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, considering both the career break job penalty and the effect on wages. Most of these studies refer to countries where female participation to the labour market is high. On the contrary fewer studies consider Southern European countries, where the main concern is the low female employment rate. 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 collective bargaining generates incresing but still low wage differentials.

We model working women's labour supply after childbirth to highlight what makes exit and wage penalty more likely.

Our results point to a significant increase in the probability of transition from employment to non-employment for new mothers, mitigated by the availability of part-time jobs. It also emerges - contrary to expectations in a centralized wage setting environment - that conditional average wages of mothers are significantly lower than those of non-mothers, showing no sign of a closing gap 5 years after childbirth. This penalty does not emerge for mothers moving to a part-time job. Differently from the previous literature we highlight the potential role of part-time in mitigating the "reduced effort" effect of childrearing.

JEL codes: J13, J31

Keywords: motherhood, employment transitions, wage penalty, career

*We thank Roberto Leombruni, Chiara Pronzato and participants at the LoWER Annual Conference 2006, AIEL Annual Conference 2007 and ESPE Annual Conference 2007 for useful comments. Usual disclaimers apply.

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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 produced a decline in the total fertility rate 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 analyses the possible relations between women's participation to the labour market and fertility decisions (for a survey Del Boca and Wetzels, 2007). 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 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*[2]. *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*: women with children may be penalized with respect to non-mothers in their career advancements and wages. In the literature this is 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.

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

[2] 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 is quite compressed, and the gender wage gap is small compared to most European Countries (European Commission, 2002). The relevant role played by trade unions since the '70s reduced wage inequality, and this helped to keep the gender wage gap quite small. At the same time, female participation is still low, despite the recent increase. In this framework we can expect new mothers to exit the labour market more than in other countries, while those not exiting should be less likely to experience a wage penalty. However, to the best of our knowledge, no analysis on these topics is available for Italy, mainly due to the lack of suitable data. This is the focus of our paper. 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 mothers' 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. For mothers remaining on the labour market we measure the wage penalty with respect to non-mothers. We do find that mothers are more likely to exit the labour market than non-mothers, especially when they hold less qualified jobs and when they earn lower wages. However, 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. The wage profile of mothers over time with respect to ever-childless women highlights a significant penalty after motherhood (contrary to expectations) that does not fade away even in the medium run. This happens only to mothers not moving to a part-time job; this again points to part-time jobs as family friendly tools.

The paper is organized as follows: Section 2 contains a review of 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 the results. Conclusions follow.

2 Career break job penalty and family wage gap

Many studies have been devoted to analyze the effect of maternity on working mothers, considering both the career break job penalty and the effect on wages. 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 most important explanation for the low participation in Southern Europe is the lack of policies and services that help women to reconcile work and family life (Del Boca and Wetzels, 2007).

Empirical studies on new-mothers' participation to the labour market show that many women **exit** the labour market 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 the other European countries and the increase in the age of the children does not rise the employment rate of mothers, showing how difficult it is to reenter 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 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. In Italy, 60% of women with primary education is still out of the labour market 48 moths after childbirth[3], while the most educated Italian women re-enter a few months after childbirth, analogously to the high educated women in the rest of Europe.

However, human capital explains only in part mothers' employment decisions after childbirth. In fact, where *childcare* services are available, affordable and

[3] Similar percentages are found for the Greece and Spain, while for the other European countries considered the percantages are much lower.

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 length of optional leave and 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 non-participation: jobs with reduced or more flexible working time increase the probability of women to work.

When looking at **wages** several regularities emerge. Harkness and Walfogel (2003) using the LIS (Luxemburg Income Study) for seven countries find that after controlling for earnings-related characteristics, a negative effect of children on women's wage exists in all countries considered and it is largest in the U.K., followed by the other Anglo-American countries and Germany, while it is smallest in the Nordic countries[4]. The literature identifies various explanations for the family wage gap (Wetzels, 2005).

The first explanation for the wage penalty after childbirth is related to *human capital* depreciation due to breaks for women who do re-enter the labour market: working mothers' human capital depreciates during the periods of break for childbearing and child-rearing. This can 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

[4] Italy is not included in this comparative study.

