Labor Market Penalties for Mothers in Italy

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Abstract

We use a large Italian employer-employee matched dataset to study how motherhood affects women's working career in terms of labor force participation and wages. We confirm that the probability of exiting employment significantly increases for mothers of pre-school children; however, this is mitigated by higher job quality, human capital endowment and childcare accessibility. Most importantly, the availability of part-time jobs reduces their probability of moving out of the labor force. Women not leaving employment after becoming mothers experience lower wages than women with no pre-school child, and there are no signs of this gap closing 5 years after childbirth. Contrary to previous literature, the wage gap penalty emerges only among women working full-time, thanks to the high protection accorded to part-time jobs in Italy.

Keywords

Motherhood Part-time jobs Wage penalty Working career Reconciliation policies

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Introduction

The increase in women's participation in the labor market is a relatively recent phenomenon for most southern European countries. Although still much lower than that of males, increases in the female participation rate made it necessary for national and local governments to promote policies and services aimed at making work and family life compatible, following the example of northern European countries. In fact, without social and labor market policies that help reconciliation of work and family responsibilities, increased participation may produce a decline in the total fertility rate, as has actually happened in many southern European countries (Kohler et al. 2002).

Italy is a clear example of this. The Italian female participation rate has been increasing significantly since the 1970s, although it is still below the European average. This increased participation has been accompanied by a decline in the total fertility rate, which reached its minimum value of 1.2 in 2000. Despite gains in younger women's participation rates in recent decades, Italy still faces higher exit rates of new mothers from employment than other countries (Pronzato 2009). This is because optional parental leave is

poorly paid, part-time job opportunities are quite limited, and most Italian regions (especially in the south) lack adequate childcare provision (see Del Boca 2002; Del Boca and Pasqua 2004, 2005; Del Boca et al. 2005, 2009).

Due to the economic relevance of fertility decline, most of the literature on Italy has analysed the possible relations between women's participation in the labor market and fertility decisions (for a survey see Del Boca and Wetzels 2007). On the other hand, less attention has been devoted to the consequences of motherhood on the subsequent working career. However, the topic is an important one to improve our understanding of the relationship between family and the labor market and for measuring the full cost of children.

In this paper we analyse how motherhood affects women's position in the labor market. In particular, we concentrate on the exit of new mothers from employment and on the wage penalty. The literature, in fact, classifies the effects of motherhood on women's work in two main categories: career break job penalty and motherhood wage penalty (Gutièrrez-Domènech 2005a). *Career break job penalty* refers to the permanent or temporary transition of working mothers to non-employment. When mothers do not leave their jobs, they may experience *motherhood wage penalty*, i.e., women with children may be penalized with respect to non-mothers in their wages.

We therefore estimate both the career break job penalty and motherhood wage penalty for Italian women using administrative data drawn from the archives of the Italian Institute for Social Security (INPS) and processed in a public-use file known as the Work Histories Italian Panel (WHIP). WHIP represents a unique source for studying the interaction between motherhood, mothers' participation in the labor market and wages since it contains information on both working career and eventual maternity leave spells.

To estimate the career break job penalty and the motherhood wage penalty we compare mothers of pre-school children to women who have no children or have older children. In fact the literature shows that the largest *impact* of motherhood on time allocation and wages is experienced when children are very young, even though it can persist or sometimes worsen over time (Mancini and Pasqua 2012; Anderson et al. 2003; Fernández-Kranz et al. 2010). We confirm that the probability of leaving employment significantly increases for mothers of a pre-school child (the career-break job penalty); however, this is mitigated by higher job quality and human capital endowment, and by childcare accessibility. Crucially, the availability of part-time jobs reduces the probability of exiting the labor force for mothers of pre-school children. Furthermore, women not leaving employment after becoming mothers face a decrease in wages relatively to women with no pre-school children, and there are no signs of this gap closing 5 years after childbirth (motherhood wage penalty). Again, part-time employment plays a crucial role, as the motherhood wage penalty emerges only among women working full-time; a part-time job after childbirth prevents any wage gap from opening.

The paper is organised as follows: "Career Break Job Penalty and Motherhood Wage Penalty: A Review of the Literature" presents the relevant literature; in "Institutional Background" we describe the Italian institutional context; in "Data and Descriptive Statistics" we present the data used, "Empirical Analysis" discusses our empirical model, and contains the results of our estimates. Conclusions are in Section "Conclusion".

Career Break Job Penalty and Motherhood Wage Penalty: A Review of the Literature

Many studies have been devoted to analysing the effects of maternity on working women, considering both the effects on their career and on wages. Most of these studies refer to the U.S., the U.K., Germany and northern European countries, where female participation in the labor market is high. In contrast, fewer studies consider southern European countries (with the exception of Spain[1]). In what follows, we review the relevant literature on career break job penalty and motherhood wage penalty.

Career Break Job Penalty

Empirical studies on new mothers' participation in the labor market show that many women exit employment after childbirth, and that most do not re-enter, especially in those countries where women's participation is low. In Italy—and similarly in Spain—women's employment rates decrease from 50 % to 40 % after childbirth and remain at 42 % ten years later (Gutièrrez-Domènech 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 employment rate of mothers does not increase as the children grow, showing how difficult it is to re-enter the Italian labor market once it has been left.

The decision to exit the labor market is linked mainly to the level of *human capital*: more skilled women, with better jobs and higher opportunity costs, are less likely to leave (Gustaffson et al. 1996; Dex et al. 1998; Gutièrrez-Domènech 2005b). Pronzato (2009) reports that in Italy 60 % of women with primary education are still out of the labor market 48 months after childbirth, while the most educated Italian women re-enter the labor market a few months after childbirth, as do highly educated women in the rest of Europe.[2] The results we obtain are consistent with these findings. We find in fact that higher wages are linked to a lower probability of leaving employment after childbirth.

However, human capital only partly explains 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 they stay more attached to the labor market (Gutièrrez-Domènech 2005b; Pronzato 2009). Consistently, we too estimate that more widely-available childcare services can lower the probability of new mothers leaving employment.

Wetzels (2001) compares mothers' labor market behaviour in Germany, the U.K., the Netherlands and Sweden and finds an important relationship between the country's specific policies and the timing of re-entry. Generosity of *parental leave* policies (in particular the length of optional leave and the replacement rate) seems to be crucial in increasing the probability of new mothers re-entering the labor market (see also Rönsen and Sunström 1996; Gustaffson et al. 1996; Pronzato 2009). Saurel-Cubizolles et al. (1999) analyse employment decisions after childbirth in France, Italy and Spain and find that in Italy and France, where optional parental leave is longer than in 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 *job characteristics in* increasing the probability of women re-entering work after childbirth. Mothers are more likely to work if the job allows flexible hours, if it is safe and physically undemanding. 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 going back to work after childbirth. A part-time job, therefore, is expected to help mothers stay attached to the labor market during their children's pre-school years. In fact, Paull (2008) shows how in Britain the substantial movement of women to part-time work occurs with the first birth and continues steadily for 10 years. Our results are in line with this argument, estimating a reduced probability of leaving employment while working part-time or working where part-time jobs are more readily available.

Motherhood Wage Penalty

The motherhood wage penalty is a common phenomenon that characterizes countries with different institutional contexts. Harkness and Waldfogel (2003), in fact, find a negative effect of children on women's wages in all the countries they consider.[3] The wage penalty is largest in the U.K., followed by the other Anglo-American countries, Spain and Germany, while it is smallest in the Nordic countries.

