
The Motherhood Earnings Dip

Evidence from Administrative Records

Daniel Fernández-Kranz
Aitor Lacuesta
Núria Rodríguez-Planas

ABSTRACT

Using Spanish Social Security records, we document the channels through which mothers fall onto a lower earnings track, such as shifting into part-time work, accumulating lower experience, or transitioning to lower-paying jobs, and are able to explain 71 percent of the unconditional individual fixed-effects motherhood wage gap. The earnings trajectories' analysis reveals that "mothers to be" experience important relative earnings increases several years before giving birth but this earnings' advantage falls right after birth, taking in average nine years to recover. Heterogeneity matters as most of the motherhood dip is driven by workers with permanent contracts.

I. Introduction

The recent and unprecedented drop in fertility rates below the replacement level observed in many high-income countries is a paramount event with serious medium- to long-term consequences. Many researchers believe that the barriers to combining market work and family life are an important determinant of this fertility decline (Brewster and Rindfuss 2000; Ahn and Mira 2001; and Feyrer, Sacerdote, and Stern 2008). This phenomenon is particularly alarming in Southern European countries because of the lack of access to proper childcare provisions (Del Boca 2002), the low participation of men in household production (Bettio and Villa 1998; De Laet and Sevilla-Sanz 2011), the low levels of social assistance (Adserà 2004), and the

Daniel Fernández-Kranz is an associate professor of economics at the IE-Business School, Madrid. Aitor Lacuesta is a senior economist at the Banco de España, Madrid. Núria Rodríguez-Planas is a visiting research fellow at IZA, affiliated researcher at the Institut d'Anàlisi Econòmica (CSIC), and visiting professor at the Universitat Pompeu Fabra. The data used in this article can be obtained beginning July 2013 through June 2016 from Daniel Fernández-Kranz, daniel.fernandez@ie.edu. This paper was partially funded by the Spanish ministry of Education and Science (grant MICINN2009-11857), the Spanish ministry of Science and Innovation (grant ECO2009-07237) the Generalitat de Catalunya (grant SGR2009-57), and the Barcelona Graduate School of Economics.

[Submitted January 2011; accepted April 2012]

SSN 022 166X E ISSN 1548 8004 8 2013 2 by the Board of Regents of the University of Wisconsin System

high levels of uncertainty in the labor market. In particular, several researchers have found that high unemployment and rigid labor markets, both common in Southern Europe, depress fertility as women delay (or abandon) childbearing to invest in early skill-acquisition, secure a good job, and increase lifetime income (Ahn and Mira 2001; Bertola, Blau, and Kahn 2007; Adserà 2005; De la Rica and Iza 2005).

However, strict employment regulations are not unique to Southern Europe. Since the mid-1980s, many Continental European countries (including France and Germany) have maintained strong employment protection for regular jobs while attempting at establishing more flexible but marginal labor market segments. These countries have experienced a deepening segmentation of their labor markets with mature workers holding permanent and highly protected jobs, on the one side, and young workers experiencing high turnover across precarious and fixed-term contracts jobs on the other (Bentolila et al. 1994; Blanchard and Landier 2002; Dolado, García-Serrano, and Jimeno 2002; Cahuc and Kramarz 2004; Beninger 2005; Eichhorst 2007; and Dolado, Jansen and Jimeno 2007). While fixed-term duration contracts coexist with permanent contracts within the same firms, they impose penalties in the form of forgone experience, delayed wage growth, and higher levels of unemployment risk to those workers who hold them (Amuedo-Dorantes and Serrano-Padial 2007). Several authors have found that another detrimental consequence of such type of contracts is that they interfere with family formation (Bertola, Blau, and Kahn 2007). The particularly high incidence of fixed-term contracts among women in many OECD countries (Kahn 2007; Petrongolo 2004; OECD 2002) makes the issue particularly troublesome in those countries.