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 time out (but not of maternity leave) on women's subsequent wages. However, they find that the penalty due to a break is different for men and women and therefore the human capital depreciation hypothesis cannot explain alone the family wage gap. Datta Gupta and Smith (2003) show that the negative effect on women's human capital of motherhood is only temporary and no long-term family wage gap exists in Denmark.

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 working are concerned. The costs of this choice can be a lower wage and 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*: mothers are more likely to reduce the number of hours worked and to look for a more flexible job or a job closer to home. For example, Wetzels and Zorlu (2003) emphasize the effect of selection into less demanding jobs in explaining wage differential 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[5].

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

The lower productivity of mothers with respect to non-mothers can be simply assumed by employers (*stigma*) that do not actually know each worker's productivity (Joshi et al., 1999; Buding and England, 2001). However, this hypothesis is even more difficult to test.

While most of the literature focuses either on participation or on wages of women after childbirth, we consider both dimensions in a country where female participation is low, contributing in filling the gap of studies of this kind in Southern Europe.

In our model, after childbirth women choose their preferred working hours, but some of them are unable to find a job that allows them to work their preferred numbers of hours. These women are therefore forced to a second-best solution, i.e. either to exit the labour market or to work more than desired. In this last case working mothers may find it difficult to reconcile work and family responsibilities and this may decrease their productivity, with a negative effect

[5] 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.

on wages. Working mothers able to reduce working hours, on the contrary, should not experience a wage penalty with respect to non-mothers.

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 ex-post for better job conditions that make it easier to reconcile work and family responsibilities.

The role of part-time jobs emerges in our results, but differently from the previous literature: we highlight its potential role in mitigating the "reduced effort" effect of child-rearing.

3 Mothers' labour supply

Our model shows how having a child reduces women's optimal labour supply, because of a change in preferences toward leisure and because of the decrease in the wage net of cost of childcare. Secondly, it highlights the consequences on wages and labour supply of not being able to reduce the actual number of worked hours. To do so, we refer to the standard labour supply framework:

$$\begin{aligned} &\max_{C,L} U_i = C_i^{1-\alpha_i} L_i^{\alpha_i} \\ &sub\ pC_i + wL_i = \overline{M}_i + w_i\overline{T} \end{aligned}$$

where individual i's utility U_i depends on consumption C_i and leisure L_i; $0 < \alpha_i < 1$ is the preference for leisure, p is consumption good's price and it is normalized to 1, w_i is the wage rate she can earn given her individual characteristics, $\overline{M}_i$ is non-labour income (including partner's labour income and household's non-labour income), and $\overline{T}$ is the time endowment.

Optimal labour supply l^* is:

$$l_i^* = (1-\alpha_i)\,\overline{T} - \alpha_i \frac{\overline{M}_i}{w_i}$$

With respect to childless women, childbirth both increases the relative value of leisure α_i - and therefore the reservation wage - and decreases the value of wage net of the costs of childcare.

Since (suppressing the subscript i) $\frac{\partial l^*}{\partial \alpha} = -\left(\overline{T} + \frac{\overline{M}}{w}\right) < 0$ and $\frac{\partial l^*}{\partial w} = \alpha \frac{\overline{M}}{w^2} > 0$, both changes have the same mutually reinforcing effect of reducing mother's optimal labour supply, as Figure 1 illustrates.

It may happen that mothers are unable to reduce their labour supply along with the optimal value, due to demand side constraints. Usually contracts are based on rigid hourly schemes, and they are either full-time (l_{FT}) or part-time (l_{PT}) and in some countries, like Italy, part-time jobs are not easily available[6].

We can therefore observe different outcomes. Let's label optimal labour supply before childbirth as $l_i^* = l_i^{NC*}$ and $l_i^* = l_i^{C*} < l_i^{NC*}$ the optimal labour supply after childbirth; corresponding actual values are l_i^C and l_i^{NC}.

First, suppose $l_i^{NC} = l_{FT}$, i.e. non-mothers work full-time. After childbirth we can have four different cases depending on the value of l_i^{C*}.

