may have driven the increase in the participation rate: increases in the participation rate of specific groups, and changes in the *composition* of women. Let us now turn to the observed changes in the population composition. Figure 3 shows the evolution of the composition of women by fertility, marital status and education categories.

Because of the selected age range (18-65 years of age), our sample includes women in less-fertile ages and therefore most women have no children<sup>9</sup> under 18. Panel 3A shows that at the beginning of the period there were more women with children between 6-17 years of age, while by the end of the period there are more women with children between 0-5 years of age.

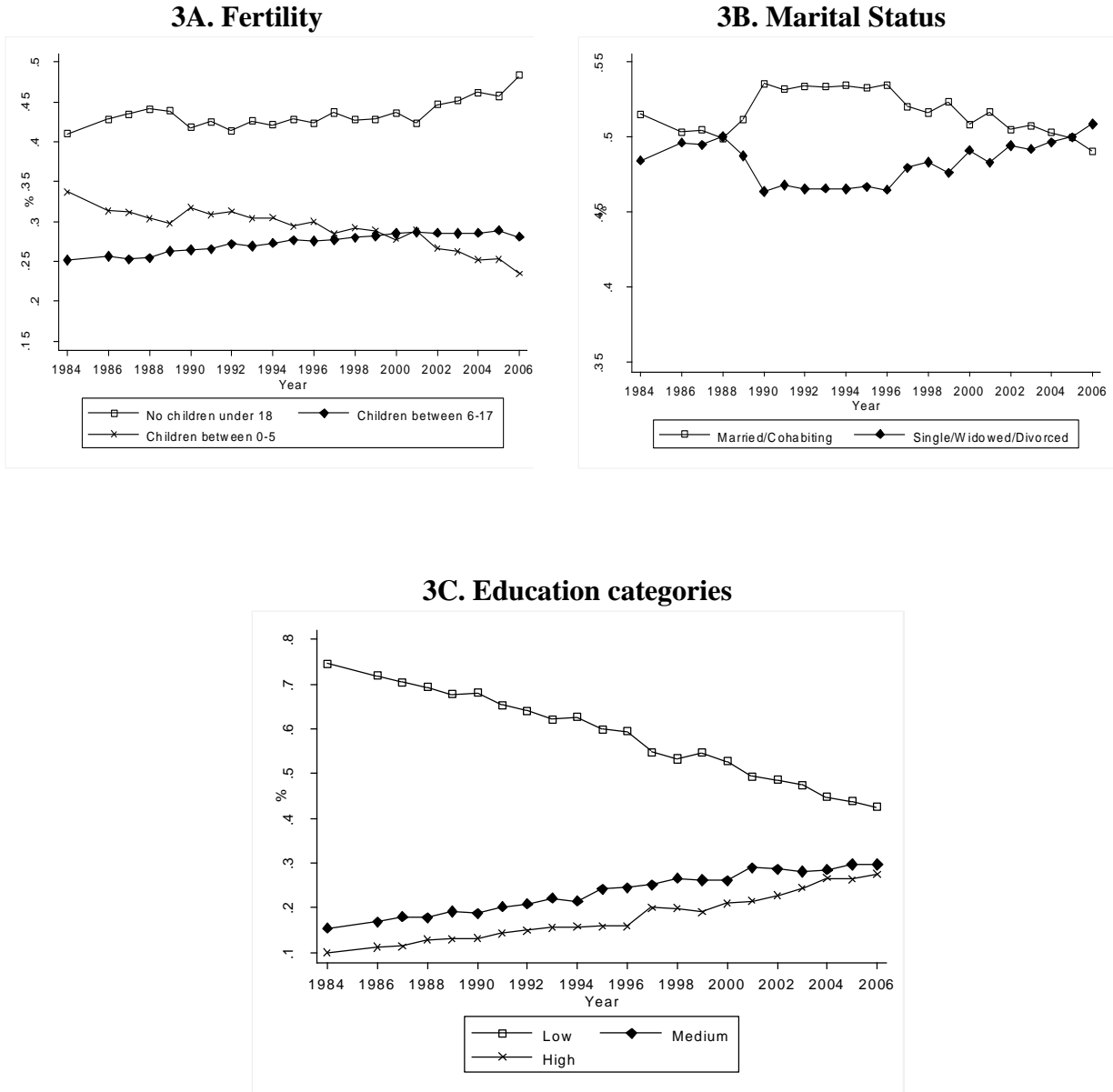
As displayed in Panel 3B, even though there is some variation during the period under study, the percentage of women who are married or cohabiting is roughly half, especially at the beginning and end of the period. However, during the 1990's, the proportion of married women was slightly higher.

The most substantial change in composition has to do with educational levels (Panel 3C). Colombian women reversed the education gap: today women have higher completion rates for primary, secondary and even college education. In the period under study the proportion of women with low education decreased from 75.6% to 42.64%. This implies that the proportion of women with medium and high education levels increased from 15.4% and 9.99% to 29.79% and 27.57%, respectively. That is, the percentage of university women almost tripled.

