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What does the stork bring to women's working career?

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Abstract

Many studies have been devoted to analyse the effect of maternity on working mothers; they mostly refer to countries where female participation is high. Fewer studies consider Southern European countries. This paper aims at filling the gap analysing the effects of motherhood on women's working career in Italy, a neat example of Southern European country where female participation is increasing but still low and where the decrease in trade unions' power increased wage disparities.

Our results show that conditional average wages of mothers become significantly lower than those of non-mothers after childbirth, showing no sign of a closing gap 5 years afterward. However, this penalty does not emerge for mothers moving to a part-time job; hence - differently from the existing literature - we highlight the potential role of part-time jobs in mitigating the "reduced effort" effect of childrearing. Furthermore, we estimate a significant increase in the probability of transition from employment to non-employment for new mothers. The probability is higher the lower the pre-childbirth wage. However, this penalty is reduced by the availability of part-time jobs in mothers' relevant labour market. Hence again it emerges the potential role of part-time jobs in mitigating the negative effect of childbirth on women's labour market participation.

JEL codes: J13, J31

Keywords: motherhood, part-time jobs, wage penalty, career

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1 Introduction

The widespread increase in women's participation to the labour market over the last thirty years represents undoubtedly a relevant phenomenon for its economic and social impact. Even if female participation rate is still far from the male one, its increase made it necessary for the national and local governments to promote policies and services aimed at making work and family life compatible. In fact, the increased participation may produce a decline in the total fertility rate, as it happened in Southern European countries where social and family policies are still inadequate. Italy is a neat example of this. Italian female participation rate has been increasing significantly since the '70s, although it is still below the European average and far below the Lisbon target. The increased participation did produce a decline in the total fertility rate, that reached its minimum value of 1.2 in 2000. This because base (fully paid) maternity leave is relatively short (5 months), optional parental leave is poorly paid, part-time job opportunities are still quite limited and most of the Italian regions (especially in the South) still lack an adequate childcare provision[1].

Due to the economic relevance of fertility decline, most of the literature on Italy analyses the possible relations between women's participation to the labour market and fertility decisions[2]. Less attention, on the contrary, has been devoted to the consequences of motherhood on the subsequent working career. However, the topic is relevant for better understanding the relationship between family and the labour market and for measuring the full cost of children.

The effects of motherhood on women's work can be classified in two main categories: career break job penalty and downward occupational mobility[3]. *Career break job penalty* refers to the permanent or temporary transition of working mothers to non-employment. When mothers do not leave their job, they may experience a *downward occupational mobility*, i.e. women with children may be penalized with respect to non-mothers in their career advancements and wages. In the literature this is also labelled *family wage gap*. On top of reasons that spur the Lisbon agreement, both career break job penalty and downward occupational mobility produce a clear loss in terms of human capital for the society as a whole if mothers do not work or if they hold occupations below their abilities and knowledge.

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[1] See Del Boca and Pasqua (2004 and 2005), Del Boca, Pasqua and Pronzato (2005), Del Boca (2002).

[2] For a survey: Del Boca and Wetzels (2007)

[3] Gutierrez-Domenech (2005a).

Italy is of specific interest with respect to both career break job penalty and family wage gap. In Italy, in fact, the wage distribution was traditionally quite compressed, and the gender wage gap was small when compared to most European Countries[4]. The relevant role played by trade unions since the '70s reduced wage inequality, and this helped to keep the gender wage gap quite small. After 1980, however, the power of the trade unions lessened and wage disparities increased, with negative effects on both gender and family wage gap. Despite the higher participation rate of younger cohorts of women achieved in the recent decades, Italy still faces high exit rates from employment of new mothers with respect to other countries[5]. This might be due to the wage penalty for mothers, accompanied by the limited availability of part-time jobs and the lack of childcare. The link between wage disparities, availability of part-time jobs and employment of new mothers is precisely the focus of our paper. To the best of our knowledge, no analysis on this topic is available for Italy.

We estimate the career break job penalty and the family wage gap comparing working mothers to working women that have no children (i.e. our benchmark does not include men). We use administrative data drawn from INPS archives (the Italian Institute for Social Security) and processed in a public-use file known as the Work Histories Italian Panel (WHIP) by LABORatorio R. Revelli. WHIP represents a unique source for studying the interaction between motherhood, mothers' participation to labour market and wages since it contains information on both working career and eventual maternity leave spells.

We model working women's labour supply after childbirth to highlight the individual and job characteristics that make exit more likely. In modelling this decision we assume a wage penalty for women working full-time after childbirth, and no penalty for mothers working part-time. Our estimates confirm this hypothesis: the wage profile over time of mothers with respect to ever-childless women highlights a significant penalty after motherhood that does not fade away even in the medium run. This happens only to mothers not moving to a part-time job. As far as exit is concerned, we do find that mothers are more likely to move to non-work than non-mothers, especially when they hold less qualified jobs and when they earn lower wages. While holding a part-time job increases the probability of exiting employment among non-mothers, the opposite is true for mothers, pointing to a significant role of part-time contracts as family-friendly tools. This is reinforced by our final result, i.e. the reduced

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[4] European Commission (2002)

[5] Pronzato (2007)

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exit rate of mothers where part-time jobs are more available.

The paper is organized as follows. Section 2 reviews the related literature. Section 3 presents a simple model of labour supply after motherhood. Section 4 describes the data. Section 5 presents the econometric strategy. Section 6 presents and discusses the results. Conclusions follow.

2   Family wage gap and career break job penalty

Many studies have been devoted to analyze the effects of maternity on working women, considering both the effect on wages and on the working career. Most of these studies refer to the U.S., the U.K. and Northern European countries, where female participation to the labour market is high. Fewer studies, on the contrary, consider Southern European Countries, and Italy in particular, since in these countries the main concern is the low female employment rate. The existing literature agrees in concluding that the key reason for the low participation rates in Southern European Countries is the lack of adequate policies and services that help women to reconcile work and family life (Del Boca and Wetzels, 2007).

Harkness and Walfogel (2003) find that a negative effect of children on women's wage (**wage penalty**) exists in all countries they consider[6]. It is largest in the U.K., followed by the other Anglo-American countries and Germany, while it is smallest in the Nordic countries.