1. If $l_i^{C*} \geqq l_{FT}$ mother i prefers to keep working full-time and no issues arise.

2. If $l_{PT} \leqq l_i^{C*} < l_{FT}$ we must sign Z_1 defined as:

$$Z_1 = U(C_i^{FT}, L_i^{FT}) - U(C_i^{PT}, L_i^{PT})$$
$$\text{where} \quad C_i^{PT} = \overline{M}_i + w_i l_{PT} < C_i^{FT} = \overline{M_i} + w_i l_{FT}$$
$$\text{and} \quad L_i^{PT} = \overline{T} - l_{PT} > L_i^{FT} = \overline{T} - l_{FT}$$

For $\alpha < \overline{\alpha}$ there is a threshold value of the wage rate $w_{FT\_PT} > 0$ such that if $w_i > w_{FT\_PT}$ then $Z_1 > 0$, i.e. the woman prefers to work full-time, while if $w_i < w_{FT\_PT}$ then $Z_1 < 0$ and she prefers a part-time job. On the contrary for stronger preferences for leisure over consumption, such that $\alpha \geqq \overline{\alpha}$, it is always the case that $Z_1 < 0$, i.e. women always prefer to work part-time (see Appendix 1 for proof).

3. When $0 < l_i^{C*} < l_{PT}$ we must sign Z_2 defined as:

$$Z_2 = U(C_i^{PT}, L_i^{PT}) - U(C_i^{OUT}, L_i^{OUT})$$
$$\text{where} \quad C_i^{OUT} = \overline{M}_i \quad \text{and} \quad L_i^{OUT} = \overline{T}$$

[6] In Italy, in fact, part-time jobs are still less common than in other European countries. In 1995 in Italy only 12.7% of working mothers had a part-time job, while the average percentage in Europe (EU-15) was 31%. The incidence of part-time among working women increased only to 16.5% in 2000, while the most relevant increase, up to about 25%, occurred only after 2004 (Eurostat, 2006). Despite the increase in the availability of part-time jobs, data from the Italian Labour Force Survey show that 6% of women with children under the age of 5 working full-time would like to reduce the number of hours worked. The presence of children is the reason why 80% of women working part-time chose this type of contract. Finally, an impressive 50% of non-working mothers (with children below the age of 5) would be available to work part-time (our elaborations from the Italian Labour Force Survey 2004).

A threshold value of the wage rate $w_{PT\_OUT} > 0$ exists such that if $w_i < w_{PT\_OUT}$ then $Z_2 < 0$, i.e. it is preferred to exit the labour market than to work part-time (see Appendix 2 for

proof).

4. Let's now consider a woman that is currently working full-time but prefers to work part-time, and suppose a part-time job is not available (Figure 2, Figure 3). We must sign Z_3 defined as:

   $$Z_3 = U(C_i^{FT}, L_i^{FT}) - U(C_i^{OUT}, L_i^{OUT})$$

There exists a threshold value of the wage rate $w_{FT\_OUT} > 0$ such that if $w_i < w_{FT\_OUT}$ then $Z_3 < 0$, i.e. the woman prefers exiting the labour market than working full-time (see Appendix 3 for proof).

5. If $l_i^{C*} = 0$ mother i prefers to exit the labour market and no issues arise.

It holds that $w_{PT\_OUT} < w_{FT\_OUT} < w_{FT\_PT}$ (see Appendix 4 for proof).

The first and general testable implication of the model is clear:

T.I. 1 *Women becoming mothers are more likely to be observed reducing the actual number of worked hours (moving to part-time or exiting) with respect to childless women.*

However, the elasticity of labour supply with respect to wage in our model is

$$\epsilon_w^l = \frac{\alpha\overline{M}}{(1-\alpha)\overline{T}w - \alpha\overline{M}}$$

and therefore it decreases as w increases; i.e. optimal labour supply decreases more for women earning lower wages. Hence, we can state our second testable implication:

T.I. 2 *Women earning lower wages before childbirth are more likely to cross a threshold after childbirth and to be observed reducing their worked hours.*

As $w_{PT\_OUT} < w_{FT\_OUT} < w_{FT\_PT}$, a woman earning w_i such that $w_i < w_{FT\_PT}$ prefers to work part-time. If a part-time job is not available, the

threshold value that induces her to leave the labour market increase to w_{FT_OUT} (that ig greater than w_{PT_OUT}) and therefore, for a given distribution of w_i in the population, more women leave the labour market after childbirth. This translates in our third testable implication:

T.I. 3 *Women working full-time before childbirth are more likely to exit after childbirth if part-time jobs are less available in their relevant labour market.*