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<sup>9</sup> In addition, it is important to note that Colombian Household Surveys only include information about children who live in the surveyed household; information about children who do not live with their mothers is not included. This increases the proportion of women without children, especially among elderly women who are less likely to be currently living with their sons/daughters.

**Figure 3. Composition changes**



There have been substantial changes both in the participation rates of particular groups as well as in the composition of women in the workforce. Therefore, it is important to determine which of these variables (education, marital status and fertility) contributed the most to the increase in the female participation rate, and how much of the increase in the participation rate is due changes in the population composition. To address these questions, we perform two exercises. First, we estimate how the described covariates affect

the probability of participation. We then perform a decomposition exercise, following Elías and Ñopo (2010).

Table 3 presents the results of a regression by Log-likelihood of the participation choice at the individual level, pooling all observations from 1984 to 2006. The dependent variable is a dummy capturing whether a particular woman participates in the labor market or not. The main regressors are dichotomous variables that indicate the individual's marital status, fertility and educational attainment. We also include time dummy variables: 1984-1989, 1990-1995, 1996-2001, 2002-2006, capturing the economic cycle to some extent, as well and the interaction of the main variables (fertility, educational attainment and marital status) with the time variables. Additional controls also include personal non-earned income, other family income, age, and city fixed effects.

**Table 3. Marginal effects for female labor participation**

Dependent variable: labor participation						
Variable	Effect	Interaction with time dummy variables				
		1984-1989		1990-1995		1996-2001
Married/Cohabiting	-0.161 *** (0.002)	-0.145 *** (0.003)	-0.104 *** (0.003)	-0.046 *** (0.003)		
Medium education	0.068 *** (0.003)	0.040 *** (0.003)	0.046 *** (0.003)	0.027 *** (0.003)		
High education	0.113 *** (0.003)	-0.006 ** (0.004)	0.037 *** (0.004)	0.025 *** (0.004)		
Children under 18	0.022 *** (0.003)	-0.036 *** (0.004)	-0.015 *** (0.004)	0.005 (0.004)		
Children under 5	-0.020 *** (0.003)	0.029 *** (0.003)	0.015 *** (0.004)	0.015 *** (0.004)		

Estimation Method: Probit regression

Omitted period: 2002-2006

Medium education refers to completed secondary, High education refers to some college.

The omitted category is Low education that refers to incomplete secondary

Sample Size: 2.151.060, Pseudo R-squared: 0.13

Marital status appears to be the strongest driving force in the participation decision: being married/cohabiting decreases by 16,1 percentual points (pp) the probability of participating as compared to being single/divorced/widowed. The effect of education is also important, but smaller. Having a college degree or medium education increases the

probability of participating by 11 pp and 6.8 pp, respectively, as compared to low education. Women's fertility appears less relevant than marital status and education in explaining participation. This is in contrast with the observed trends in other countries such as the U.S. where the bulk of the increase in female participation has been driven by mothers of young children.

Not only does marital status have the strongest impact on the decision to participate, but it is also the factor that has changed the most throughout the analyzed period. This is captured by the coefficients on the interaction terms between our main explanatory variables and the time dummies. Because the omitted period is 2002-6, the interaction with the 1984-9 quantifies the change in the coefficient of each of these variables in the period under study. Clearly, the effect of marital status has changed the most during the time period. The changes in the coefficients associated with educational attainment have not been as dramatic as those displayed by marital status. The sum of the variable's coefficient and that of the interaction captures the effect of the variable at the beginning of the period. In 1984-9 being married decreased the probability of participating by 30.6 pp.

Let us now turn to the second exercise to determine the relative contribution of changes in the relevant covariates (education, marital status and fertility) and that of changes in the population composition in explaining the secular increase in female participation in Colombia. We follow the methodology proposed by Elías and Ñopo (2010). They decompose the changes in the labor force participation into the participation rate of specific subgroups of the population and population composition components. The basic idea is to express the female labor force participation  $l_t$  at time  $t$ , as

$$l_t = \sum_k m_t(K)P_t(K),$$

where  $m_t(K)$  is the labor force participation rate in period  $t$  for the group  $K$ , and  $P_t(K)$  is the fraction of women in group  $K$ , in period  $t$ . The change in women labor force participation through time can then be decomposed into a change in participation rates within groups and changes in the composition of the population, that is,

$$l_{t+1} - l_t = \sum_k P_{t+1}(K)[m_{t+1}(K) - m_t(K)] + \sum_k m_t(K)[P_{t+1}(K) - P_t(K)]$$

We first apply the methodology to Colombian data analyzing in turn the explanatory variables, and then consider then all simultaneously. Table 4 displays the decomposition

results for marital status. Changes in the participation rates of specific subgroups drive the aggregate trend, while changes in composition are only marginally. On average (see last row), changes in the participation rates of married/cohabiting and single/widowed/divorced account for the total change in the labor force participation of women and most of the participation rate component is accounted by the increase in participation rates of the married/cohabiting group (0.025 out of 0.035). In contrast, on average, changes in composition are unimportant in explaining changes in the participation rate. This is because the effect of changes in the proportion of women married/cohabiting cancels out with the effect of changes in the proportion of single/widowed/divorced women.