The literature identifies several explanations for the family wage gap (Wetzels, 2005). The first is related to the *human capital* depreciation during non-work spells (childbearing and childrearing) for women who do re-enter the labour market. This can contribute to explain the lower hourly wage of women that spent some periods out of the labour market. Waldfogel (1995) for the U.S. and Joshi et al. (1999) for the U.K. show how human capital plays an important part in explaining the wage differential between mothers and non-mothers. In particular, Joshi et al. (1999) find no wage penalty for mothers who did not take breaks after childbirth. Anderson et al. (2002) find no penalty for less educated mothers for which the human capital accumulation is less relevant. Albrecht et al. (1999) for Sweden find a negative effect of non-work spells (but not of maternity leaves) on women's subsequent wages. However, they find that the penalty due to a break is different for men and women and therefore the

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[6]They use the LIS (Luxemburg Income Study) and control for earnings-related characteristics. Italy is not included in this comparative study.

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human capital depreciation hypothesis cannot explain alone the family wage gap. Datta Gupta and Smith (2003) for Denmark show that the negative effect on women's human capital of motherhood is only temporary.

Moreover, employers may consider breaks (especially when prolonged beyond the base leave period) or even motherhood, as a *signal* of a lower work commitment, with negative effects on career and wages (Mavromaras and Rudolph, 1997).

Secondly, women that want to have children are more likely to choose jobs with more suitable working conditions *ex-ante*, in particular for what time and place of work are concerned. The cost of this choice can be a lower wage and/or less career opportunities for working mothers (Gronau, 1988), even before childbirth. Koreman and Neumark (1992) and Datta Gupta and Smith (2002) find that the family wage gap is due primarily to heterogeneity and self-selection into less demanding/lower paid jobs; on the contrary, Waldfogel (1995, 1997, 1998) finds that controlling for unobserved heterogeneity (fixed effects) does not reduce the estimated penalty in the U.S. and therefore differences in motivation and attitudes cannot explain alone the family wage gap.

Moreover, new mothers may look for better job conditions *ex-post*: new mothers are more likely to reduce the number of hours worked, to look for a more flexible job or for a job closer to home. Wetzels and Zorlu (2003) emphasize the effect of selection into less demanding jobs in explaining wage differentials between mothers and non-mothers. Joshi et al. (1999) for the U.K. find no pay penalty for mothers within the group of full-time workers or within the group of part-time workers, but mothers that pass from full-time to part-time suffer a relevant wage penalty. Similarly, in Walfogel (1997) part-time employment is an important component in explaining the family gap in pay. Hence, a *part-time job* helps mothers in staying attached to the labour market, but in many countries part-time jobs are less protected and less paid than full-time jobs (Del Boca et al., 2005; Ariza et al., 2005) and therefore moving to a part-time job imposes a cost to working mothers in terms of career and hourly wages. We will show that in Italy the opposite result holds[7].

Finally, mothers may be *less productive* than non-mothers, because of family responsibilities and increased household production and caring activities, or because of the tiredness and because they "store" energies for their duties at

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[7]See also Newell and Joshi (1986), Dex et al. (1998) and Joshi et al. (1999), for the U.K.; Ellingsaeter and Rönsen (1996) for Norway. Del Boca et al. (2005) highlight a positive effect of part time on female participation in Italy, but they do not consider wages.

home. As Becker (1991, 1995) argues, this is the consequence of specialization within the family: women are in fact the main responsible for domestic work and childcare; therefore they spend less time in leisure activities and more in household tasks and less energy is left for the paid work. Moreover they may stay at home when children are ill, they may spend some time at work organizing childcare and children's activities. This hypothesis is not easily testable using the typical data available to the researchers. However, Davies and Pierre (2005) show that wage penalty increases with the number of children while Anderson et al. (2003) use children age in their wage equation and they show that when children grow up the negative effect of their presence on the mother's wage is reduced: more and younger children are more time and energy demanding for their mothers. Phipps et al. (2001) test the hypothesis that Canadian women with more onerous unpaid work responsibilities (due in particular to the presence of children) are less productive in their paid work. They consider only full-timers and they find that total hours of unpaid work are negatively associated with current income.

Furthermore, the lower productivity of mothers with respect to non-mothers can be simply assumed by employers (*stigma*) that do not actually observe each worker's productivity (Joshi et al., 1999; Buding and England, 2001). However, this hypothesis is even more difficult to test against the previous one. To the best of our knowledge no results are available in the literature on this point.

Empirical studies on new-mothers' participation to the labour market show that many women **exit** employment after childbirth, and that most of them do not re-enter, especially where women's participation is low. In Italy - and similarly in Spain - women's employment rates decrease from 50% to 40% after childbirth and it remains at 42% after 10 years (Gutierrez-Domenech, 2005b). Moreover, Geyer and Steiner (2007) in a cross-country study using the European Panel show that in Italy the employment rate of women decreases with the number of children more than in other European countries; in addition, the ageing of the children does not rise the employment rate of mothers, showing how difficult it is to re-enter the Italian labour market once left.

The decision of exiting the labour market is mainly linked to the level of *human capital*: more skilled women, with better jobs and higher opportunity costs tend not to leave (Gustaffson et al., 1996; Dex et al., 1998; Gutièrrez-Domènech, 2005b). Pronzato (2007) reports that in Italy, 60% of women with primary education is still out of the labour market 48 months after childbirth,

while the most educated Italian women re-enter a few months after childbirth, analogously to the high educated women in the rest of Europe[8].

However, human capital explains only in part mothers' employment decisions after childbirth. In fact, where *childcare* services are available, affordable and of good quality (mainly in Northern European countries), it is easier for women to reconcile work and family responsibilities and therefore it is more likely that they stay attached to the labour market (Gutièrrez-Domènech, 2005b, Pronzato, 2007). Wetzels (2001) compares mothers' labour market behavior in Germany, the U.K., the Netherlands and Sweden and she finds an important relationship between the country's specific policies and the timing of re-entry. Generosity of the parental leave policies (in particular the length of optional leave and the replacement rate) seems to be crucial in increasing the probability of re-entering of new-mothers (Rönsen and Sunström, 1996; Gustaffson et al., 1996; Pronzato, 2007). Saurel-Cubizolles et al. (1999) analyze the employment decisions after childbirth in France, Italy and Spain and they find that in Italy and France, where optional parental leave is longer compared to Spain, around 80% of women return to work, while in Spain only 53% of new-mothers return to work.