If $l_i^{NC} = l_{PT}$ (i.e. if future mothers work part-time before childbirth) only case 3 applies; it implies that women working part-time before childbirth exit the market only if their wage rate is such that $w_i < w_{PT\_OUT}$, i.e. they are less likely to exit with respect to women working full-time before childbirth, as the issue of not finding a part-time job is irrelevant. This translates in our fourth testable implication:

T.I. 4 *Women working part-time before childbirth are less likely to exit after childbirth with respect to women working full-time before childbirth.*

Finally, suppose $Z_3 > 0$, i.e. the (sub-optimal) utility of working full-time is greater than the utility of exiting the labour market. Hence, woman i works full-time even if she had preferred to work less hours. As discussed in the previous section, due to family responsibilities and extra household production and caring activities, mothers' *effort* in working activities may be lower compared to the effort of non-mothers. We can expect this to have a negative impact on their relative wage with respect to non-mothers. However, if mothers are actually able to move to a part-time job, no strain on effort should arise. This leads to our final testable implication.

T.I. 5 *Relative wages of mothers with respect to non-mothers decrease after childbirth if they work full-time after childbirth, not if they work part-time after childbirth.*

This holds on average, as among mothers working full-time there are "involuntary" full-timers as well as voluntary (those sub 1. above).

It is clear from the above discussion that the natural control group to verify our testable implications is the set of childless women, not the set of men with children.

4 Data and descriptive statistics

We use the Work Histories Italian Panel (WHIP), an administrative dataset produced by LABORatorio Riccardo Revelli. It spans the period 1985 to 2002. 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[7]. In this paper we use only the dependent employment section of WHIP, which is a Linked Employer Employee Database.

In Italy female employees 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 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[8].

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

[8] 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.

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, it means out of the (regular) labour force if it is a long/permanent absence[9]. We focus on unemployment spells of at least 12 months, to exclude frictional unemployment. Figure 4 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")

A transition to non-employment is more likely for mothers than for non-mothers, despite their good attachment to the labour market before $t = 0$: conditioning on being employed for 4 years before childbirth, only 54% of mothers is always working between $t = 1$ and $t = 5$, with respect to 93% of non-mothers. 30% of mothers exits employment for good after $t = 0$ (2% of non-mothers) and 16% of mothers experiences some unemployment after $t = 0$ (5% of non-mothers)[10]. This descriptive evidence is consistent with T.I.1.

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.

Comparing non-mothers to mothers the two groups appear quite similar (Table 3). Only mothers are sligthly younger, employed in sligthly smaller firms and earning sligthly lower wages. However, comparing non-mothers to the two groups of mothers ("always working" and "not always working") separately,

[9] 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.

[10] Results are very similar even if we condition on being employed only one year before childbirth: mothers "always working" are 51%; mothers "out for good" are 32%.

it becomes clear that non-mothers and "always working" mothers are almost indistinguishable at $t = 0$, while "not always working" mothers are different, i.e. women strongly attached to the labour market are similar to each other regardless motherhood. In fact, "not always working" mothers are younger than the other two groups, more frequently blue collars, employed in smaller firms and earning lower wages (see Table 3). These descriptive differences are 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 (Del Boca et al., 2005, Del Boca and Wetzels, 2007). 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[11]; consistently with this, Table 3 shows that mothers are more likely to leave the labour market if they live in those regions.

Now we describe the empirical strategy to bring to the data the Testable Implications of our model.

5 Empirical Model

We devise two separate empirical approaches. First, we focus on T.I.1 to T.I.4 and we analyze the transitions of women out of employment after childbirth, paying special attention to the role of part-time contracts. Second, we restrict the analysis to continuously working women and analyze their wage profiles (T.I.5). The aim of the exercise is to estimate the effect of motherhood on career break job penalty and on family wage gap separately. Hence we provide (a) the probability of a career break and (b) the measure of the wage gap conditional on no 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 selecting women highly attached to the labour market, we can assume maternity as uncorrelated to the working career up to $t = 0$, i.e. no ex-ante job selection of future mothers.

[11] Del Boca (2002).

Section 6 shows 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 Career break job penalty

We estimate the probability of exiting employment after childbirth, temporarily or permanently. We focus on non-employment 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 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.

We estimate

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

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). 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[12].