**Table 4. Decomposition of Changes in Women Labor Force Participation by Marital Status**

Year	Changes in Participation rates			Changes in the Composition			Total Change in Labor Force Participation rate
	Total	Married/ Cohabiting	Single/Widowed/ Divorced	Total	Married/ Cohabiting	Single/Widowed/ Divorced	
<b>1986-2 vs. 1990-2</b>	0.037	0.025	0.012	-0.008	0.012	-0.020	0.029
<b>1990-2 vs. 1994-2</b>	0.043	0.027	0.016	0.000	-0.001	0.001	0.043
<b>1994-2 vs. 1998-2</b>	0.065	0.044	0.020	0.004	-0.008	0.012	0.068
<b>1998-2 vs. 2002-2</b>	0.044	0.033	0.011	0.002	-0.006	0.008	0.046
<b>2002-2 vs. 2006-2</b>	-0.014	-0.006	-0.008	0.002	-0.009	0.011	-0.012
<b>Average</b>	0.035	0.025	0.010	0.000	-0.002	0.002	0.035

When decomposing the increase in participation by fertility (Table 5), as was the case with marital status, changes in the participation rates of subgroups account for the total change in female labor force participation. The bulk of the increase in participation is accounted for by the increase in participation rates of women with young children; between 6-17 (0.014 out of 0.036) and women with children between 0-5 (0.013 out of 0.036).

By education (Table 6), the situation is somewhat different since changes in composition are important. Changes in participation rates account for roughly two-thirds of the increase in participation (0.024 out of 0.035), and changes in composition account for the remainder (0.011 out of 0.035). Most of the composition component is accounted by the increase in the proportion of the women with a high education level (0.024 out of 0.024), while most of the participation rate component is accounted for by the increase in participation rates of the women with low education (0.016 out of 0.024).



**Table 5. Decomposition of Changes in Women Labor Force Participation by Women's Fertility.**

Year	Changes in Participation rates				Changes in the Composition				Total Change in Labor Force Participation rate
	Total	No children under 18	Children 6-17	Children 0-5	Total	No children under 18	Children 6-17	Children 0-5	
1986-2 vs. 1990-2	0.030	0.005	0.016	0.009	-0.001	-0.006	0.003	0.002	0.029
1990-2 vs. 1994-2	0.043	0.009	0.018	0.016	0.000	0.002	0.004	-0.006	0.043
1994-2 vs. 1998-2	0.068	0.017	0.022	0.029	0.000	0.003	0.004	-0.007	0.068
1998-2 vs. 2002-2	0.047	0.015	0.017	0.015	-0.001	0.011	0.004	-0.017	0.046
2002-2 vs. 2006-2	-0.009	-0.003	-0.002	-0.004	-0.003	0.023	-0.004	-0.022	-0.012
<b>Average</b>	0.036	0.008	0.014	0.013	-0.001	-0.007	-0.002	-0.010	0.035

**Table 6. Decomposition of Changes in Women Labor Force Participation by Women's Education.**

Year	Changes in Participation rates				Changes in the Composition				Total Change in Labor Force Participation rate
	Total	Low	Medium	High	Total	Low	Medium	High	
1986-2 vs. 1990-2	0.022	0.008	0.004	0.010	0.007	-0.017	0.011	0.013	0.029
1990-2 vs. 1994-2	0.032	0.022	0.007	0.003	0.012	-0.024	0.017	0.019	0.043
1994-2 vs. 1998-2	0.049	0.029	0.012	0.009	0.019	-0.045	0.033	0.031	0.068
1998-2 vs. 2002-2	0.036	0.033	0.006	-0.002	0.010	-0.026	0.014	0.022	0.046
2002-2 vs. 2006-2	-0.022	-0.012	-0.004	-0.006	0.009	-0.036	0.008	0.037	-0.012
<b>Average</b>	0.024	0.016	0.005	0.003	0.011	-0.030	0.017	0.024	0.035

The decompositions described above show that the increase in participation has been mostly driven by changes in participation rates of particular subgroups rather than by changes in the composition of the population. However, we still need to determine the relative importance of the increase in the participation of the different groups. Thus, Table 7 and Table 8 report the decomposition combining all the possible categories in the three covariates: marital status (married/cohabiting), fertility (no children under 18, children between 0-5 and children between 6-17) and education (low, medium and high), resulting in 18 groups.