Desai and Waite (1991) discuss the importance of the *job characteristics* to increase the probability of women to re-enter work after a childbirth: mothers are more likely to work if the job allows flexibility in hours, if it is safe and physically undemanding. A part-time job, for example, helps mothers in staying attached to the labour market in the pre-school years of the children. Bratti et al. (2005) for Italy show how different job characteristics imply different costs of participation: jobs with reduced or more flexible working time increase the probability of women to work.

While most of the literature focuses either on wages or on participation, we consider both dimensions in a country where female participation is low, thus contributing in filling the gap of studies of this kind referred to Southern European Countries. To do so, as it will become clear in the next sections, we select women highly attached to the labour market, so that the career motivation as well as the human capital depreciation explanations for the family wage gap are less relevant; we can hence focus on explanations based on the reduced effort of working mothers and on the tendency of mothers to look for better

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[8]In Europe only 25% of mothers return to work before the child is one year old, while, when the child ages, large differences emerge among countries: in the U.K. 50% of mothers are already working by the time the child is 2 years old, while in Ireland this happens only when the child is 3 years old.

job conditions that allow them to better reconcile work and family life. In this way, we highlight a role for part-time jobs in Italy that is different from what emerges in the literature, i.e. we highlight its potential role not only in keeping women with children at work but also in mitigating the "reduced effort" effect of child-rearing.

3 Mothers' labour supply

We are interested in analyzing the behaviour of women once they become mothers, in particular their employment decisions. We focus on women highly attached to the labour market[9], to be able to treat childbirth as an event not correlated to the previous labour market history. In this way we estimate a lowerbound of the career break job penalty with respect to the whole population of women. In this context participation decisions of non-mothers are just not an issue (Table 1); it is well proven in the literature that the hazard rate of leaving employment decreases as labour market experience increases. However, becoming mother prompts a significant reallocation of time, as we show below with our simple model that introduces the empirical analysis.

We refer to a static model of labour supply with household production to derive some testable predictions on the behaviour of mothers on the labour market. A life cycle model might have been more suited to the topic; however, this simpler approach produces a neat framework to analyze mothers' behaviour over a quite defined time span. In fact we focus on the years immediately following childbirth[10], not including in our analysis either previous participation choices or future working career in the longer run.

Motherhood causes time re-allocation with possible effects on labour supply. We assume that mothers' utility is defined over consumption c, leisure l and child quality k. Child quality is produced with two inputs: time (τ) and goods purchased in the market (q). Father's input in the production function of child quality is assumed as given. Usual properties apply to the utility funcion. The prices of c and q are normalized to 1. The maximization problem for a working woman that becomes mother reads as follows:

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[9] At least 5 years in employment, with short or no unemployment spells. Short unemployment spells means less than 12 months.

[10] Five years.

$$\max_{c,l,k} U_i(c_i, l_i, k_i) \tag{1a}$$

$$sub\ c_i + q_i \quad \leq \quad \overline{M}_i + w_i^0 h_i \tag{1b}$$

$$h_i + l_i + \tau_i \quad = \quad \overline{T} \tag{1c}$$

$$k_i \quad = \quad k_i(q_i, \tau_i) \tag{1d}$$

where $\overline{M}_i$ is non-labour income (including partner's labour income and household's non-labour income), $\overline{T}$ is the time endowment, h_i is labour supply and w_i^0 the wage; $k_i(q_i, \tau_i)$ is the production function of child quality, with diminishing returns on each input and $k_i(q_i, 0) = k_i(0, \tau_i) = 0$.

Job changes are endogenous[11]. Mothers can always keep their jobs, as job protection legislation allows them to do so. Once not-working[12] (quit) they receive offers either for part-time jobs or for full-time jobs with exogenous probabilities π_p and π_f.

If she quits and does not work afterword, her utility reads (omitting the i subscript from now on):

$$V_0 = \max_{c,l,k}\ U(c,l,k)$$
$$sub\ c + q \leq \overline{M}$$
$$l + \tau = \overline{T}$$
$$k = k(q, \tau)$$

The utility of an employed mother is:

$$V_J(w) = \max_{c,l,k}\ U(c,l,k)$$
$$sub\ c + q \leq \overline{M} + wh_J$$
$$h_J + l + \tau = \overline{T}$$
$$k = k(q, \tau)$$

where index $J = p, f$ stays for part-time or full-time jobs and h_J are the hours of work in a full/part-time job. As usual, $V_J(w)$ is increasing in w.

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[11] There is no exogenous probability of job destruction. This is ininfluential provided that the probability of job destruction is not related to the motherhood status.

[12] We impose that they can search for a new job only when unemployed; this simplifies the model without changing its main implications.

The key assumption is the following: mothers and non-mothers are equally able to perform a part-time job, and therefore they face the same part-time wage distribution. On the contrary, when working full-time, mothers are only offered jobs which do not require big energy investments, and these jobs are typically paid lower wages. This is due to the - actual or assumed - lower productivity of mothers with respect to non-mothers. For the same reason, mothers keeping their pre-childbirth full-time job face less internal-career opportunities than childless women. However, if they keep their pre-childbirth job, w^0 act as lowerbound of future wages, i.e. the career can be flatter with respect to non mothers, but no nominal wage cuts are expected[13]. On the contrary if they change jobs they draw from the whole wage distribution. Hence the distribution of full-time wages is different according to the motherhood status both for job stayers and for job movers[14]. Therefore, mothers receive a wage drawn from the distribution $F_f\left(w|mother=1\right)$ or $F_p\left(w\right)$ depending on whether they work full-time or part-time. Clearly, $F_f\left(w|mother=1\right)$ is statistically dominated by $F_f\left(w|mother=0\right)$.

Supposing that she can get either an offer for a part-time job or for a full-time one (but not both at the same time), the expected value of quitting is given by:

$$\overline{V} \quad = \quad (1-\pi_p-\pi_f)V_0 + \pi_p \int \max\left(V_0,V_p\left(x\right)\right)dF_p\left(x\right) \qquad (2a)$$

$$+\pi_f \int \max\left(V_0,V_f\left(x\right)\right)dF_f\left(x|mother\right) \qquad (2b)$$

An employed woman will quit her job after childbirth if $\overline{V} > V_J(w)$.

Notice that in this labour market all non-working women face the same opportunity set and the same $\overline{V}$ (conditional on motherhood status), regardless their previous wage or contract. In bringing the model to the data, we will condition also on individual and past-job characteristics, thus relaxing this assumption.