The contribution of this paper is threefold. Using a rich longitudinal data set obtained from the Spanish Social Security records that covers workers' employment history from 1985 to 2006, we first examine the implications of having a child on mother's subsequent earnings controlling for *both* individual- and job-match unobserved heterogeneity. Similar to other countries, we find a 9 percent unconditional individual fixed-effects motherhood earnings reduction.¹ The richness of the data we exploit enables us to document the channels through which mothers fall onto a lower earning track, such as shifting into part-time work, accumulating lower experience, or transitioning to lower-paying jobs. With the complete specification, we are able to explain 71 percent of the unconditional individual fixed-effects motherhood wage gap, in sharp contrast with most U.S. and U.K. studies, which fail to explain the majority of this gap.²

Second, we identify the earnings trajectories of mothers (again correcting for both individual and job-match fixed-effects, FE hereafter) and explore whether earnings changes precede or follow childbearing—following a strategy similar to Jacobson, LaLonde, and Sullivan 1993; and Hijzen, Upward, and Wright 2010. This analysis reveals that “mothers to be” experience important earnings increases several years before giving birth. This earnings' advantage falls right after birth, taking nine years

1. Unconditional estimates only control for year, age, and province dummies.

2. Using extensive controls for human capital at the micro level, Gangl and Ziefle (2009) are also able to explain most of the motherhood wage gap in the United States and the United Kingdom (but they fail to do so in Germany).

to return to their prebirth (relative) levels. The finding that the wage losses decline over time contrasts with evidence from the United States and Germany showing that mothers' wage losses tend to persist over time (Waldfogel 1997; Lundberg and Rose 2000; and Ziefle 2004). Although they are more in line with recent work from Anderson, Binder and Krause 2003, that finds that mothers' wage losses in the United States partly decline as the youngest child in the household grows up.

Finally, we explore whether the motherhood earnings gap differs across two segments of the labor market, based on whether workers had a permanent or a fixed-term contract prior to giving birth. We find that much of the motherhood earnings gap is driven by women working in the primary labor market. By studying pre- and postbirth labor earnings, we are able to document the channels through which mothers fall onto a lower earnings track. For mothers working in the primary labor market about half of the earnings losses occurs because mothers change employers to work part-time, or (if they stay with their former employer) they accumulate less experience as they take a leave of absence.

This analysis is important for countries with fertility rates below the replacement levels because it is a first step for designing policies that aim at improving the conditions of working mothers, in particular, and female workers, more generally. Moreover, studying how the earnings trajectories of mothers differ by the segment in the labor market they work in allows us to assess how job protection (or the lack of it) affects mothers' careers.

Spain is a suitable case to investigate this issue because it has experienced the most dramatic fall in birth rates within the OECD countries. The Spanish fertility rate dropped from 2.8 in 1975 to 1.15 in 1997, only to recover very lightly to 1.2 in the early 2000s. Spain is also well known for its striking segmentation of its labor market by type of contract. The Spanish unemployment rate has been extremely high (as much as one-fifth of the labor force) for almost two decades (during the 1980s and 1990s), and it is currently at 23 percent, the highest in Europe. In addition, an important dual labor market developed after legislation changes in 1984, resulting in the economy with the highest rate of fixed-term contracts in Europe for the last two decades (over one-third of all contracts are fixed-term contracts). In Spain most new hires are employed through fixed-term contracts. Moreover, the conversion rate of fixed-term contracts into permanent ones is low and decreasing over time, as it has gone down from 18 percent in 1987 to 5 percent in 1996 (Bover and Gómez 2004; and Güell and Petrongolo 2007). This reflects the fact that employers use fixed-term contracts more as a flexible device to adjust employment in the face of adverse shocks than as stepping stones towards permanent jobs.

We do not model endogenous fertility and type of contract. Therefore, we do not strictly identify the causal impact on earnings of becoming a mother by type of contract. However, longitudinal estimates more closely approximate average treatment effects among the treated than among random draws from the population addressing some of the issues raised in this literature, namely unobserved ability differences and prechildbearing self-selection into particular jobs. Moreover, our estimates bring new evidence on the situation of mothers in segmented labor markets in general, and in Spain, more specifically.