**Decomposition of Changes in Women Labor Force Participation combining fertility, marital status and education.**

**Table 7. Changes in Participation Rates**

Years	Total	Childless women						Women with Children between 0-5						Women with Children between 6-17					
		Married/Cohabiting			Single/Widowed/Divorced			Married/Cohabiting			Single/Widowed/Divorced			Married/Cohabiting			Single/Widowed/Divorced		
		Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
1986-2 vs. 1990-2	0.028	0.000	0.002	0.002	-0.002	0.002	0.004	0.005	-0.001	0.002	0.001	0.000	0.000	0.005	0.003	0.001	0.003	0.000	0.001
1990-2 vs. 1994-2	0.033	0.002	0.001	0.000	0.001	0.002	0.002	0.006	0.003	0.001	0.002	0.000	0.000	0.010	-0.001	0.000	0.003	0.001	0.000
1994-2 vs. 1998-2	0.045	0.002	0.000	0.001	0.003	0.000	0.002	0.010	0.004	0.002	0.002	0.001	0.001	0.008	0.004	0.002	0.001	0.001	0.001
1998-2 vs. 2002-2	0.036	0.008	0.001	-0.002	0.006	0.001	-0.001	0.007	0.002	0.000	0.000	0.000	0.000	0.010	0.001	-0.001	0.003	-0.001	0.000
2002-2 vs. 2006-2	-0.018	0.000	-0.001	0.001	-0.005	0.000	-0.003	-0.002	-0.003	-0.002	0.000	0.000	0.000	-0.002	0.000	-0.001	0.000	-0.001	0.000
Average	0.025	0.003	0.001	0.000	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.000	0.000	0.006	0.001	0.000	0.002	0.000	0.000

**Table 8. Changes in the Composition**

Years	Total	Childless women						Women with Children between 0-5						Women with Children between 6-17					
		Married/Cohabiting			Single/Widowed/Divorced			Married/Cohabiting			Single/Widowed/Divorced			Married/Cohabiting			Single/Widowed/Divorced		
		Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
1986-2 vs. 1990-2	0.001	0.002	0.001	0.002	-0.013	0.000	0.000	-0.002	0.005	0.004	-0.004	0.000	0.000	0.000	0.002	0.004	-0.004	0.001	0.002
1986-2 vs. 1990-2	0.011	0.001	0.002	0.003	-0.013	0.002	0.009	-0.007	0.003	0.001	-0.004	0.005	0.001	-0.003	0.003	0.003	0.001	0.003	0.002
1986-2 vs. 1990-2	0.024	-0.003	0.004	0.006	-0.013	0.007	0.009	-0.013	0.004	0.005	-0.003	0.007	0.003	-0.007	0.004	0.005	-0.003	0.009	0.003
1986-2 vs. 1990-2	0.010	0.001	0.002	0.005	-0.002	0.001	0.005	-0.013	-0.002	-0.001	-0.005	0.006	0.003	-0.006	0.005	0.008	-0.003	0.001	0.003
1986-2 vs. 1990-2	0.006	0.001	0.001	0.007	-0.006	0.007	0.017	-0.013	-0.001	0.005	-0.008	-0.003	0.001	-0.010	0.003	0.002	-0.002	0.001	0.005
Average	0.010	0.000	0.002	0.005	-0.009	0.003	0.008	-0.010	0.002	0.003	-0.005	0.003	0.002	-0.005	0.003	0.004	-0.002	0.003	0.003

When combining all categories we find that changes in participation rates account for most of the change in the total change in labor force participation (0.025 out of 0.035). The groups that have driven the increase in labor force participation are women who are married/cohabiting and have a low education level regardless of their fertility status: children between 6-17 (average contribution of 0.06 points), children between 0-5 who (average contribution of 0.05 points) and women without children under 18 (average contribution of 0.03). Adding up the contributions of these three groups, we obtain a total contribution of 0.014 out of 0.025; the increase in participation rates of these subgroups account for about 56% (0.014 out of 0.025) of the total change in the participation rate.

The results of the pooled OLS are very consistent with the decomposition results. Marital status appears to be the strongest driving force in the participation decision, followed by education, while fertility appears less relevant. The increase in participation is driven by the increase in the participation rate of women who were married/cohabiting and had a low education level, regardless of their fertility status. These are groups that traditionally had low labor market attachment. In addition, composition appears to be a second order effect.