This simple model highlights the role of part-time jobs on mothers' behaviour. In fact, the shift from full-time to part-time may help women with children

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[13] Nominal and real downward wage rigidity, Devicienti et al. (2007).
[14] This assumption is tested in the empirical part of the paper and it is supported by the data.

to remain employed. Let's consider a mother working full-time and willing to reduce h; according to our model she has to quit her full-time job and look for a part-time one. This is more likely to occur if part-time jobs are more available in her relevant labour market. In fact an increase in part-time job availability (i.e. and increase in π_p) increases the probability of quitting the pre-motherhood full-time job and clearly increases the probability of working (part-time) after childbirth. To proof this important implication of the model, notice that (i) mothers working full time quit if $\overline{V} > V_f(w)$; an increase in π_p decreases the value of the first term of equation 2a and increases the value of the second term. Since the minimum value of the second term is V_0, the effect of an increase in π_p on $\overline{V}$ is positive. (ii) An increase in π_p means more part-time jobs offered and therefore more employed mothers, since the decision of accepting a job is not affected by the value of π_p. Notice that contrary to the existing literature we expect part-time jobs to preserve wages and productivity, not to hamper career and hence wages. This might be specific of the Italian institutional environment, where part-time jobs are well protected (Samek Ludovici and Semenza, 2004).

We do not specify a functional form for the utility function and for the childrearing technology in order to keep the setting as general as possible. Nonetheless, the model can be used as a framework to discuss the behaviour of mothers. We are particularly interested in labour market decisions on worked hours (participation as well as holding/not holding part-time jobs), also in relationship to wage levels. To derive more specific predictions a functional form as to be arbitrarily chosen.

Having a child, i.e. moving from $\tau = 0$ to $\tau > 0$, prompts a reallocation of time, that was allocated only between work (h) and leisure (l) before childbirth. This will reduce either l or h or both; the relative amount depending on the preferences of the individuals, and on real wages. I.e. the higher the wage the higher the cost of reducing h instead of l. So we expect new mothers to reduce worked hours (moving to part-time jobs or exiting employment), and to reduce them more if they earn lower wages. The cost of substituting mother's time τ with childcare bought on the market q depends on the cost of childcare with respect to the wage. The higher the cost of q with respect to the wage, the more likely are mothers to reduce worked hours and increase time dedicated to the child; hence again, the lower the wage the higher the probability to observe mothers leaving employment.

Furthermore, if the woman was working part-time before childbirth she has

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more scope to reallocate non-market time between τ and l, even leaving h unchanged. In addition, given our assumption on wage distributions, she will expect no wage penalty with respect to non-mothers. On the contrary, full-time new mothers will expect their relative wages to decrease, so making less costly (in relative terms) for them to decrease worked hours. Hence we might expect women working part-time before childbirth to leave employment less than women working full-time before childbirth.

In Section 5 we bring these predictions to the data.

4   Data and descriptive statistics

We use the Work Histories Italian Panel (WHIP) produced by LABORatorio Riccardo Revelli. The Atchive spans the period 1985 to 2003 and it draws randomly a 1:90 sample from all Italian Social Security Administration (INPS) archives, i.e. from the population of those who have worked in Italy as employees or self employed or have received income support or pension by INPS. For each of these people all their working career is observed. Only open ended contracts in the public sector and selected professions (e.g. lawyers) are excluded[15]. In this paper we use only the dependent employment section of WHIP, which is a Linked Employer Employee Database. It records individual (gender, age, place of birth) and job (e.g. contract, firm size, industry, location) characteristics, as well as the gross wage and the number of full-time equivalent weeks worked in the period, so that comparable gross weekly wages can be computed for full as well as part-time workers.

In Italy employed mothers must take a compulsory and fully-paid maternity leave for 5 months (one or two before delivery and 3 or 4 afterward). Women can also chose an additional maternity leave of up to 6 months, which is paid 30% of the regular salary; they can spread this optional leave during the first 3 years of life of the child. Finally they can take spells of unpaid leave till the child is 8 years old. During paid maternity leaves mothers receive maternity benefits from INPS. This event is recorded in WHIP and is our key variable.

Statistics from WHIP are consistent with the 2002 ISTAT birth sample survey: ISTAT (the Italian Statistical Institute) surveys about 175.000 births from women that are employed in the private sector between 2000 and 2001; WHIP records women receiving maternity benefits in 2001 representing about 180.000

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[15] Full details on the WHIP archive can be found at www.laboratoriorevelli.it/whip.

births.

To conduct our empirical analysis, we select women aged between 18 and 45 who are recorded to be employed and not in maternity leave for 4 consecutive years (from $t = -4$ to $t = -1$). Some of them are observed receiving the maternity benefit during the subsequent year ($t = 0$); they are our sample of mothers (call them "mothers in $t = 0$"). The control group is made of "non-mothers in $t = 0$". We study the employment situation of mothers and non-mothers for 5 years afterward ($t = 1$ to $t = 5$). For a neater analysis, we further restrict the sample of mothers to women not having another child after the end of the first maternity leave[16].

To increase sample size, we pool 5 cohorts of women, where $t = 0$ is a year between 1993 and 1997. The five cohorts of mothers are made of different individuals by construction, i.e. it is not possible that the same individual belongs to different cohorts. On the contrary, non-mothers can be sampled more than once. In this case, we randomly select which cohort they belong to.

Between $t = 1$ and $t = 5$ both mothers and non-mothers can experience employment and non-employment periods. Non-employment here means absence from WHIP and indicates unemployment if it is a temporary absence, while it means out of the labour force if it is a long/permanent absence[17]. We focus on unemployment spells of at least 12 months, to exclude frictional unemployment. Figure 1 illustrates the structure of the sample.

Table 1 details the sample size of the groups. We can distinguish 3 different situations: women without any unemployment spell longer than 12 months between $t = 1$ and $t = 5$ (call them "always working"), women who experience a period of long term unemployment but re-enter employment before $t = 5$ (call them "some unemployment"), women who leave employment somewhere between $t = 1$ and $t = 5$ and do not re-enter into employment up to $t = 5$ (call them "out for good"). It is immediately clear, as already mentioned, that once we condition on 5 years of continuous work non-mothers almost never

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[16]Note that in the database we do not observe the date in which the delivery occurs, but only that the worker receives maternity benefits. The leave can span between years, thus we impose to our subsample of mothers not to be in maternity leave again in $t = 3$ to $t = 5$ (in $t = 1$ and $t = 2$ they can have additional leave to look after the first child). Notice further that if they are not employed in that period we cannot observe eventual new births.