The literature identifies several explanations for the motherhood wage penalty (Wetzels 2007). The first is related to *human capital* depreciation during non-work spells (childbearing and childrearing) for women who re-enter the labor 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 do not take breaks after childbirth, while Anderson et al. (2002) find no penalty for less educated mothers for whom human capital accumulation is less relevant. However, Datta Gupta and Smith (2002) for Denmark, and Lalive and Zweimüller (2009) for Austria show that the negative effect of motherhood on women's human capital is only temporary. Albrecht et al. (1999) for Sweden find a negative effect of non-work spells but not of maternity leave on women's subsequent wages. Furthermore, they find that penalties due to breaks are different for men and women and, therefore, the human capital depreciation hypothesis alone cannot explain the motherhood wage penalty.

In addition, negative effects on career and wages sometimes occur because employers may consider breaks (especially when prolonged beyond the base leave period) or even motherhood, as a *sign* of a lower work commitment (Mavromaras and Rudolph 1997). Or, they may simply assume that mothers are less productive than non-mothers (*stigma*) without observing their actual productivity (Joshi et al. 1999; Buding and England 2001).

On the other hand, mothers may truly be *less productive* than non-mothers, due to family responsibilities and increased household production and caring activities, or because of tiredness and the need to save energy for their duties at home. As Becker (1991, 1995) argues, this is the consequence of specialization within the family. Women are, in fact, still predominantly responsible for domestic work and childcare; therefore, they spend less time participating in leisure activities and more in household tasks. Consequently, less energy is left for paid work. Moreover, they may have to stay at home when their children are ill, or spend time at work organizing childcare and children's activities. This hypothesis is not easily testable using the typical data available to researchers. However, Davies and Pierre (2005) and Molina and Monuenga (2009) show that the wage penalty increases with the number of children, while Anderson et al. (2003) use children's age in their wage equation and show that as children grow, the negative effect of their presence on the mother's wage is reduced. Younger children demand more time and energy from their mothers. Similarly, Fernández-Kranz et al. (2010) for Spain find that mothers' earnings return to their pre-birth levels only after 9 years. 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-time workers and find that the total hours of unpaid work is negatively associated with current earnings.

However, women who want to have children may be more likely to choose jobs with better working conditions *ex-ante*, particularly in relation to working hours and job location. The cost of this choice might be lower wages 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 motherhood wage penalty 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 alone cannot explain the motherhood wage penalty. Consistent with this last result, we estimate that there is no wage gap before childbirth among women highly attached to the labor market,[4] i.e., there is no detectable wage difference between the two groups before one group gives birth but the wage gap emerges after the event of birth.

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 the selection into less demanding jobs in explaining wage differentials between mothers and non-mothers, while Ejrnaes and Kunze (2011) estimate a 10–20 % gap in real wages

between mothers and childless women in Germany that arises from job mobility of unskilled women. In particular, it emerges from the literature[5] that a *part-time job* helps mothers stay attached to the labor market. However, in many countries part-time jobs are less protected and the wage is lower than in full-time jobs and therefore moving to a part-time job imposes a cost to working mothers in terms of career and hourly wages. Furthermore, the wage penalty of part-time workers is likely to worsen with the increase in the incidence of temporary contracts (Fernández-Kranz and Rodríguez-Planas 2011). More specifically, 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 who move from full-time to part-time suffer a relevant wage penalty. Our empirical analysis reaches somewhat different conclusions. We show that, in Italy, mothers of a pre-school child who work part-time or who move to a part-time job after childbirth face no wage penalty relative to women with no pre-school children holding the same kind of job, while those who work full-time do. We argue that this is due to the higher protection of part-time jobs provided by the Italian legislation at the time of our analysis, as discussed in the next Section.

Institutional Background

The Italian institutional context for the period 1989–2003 (the period we consider in our empirical analysis) is of particular interest, especially in relation to the study we perform. As already pointed out, Italy has always been characterised by one of the lowest female employment rates in Europe (together with Spain and Greece). The existing literature agrees in concluding that the key reason for the low participation rates in southern European countries is the lack of satisfactory policies and services that help women to reconcile work and family life (Del Boca and Wetzels 2007).

Studies on time use show that women perform most of the domestic and care work in Italian households (Burda et al. 2008; Mancini and Pasqua 2012) even when they have a job. The presence of children further increases the specialisation and therefore the hours devoted to domestic activities for both working and non-working mothers. This specialisation is the result of social norms and labor market policies designed with the idea that women are the main (when not the only) caregivers in the family. An example of this is provided by parental leave rules. Italian mothers, after a compulsory and fully-paid maternity leave of 5 months, can access (if the child is still under the age of three) up to 6 months of parental leave paid only 30 % of the regular salary. If the child is between three and 8 years old such leave is still accessible but unpaid. This parental leave was extended to fathers in 2000, but only a negligible portion of fathers utilized it. In fact, when both parents work, the father usually earns the highest wage and therefore, in addition to possible cultural constraints, it is a rational choice for mothers to take the optional leave.[6]

Low availability of childcare slots is also a serious obstacle to women's work. Table 1 shows the percentage of children in the age range 0–2 who had access to childcare in 1995 (the midpoint of our observation period, but the percentage has not increased over time). Italian shares are very low: around 10 % compared to 23 % in France, 33 % in Sweden, 48 % in Denmark.[7] Data from "Cittadinanza attiva"[8] show that the number of

children on waiting lists to access public childcare is almost equal to the number of accepted children. The development of market-based childcare is only a recent phenomenon, subsequent to our observation period. This minimizes any endogeneity issue about childcare demand. Also evident is a wide regional disparity, resulting from the almost complete lack of childcare services in southern regions.

Table 1 : Childcare availability and part-time jobs, Italian regions, 1995

Region	Area	Formal childcare availability (% of population <3 years)	Part-time (% of female workers)
Emilia Romagna	Center	28.4	6.6
Piemonte-Valle D'Aosta	North	16.5	5.9
Lombardia	North	13.8	6.8
Marche	Center	13.2	5.9
Toscana	Center	11.7	7.1
Umbria	Center	11.5	6.7
Trentino	North	11.0	7.8
Lazio	Center	10.4	5.6
Liguria	North	10.1	6.3
Veneto and Friuli Venezia Giulia	North	8.6	6.8
Basilicata	South	5.8	5.7
Puglia	South	4.8	6.2
Abruzzo and Molise	South	4.5	5.6
Sicilia–Sardegna	South	4.0	5.8
Calabria	South	1.2	7.3
Campania	South	1.0	4.5

Del Boca (2002)

The availability of childcare improves substantially for children between three and 5 years of age. In fact, in this age range, in 1995 more than 80 % of children 3–5 years old attended childcare centers. However, opening hours of the service were (and still are) often incompatible with full-time work. This also happens in primary schools where most schools close at 4.30 p.m. and some (especially in the south) do not have a cafeteria for serving lunch. Moreover, summer holidays are traditionally very long in Italy (almost 3 months), which poses a serious problem for families in which both parents work. Many parents rely on the help of grandparents, who have become an essential (and free) instrument to help families in making work and family life compatible.

In this context, having a part-time job is the only way for many women to stay attached to the labor market after childbirth. However, in 1995 (Table 1) less that 8 % of women worked part-time, as employers in the private sector were and are not obliged to accept workers' request for reduced working hours.[9] Despite its

low availability, and differently from Anglo-Saxon countries, part-time work had the same protection and the same hourly wage[10] as full-time work (set by national collective contracts and by law[11]). Growth in part-time work actually occurred only after 2000, when contract conditions of part-timers were deregulated to encourage employers to hire them, e.g. working schedule can now be set and changed by the employer even without the consent of the employee, and with very short notice. However, the 2000 reform only marginally influences our observation period, as discussed in the next Section on data issues.