## **6. What are the Channels?**

In this section, we explore some of the institutional, labor market and social factors that may be behind the steep increase observed in participation in the last decades in Colombia. First, the increase in participation may be driven by changes in culture and perception. For example, if children saw their mother working as they grew up, they will be more prone to see this as 'normal'. Another potential explanation is the increase in the probability of divorce: women work more as insurance against becoming a single-person household. The increased availability of inexpensive childcare (which could enable low education women to work) could also foster participation among mothers. Also, the documented decrease in the wage gap may have increased female participation, by increasing the benefits of working for women and making the potential income above the reservation wage. Second, it is possible that the equalizing effect of economic growth may be behind some of these changes. Finally, it is possible that changes in labor market regulation may have leveled the ground for certain groups of

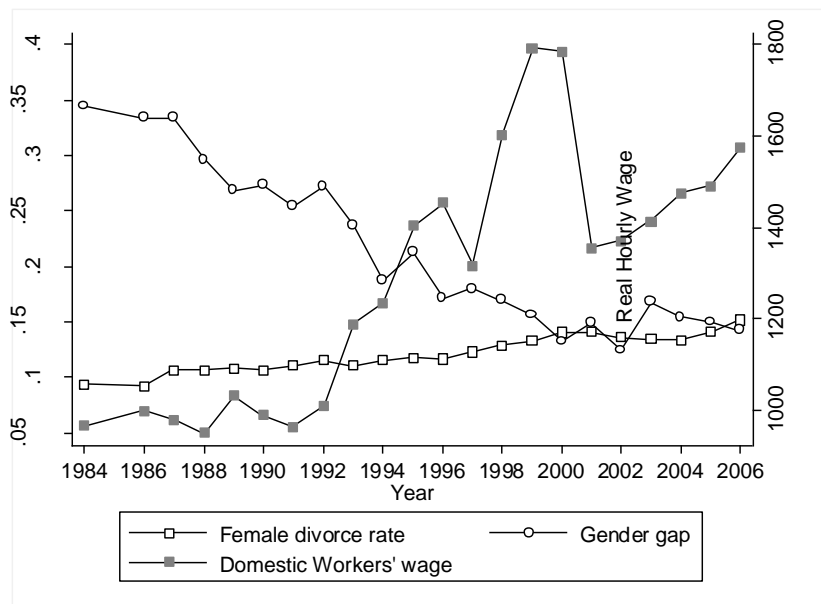
women, fostering their labor market participation. We explore this by analyzing the changes in labor market regulations.

We find that lagged participation and divorce rates in a given city are very strong predictors of female participation, which would favor cultural and perception change as an important explanation behind the increase in female labor participation. There is no evidence that the increase in participation is correlated with growth or unemployment patterns. Finally, changes in the legislation may have a significant but potentially limited effect on female participation.

### 6.1 Cultural and perception change

Figure 4 shows the evolution of the gender wage gap, the domestic worker's wages and the divorce rates for the period under study. Divorce rates have roughly increased 6 percentual points, while the gender raw gap has decreased around 20 percentual points. The real hourly wage for domestic workers has been characterized by a growing trend.

**Figure 4. Descriptive Stats**



We want to test whether the increase in participation is driven by changes in culture and perception. Although we don't have a natural experiment to determine causality, we run a probit model of female participation, pooling all individual

observations between 1984 and 2006. We then control for all the proposed explanations under Cultural and Perception Change. This way we can study the conditional correlations, and study whether one explanation has more predictive power than another.

The explanations included under Culture and Perception change are (i) the growing tendency to see working women as a normal phenomenon, (ii) the increase in the probability of divorce which would make women more likely to become a single person household or a head of household, (iii) the documented decrease in the wage gap which has potentially increased the benefits for working women and (iv) the availability of inexpensive childcare which has increased in Colombia<sup>10</sup>.

However the data contained in the CHS has a number of limitations that does not allow us to properly test the mentioned hypothesis. First, because we do not have information of the maternal employment status of today's workers, we use the lagged female participation rates for each city. In the estimations presented in the text we used the female participation lagged 10 years. This choice which was driven by the time period available. Second, the information available does not include information on preferences or cultural perceptions on divorce, therefore we used the female divorce rates by city lagged 5 years as a proxy for the influence of declines in divorce rates on female's labor participation decision. Third, since we do not have data for the number of inexpensive childcare centers available in each of the 10 cities of our sample we use domestic workers' real hourly wage as a proxy. Finally, we include a 5 year lagged measure of the gender wage gap by city<sup>11</sup> to capture the increasing benefits of working for women.

In addition we include some additional controls in the estimation that include age and its square, marital status, whether there were children younger than 5 years of age, or between 6 and 17 years of age, education level, city dummies, other family income and non-earner income. It does not include time dummies because the participation and divorce rates are lagged.

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<sup>10</sup> This was in part due to the implementation of a government program called 'Hogares Comunitarios de Bienestar' which consists of a network of inexpensive childcare centers located in poverty areas. However, it was impossible to get the time series of available slot in this program by city.

<sup>11</sup> We performed several robustness checks regarding the number of lags for each variable (participation rates, divorce rates and wage gap) and the results are very similar.