[17]As said, WHIP excludes only permanent employees in the public sector (and the shadow economy, by definition). However, employment in the public sector has been constant during the 90's and decreasing after year 2000, making the transition private-public sector highly unlikely.

leave employment afterward. In fact, 93% of non-mothers is always working between $t = 1$ and $t = 5$, with respect to only 54% of mothers; 2% of non-mothers exits employment for good after $t = 0$ (30% of mothers) and 5% of non-mothers experiences some unemployment after $t = 0$ (16% of mothers). Table 2 compares the unconditional probability of moving to part-time after $t = 0$ for mothers and non-mothers: 30% of mothers with respect to just 10% of non-mothers makes the transition[18]. Hence the statistics reported in these two tables are consistent with the prediction of the model that women reallocate their time after childbirth, and that they are more likely to reduce worked hours.

It is important to notice that non-mothers and mothers appear quite similar with respect to observable characteristics (Table 3). Mothers are only slightly younger, employed in slightly smaller firms and earning slightly lower wages. However, comparing non-mothers to the two groups of mothers ("always working" and "not always working") separately, it becomes clear that non-mothers and "always working" mothers are almost indistinguishable at $t = 0$, while "not always working" mothers are slightly different[19], i.e. women strongly attached to the labour market are similar to each other regardless motherhood. These descriptive evidence is consistent with the literature pointing to a higher propensity to leave the labour market for mothers with a smaller human capital endowment and holding worse jobs in terms of safety and physical strain.

The literature also identifies childcare availability as important in increasing the employment rates of mothers. Unfortunately we cannot include the availability of childcare in our analysis, as the only meaningful measure would be at the local (town) level; such data are not available for the whole Country consistently over time. However, it is established that on average childcare is less available in Southern regions[20]; consistently with this, Table 3 shows that mothers are more likely to leave the labour market if they live in those regions.

5   Empirical Model

Our empirical analysis aims both at comparing the wage profiles of mothers and non-mothers continuously working over a period of 10 years and at studying

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[18] Also the probability to move to part-time, conditional on observable characteristics is significantly different between mothers and non-mothers. Results not reported, but available upon request.

[19] "Not always working" mothers are younger than the other two groups, more frequently blue collars, employed in smaller firms and earning lower wages.

[20] Del Boca (2002).

the transitions of women out of employment after childbirth, paying special attention to the role of part-time contracts. The objective of the exercise is to estimate the effect of motherhood on family wage gap and on career break job penalty separately. Hence we provide (a) a measure of the wage gap conditional on no break and (b) the probability of a career break. The total effect of motherhood is the sum of the two, however defined.

As explained in the previous section, we focus on a group of women highly attached to the labour market before maternity. This because in this way we can assume maternity as uncorrelated to the working career up to $t = 0$, i.e. no ex-ante job selection of future mothers. In section 6 we show that this hypothesis is supported by the data. However, as a consequence, we search for penalties among those mothers who are less likely to experience them, providing a lower bound of the average penalty in the whole population.

5.1 Family wage gap

We need to test the key assumption of our model, i.e. that the wage distribution of mothers and non-mothers is different after $t = 0$, iif they work full-time. To do so, we study the wage profile of mothers and non-mothers continuously employed from $t = -4$ to $t = 5$, allowing for unemployment spells shorter than 12 months only[21].

We follow Jacobson, Lalonde and Sullivan (1993) and estimate

$$w_{it} = \alpha_i + \alpha_t + x_{it}\beta + \sum_{k=-2}^{5} M_i m_k + \epsilon_{it} \tag{3}$$

where α_i are individual fixed-effects that take into account unobserved heterogeneity, α_t are time fixed-effects, m_k are average conditional wage differentials between mothers ($M = 1$) and non-mothers ($M = 0$) from 2 years before maternity to 5 years afterward. x includes controls for human capital and job characteristics as in Table 3, plus a control for job movers to allow for different wage profiles of women changing jobs. We estimate equation (3) with wages both in levels and in logs, to test penalty both in money value and in the growth rate. We choose a least squares estimator, to control for individual fixed-effects (it is a generalized difference in differences - DID - estimator).

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[21]This to avoid problems related to the depreciation of human capital during long breaks, as already argued.

The family wage gap in this context cannot be explained either by human capital depreciation, as career breaks are excluded, or by ex-ante sorting into jobs, as non-mothers and always working mothers are very similar groups; crucially, we will also see that conditional wages of mothers and non-mothers are not significantly different before $t = 0$ consistently with our theoretical model. We are left with two possible causes of family wage gap: the ex-post job sorting and the decreased productivity due to increased family burden[22]. To separate the two we use the eventual movement to a part-time job, as follows.

In Section 3 we assume that mothers working full-time are only offered jobs that do not require big energy investments, with less responsibilities and therefore with lower wages then non-mothers. However mothers are assumed to be equally able than non-mothers to perform part-time jobs. As a consequence, in the theoretical model, the distribution of full-time wages is different according to the motherhood status. Hence we estimate equation (3) with different subsamples:

(a) we compare mothers and non-mothers always working full-time. If mothers experience a wage penalty we will find that $m_k < 0$ for $k > 0$.

(b) we then compare non-mothers always working full-time to mothers that move to a part-time job after $t = 0$. If no wage penalty occurs to mother working part-time we will find that $m_k = 0$ for $k > 0$.

The use of subsamples is allowed as long as the common trend identifying assumption required for a DID estimator holds, conditional on x. As x includes job characteristics (identified by job movers), we have no reasons to believe that the assumption is violated.

5.2   Career break job penalty

We estimate the probability of leaving employment after childbirth, temporarily or permanently, focussing on the role of part-time jobs.

We focus on non-work spells long enough to trigger the depreciation of human capital, as short, frictional unemployment as well as compulsory maternity leaves (5 months) are more likely to be inconsequential with respect to downward occupational mobility (Ruhm, 1998). We control for individual and job characteristics linked to human capital endowment and to job quality, to single

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[22]There is a third explanation in the literature: the stigma/discrimination explanation, i.e. not a decrease in productivity but just a decrease in wages, because firms expect a lower productivity from mothers. However, "stigma" and "decreased productivity" teories are not empirically separately identified without a measure of actual productivity.

out the net effect of motherhood.