In any case, if a woman leaves the labor market after childbirth, not even temporary contracts, although still scarce in the period we consider, appear to be a channel for re-obtaining good employment conditions (Berton et al. 2011).[12]

Data and Descriptive Statistics

We use the Work Histories Italian Panel (WHIP) produced by an agreement between the University of Turin and the Italian Social Security Administration (INPS) and made available by LABORatorio Riccardo Revelli.[13] The archive spans the period 1985 to 2003 and randomly draws a 1:90 sample from all Italian Social Security Administration (INPS) archives, i.e., from the population of those who have been employed in Italy as dependent workers, have been self-employed or have received income support or a pension from INPS. The entire working career of each of these individuals is observed. Only open-ended contracts in the public sector and selected professions (e.g. lawyers) are not observed. Women employed in the public sector make up about 25 % of total female workers, while the number of female professionals is a tiny fraction of total female employment. These shares are stable in the period we consider.[14] We discuss the implications of the exclusion of civil servants and professionals in the subsection “Motherhood Wage Penalty” in “Empirical Analysis”.

In this paper, we use the dependent employment section of WHIP, which is a Linked Employer Employee Database and provides full details on working careers.[15] It records individual (gender, age, place of birth) and job (e.g. contract, firm size, industry, location) characteristics, as well as gross weekly wages and the number of full-time equivalent weeks worked during the period. Comparable gross weekly wages can therefore be computed for full- as well as part-time workers. We focus on the period 1989–2003, as maternity leaves were not fully recorded in the years before 1989.

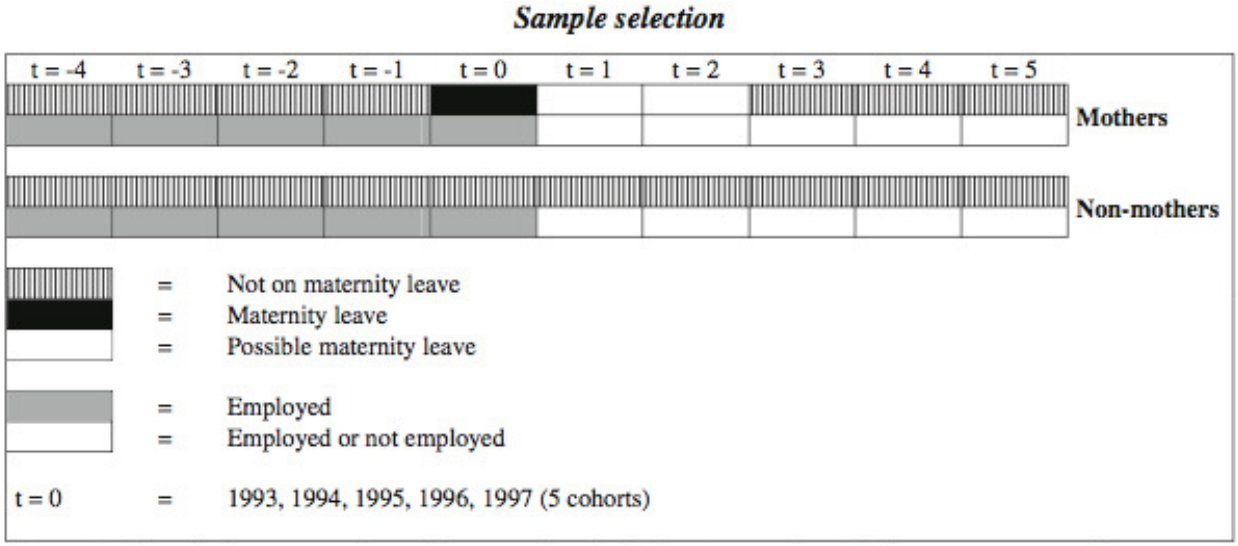
Statistics on motherhood from WHIP are consistent with the 2002 ISTAT (the Italian Statistical Institute) birth sample survey.[16] In fact, ISTAT surveyed about 175,000 births from women employed in the private sector between 2000 and 2001 and WHIP records of women receiving maternity benefits in 2001 correspond to about 180,000 births.[17]

To conduct our empirical analysis, we select women aged 18 to 45 in employment and not on maternity leave for four consecutive years (from $t=-4$ to $t=-1$) .[18] Some are observed as receiving maternity benefits

during the subsequent year ($t = 0$); these are our sample of mothers of a pre-school child (call them mothers in $t = 0$). The control group comprises "women with no pre-school children in $t = 0$".[19] We study the employment status of mothers of a pre-school child and women with no pre-school children for 5 years afterward (from $t = 1$ 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 maternity leave we observe.[20] As the fertility rate was as low as 1.2, this selection is not expected to bias our sample. Furthermore, the Italian institutional setting (as discussed in "Institutional Background") clearly implies that it is more challenging to provide childcare outside the family to very young children. Therefore it is most likely that it is the age of the youngest child that matters more for mothers' employment decisions.[21] In fact, Mancini and Pasqua (2012) show that having a child younger than 3 reduces the mother's working time by more than 40 min per day, while the presence of a child aged three to five has no significant impact.

To increase sample size, we pool five cohorts[22] of women (about 2,500 women with no pre-school children and 500 mothers of a pre-school child in each cohort), where $t = 0$ is a year between 1993 and 1997. The five cohorts of mothers of a pre-school child comprise different individuals by construction, i.e., it is not possible for the same individual to belong to different cohorts.[23] In contrast, women with no pre-school children 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 of a pre-school child and women with no pre-school children can experience employment and non-employment periods. Figure 1 illustrates the structure of the sample.

Fig. 1 Sample selection



Note: *Mothers* indicates mothers of a pre-school child; *Non-mothers* indicates women with no pre-school children.

Table 2 details the sample size of the groups in the period 1993–1997. We distinguish three different situations: women without non-employment spells longer than 12 months[24] between $t = 1$ and $t = 5$ (called "always working"); women who experience a period of long-term unemployment but re-enter employment before $t = 5$ (called "combining employment with spells of non-employment"); women who leave

employment between $t = 1$ and $t = 5$ and do not re-enter employment up to $t = 5$ (called "no spells of employment after $t = 0$"). It is immediately clear that once we condition on 5 years of continuous work, women with no pre-school children almost never leave employment afterward. In fact, 93 % of women with no pre-school children always work between $t = 1$ and $t = 5$, compared to only 54 % of mothers of a pre-school child. In addition, 2 % of women with no pre-school children have no spells of employment after $t = 0$ (as opposed to 30 % of mothers[25]) and 5 % of non-mothers combine employment with spells of non-employment after $t = 0$ (as opposed to 16 % of mothers).

Table 2 Motherhood and employment

	Always working	Combining employment with spells of non employment after t=0	No spells of employment after t=0	Total
Non-mothers	12,702	730	264	13,696
Row %	*0.927*	*0.053*	*0.019*	
Mothers	1,261	378	703	2,342
Row %	*0.54*	*0.16*	*0.30*	
All	13,963	1,108	967	16,038
Row %	*0.87*	*0.07*	*0.06*	

Mothers indicates mothers of a pre-school child; *Non-mothers* indicates women with no pre-school children

Table 3 compares the unconditional probability of moving to part-time work after $t = 0$ for mothers of a pre-school child and women with no pre-school children: 23 % of mothers compared to just 8 % of non-mothers make the transition.[26] Most transitions from full- to part-time occur within the same firm (75 % for mothers of a pre-school child, 40 % for women with no pre-school children).