**Table 9. Changes in Participation  
Marginal effects**

<b>Dependent variable is labor participation</b>	
<b>Variable</b>	<b>Coefficient</b>
Married/Cohabiting	-0.210 *** (0.008)
Medium education	0.083 *** (0.011)
High education	0.122 *** (0.013)
Children under 18	0.021 *** (0.006)
Children under 5	-0.007 (0.005)
Participation rates [t-10]	0.631 ** (0.250)
Wage Gap [t-5]	-0.034 (0.155)
Divorce Rate [t-5]	0.770 ** (0.354)
Domestic Worker's wages	0.000 0.000

\*Clustered standard errors at city level in parenthesis

Results in

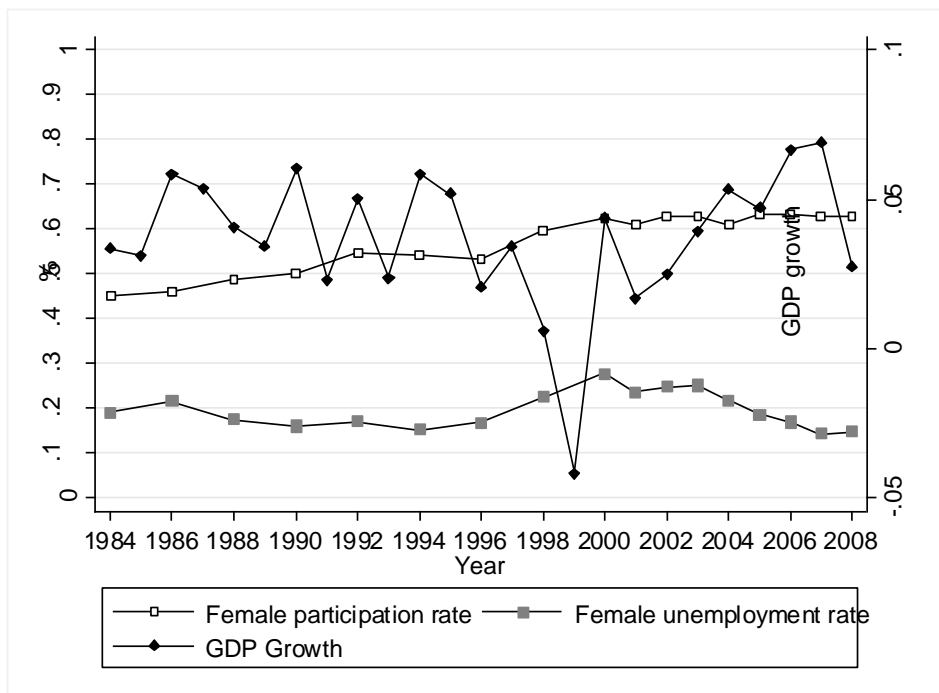
Table 9 show that lagged participation rates in a given city are strong predictors of female participation: an increase in one percentage point in the lagged participation rate increases the probability of participation in 63 percentage points. This is consistent with the intuition presented in Fogli and Veldkamp (2007): female participation increases when women learn from experience about the benefits of working, and hence it becomes socially acceptable. Lagged divorce rates are also strong predictors of female participation: an increase in one percentage point in the lagged divorce rate increases the probability of participation in 77 percentage points. The gender gap and domestic

workers' wages does not appear to be significant in explaining the increase in female participation rate<sup>12</sup>.

### 6.2 The effect of the economic cycle

Figure 5 displays the evolution over the period under study of female participation, female unemployment rate and GDP growth. There doesn't seem to be a clear association between the GDP trend and the unemployment and participation rates, except perhaps for the period 1999-2000 when Colombia experienced a deep economic crisis that subsequently induced an increase in female participation rate and female unemployment. This visual lack of correlation is confirmed by calculating the correlation coefficients between the series. Female participation is not correlated at standard levels of significance with either GDP growth or female unemployment.