We restrict the sample to women working full-time up to $t = 0$ so that:

T.I.1 translates into $H_0 : \lambda > 0$

T.I.2 translates into $H_0 : \alpha_M < 0$

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

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).

To focus on the role of part-time jobs in reducing the probability of exiting employment we use two different strategies.

First, using the sample to women working full-time up to $t = 0$, we augment equation (1) including a dummy (pt_av_{it-1}) signalling whether in the labour market relevant for individual i there are part-time jobs available[13], also interacted to the "mother" dummy:

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

T.I.3 translates into $H_0 : \beta_M < 0$

Second, with the whole sample[14], we augment equation (1) including a control for mothers working part-time before $t = 0$:

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

T.I.4 translates into $H_0 : \eta_M < 0$

Finally, on women working full-time before $t = 0$, we estimate, :

$$pr\left(pt_i = 1\right) = F\left(\lambda^{PT} M_i + z_{it-1}\gamma^{PT}\right) \tag{2}$$

where $pt_i = 1$ if woman i works part-time after $t = 0$.

T.I.1 translates into $H_0 : \lambda^{PT} > 0$

[13] 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.

[14] 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.

5.2 Family wage gap

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

The sample is selected on purpose. Always working mothers are not representative of all mothers, as it emerges clearly from the previous subsection. We measure the wage gap conditional on no significant career breaks. In a country where collective bargaining discourages the opening of any wide wage differential[15], this is the setup where we are less likely to find a significant penalty. If we do find it, then we (i) confirm that the family wage gap exists in Italy, (ii) provide a lower bound of its size.

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, x includes controls for human capital and job characteristics[16], and $m_{_k}$ are average conditional wage differentials between mothers and non-mothers from 2 years before maternity to 5 years afterward. 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).

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 already discussed; we will also see that conditional wages of mothers and non-mothers are not significantly different before $t = 0$. 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[17]. To separate the two we use the eventual movement to a part-time job, as follows.

[15] Borgarello and Devicienti (2006).

[16] As in table 3 plus a dummy for job movers.

[17] 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.

T.I.5 (decreased productivity) predicts a decrease in average relative wages of mothers with respect to non-mothers if they do not decrease the number of worked hours. Hence we estimate eq. (3) with different subsamples:

(a) we compare mothers and non-mothers always working full-time

T.I.5 translates in $H_0 : m_k < 0$ *for* $k > 0$.

(b) we compare non-mothers always working full-time to mothers that move to a part-time job after $t = 0$:

T.I.5 translates in $H_0 : m_k = 0$ *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.

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).

6 Empirical results

It can be argued that maternity is an endogenous choice, in the sense that it 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 (1) and choose as instruments 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[18]. 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[19]. Hence, as anticipated in the previous section, in our sample there is no evidence of ex-ante job selection of future mothers. Furthermore, as discussed below, conditional average wages of future mothers are not significantly different from non-mothers' before childbearing, confirming that the two groups are statistically the same

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

[19] 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).

before $t = 0$ (Section 6.2).

6.1 Career break job penalty

It is clear from the descriptive analysis above 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[20]. We now turn to the estimate of equation (1) to assess the point more formally.

Table 4 reports the estimated coefficients of the variables of interest. Other controls included have the expected impact and are not reported[21].

Column (a) reports results referred to eq. (1) for women working full-time before $t = 0$. It confirms $\lambda > 0$ and $\alpha_M < 0$, as T.I.1 and T.I.2 predict. Table 5 presents the average probability of exiting for given individual profiles, using estimates reported in column (a) of Table 4. If we increase the wage earned in $t = -1$ we see the probability of exiting for non-mothers increasing slightly, while we see the probability of exiting for mothers decreasing from 48% to 33% (if we move from average wage minus one standard deviation to average wage plus one standard deviation, *ceteris paribus)*. 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 4 reports results referred to eq. (1) augmented with the control for the availability of part-time jobs, for women working full-time before $t = 0$. It again confirms $\lambda > 0$ and $\alpha_M < 0$, as T.I.1 and T.I.2 predict. While the availability of part-time jobs is non-influential on the probability of exiting employment for non-mothers (β), it confirms $\beta_M < 0$ as T.I.3 predicts. When part-time jobs are more available mothers are less likely to leave the labour market. This result is consistent with the existing literature.