Table 3 Motherhood and working hours

	Always full-time	Always part-time	From full-time to part-time[a]	Other combinations[b]	Total
Non-mothers	9,506	923	995	1,278	12,702
Row %	*0.75*	*0.07*	*0.08*	*0.10*	
Mothers	766	95	292	108	1,261
Row %	*0.61*	*0.08*	*0.23*	*0.09*	
Total	10,272	1,018	1,287	1,386	13,963
Row %	*0.74*	*0.07*	*0.09*	*0.10*	

Mothers indicates mothers of a pre-school child; *Non-mothers* indicates women with no pre-school children. Results refer to always working women

[a]Only one transition

[b]Several transitions in both directions

The statistics reported in these two tables are hence consistent with the prediction that women reallocate their time after childbirth, and that they are more likely to reduce their working hours. It is important to notice that non-mothers and mothers appear quite similar with respect to observable characteristics (Table 4). Mothers of a pre-school child are only slightly younger and employed in slightly smaller firms. However, comparing women with no pre-school children 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 $t = 0$, although some small differences do arise when comparing them to mothers who leave employment temporarily or permanently in our observation period. This second group is in fact younger, blue collar, employed in smaller firms and earns lower wages. This descriptive evidence is consistent with the literature pointing to a higher propensity to leave the labor market for mothers with a smaller human capital endowment and holding worse jobs in terms of safety and physical strain. In general, however, women strongly attached to the labor market resemble each other, regardless of motherhood.

Table 4 Sample composition at $t = 0$

	Non-mothers		Mothers					
			Total		Always working		Not always working	
Age	31.83	(*7.31*)	29.08	(*4.25*)	29.65	(*4.33*)	28.41	(*4.07*)
Log firm size	3.90	(*2.58*)	3.45	(*2.26*)	3.79	(*2.38*)	3.05	(*2.03*)
Log real wage in t−1	5.89	(*0.34*)	5.84	(*0.31*)	5.90	(*0.31*)	5.78	(*0.31*)
Contract:								
Part-time	0.14	(*0.35*)	0.13	(*0.33*)	0.13	(*0.34*)	0.12	(*0.33*)
Atypical contracts	0.03	(*0.16*)	0.03	(*0.17*)	0.02	(*0.14*)	0.04	(*0.20*)
Apprenticeships	0.03	(*0.17*)	0.01	(*0.11*)	0.01	(*0.10*)	0.01	(*0.12*)
Blue collar workers	0.44	(*0.50*)	0.46	(*0.50*)	0.39	(*0.49*)	0.54	(*0.50*)
White collar workers	0.53	(*0.50*)	0.53	(*0.50*)	0.59	(*0.49*)	0.45	(*0.50*)
Geo. Area:								
Northwest	0.41	(*0.49*)	0.42	(*0.49*)	0.46	(*0.50*)	0.38	(*0.48*)
Northeast	0.30	(*0.46*)	0.29	(*0.45*)	0.28	(*0.45*)	0.31	(*0.46*)
Centre	0.19	(*0.39*)	0.19	(*0.39*)	0.19	(*0.39*)	0.18	(*0.39*)
South	0.10	(*0.30*)	0.10	(*0.30*)	0.08	(*0.26*)	0.13	(*0.34*)
Industry:								
Energy, gas, water	0.01	(*0.10*)	0.00	(*0.05*)	0.00	(*0.06*)	0.00	(*0.03*)
Mining and chemical	0.05	(*0.21*)	0.04	(*0.20*)	0.05	(*0.21*)	0.04	(*0.20*)
Metal work	0.14	(*0.35*)	0.15	(*0.36*)	0.18	(*0.38*)	0.13	(*0.34*)
Food, textiles and other manufacturing	0.30	(*0.46*)	0.35	(*0.48*)	0.31	(*0.46*)	0.39	(*0.49*)
Construction	0.02	(*0.13*)	0.02	(*0.14*)	0.02	(*0.14*)	0.02	(*0.13*)
Trade	0.24	(*0.43*)	0.24	(*0.43*)	0.24	(*0.42*)	0.25	(*0.43*)
Transport and communication	0.02	(*0.16*)	0.01	(*0.10*)	0.01	(*0.11*)	0.01	(*0.09*)
Banking and insurance	0.18	(*0.38*)	0.14	(*0.35*)	0.16	(*0.36*)	0.12	(*0.33*)
Other	0.03	(*0.18*)	0.04	(*0.19*)	0.03	(*0.18*)	0.04	(*0.20*)
Formal childcare availability (% of population <3 years)	13.26	(*6.54*)	12.93	(*6.16*)	13.59	(*6.24*)	12.16	(*5.99*)
Part-time availability (% of female workers)	0.68	(*0.47*)	0.66	(*0.47*)	0.69	(*0.46*)	0.63	(*0.48*)
Average regional female employment rate	44.25	(*6.87*)	44.17	(*6.61*)	44.82	(*5.99*)	43.42	(*7.20*)

Mothers of a pre-school child; *Non-mothers* indicates women with no pre-school children. Mean values, standard deviations in parentheses

Empirical Analysis

Our empirical strategy focuses on the years immediately following childbirth. Our two aims are to study the transitions of women out of employment after childbirth and to compare the wage profiles and labor force attachment of mothers of a pre-school child and women with no pre-school children continuously working over a period of 10 years.

We focus on women highly attached to the labour market before maternity, as defined in the data section. 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 the following paragraph, we show that the data supports this hypothesis. However, as a consequence of this selection, we are able to estimate only a lower bound of the career break job penalty—the increase in the probability of leaving the labor market—with respect to the whole population of women. In fact, it is well proven in the literature that the hazard rate of leaving employment decreases as labor market experience increases. As a confirmation, in our sample, changes in participation of women with no pre-school children after 5 years of continuous employment are negligible (Table 2).

Career Break Job Penalty

We estimate the probability of leaving employment after childbirth, temporarily or permanently, focusing 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 to career break job penalties (Ruhm 1998). We control for individual and job characteristics linked to human capital endowment and to job quality, to identify the net effect of motherhood on employment.

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. In fact, the average age-difference between siblings is over 2 years, so our observation period (5 years after the first observed child) would not allow us to observe participation choices following the second child. Furthermore, because most Italian women only have one child, they would be excluded from the estimates.

The base specification we estimate is a linear probability model:

$$out_i = \lambda M_i + \alpha w_{i,t-1}(1 - M_i) + \alpha_M w_{i,t-1} M_i + z_{i,t-1}\gamma \quad (1)$$

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). M_i signals that individual i belongs to the group of mothers of a pre-school child, w_{t-i} is the full-time equivalent weekly real[27] wage at $t-1$, and z_{t-1} includes controls for human capital, job characteristics, childcare availability and the demand for female workers in the local labor market (proxied by the regional female employment rate in 20 Italian regions). Childcare availability is

measured by the share of the population under 3 years of age accessing formal childcare; it varies at the regional level (see Table 1). Notice that before $t = 0$, both future mothers and future non-mothers work on average nearly the maximum of 52 weeks per year. This reveals their attachment to the labor market, but at the same time prevents us from using the number of weeks worked in the past as an additional source of variability in our model.

Before presenting the results, it is useful at this point to briefly discuss our assumption of exogenous maternity (in a statistical sense). An argument could be made that maternity is correlated to working career up to $t = 0$. While this might be generally true, we need to assess whether it is relevant in our sample of women highly attached to the labor market. To test for the endogeneity of maternity we estimate Eq. (1) instrumenting motherhood with interactions of age and birthplace, thus exploiting the cultural differences across Italian regions about motherhood. The tests for the validity of instruments and the exogeneity hypothesis support our strategy of modelling maternity as exogenous (Table 5). Hence, as anticipated in the previous section, in our sample there is no evidence of ex-ante job selection of future mothers.

Table 5 Tests for exogeneity of maternity

Test	Test value		Model
Anderson canon. corr. LR statistic (identification/IV relevance test)	345.823	*P*-val=0.0000	IV (2SLS) regression with robust standard errors
Hansen J statistic (eqn. excluding suspect orthog. conditions)	44.592	*P*-val=0.1828	IV (2SLS) regression with robust standard errors
C statistic (exogeneity/orthogonality of suspect instruments)	2.626	*P*-val=0.1051	IV (2SLS) regression with robust standard errors

Instruments: age × area of birth

Table 6 reports the estimated coefficients of the variables of interest for the probability of exiting employment. Column (a) in Table 6 reports results from Eq. (1) for women working full-time[28] before $t = 0$. It is already clear from the descriptive analysis in "Data and Descriptive Statistics" that, while women with no pre-school children are strongly attached to employment after 4 years of continuous work, those who have a child are more likely to combine employment with spells of non employment or to have no further spells of employment after $t = 0$. This is confirmed by the very high estimated coefficient for the variable "mothers". Participation is almost not an issue for women with no pre-school children. They basically do not exit, unless they earn high wages (income effect prevailing) or work part-time (lower attachment to the labor market).