**Figure 5. Female Participation, Unemployment and GDP Growth**



Source: The World Bank (for the GDP) and author's calculations

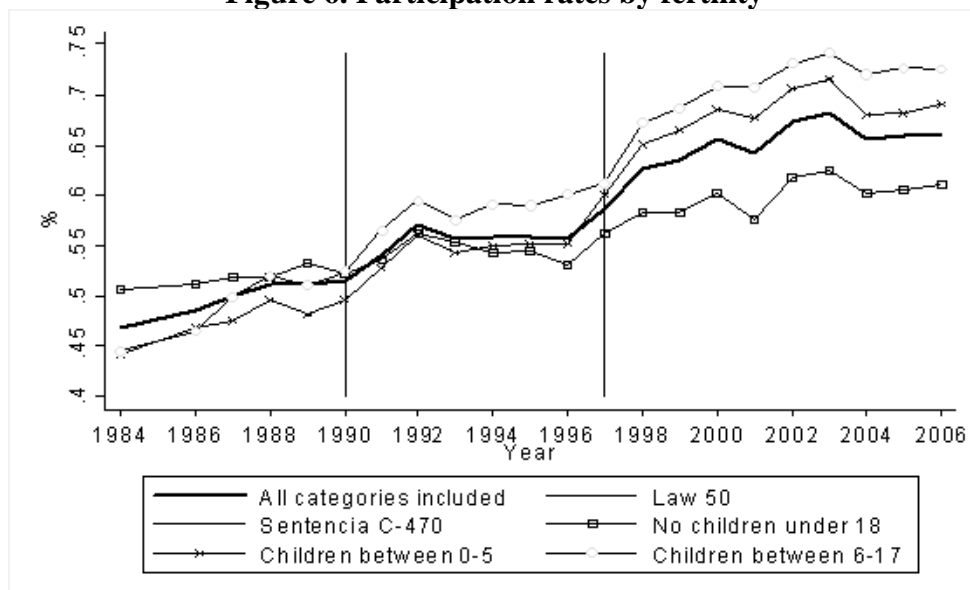
### 6.3 Changes in Legislation

<sup>12</sup> When the explanations are tested individually, participation rates, divorce rates and the gender wage gap appear to be statistically significant and economically relevant channels. However, when performing the joint estimation, only female participation and divorce rates retain their explanatory power.

Colombian legislation promotes gender equality; Articles 13 and 43 of the Labor Code explicitly state that employers should pay equal wages for equal jobs. However, the Labor Code was issued in the 60's (through Law 141 of 1961) a time that is not comprised in the period under analysis. Therefore in terms of gender equality measured by equalitarian salaries it is hard to relate legislative changes with the substantial increase in participation rates since these mentioned legislative reforms were made outside the period under consideration.

However there are other legislative reforms related to women's labor force that did take place in the period under consideration and deserve further analysis. Figure 11 shows an important change that took place right after 1990; the participation rate of the women with children between 0-5 years of age started showing an ascending trend surpassing childless women. After 1997 the participation rate of women with children under 5 continued increased its growing trend, growing even above the aggregate trend (bold line).

**Figure 6. Participation rates by fertility**



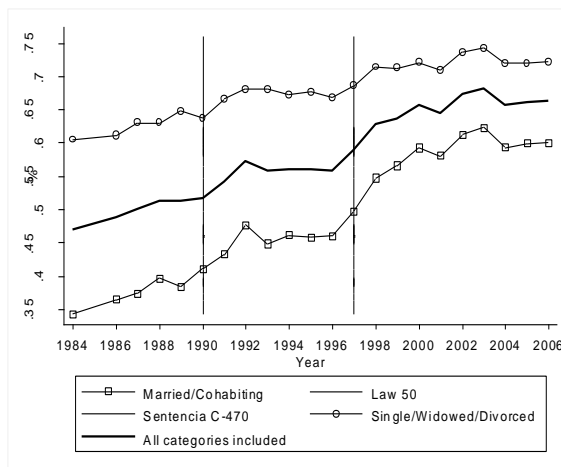
These two significant changes coincide with two important legislative changes that took place under the analyzed period (1984-2006). The first one occurred in 1990 when articles 236-239 were introduced to the Labor Code through Law 50. Those articles state that all female workers in a state of pregnancy have the right to a 12-week paid leave, that a female worker cannot be fired due to pregnancy and that if she is fired the employer should pay a compensation to the female worker equivalent to a month of



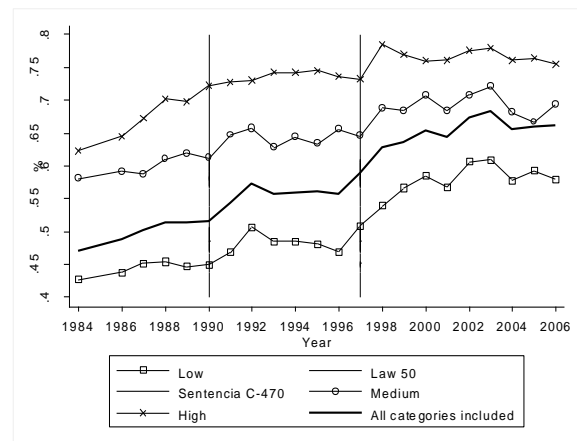
work (60 days) together with a 12-week paid leave. The second was in 1997 with the Resolution C-470 issued by the Constitutional Court. A lawsuit was filed to article 239 of the Labor Code stating that it didn't protect pregnant women since it left a window through which they could be fired by paying a monetary compensation afterwards. The Constitutional Court through Resolution C-470 of 1997 (Sentencia C-470 de 1997) declared that the compensation should be understood as a means for sanctioning the employer but should *not* be understood as a means for firing a pregnant woman. Instead, the Court mandated that all women who had been resigned from their jobs in a state of pregnancy or during the three months after delivery should be reintegrated to their previous job.