In this framework it is not possible to allow for unobserved heterogeneity, as only one episode of maternity/eventual exit is observable for each woman. Notice that this does not depend on our sample selection of single child mothers, as women having more than one child often concentrate births in a short period of time; this results in a "long maternity spell" before, eventually, going back to work.

The base specification we estimate allows to highlight the role of wages:

$$pr\left(out_i = 1\right) = F\left(\lambda M_i + \alpha w_{i,t-1}(1 - M_i) + \alpha_M w_{i,t-1}M_i + z_{i,t-1}\gamma\right) \qquad (4)$$

where $out_i = 1$ if woman i experiences at least 12 consecutive months of non-employment between $t = 1$ and $t = 5$, $out_i = 0$ otherwise (always working). F is the normal distribution, M_i signals that individual i belongs to the group of mothers, w_{t-1} is the weekly real wage rate at $t-1$, z_{t-1} includes controls for human capital and job characteristics[23].

To focus on the role of part-time jobs on the probability of exiting employment we use two different strategies. First, using the sample of women working full-time up to $t = 0$[24], we augment equation (4) including a dummy (pt_av_{it-1}) signalling whether there are part-time jobs available in the labour market relevant for individual i [25].

$$pr\left(out_i = 1\right) = F\left(\begin{array}{c} \lambda M_i + \alpha w_{it-1}(1 - M_i) + \alpha_M w_{it-1}M_i + \\ +\beta pt\_av_{it-1}(1 - M_i) + \beta_M pt\_av_{it-1}M_i + z_{it-1}\gamma \end{array}\right)$$

We expect the availability of part-time jobs to decrease the probability of exiting employment for mothers ($\beta_M < 0$).

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[23] As in Table 3 plus year dummies. No information on the level of education is available in our data.

[24] We are allowed to select sub-samples of women, as the hypothesis of no ex-ante job selection of future mothers is supported by the data, i.e. the selection is not endogenous (see Section 6).

[25] In the cell defined by individual i's industry, area and occupation in $t - 1$, if part-time jobs held by women are more than 15% of all jobs held by women in the cell, then part-time is "available". This is computed with the whole population of female employees.

Second, with the whole sample[26], we augment equation (4) including a control for mothers working part-time before $t = 0$ (pt_{it-1}).

$$pr\left(out_i = 1\right) = F\left(\begin{array}{c} \lambda M_i + \alpha w_{it-1}(1 - M_i) + \alpha_M w_{it-1}M_i + \\ +\eta pt_{it-1}(1 - M_i) + \eta_M pt_{it-1}M_i + z_{it-1}\gamma \end{array}\right)$$

We expect mothers working part-time before childbirth to leave employment less than mothers working full-time before childbirth ($\eta_M < 0$).

6 Empirical results

In this Section we present the results of the empirical analysis in which we apply the methodology presented in the previous Section. Before presenting the results, however, a short discussion is necessary on the assumption we made of exogenous maternity (in a statistical sense). In fact it can be argued that maternity is correlated to the working career up to $t = 0$. While this might be true in general, we need to assess whether this is a relevant issue in our sample of women highly attached to the labour market. To test for the endogeneity of maternity we estimate equation (4) instrumenting motherhood with interactions of age and area of birth, so exploiting the cultural differences across Italian regions about motherhood. The Wald test of exogeneity is unable to reject the null in a probit framework[27]. With a linear probability specification we can check the relevance and validity of instruments, as well as the exogeneity hypothesis. All tests support our strategy of modelling maternity as exogenous[28]. Hence, as anticipated in the previous Section, in our sample there is no evidence of ex-ante job selection of future mothers.

6.1 Family wage gap

We condition this part of the analysis on being employed every year from $t = -4$ to $t = +5$, and we investigate the effect of motherhood on wages following a difference in differences approach (and using the panel dimension of the data). Those who do not become mothers act as the control group, while maternity

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[26] As a further confirmation that we can safely select women working full-time before $t = 0$, we will see that the estimates of the coefficients $\lambda, \alpha, \alpha_M$ are unchanged using the whole sample or the selected sample.

[27] Wald test of exogeneity (/athrho = 0): chi2(1) = 2.65 Prob > chi2 = 0.1035

[28] Anderson LR statistic (identification/IV relevance test): 345.823 (P-val = 0.00). Hansen J statistic (eqn. excluding suspect orthog. conditions): 44.592 (P-val = 0.1828). C statistic (exogeneity/orthogonality of suspect instruments): 2.626 (P-val = 0.1051).

is the treatment. We follow Jacobson et al. (1993) in estimating the effect of motherhood on every t before and after childbirth (equation 3).

Table 4, column (a), contains the estimates of the average conditional wage differentials between mothers and non-mothers working full-time (m_k)[29]. Conditional average wages of future mothers are not significantly different from non-mothers' ones before childbearing, confirming that the two groups are not statistically different before $t = 0$. However, wages of mothers become significantly lower for $t > 0$, showing no sign of a closing gap after 5 years (disregarding $t = 0$ to $t = 2$ because of the eventual additional periods of maternity leave that can decrease wages artificially). The gap amounts to about 15 euro a week three years after childbirth, with respect to an average weekly wage of 360 euro in $t = -1$. Table 5, column (a), contains the same estimates on log wages. Conditional average wage growth of future mothers is again non significantly different from non-mothers' before childbearing. It becomes significantly lower afterward (wage growth is about 3% lower three years after childbirth). Hence we do observe a significant family wage gap in Italy, despite the collective wage bargaining setup, despite selecting women always working, despite controlling for unobserved heterogeneity.

Columns (b) to (d) in the two tables prove that mothers moving to part-time jobs do not experience a significant family wage gap with respect to non-mothers. This holds using full-time non-mothers as control group as well as part-time non-mothers or non-mothers moving from full to part-time jobs[30].

All this confirms a family wage gap for Italian women. Women unable to reduce worked hours after childbirth reduce their actual or perceived productivity on the job and face a negative wage gap with respect to otherwise similar childless women. On the contrary, women able to reduce worked hours do not reduce their productivity and (relative) wages.

Hence, contrary to the existing literature ex-post job selection can protect instead of hamper mothers' working career: moving to a part-time job reduces the family wage gap, while keeping a full-time job is penalizing in terms of wages.

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[29] Full-time equivalent gross weekly wages. Worked hours not available in our dataset. Estimated coefficients of controls available upon request.