Table 6 Estimated linear probability of exiting employment after $t = 0$

	(a)		(b)		(c)	
	Coefficient	Robust std. err.	Coefficient	Robust std. err.	Coefficient	Robust std. err.
Mother of a pre-school child	2.324	(*0.205*)[a]	2.281	(*0.207*)[a]	2.297	(*0.124*)[a]
Ln wage × non M	0.076	(*0.013*)[a]	0.075	(*0.013*)[a]	0.071	(*0.010*)[a]
Ln wage × M	−0.241	(*0.036*)[a]	−0.231	(*0.036*)[a]	−0.241	(*0.021*)[a]
Formal childcare availability × non M	0.0001	(*0.001*)[a]	0.0001	(*0.001*)[a]	0.0005	(*0.001*)[a]
Formal childcare availability × M	−0.006	(*0.002*)	−0.006	(*0.002*)	−0.006	(*0.001*)
Part-time available $_{t-1}$ × non M			−0.005	(*0.008*)		
Part-time available $_{t-1}$ × M			−0.043	(*0.024*)[c]		
Part-time$_{t-1}$					0.025	(*0.008*)[a]
Part-time $_{t-1}$ × M					−0.045	(*0.020*)[b]
Age at t−1	0.009	(*0.004*)[b]	0.009	(*0.004*)[b]	0.008	(*0.004*)[b]
Age at t−1 squared	−0.015	(*0.005*)[b]	−0.015	(*0.005*)[b]	−0.014	(*0.006*)[b]
Atypical contracts	0.037	(*0.016*)[b]	0.038	(*0.016*)[b]	0.038	(*0.015*)[b]
Apprenticeships	0.019	(*0.016*)	0.014	(*0.017*)	0.020	(*0.017*)
Blue collar workers	0.016	(*0.007*)[b]	0.014	(*0.007*)[c]	0.019	(*0.006*)[b]
Log firm size in t−1	−0.006	(*0.001*)[a]	−0.006	(*0.001*)[a]	−0.004	(*0.001*)[a]
Sample	only ft in t−1		only ft in t−1		all	
N.obs	13,762		13,762		15,971	
Wald chi2	2,021.41[a]		2,017.65[a]		2,241.98[a]	

Other controls: geographical area, economic activity, year dummies, regional female employment rate

Robust standard errors in parentheses

[a]Statistically significant at 0.01 level

[b]Statistically significant at 0.05 level

[c]Statistically significant at 0.10 level

The results also confirm that mothers of a pre-school child are more likely to exit employment when they are earning lower wages. The wage is related to both human capital and job quality; the effect on the mothers' probability of exiting is very large.

A crucial point is that the availability of childcare reduces the probability that mothers of a pre-school child will leave employment, while it has no effect on the probability that women with no pre-school children will leave employment. This result highlights once again the importance of childcare services for female labor market attachment. The other controls (age, type of contract and firm size) have the expected impact and, in general, show that better job conditions mitigate the career break job penalty.

Let's now consider the role of part-time jobs on the probability that a mother of a pre-school child reduces her number of hours worked; we expect her to do so if part-time jobs are more available in her relevant labour market (within or outside her firm). To focus on the role of part-time jobs on the probability of exiting employment we use two different strategies. First, using again the sample of women working full-time up to $t = 0$, we augment Eq. (1) including a dummy (*Part-time available* $_{t-1}$) signalling whether there are part-time jobs available in the labor market relevant for individual i: *Part-time available* $_{t-1} = 1$ if in the cell defined by individual i's industry, area and occupation in $t-1$, part-time jobs held by women are more than 15 % of all jobs held by women in the cell; this is computed with the whole sample of female employees. We expect the availability of part-time jobs to decrease the probability of exiting employment only for mothers of a pre-school child. Second, with the whole sample (full-time and part-time), we augment Eq. (1) including a control for mothers of a pre-school child working part-time before $t = 0$ (*Part-time* $_{t-1}$) and we expect mothers working part-time before childbirth to leave employment less often than mothers working full-time before childbirth.

Column (b) and (c) of Table 6 report the results of these exercises. Notice that the estimates of the other coefficients are unchanged using the whole sample or the full-time sample, as a further confirmation that we can safely select women working full-time before $t = 0$. Column (b) shows that the availability of part-time jobs has a negative and significant effect on the exit of mothers of a pre-school child, helping them stay employed. Instead, the availability of part-time work is non-influential on the probability of exiting employment for women with no pre-school children. Column (c) shows that holding a part-time job in $t = -1$ significantly increases the probability of exiting in general, while it significantly decreases exits for mothers of a pre-school child.

It must be made clear, however, that we can read the above results in two different ways. In fact, the exit of mothers of pre-school children can be both the result of a voluntary choice or it can be imposed by the employers. Up to now we have interpreted our results in terms of labor supply decisions. However, in case of demand side decisions (i.e., a layoff) our results can be reinterpreted as follows. Employers are more likely to fire women with very young children (positive sign of the dummy variable "mother"), especially if they hold less protected contracts (positive sign of the dummy variables "atypical contract" and "apprenticeships"). Since reconciliation is easier for women working part-time and their productivity after childbirth can be expected to decrease less than for new mothers working full-time (as we confirm in the next section), employers are less likely to fire part-timers (positive sign of both variables related to part-time

when interacted with the dummy "mother"). Instead, the employers are more willing to fire women with a pre-school child if they are less qualified (positive sign of the dummy "blue collar" and negative sign of the variable "wage" when interacted with the dummy "mother").

Thus, our results in this sub-section show that the probability of leaving employment is lower if the wage is higher and if childcare facilities are available. In addition, our analysis clearly shows that part-time jobs can play a role in allowing mothers of a pre-school child to remain in the labor market.

Motherhood Wage Penalty

We expect that wages of mothers and of women with no pre-school children to be different after $t = 0$, if and only if they work full-time. To test this hypothesis, we study the wage profiles of mothers of a pre-school child and women with no pre-school children continuously employed from $t = -4$ to $t = 5$, allowing for unemployment spells shorter than 12 months only. We follow Jacobson et al. (1993) and estimate

$$w_{iy} = \alpha_i + \alpha_y + x_{iy}\beta + \sum_{t=-2}^{5} M_i m_t + \epsilon_{iy} \quad (2)$$

where i indicates individuals, y is the calendar year, t is the relative time from childbirth; α_i are individual fixed-effects, α_y are time fixed-effects, m_t are average conditional wage differentials between mothers of a pre-school child ($M = 1$) and women with no pre-school children ($M = 0$) from 2 years before maternity to 5 years afterward; x includes controls for human capital and job characteristics as in Table 4, plus a control for job movers (i.e. those who change jobs) to allow for different wage profiles of women changing jobs. We estimate Eq. (2) with weekly log-earnings. We use the panel dimension of the data and choose a least squares estimator to control for individual fixed effects (it is a generalized difference in differences -DID- estimator). Those who do not become mothers in $t = 0$ act as the control group, while maternity is the treatment.