The described legislative changes may have driven the participation rates of women with children. However the impact of the legislation is less clear when analyzing women by marital status and by education. By marital status (Figure 7), there are no major changes in the participation trend around the years 1990 and 1997, and the same scenario applies to the analysis by education levels (Figure 8).

**Figure 7. Participation rates by marital status**



**Figure 8. Participation rates by education**



From the exercises described in previous sections, we know that the increase in participation was driven by women married/cohabiting and with low education levels. Therefore, these changes in legislation are likely to have had limited effect on the increase in participation. We confirm this by running a probit model of female participation, pooling all individual observations between 1984 and 2006. In order to test whether these two legislative acts induced a change in participation rates we added a series of dummy variables and their interactions with the main variables that

correspond to the following time periods: 1984-1990, 1991-1997, 1998-2002 and 2003-2006 (Table 12).

After introducing time dummies and their interactions, results are very similar to those portrayed earlier: marital status is not only the factor that has been the most important in determining the participation decision but also the factor that has changed the most throughout the analyzed period. The time periods 1984-1990, 1991-1997, 1998-2002 decrease the probability of participating by 8.4, 6.6 and 0.6 pp respectively, as compared to 2003-2006. This implies that the change in time periods contributes positively to participation, reinforcing our hypothesis according to which the legislative changes introduced in 1990 and 1997 positively impacted participation.

**Table 12. Changes in Participation - Legislative Changes**

Dependent variable is labor participation						
Variable	Coefficient	Interaction with time dummy variables				
		1984-1989	1990-1997	1998-2002		
Married/Cohabiting	-0.194 *** (0.003)	-0.136 *** (0.003)	-0.091 *** (0.003)	-0.023 *** (0.004)		
Medium education	0.066 *** (0.003)	0.042 *** (0.003)	0.046 *** (0.003)	0.018 *** (0.004)		
High education	0.113 *** (0.003)	0.001 (0.004)	0.036 *** (0.004)	0.012 ** (0.005)		
Children under 18	0.034 *** (0.003)	-0.056 *** (0.003)	-0.028 *** (0.003)	-0.004 (0.003)		
Children under 5	-0.020 *** (0.003)	0.029 *** (0.003)	0.015 *** (0.004)	0.017 *** (0.004)		
Period 1984-1990	-0.084 *** (0.003)					
Period 1991-1997	-0.066 *** (0.003)					
Period 1998-2002	-0.006 * (0.003)					

Did the changes in legislation induce a structural change in the female participation rate? In order to formally test if the data should be treated as “pooled” or should account for the structural change introduced by legislative changes we implemented a Chow Test. The null hypothesis of the Chow Tests implies that all the coefficients associated with the time dummy variables as well as their interactions are

not statistically significant. The results of a chi-square test show that there is in fact a structural change generated by some time periods.

Therefore, changes in legislation significantly increased female participation. However, because as compared to marital status and education level, fertility explains relatively little of the aggregate trend in the participation rate, we believe that the changes in legislation have only limited explanatory potential.

## **7. Conclusions**

Many changes have contributed to the increase in female labor force participation over the last decades. We decompose the evolution of participation into changes in the composition of the population and changes in the participation rates by groups (according to educational attainment, fertility and marital status). The increase in participation is driven by the increase in the participation rate of women with low education levels who were either married or cohabiting regardless of their fertility status while changes in the population composition are second order effects.

The increase in participation is strongly associated with past participation and divorce rates, but not with the availability of affordable childcare or decreases in the gender wage gap, implying that cultural and perception of change has been an important force behind the increase in participation rates by influencing women to work more as an insurance against becoming a single-person household or head of household and by making working women a more socially acceptable phenomenon. Changes in maternity legislation appear to play a small but significant role while female participation appears unaffected by the business cycle. All in all, these results suggest that the observed changes were fueled by changes in what was culturally acceptable rather than by policy of macro-economic conditions.

In Colombia, young women are more educated than men and are one of the very valuable resources that can make a difference regarding the long run growth in the economy. Therefore, gender differences in the labor market that misuse this resource are not only generating inefficiencies, but leaving women dissatisfied and frustrated. Given the paper's findings, we believe that fostering gender equality in the labor market, especially for low education women, can improve labor market outcomes and thus achieve potential growth. This is, however, not an easy task, since most low education

women work in the informal sector where labor market regulations are not binding (Mondragón-Vélez, Peña and Wills, 2010). Therefore, we believe that general policies aiming at decreasing the size of the informal sector may play an important role.

Women who are married or cohabiting substantially increased their participation, but it is still below that of single, divorced or widowed women. As compared to marital status, fertility plays a secondary role in explaining the increase in participation. The group of married/cohabiting women may face home responsibilities (other than those related to childrearing) or cultural barriers that preclude women from participating in the labor market. Further cultural change, maybe fueled by public campaigns emphasizing the importance of sharing house work within the couple, could foster further increases in their participation rates.

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