[30] The only exception is col. (d) in table 5, where we find that mothers moving from full to part time face a penalty in terms of wage growth rate (but not in wage levels) with respect to non-mothers also moving from full to part time four and five years after childbirth.

6.2 Career break job penalty

Table 6 reports the estimated coefficients of the variables of interest for the probability of exiting employment, while Table 7 presents the average probability of exiting for given individual profiles, using the estimates reported in Table 6[31].

Column (a) in Table 6 reports results referred to equation (4) for women working full-time before $t = 0$. It was already clear from the descriptive analysis of Section 4 that, while non-mothers are strongly attached to employment after 4 years of continuous work, those who become mothers are more likely to exit employment for good or at least temporarily[32]. This is confirmed by the high estimated coefficient for "mothers". Participation is almost not an issue for non-mothers. They basically do not exit, unless earning high wages (income effect prevailing) or working part-time (lower attachment to the labour market).

The results confirm also that mothers are more likely to exit employment when earning lower wages. If we increase the wage earned in $t = -1$ from average wage minus one standard deviation to average wage plus one standard deviation, we see the probability of exiting for mothers decreasing from 48% to 33% (Table 7). The wage is related to both human capital and job quality; the effect on mothers' probability to exit is very large.

Column (b) of Table 6 reports results referred to equation (4) augmented with the control for the availability of part-time jobs, and estimated again with data on women working full-time before $t = 0$ only. While the other coefficients of interest are unchanged, the availability of part-time jobs has a negative and significant effect on mothers' exits: when part-time jobs are more available mothers are less likely to leave the labour market. On the contrary, the availability of part-time is non-influential on the probability of exiting employment for non-mothers. This result is consistent with the existing literature.

Column (c) reports results referred to equation (4) augmented with the control for the kind of job held before $t = 0$ (full or part-time), estimated with data on all women in the sample. Notice that the estimates of the other coefficients are unchanged using the whole sample or the full-time women sample, as a further confirmation that we can safely select women working full-time before

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[31] Other controls included have the expected impact and are not reported. They are available upon request.

[32] We also checked which characteristics help mothers to re-enter employment; it emerges only that mothers leaving larger firms are more likely to re-enter employment with respect to mothers leaving smaller firms.

$t = 0$. Column (c) shows that holding a part-time job in $t = -1$ decreases the probability of exiting for mothers; however the estimate is imprecise.

All the results of our simple theoretical model regarding the probability of exiting are therefore supported by the data. The probability of leaving employment decreases as the wage of mothers increases and the role of part-time jobs in preventing mothers from exiting the labour market emerges clearly from our results.

Two comments are in order. First, women working in the public sector are not in our sample; several "female public sector jobs" are often very similar to part-time jobs (e.g. teachers), thanks to the reduced number of hours worked per week. Were those women - formally working full-time and not moving to part-time after becoming mothers - included in the sample, our results would have been less neat. Second, part-time jobs are specially relevant because of the lack of adequate public childcare provision, that is a common feature allover Italian regions. And in fact, even our mothers of only one child seldom move back to full-time employment after getting a part-time job: just 10% of those who moved from full to part-time after $t = 0$ return to a full-time job during the observation period, i.e. up to when the child is 5 years old[33].

7 Conclusions

Even if Italy is characterized by low wage differentials, Italian women experience a non negligible penalization in terms of wages after motherhood. After childbirth, wages of mothers in fact become significantly lower than wages of non-mothers, showing no sign of a closing gap after 5 years. The gap amounts to about 15 euro a week, with respect to an average weekly wage of 360 euro before childbearing (and the average yearly wage growth is about 3% lower).

In addition, if compared to childless women, mothers are more likely to experience - in the years after childbirth - a transition to non-employment. This transition depends crucially on the level of human capital and on job quality. If we consider that wages are related to both human capital and job quality their effect on mothers' probability to exit is very large. In fact, the probability of exiting for mothers decreases from 48% to 33% if we move from average wage

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[33] Part-time jobs can be a trap that mothers cannot leave at will, i.e. it might be difficult to move back from part-time to full-time employment. However, at 5 years of age children are not at compulsory school yet, hence mothers might still be postponing the attempt to move back to a full-time job.

minus one standard deviation to average wage plus one standard deviation, *ceteris paribus.*

Finally, it emerges clearly the positive role of part-time jobs in mitigating these negative events on the labour market in the medium run. The general consensus in the literature points to *part-time jobs* as helpful for mothers in staying attached to the labour market but - as part-time jobs are less protected and less paid than full-time jobs - detrimental in terms of career and hourly wages. Italy stands out because of the higher protection granted to part-time jobs. In fact we find that women moving to part-time jobs do not see a slowdown in their career with respect to non-mothers in terms of wages. In addition, consistently with the literature, we find that mothers are less likely to leave the labour market when part-time jobs are more available, while the availability of part-time jobs is non-influential on the probability of exiting employment for non-mothers. However, further research is needed to assess the effect of holding a part-time job in the longer run, beyond 4-5 years.

Nevertheless, it must be remembered that we search for penalties among those mothers who are less likely to experience them, as we have selected women highly attached to the labour market and having only one child, hence providing a lower bound of the average penalty in the whole population.

Summing up, our results seem to confirm that policies aimed at helping women to reconcile work and family are not only useful to increase female employment without reducing fertility, but they may also reduce employment penalties after motherhood.

A final remark on the other half of the world. If it is true that part-time jobs are not detrimental for the future working career in the short-medium run, it might be sensible to provide incentives also to fathers to move temporarily to part-time, so that both market and non-market activities can be shared more evenly within the couple.