The paper is organized as follows. The next section presents an overview of the lit-

erature. Section III describes the Spanish institutional background. Section IV presents the data and the descriptive statistics. Section V explains the methodological approach, and analyzes the results. Section VI concludes.

II. Literature on the Motherhood Wage Gap

Many researchers have increasingly become interested in analyzing the effect of motherhood on women's careers by analyzing how motherhood affects women's earnings. While the earliest studies focused on the United States and the United Kingdom, the more recent literature has evaluated the child penalty in other industrialized countries, such as Canada, Denmark, Spain, Sweden, and West Germany, among others.

What explains the motherhood wage gap? In many studies, part of the motherhood wage gap is explained by differences in the observed human capital variables between mothers and childless female workers, such as education, work experience, and mothers' work interruptions and subsequent entry into part-time jobs. In other studies, the motherhood wage gap decreases as one controls for women shifting to occupations and industries offering predictable work schedules or job security. In addition, job changes may imply loss of firm-, occupation-, or industry-specific human capital and will then similarly result in wage losses. Finally, some studies have found that an important child penalty persists after controlling for these variables if not for all workers for some subset, such as the private-sector workers.

At the end, most studies find a significant unexplained child penalty, the magnitude of which differs substantially across the different countries since it ranges between 0 and 8 percent. While some of the differences in the results are explained by countries' institutional and cultural differences, and the amount of information available on workers, jobs, and labor market characteristics in the different data sets used, as well as the methodology used, several identification problems within this literature are difficult to overcome. Most of this literature compares the hourly wages of mothers with childless female workers after controlling for all observable characteristics, acknowledging that individual unobserved heterogeneity may still prevail, as women deciding to have children may have different tastes and preferences about work than do childless female workers. If there are unobserved quality differences between mothers and childless female workers, results from cross-sectional studies of the family gap will reflect an omitted variable bias. Nevertheless, many of the studies in this literature have been estimated on cross-sectional samples. One way to address the time-invariant unobserved heterogeneity problem is to use panel data and to estimate an individual FE "within" estimator, in which case, the effect of motherhood on wages is identified through those female workers who become mothers—see Korenman and Neumark 1992; Waldfogel 1997, 1998a; Taniguchi 1999; Lundberg and Rose 2000; Anderson, Binder, and Krause 2002, 2003; Amuedo-Dorantes and Kimmel 2005; Davies and Pierre 2005; Gangl and Ziefle 2009. These studies report reductions in mothers' earnings ranging between 3 and 9 percent for the first child.

A related problem is the possibility that the wage differential between mothers and childless women is driven by the selection of mothers into firms that pay lower wages. Using a novel matching approach where mothers' wages upon return to work are

compared to those of their female colleagues within the same establishment, Beblo, Bender, and Wolf 2009, find that selection into establishments is an important explanatory factor for the German family pay gap. Because we have repeated observations for the same individual in different firms, our analysis also controls for job-match FE.³ In this case, the coefficient of having a child measures the wage change of women who became mothers once we control for job changes.

Another problem is measurement errors of wages. Given that most studies in this literature use workers' survey data, measurement errors of hourly wages is a frequent (albeit rarely discussed) concern in this literature. The measurement error is of particular concern in those studies where the wage rate is calculated as weekly (or annual) earnings divided by weekly (or annual) hours worked, as opposed to the pay rate available only for hourly workers, because of the added noise in the hours worked variable. Unfortunately, this is the most frequent outcome used in the motherhood earnings differential literature.⁴

Another important identification problem is endogenous fertility (or the danger of reverse causation). Since fertility is a choice and the market wage is one component of the "cost" of children, it may be low wages that "cause" childbearing, not the childbearing that 'causes' low wages. This problem is usually addressed by using an instrumental variables strategy. However, valid instruments are extremely difficult to find, and when they exist it is unclear whether the estimated effects would generalize to the effects of first (and second) children for all mothers (see Rosenzweig and Wolpin 1980; Bronars and Grogger 1994; Angrist and Evans 1998; Hotz, McElroy, and Sanders 2005; Miller 2011; Cristia 2008).