Column (c) reports results referred to eq. (1) augmented with the control for the part-time job held before $t = 0$, estimated with all women in the sample. It again confirms $\lambda > 0$ and $\alpha_M < 0$, as T.I.1 and T.I.2 predict. Notice that the estimates of the coefficients $\lambda, \alpha, \alpha_M$ are unchanged using the whole sample or the selected sample (col. (a) and (b)), as a further confirmation that we can safely select women working full-time before $t = 0$. It also confirms $\eta_M < 0$ as T.I.4 predicts; however the estimate is imprecise and the null $\eta_M = 0$ cannot

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

[21] Available upon request.

be rejected. Notice the opposite impact of holding a part-time contract on the probability of exiting employment for non-mothers (η): part-time non-mothers are more likely to exit, i.e. a part-time contract signals their lower attachment to the labour market.

Finally, Table 6 reports the marginal effects of the regressors of interest of equation (2). Other controls included have the expected impact and are not reported[22]. T.I.1 is again confirmed by $\lambda^{PT} > 0$.

All the testable hypoteses of our simple model regarding the probability of exiting are supported by the data. The probability of leaving employment is larger for mothers, all other things equal. The said probability decreases as the wage of mothers increases. Finally, the role of part-time jobs in preventing mothers from exiting the labour market for long periods 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 (about 35 instead of 40). 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[23].

6.2 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

[22] Available upon request.

[23] 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 school yet, hence mothers might still be postponing the attempt to move back to a full-time job.

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 7, column (a), contains the estimates of m_k on full-time women wage levels. Conditional average wages of future mothers are not significantly different from non-mothers' before childbearing, confirming that the two groups are statistically the same before $t = 0$. 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 maternity leave that can decrease wages artificially). The gap amounts to about 15 euro a week for $t \geq 3$, with respect to an average weekly wage of 360 euro in $t = -1$. Table 8, column (a), contains the estimates of m_k on full-time women 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 for $t \geq 3$). 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 women moving to part-time jobs do not see a slowdown in their career 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[24].

All this confirms T.I.5. Women unable to reduce worked hours along with optimal labour supply after childbirth reduce their 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) wage.

Hence, contrary to the existing literature - mostly referred not to Southern European Countries - 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.

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

[24] In case of part-time jobs, w are full-time equivalent weekly wages.

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 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 depend 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 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. 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, 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.

8 Appendix

8.1 Appendix 1

For $\alpha < \overline{\alpha}$ there is a threshold value of the wage rate w_{FT_PT} such that if $w_i \geqq w_{FT\_PT}$ then $Z_1 > 0$, i.e. the woman prefers to work full-time, while if $w_i < w_{FT\_PT}$ then $Z_1 < 0$, i.e. she prefers a part-time job. On the contrary for $\alpha \geqq \overline{\alpha}$ (stronger preference for leisure over consumption), then $Z_1 < 0$, i.e. women always prefer part-time. Proof.

Suppose $l_{FT} = 8, l_{PT} = 4, \overline{T} = 16$

$$U_{FT} = \left(\overline{M} + 8w\right)^{1-\alpha} \left(\overline{T} - 8\right)^{\alpha} = \left(\overline{M} + 8w\right)^{1-\alpha} 8^{\alpha}$$

$$U_{PT} = \left(\overline{M} + 4w\right)^{1-\alpha} \left(\overline{T} - 4\right)^{\alpha} = \left(\overline{M} + 4w\right)^{1-\alpha} 12^{\alpha}$$

$Z_1 < 0$ if $U_{PT} > U_{FT}$ and therefore if $\left(\overline{M} + 4w\right)^{1-\alpha} 12^{\alpha} > \left(\overline{M} + 8w\right)^{1-\alpha} 8^{\alpha}$

$$\frac{\left(\overline{M}+4w\right)}{\left(\overline{M}+8w\right)} > \left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}$$

$$4w\left[2\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}} - 1\right] < \overline{M}\left[1 - \left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}\right]$$

$\left[2\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}} - 1\right] > 0$ if $\alpha < 0.63$

If $\alpha < 0.63$ when $w < \frac{\overline{M}\left[1-\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}\right]}{4\left[2\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}-1\right]} = w_{FT\_PT}$ the woman prefers to work part-time rather than full-time.