The motherhood wage penalty 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 weekly earnings of mothers and women with no pre-school children are never significantly different before $t = 0$, which is consistent with this. We are then left with a few possible causes of motherhood wage penalty: the ex-post job sorting and the—actual or assumed—decreased productivity due to increased family burden. To shed some light on the possible different explanations of the motherhood wage penalty we use movements to a part-time job, and we estimate Eq. (2) with different subsamples. First, we compare mothers and women with no pre-school children always working full-time.[29] If mothers experience a wage penalty we will find that $m_t < 0$ for $t > 0$. Then we use different combinations of full- and part-time work for the treatment and the control group. For example, we compare non-mothers working full-time to mothers who move to a part-time job after $t = 0$. Again, if a wage penalty occurs to a mother of a pre-school child working part-time we will find that $m_t < 0$ for $t > 0$, that is, motherhood is associated with lower wages after child birth.

Table 7, column (a), contains the estimates of the average conditional log-wage differentials between mothers and women with no pre-school children working full-time (m_t). Table 8 in the Appendix reports all variables included in the specification of the model. Before childbirth, conditional average log-wages of future new mothers are not significantly different from those of non-mothers, confirming that the two groups are not statistically different before $t = 0$. However, weekly log-earnings of mothers of a pre-school child become significantly lower for $t > 0$, and show no sign of a closing gap after 5 years (disregarding $t = 0$ to $t = 2$ because of the eventual parental leave that can decrease earnings artificially[30]). The gap amounts to about 3 % three years after childbirth. Hence, we do observe a significant motherhood wage penalty in Italy, despite the collective wage bargaining setup, despite selecting women always working, and despite controlling for unobserved heterogeneity.

Table 7 Estimated log-wage differentials: coefficients of M_i from Eq. (2)

	Sample a		**Sample b**		**Sample c**		**Sample d**		**Sample e**	
	Coefficient	**(s.e.)**	**Coefficient**	**(s.e.)**	**Coefficient**	**(s.e.)**	**Coefficient**	**(s.e.)**	**Coefficient**	**(s.e.)**
m_{t-2}	0.00	(*0.01*)	0.00	(*0.01*)	0.00	(*0.01*)	−0.002	(*0.02*)	−0.01	(*0.02*)
m_{t-1}	−0.01	(*0.01*)[a]	−0.02	(*0.01*)	−0.01	(*0.01*)	−0.02	(*0.02*)	−0.01	(*0.02*)
m_t	−0.30	(*0.01*)[a]	−0.25	(*0.01*)[a]	−0.25	(*0.01*)[a]	−0.26	(*0.02*)[a]	−0.14	(*0.02*)[a]
m_{t+1}	−0.21	(*0.01*)[a]	−0.11	(*0.01*)[a]	−0.10	(*0.01*)[a]	−0.12	(*0.02*)[a]	−0.07	(*0.02*)[a]
m_{t+2}	−0.05	(*0.01*)[a]	−0.02	(*0.01*)	−0.01	(*0.01*)	−0.01	(*0.02*)	−0.01	(*0.02*)
m_{t+3}	−0.03	(*0.01*)[a]	−0.01	(*0.01*)	0.00	(*0.01*)	0.02	(*0.02*)	0.00	(*0.02*)
m_{t+4}	−0.03	(*0.01*)[a]	−0.02	(*0.01*)	0.00	(*0.02*)	−0.03	(*0.02*)	−0.02	(*0.02*)
m_{t+5}	−0.03	(*0.01*)[a]	−0.01	(*0.01*)	−0.01	(*0.02*)	−0.03	(*0.02*)	0.00	(*0.02*)
N.obs	102,502		98,113		22,171		12,958		10,178	

Robust standard errors in parentheses

Other controls displayed in Table 8

[a]Statistically significant at 0.01 level

Sample a Mothers and non-mothers always full-time; *Sample b* Non-mothers full-time and mothers from full-time to part-time; *Sample c* Non-mothers part-time after t = 0 and mothers from full-time to part-time; *Sample d* Non-mothers and mothers from full-time to part-time; *Sample e* Non-mothers and mothers always part-time

Mothers of a pre-school child; *Non-mothers* indicates women with no pre-school children

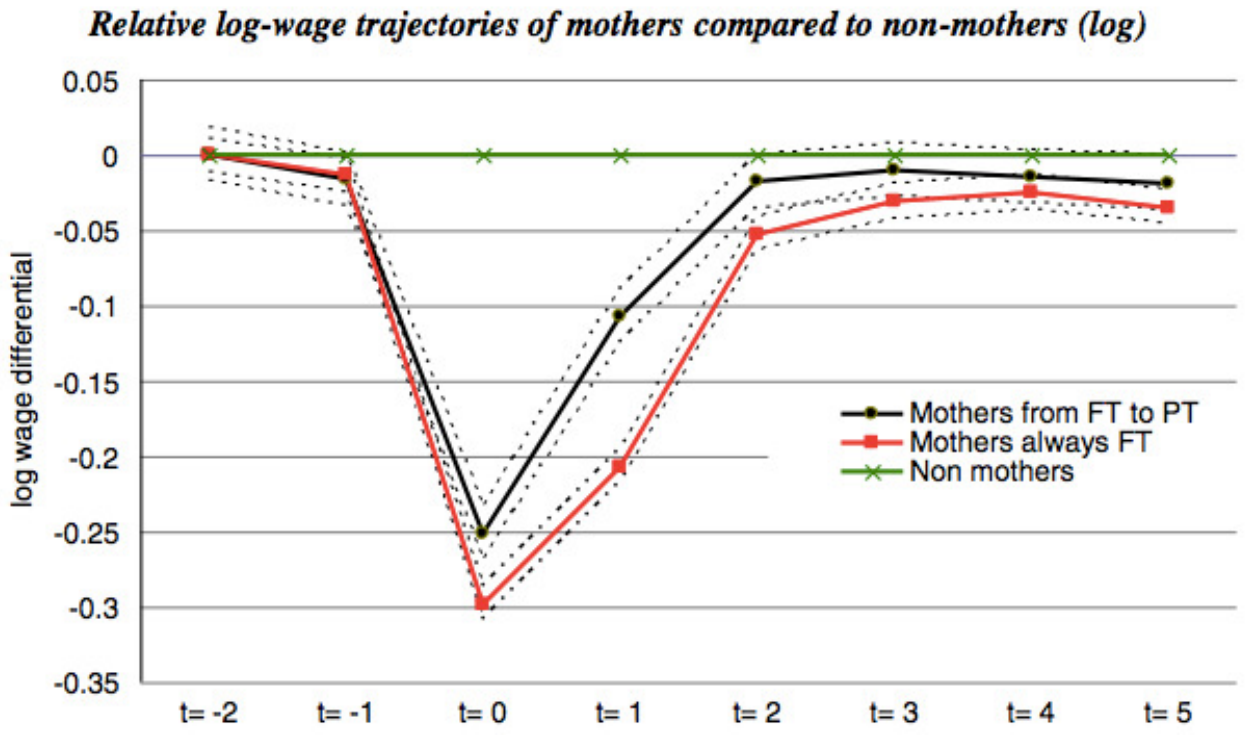
The other columns in the table present the results on different subsamples of women, and highlight the role of part-time jobs in mitigating the motherhood wage penalty. In particular we compare: (i) the log-weekly earnings of women with no pre-school children working full-time with those of mothers of a pre-school child that moved from full-time to part-time (column b); (ii) the log-weekly earnings of women with no pre-school children working part-time with those of mothers of a pre-school child that moved from full-time to part-

time (column c); (iii) the log-weekly earnings of non-mothers and mothers of a pre-school child that moved from full-time to part-time (column d). Columns (b) to (d) prove that mothers of a pre-school child moving to part-time do not experience a significant motherhood wage penalty in comparison to women with no pre-school children, whatever her time schedule (full-time women with no pre-school children, as well as part-time or those moving from full- to part-time). Finally, we compare mothers and women with no pre-school children both always working part-time (column e). Also in this case no significant wage penalty emerges. Notice that, in contrast to the existing literature, no penalty emerges for mothers moving to part-time after childbirth compared to non-mothers even if non mothers keep working full-time. This shows that in Italy a part time-job per se does not imply a lower wage (as in Joshi et al. 1999).