In this paper we account for both worker and job-match unobserved heterogeneity by exploiting a rich longitudinal data set that covers employment history from 1985 to 2006, and has only recently been available to researchers in Spain. In addition, as our data comes from Social Security records, our measure of annual earnings does not have the problem of measurement error due to recall bias or nonresponse. To overcome a problem with measurement error of contractual hours in our data set, we focus our analysis on yearly earnings as opposed to hourly wages. As explained by Fernández-Kranz and Rodríguez-Planas 2011a, in the Spanish Social Security records contractual hours underestimate hours worked because employers have an incentive to underreport contractual hours to reduce total labor costs, and (albeit illegal) they are more able to do so with their more vulnerable workers, such as those working flexible time or part-time jobs (since they are less protected by the law and the unions). Because mothers are much more likely to have flexible work arrangements than childless women, we are concerned that by estimating and using hourly wages as our outcome variable we may overestimate hourly wages for the former relative to the latter. To overcome this problem, we use yearly earnings from Social Security records as our outcome variable and refocus the analysis from productivity effects to both productivity and labor supply effects. We then disentangle how much of the motherhood earnings differential is explained by mothers': (i) temporarily interrupting their career due

3. Job-match refers to a match between a worker and a firm.

4. To avoid the measurement error in hours worked, Lundberg and Rose (2002) only use the pay rate available in the PSID from hourly and salary workers. However, such approach does not eliminate the problem of measurement error in wages, and introduces a particular selection in the type of workers the analysis focuses on.

to childcare (by controlling by actual experience); (ii) reducing their work schedule (to part-time work); (iii) shifting to more family-friendly occupations and industries, and (iv) shifting employers.⁵ Given the strong duality of the Spanish labor market, the analysis is also done separately by type of contract.

Finally, our analysis identifies different wage trajectories by motherhood status and type of contract. While individual or job-match FE are essentially before-after strategies that control for any unchanging and unmeasured differences across individuals or job-matches; they do not fully solve the endogeneity problem. In contrast, trajectories can themselves be observed and one can look for anomalous breaks in patterns that differ with childbirth, noting whether wage changes preceded or followed childbearing.

III. Institutional Background

The two most common forms of flexible work arrangements (fixed-term contracts and part-time work) have evolved quite differently in Spain over the last two decades. Both types of contracts were first regulated by law in 1984 with the objective of adding flexibility and promoting employment in a rigid labor market with stringent employment protection legislation and high levels of unemployment. While fixed-term employment soared, the growth in part-time employment was modest, at most. As a result, since the early 1990s, fixed-term employment represents close to one-third of the Spanish labor force (by far, the highest share among European countries), whereas the share of part-time employment is below one tenth of the labor force (far from the E.U. average of 18 percent). In terms of female employment, the incidence of part-time work in Spain is 20 percent and the incidence of fixed-term employment is 31 percent. In comparison, in the United States, the incidence of female part-time employment is 18 percent and the incidence of female temporary employment is 4 percent (OECD 2001). These figures highlight that the unique specificities of the Spanish labor market may lead to significant differences on the effects of childcare interruptions and the child earnings differential, as discussed below.