If, on the contrary, $\alpha > 0.63$ then $w > \frac{\overline{M}\left[1-\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}\right]}{4\left[2\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}-1\right]}$ that is true for every value of w and α, as the ratio is negative. In this case the woman prefers always to work part-time.

8.2 Appendix 2

A threshold value of the wage rate $w_{PT\_OUT} > 0$ exists such that if $w_i < w_{PT\_OUT}$ then $Z_2 < 0$, i.e. women prefer to exit the labour market than work part-time. Proof.

Suppose $l_{FT} = 8, l_{PT} = 4, \overline{T} = 16$

$U_{PT} = \left(\overline{M} + 4w\right)^{1-\alpha} \left(\overline{T} - 4\right)^{\alpha} = \left(\overline{M} + 4w\right)^{1-\alpha} 12^{\alpha}$

$U_{OUT} = \overline{M}^{1-\alpha}\overline{T}^{\alpha} = \overline{M}^{1-\alpha}16^{\alpha}$

$Z_2 < 0$ if $U_{OUT} > U_{PT}$ and therefore if $\overline{M}^{1-\alpha}16^{\alpha} > \left(\overline{M} + 4w\right)^{1-\alpha} 12^{\alpha}$

$\frac{\overline{M}}{\overline{M}+4w} > \left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}$

$4w\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}} < \overline{M}\left[1 - \left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}\right]$

As $\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}} > 0$ for $0 < \alpha < 1$ we have that when $w < \frac{\overline{M}\left[1-\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}\right]}{4\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}} = w_{PT\_OUT}$ the woman prefers to exit.

Notice that the numerator is positive for every value of α.

8.3 Appendix 3

There exists a threshold value of the wage rate $w_{FT\_OUT} > 0$ such that if $w_i < w_{FT\_OUT}$ then $Z_3 < 0$, i.e. the woman prefers exiting the labour market than working full-time. Proof.

Suppose $l_{FT} = 8, l_{PT} = 4, \overline{T} = 16$

$U_{FT} = \left(\overline{M} + 8w\right)^{1-\alpha} \left(\overline{T} - 8\right)^{\alpha} = \left(\overline{M} + 8w\right)^{1-\alpha} 8^{\alpha}$

$U_{OUT} = \overline{M}^{1-\alpha}\overline{T}^{\alpha} = \overline{M}^{1-\alpha}16^{\alpha}$

$Z_3 < 0$ if $U_{OUT} > U_{FT}$ and therefore if $\overline{M}^{1-\alpha}16^{\alpha} > \left(\overline{M} + 8w\right)^{1-\alpha} 8^{\alpha}$

$\frac{\overline{M}}{\overline{M}+8w} > \left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}$

$8\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}} w < \overline{M}\left[1-\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}\right]$

As $\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}} > 0$ for $0 < \alpha < 1$ we have that when $w < \frac{\overline{M}\left[1-\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}\right]}{8\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}} = w_{FT\_OUT}$ the woman prefers exiting the labour market.

Notice that the numerator is positive for every value of α.

8.4 Appendix 4

It holds that $w_{PT\_OUT} < w_{FT\_OUT} < w_{FT\_PT}$, i.e.

$\frac{\overline{M}\left[1-\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}\right]}{4\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}} < \frac{\overline{M}\left[1-\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}\right]}{8\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}} < \frac{\overline{M}\left[1-\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}\right]}{4\left[2\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}-1\right]}$. Proof.

First step:

$\frac{\overline{M}\left[1-\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}\right]}{4\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}}} < \frac{\overline{M}\left[1-\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}\right]}{8\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}}$

$2-\left(\frac{3}{4}\right)^{\frac{\alpha}{1-\alpha}} - \left(\frac{3}{2}\right)^{\frac{\alpha}{1-\alpha}} < 0$

Always true, as it is 0 when $\alpha = 0$, monotonically decreasing for $0 < \alpha < 1$

Second step:

$\frac{\overline{M}\left[1-\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}\right]}{8\left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}}} < \frac{\overline{M}\left[1-\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}\right]}{4\left[2\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}}-1\right]}$

$2\left(\frac{2}{3}\right)^{\frac{\alpha}{1-\alpha}} - 1 - \left(\frac{1}{2}\right)^{\frac{\alpha}{1-\alpha}} < 0$

Always true, as it is 0 when $\alpha = 0$, monotonically decreasing for $0 < \alpha < 1$

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9 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: Probability of exiting employment.