The sign of the other variables is as expected and in line with previous results, as shown in Appendix Table 8. It is interesting to observe that the dummy "mover" has a negative sign, while in the literature on wages movers usually obtain higher incomes. It seems, therefore, that mothers of very young children move either because obliged to (they are laid off) or because they are looking for a job with characteristics that better help reconciliation of work and childrearing, even at the cost of a lower wage.

Figure 2 displays the relative log-wage trajectories as estimated in the corresponding Table 7 (columns a and b). It plots the average conditional log-wage differential of mothers of a pre-school child always working full-time and of mothers of a pre-school child moving from full- to part-time with respect to full-time women with no pre-school children (the line at zero). The small dotted lines highlight the 95 % confidence interval and show that only mothers continuing to work full-time face a penalty that is persistent over time.

Fig. 2 Relative log-wage trajectories of mothers compared to non-mothers (log)



Note: Mothers indicates mothers of a pre-school child; Non-mothers indicates women with no pre-school children.

All the results consistently confirm a motherhood wage penalty for Italian women. Women unable to work fewer hours after childbirth have an actual or perceived lower productivity on the job and face a negative wage gap with respect to otherwise similar women with no pre-school children. In contrast, women who can work fewer hours do not decrease their (actual or perceived) productivity and relative wages.

To conclude, contrary to the existing literature, ex-post job selection can protect instead of hamper mothers' working careers: moving to a part-time job reduces the motherhood wage penalty, while keeping a full-time job is penalizing in terms of wages. A crucial difference between Italy and most countries is that part-time jobs were few but well paid and protected in the period we analyse.

Three comments are in order. First, women working in the public sector (around one fourth of total female employment, constant in our observation period) are not covered by our data; several "female public sector jobs" are often very similar to part-time jobs (e.g. teachers), thanks to the limited number of hours worked per week. Had those women—e.g. formally working full-time and not moving to part-time work after becoming mothers—been included in the sample, our results would have been less neat. Our estimated results are, therefore, representative of the private sector. However, our conclusions are more general, as jobs in the public sector share the characteristics that our analysis indicates as more family friendly, and moreover, in the public sector the move from full-time to part-time is made easier by law. Hence, we can predict a lower penalty for mothers working with a permanent contract in the public sector. On the other hand, it must be noticed that in more recent years employment turnover in the public sector has been frozen, so very few young workers have obtained a permanent public job, while the flexible/precarious career necessary to enter the public sector has lengthened; this has decreased the share of family friendly jobs for the younger cohorts of women.

Second, part-time jobs are especially relevant because of the lack of provision of adequate public childcare that is common all over Italy. And in fact, even our mothers of just one pre-school 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.[31]

Third, it may be argued that the drop in the wage after motherhood is a consequence of the new mother's decreased number of overtime hours. This is not the case as, according to the EWCS (European Working Condition Survey),[32] only 5.3 % of mothers and 5.5 % of non-mothers work over 40 h per week, and therefore no difference emerges in overtime work by motherhood status.

Conclusion

In Italy, mothers of pre-school children are more likely to experience a transition (either voluntary or not) to non-employment in the years after childbirth, compared to women with no pre-school children. 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' likelihood of exiting employment is very large. In addition, Italian mothers experience a non-negligible wage penalty. After childbirth, the wages of mothers become significantly lower than the wages of women with no pre-school children, and the gap shows no sign of closing after 5 years. We estimate that the gap amounts to about 3 %.

Finally, part-time jobs play a positive role in mitigating these negative events on the labor market in the medium run. The general consensus in the literature is that *part-time jobs* help mothers of pre-school children to stay attached to the labor market, but as part-time jobs are less protected and less well-paid than full-time jobs, these part-time jobs are 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 mothers of a pre-school child moving to part-time do not experience a slowdown in their wages. In addition, and consistent with the literature, we find that mothers are less likely to leave the labour market when the availability of part-time jobs is greater, while the availability of part-time jobs is non-influential on the probability of women with no pre-school children exiting employment. However, further research is needed to assess the effect of holding a part-time job in the longer term, beyond 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 labor market who have only one pre-school child, hence providing a lower bound of the average penalty among the whole population.

A bleaker note to conclude. The results of the paper utilized a time period during which part-time jobs had attributes similar to full-time jobs (the same hourly wage and the same job protection, as well as a stable time schedule—set in advance and not modifiable by the employer). Since 2000, employers are provided with more flexibility to alter the parameters of part-time work, and this led to the worsening of the key features of part-time contracts. In fact, the D.L. 61/2000 allowed the employer to change (and also prolong) the work schedule of part-timers almost at will and with very short notice; furthermore, temporary contracts are now widespread among part-timers. So, the results of this paper regarding the impact of part-time job availably on wages and employment should be taken with caution as they may not apply post-2000, as its current characteristics decrease its role as a family friendly contract.

Notes

1. Molina and Monuenga (2009) and Fernández-Kranz et al. (2010).

2. In Europe, only 25 % of mothers return to work before the child is 1 year old, whereas large differences emerge among countries as the child grows: 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.

3. They use the LIS (Luxemburg Income Study), controlling for earnings-related characteristics. Italy is not included in this comparative study.

4. As discussed in "Empirical Analysis".

5. Ariza et al. (2005); Del Boca et al. (2009). In Waldfogel (1997) and in Fernández-Kranz et al. (2010) part-time employment is an important component in explaining the family gap in pay. See also Newell and Joshi (1986), Dex et al. (1998) and Joshi et al. (1999) for the U.K. and Ellingsaeter and Rönsen (1996) for Norway. Del Boca et al. (2005 and 2009) highlight a positive effect of part-time work on female participation in Italy, but they do not consider wages.

6. In the empirical analysis we focus on a sample of working women who became mothers between 1993 and 1997, thus the extension of parental leave to fathers is non-influential for our analysis.

7. Source: Del Boca (2002).

8. http://www.cittadinanzattiva.it/

9. The situation is different in the public sector, which is, however, excluded from our empirical analysis.

10. Sometimes even more than full-time work (Ariza et al. 2005).

11. D.L. 61/2000.

12. In fact the use of temporary and flexible contracts in Italy spread only after the 1997 reform. In general, flexible and temporary workers receive less protection and lower hourly wages than permanent workers.

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

14. See ILO statistics (http://laborsta.ilo.org/).

15. We exclude the self-employed (less than 10 % of female employment), as their careers and their wages are affected by large measurement error.

16. This survey is available only for the year 2002.

17. Maternity leaves recorded by INPS cover all maternity events among dependent workers. In fact, there are no eligibility criteria for maternity payments among dependent employees. Only the self employed, free-lance and agricultural workers must meet eligibility criteria, but they are excluded both from our analysis and from our comparison with ISTAT data.

18. We further selected the sample to include only women aged 23–45, so that potential students working part-time are excluded. This more restrictive setup yields the same results as presented in the text.

19. We use this label because we cannot determine whether women have children born before $t = -4$ or not. In any case in $t = 0$ they would be entering primary school (or be even older).

20. 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 years, so we impose the condition on our subsample of mothers that they have not been on maternity leave again in $t = 3$ to $t = 5$. In $t = 1$ and $t = 2$ they can have parental leave periods to look after the first child.

21. Unfortunately, no robustness checks on this point are possible in our dataset, as the necessary selection of women highly attached to the labor market and the short observation period after $t = 0$ make it unobservable the effect of an eventual second child on the subsequent working career of the mother.

22. The word "cohort" refers to the year of birth of the child ($t = 0$) not to that of the mother. For women with no pre-school children we use the same word to refer to women in the control group for "mothers of a pre-school child in $t = 0$".