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8 Figures and tables

Table 1: Sample composition.

	always working	some unemployment	out for good	All
non mothers	12702	730	264	13696
row pct	*0.93*	*0.05*	*0.02*	
mothers	1261	378	703	2342
row pct	*0.54*	*0.16*	*0.30*	
All	13963	1108	967	16038
row pct	*0.87*	*0.07*	*0.06*	
Complete sample. Some unemployment and out for good after t=0				

Table 2: Full-time and part-time.

	always full time	full to part time	All
non mothers	9885	1076	10961
row pct	*0.90*	*0.10*	
mothers	777	319	1096
row pct	*0.71*	*0.29*	
All	10662	1395	12057
row pct	*0.88*	*0.12*	
Always working women, working full time before t=0			
From full to part time after t=0			

Table 3: Sample composition at t=0.

| | | Non mothers | mothers | | |
---	---	all	all	always working	not always working
age	mean	31.83	29.08	29.65	28.41
firm size	mean	49.38	31.49	44.44	21.02
weekly wage in t=-1	mean	361.40	344.73	363.33	324.23
Contract:					
part-time	share	0.14	0.13	0.13	0.12
atypical contracts	share	0.03	0.03	0.02	0.04
apprentiships	share	0.03	0.01	0.01	0.01
blue collars	share	0.44	0.46	0.39	0.54
white collars	share	0.53	0.53	0.59	0.45
Area:					
north west	share	0.41	0.42	0.46	0.38
north east	share	0.30	0.29	0.28	0.31
centre	share	0.19	0.19	0.19	0.18
south	share	0.10	0.10	0.08	0.13
Industry:					
energy, gas, water	share	0.01	0.00	0.00	0.00
mining and chemical	share	0.05	0.04	0.05	0.04
metal work	share	0.14	0.15	0.18	0.13
food, textile and other manufacturing	share	0.30	0.35	0.31	0.39
construction	share	0.02	0.02	0.02	0.02
trade	share	0.24	0.24	0.24	0.25
transport and communication	share	0.02	0.01	0.01	0.01
banking and insurance	share	0.18	0.14	0.16	0.12
other	share	0.03	0.04	0.03	0.04

Table 4: Wages, levels

	(a) Coef.	s.e.	(b) Coef.	s.e.	(c) Coef.	s.e.	(d) Coef.	s.e.
mt-2	0.01	(2.30)	-0.90	(3.77)	0.20	(6.15)	-3.12	(7.44)
mt-1	-3.55	(2.31)	-5.44	(3.78)	-3.29	(6.19)	-9.32	(7.53)
mt0	**-89.78**	(2.31)	**-70.87**	(3.78)	**-69.10**	(6.23)	**-79.14**	(7.61)
mt1	**-66.56**	(2.32)	-3.09	(3.78)	-0.02	(6.25)	-13.63	(7.68)
mt2	**-21.90**	(2.34)	0.60	(3.81)	6.89	(6.32)	6.55	(7.73)
mt3	**-14.40**	(2.35)	-2.11	(3.81)	8.08	(6.32)	3.26	(7.79)
mt4	**-13.23**	(2.36)	-7.15	(4.19)	4.32	(6.90)	-11.92	(8.54)
mt5	**-16.56**	(2.38)	-5.77	(4.02)	1.34	(6.75)	-5.50	(8.42)
N.obs	102502		98010		22066		12851	

(a) Mothers and non mothers always FT

(b) Non mothers FT and mothers FT to PT

(c) Non mothers PT after t0 and mothers FT to PT

(d) Non mothers and mothers FT to PT

Weekly wages. Other controls: as in table 3, plus dummy on movers and year dummies. Robust Std. Err.

Table 5: Wages, logs

	(a) Coef.	s.e.	(b) Coef.	s.e.	(c) Coef.	s.e.	(d) Coef.	s.e.
mt-2	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	-0.01	(0.02)
mt-1	**-0.01**	**(0.01)**	-0.02	(0.01)	-0.01	(0.01)	-0.03	(0.02)
mt0	**-0.30**	(0.01)	**-0.25**	(0.01)	**-0.25**	(0.01)	**-0.27**	(0.02)
mt1	**-0.21**	(0.01)	**-0.11**	**(0.01)**	**-0.10**	**(0.01)**	**-0.13**	**(0.02)**
mt2	**-0.05**	(0.01)	-0.02	(0.01)	-0.01	(0.01)	-0.02	(0.02)
mt3	**-0.03**	(0.01)	-0.01	(0.01)	0.00	(0.01)	-0.02	(0.02)
mt4	**-0.03**	(0.01)	-0.02	(0.01)	0.00	(0.02)	**-0.04**	**(0.02)**
mt5	**-0.03**	(0.01)	-0.01	(0.01)	-0.01	(0.02)	**-0.04**	**(0.02)**
N.obs	102502		98010		22066		12851	

(a)Mothers and non mothers always FT

(b)Non mothers FT and mothers FT to PT

(c)Non mothers PT after t0 and mothers FT to PT

(d)Non mothers and mothers FT to PT

Log weekly wages. Other controls: as in table 3, plus dummy on movers and year dummies. Robust Std. Err.

Table 6: Probability of exiting employment.

		(a) Coeff.	Std. Err.	(b) Coeff.	Std. Err.	(c) Coeff.	Std. Err.
T.I.1	Mother	7.552	(0.664)	7.376	(0.673)	7.408	(0.624)
	Ln wage * non M	0.467	(0.081)	0.455	(0.082)	0.417	(0.071)
T.I.2	Ln wage * M	-0.583	(0.109)	-0.555	(0.109)	-0.608	(0.101)
	pt available * non M			0.026	(0.057)		
T.I.3	pt available * M			-0.148	(0.070)		
	Part time t-1 * non M					0.186	(0.046)
T.I.4	Part time t-1 * M					-0.073	(0.080)
	N.obs	13762		13762		15971	

(a)Only ft in t-1

(b)Only ft in t-1

(c)All women

Robust Std. Err. Other controls: as in Table 3 plus year dummies

Table 7: Probability of exiting employment.

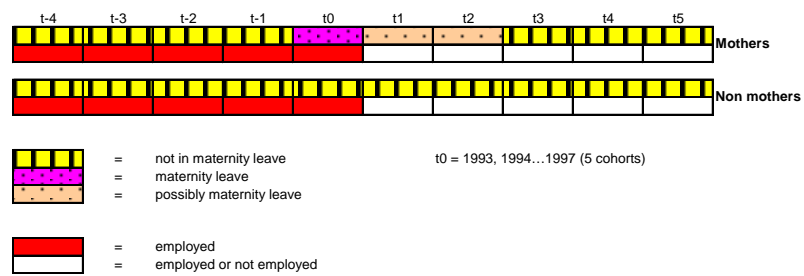| Benchmark case1: Age=30, firm size=50, average wage, all dummies at zero value	
P(out) for mothers	0.40
P(out) for non mothers	0.07
Benchmark case2: Age=30, firm size=50, average wage + 1 s.d., all dummies at zero value	
P(out) for mothers	0.33
P(out) for non mothers	0.09
Benchmark case3: Age=30, firm size=50, average wage - 1 s.d., all dummies at zero value	
P(out) for mothers	0.48
P(out) for non mothers	0.05

Figure 1: Sample characteristics