		(a)		(b)		(c)	
		Coeff.	Std. Err.	Coeff.	Std. Err.	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 5: 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

Table 6: Probability of moving to a part-time job.

	(a) dy/dx	s.e.
Mother	0.120	*(0.022)*
Ln wage t-1	-0.116	*(0.011)*
N.obs	13762	
(a)Only ft in t-1		
Other controls: as in table 4		

Table 7: 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 8: 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.								

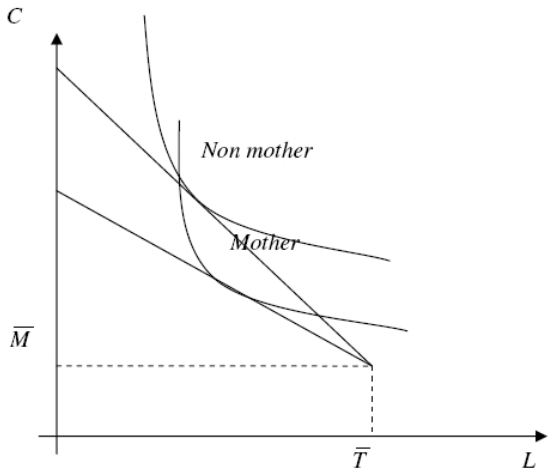

Figure 1: Mothers' and non mothers' labour supply

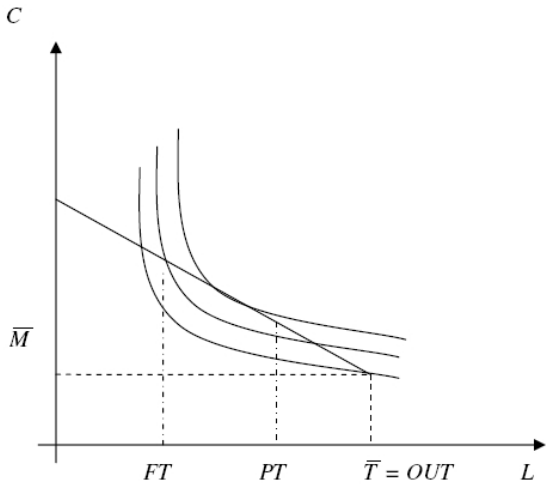

Figure 2: Mothers (with high wages) unable to find a part-time job and accepting to work full-time

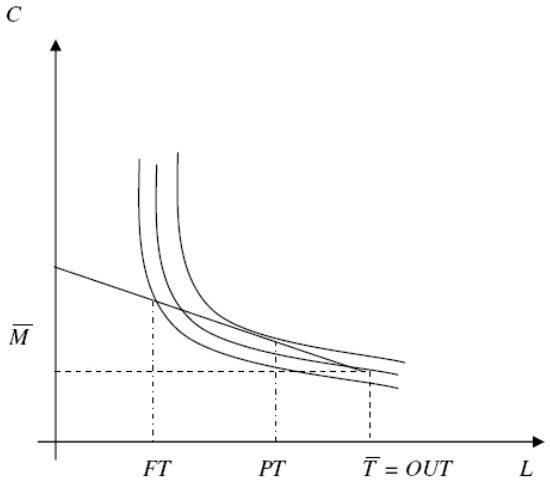

Figure 3: Mothers (with low wages) unable to find a part-time job and exiting the labour market

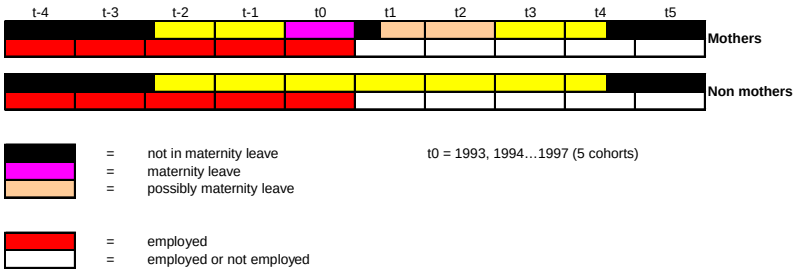

Figure 4: Sample characteristics