23. Pooling five cohorts and imposing on them the same attachment to the labor market does not generate any selection of working women over time because participation rates (also controlling for education) and female youth unemployment rate have remained constant over the decade of interest (see Del Boca et al. 2012); hence our selection can be regarded as constant in the period we consider.

24. We cut non-employment spells shorter than 12 months, to exclude frictional unemployment (more details below).

25. For the sake of simplicity, we sometimes skip the specification “of a pre-school child” although always referring to them.

26. The probability of moving to part-time work, conditional on observable characteristics, is also significantly different between mothers and non-mothers. The results are not reported, but are available upon request.

27. Real wages are deflated using the official inflation index provided by Italian Statistics on the basket of consumption of families of blue and white collar workers (famiglie di operai e impiegati).

28. It is possible 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 “Conclusion”).

29. 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 reason to believe that the assumption is violated.

30. During the 5 months of compulsory maternity leave women receive 80 % of their salary from social security and 20 % from the employer, while during the following 6 months of optional maternity leave they receive 30 % of their salary from social security. Hence, after childbirth we observe an artificial drop in wages since WHIP records only payments made by employers and not by social security.

31. 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.

32. Our own calculations.

Appendix

Table 8 Estimated log-wage differentials: coefficients from Eq. (2)

	Sample a		**Sample b**		**Sample c**		**Sample d**		**Sample e**	
	coefficient	**(s.e.)**	**coefficient**	**(s.e.)**	**coefficient**	**(s.e.)**	**coefficient**	**(s.e.)**	**coefficient**	**(s.e.)**
m_{t-2}	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	−0.01	(0.02)	−0.01	(0.02)
m_{t-1}	−0.01	(0.01)	−0.02	(0.01)	−0.01	(0.01)	−0.03	(0.02)	−0.01	(0.02)
m_t	−0.30	(0.01)	−0.25	(0.01)	−0.25	(0.01)	−0.27	(0.02)	−0.14	(0.02)
m_{t+1}	−0.21	(0.01)	−0.11	(0.01)	−0.10	(0.01)	−0.13	(0.02)	−0.07	(0.02)
m_{t+2}	−0.05	(0.01)	−0.02	(0.01)	−0.01	(0.01)	−0.02	(0.02)	−0.01	(0.02)
m_{t+3}	−0.03	(0.01)	−0.01	(0.01)	0.00	(0.01)	−0.02	(0.02)	0.00	(0.02)
m_{t+4}	−0.03	(0.01)	−0.01	(0.01)	0.00	(0.01)	−0.04	(0.02)	−0.02	(0.02)
m_{t+5}	−0.03	(0.01)	−0.02	(0.01)	−0.02	(0.01)	−0.04	(0.02)	0.00	(0.02)
North-East	0.01	(0.01)	0.01	(0.01)	0.06	(0.02)	0.08	(0.03)	0.00	(0.03)
Centre	−0.03	(0.01)	−0.02	(0.01)	0.01	(0.03)	−0.04	(0.04)	0.06	(0.03)
South	−0.06	(0.01)	−0.06	(0.01)	−0.07	(0.04)	−0.07	(0.05)	−0.01	(0.07)
Energy gas and water	−0.01	(0.01)	−0.01	(0.01)	−0.04	(0.05)	−0.13	(0.09)	0.06	(0.05)
Mining, metals, chemicals	0.01	(0.01)	0.01	(0.01)	0.04	(0.02)	0.05	(0.03)	−0.01	(0.04)
Metal products	−0.01	(0.00)	−0.01	(0.00)	0.00	(0.01)	0.01	(0.01)	0.01	(0.02)
Textile, clothing, wood	0.00	(0.01)	0.00	(0.01)	0.06	(0.02)	0.07	(0.03)	0.02	(0.03)
Building	0.00	(0.00)	0.00	(0.00)	0.03	(0.01)	0.03	(0.01)	0.03	(0.01)
Commerce	−0.11	(0.01)	−0.10	(0.01)	−0.04	(0.02)	−0.05	(0.03)	0.00	(0.03)
Transportation,	−0.07	(0.00)	−0.07	(0.00)	−0.08	(0.01)	−0.09	(0.01)	−0.01	(0.01)

	Sample a		Sample b		Sample c		Sample d		Sample e	
	coefficient	**(s.e.)**	**coefficient**	**(s.e.)**	**coefficient**	**(s.e.)**	**coefficient**	**(s.e.)**	**coefficient**	**(s.e.)**
communication										
Other services	−0.06	(0.01)	−0.06	(0.01)	−0.07	(0.01)	−0.10	(0.02)	0.02	(0.02)
Apprentices	−0.18	(0.00)	−0.18	(0.00)	−0.22	(0.01)	−0.20	(0.02)	−0.03	(0.11)
White collars	0.07	(0.00)	0.07	(0.00)	0.08	(0.01)	0.09	(0.01)	0.04	(0.01)
Firm size 20–200	0.03	(0.00)	0.03	(0.00)	0.03	(0.01)	0.03	(0.01)	0.03	(0.01)
Firm size 200–1000	0.03	(0.00)	0.03	(0.00)	0.04	(0.01)	0.05	(0.01)	0.01	(0.01)
Firm size over 1000	0.05	(0.00)	0.05	(0.00)	0.02	(0.01)	0.03	(0.01)	0.00	(0.01)
Mover	−0.02	(0.00)	−0.02	(0.00)	−0.04	(0.00)	−0.05	(0.01)	−0.02	(0.01)
Dummy 1990	0.03	(0.00)	0.03	(0.00)	0.02	(0.01)	0.05	(0.02)	−0.03	(0.01)
Dummy 1991	0.08	(0.00)	0.08	(0.00)	0.07	(0.01)	0.11	(0.02)	0.02	(0.01)
Dummy 1992	0.09	(0.00)	0.09	(0.00)	0.08	(0.01)	0.11	(0.02)	0.03	(0.01)
Dummy 1993	0.09	(0.00)	0.10	(0.00)	0.08	(0.01)	0.13	(0.02)	0.02	(0.01)
Dummy 1994	0.09	(0.00)	0.09	(0.00)	0.08	(0.01)	0.13	(0.02)	0.02	(0.01)
Dummy 1995	0.11	(0.00)	0.11	(0.00)	0.09	(0.01)	0.15	(0.02)	0.02	(0.01)
Dummy 1996	0.12	(0.00)	0.12	(0.00)	0.10	(0.01)	0.17	(0.02)	0.02	(0.01)
Dummy 1997	0.15	(0.00)	0.15	(0.00)	0.13	(0.01)	0.21	(0.02)	0.04	(0.01)
Dummy 1998	0.17	(0.00)	0.18	(0.00)	0.16	(0.01)	0.24	(0.02)	0.06	(0.01)
Dummy 1999	0.22	(0.00)	0.22	(0.00)	0.20	(0.01)	0.29	(0.02)	0.09	(0.01)
Dummy 2000	0.20	(0.00)	0.20	(0.00)	0.16	(0.01)	0.24	(0.02)	0.07	(0.01)
Dummy 2001	0.22	(0.00)	0.22	(0.00)	0.18	(0.01)	0.27	(0.02)	0.07	(0.01)
Dummy 2002	0.23	(0.00)	0.23	(0.00)	0.18	(0.01)	0.27	(0.02)	0.08	(0.01)
Constant	5.77	(0.01)	5.77	(0.01)	5.70	(0.02)	5.61	(0.02)	5.83	(0.02)
sigma_u	0.29		0.29		0.24		0.25		0.23	
sigma_e	0.13		0.13		0.20		0.23		0.14	
Rho	0.84		0.83		0.60		0.53		0.72	
F	27.63[a]		26.69[a]		10.02[a]		7.18[a]		17.45[a]	
N. obs	102,502		98,113		22,171		12,958		10,178	

As in Table 7

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