A. A Dual Labor Market

Prior to 1984, most contracts in Spain were permanent contracts. With such contracts, the costs of dismissing a worker were high (up to 45 days of wages per year worked if the worker appealed to Court and the dismissal was declared “unfair,” with a limit of 24 months’ wages).⁶ In 1984, in a context of high unemployment and given that an across-the-board reduction of dismissal costs was politically unfeasible; the use of fixed-term contracts was liberalized. This implied that any regular activity could be performed under a fixed-term contract (instead of a permanent one), but at a lower cost for employers as fixed-term contracts entailed lower severance payments than

5. Part-time workers are those who work less than 30 hours a week. Because we identify part-time status by whether the worker has a part-time contract, problems of measurement error of hours worked when using contractual hours is not an issue in our analysis.

6. Izquierdo and Lacuesta 2012, and Galdón-Sánchez and Güell 2003, estimate that between 72 percent and 75 percent of cases that arrived to court were declared “unfair” by Spanish judges.

permanent contracts (eight days per year worker if the worker was laid off prior to contract termination) and their termination could not be appealed to Court. Moreover, the regulation that established that fixed-term contracts could only be used up to a maximum of three consecutive years was not enforced until 2010. As a consequence, the majority of workers in Spain initiate their employment history with a fixed-term contract and as many as 40 percent of them still hold such type of contract ten years later (Estrada, Izquierdo, and Lacuesta 2009).

In Spain, workers with fixed-term contracts hold unstable, low protected and poorly paid jobs, while workers with permanent contracts enjoy protection, and benefits. According to Amuedo-Dorantes and Serrano-Padial 2007, turnover rates among fixed-term contract workers are high (in the range of 34 to 66 percent), and contrast with those of permanent contract workers (only 10 percent of permanent contract workers experience turnover). Moreover, while the vast majority of job movers with a fixed-term contract transition to a new fixed-term contract job or become unemployed, those with a permanent contract transition to a new permanent contract job or retire.

Amuedo-Dorantes and Serrano-Padial (2007), also examine wage growth patterns by type of contract in Spain.⁷ Not surprisingly, they find that wage growth among workers with permanent contracts primarily occurs via job mobility because these workers only leave the security of their jobs to take a better job opportunity. In contrast, fixed-term employees experience wage gains via job mobility as well as on-the-job. As a result, among job stayers, fixed-term workers are able to narrow their wage gap with respect to similar counterparts with permanent contracts. However, given the limited number of fixed-term contract workers who manage to keep their jobs beyond their initial contractual agreement, the overall wage gap between past fixed-term and indefinite-term workers remains.

As a consequence, in countries with high-employment protection such as Spain, a permanent contract is at least as desirable as a temporary one given that it commits the firm rather than the worker to costly procedures in case of separation. Thus, while in the United States women may self-select into temporary employment in order to achieve the flexibility they need while having children, in Spain women wait to secure a permanent contract to become mothers (Ahn and Mira 2001, among others).

B. Motherhood and Reconciling Work and Family in Spain

The evidence suggests that Spain is not a family-friendly country for working parents (and especially mothers). First, Spain has one of the lowest female employment rates in the OECD. For instance, in 2002, the Spanish female employment rate was 45 percent, far from the 66 percent of the United States and the United Kingdom, 67 percent of Canada, and 73 percent of Sweden. Second, Spanish maternity leave is, on average, nine weeks shorter than in most of the European countries (OECD 2001). Third, the use of formal childcare arrangements for three-year-old children is much less frequent in Spain than in the average European country. At 9 percent, the proportion of Spanish children under the age of three enrolled in preschool in 2001 is far from the European average of 25 percent (Gauthier 2000; and Tietze and Cryer 1999). This is partly due

7. The typical wage profile in Spain is considerably flatter than that of the United States (Martínez, Bover, and Velilla 2005).

to the fact that access to childcare for children under three is very scarce in Spain and, being predominantly private, it is also relatively expensive. Fourth, the 2004 Spanish Labor Population Survey indicates that 65 percent of women aged 45 and younger reported family responsibilities as their main reason for not participating in the labor market (Herrarte-Sánchez, Moral-Carcedo, and Sáez 2007). Last, but not least, at 1.25 in 2002, the Spanish fertility rate is one of the lowest fertility rate among the OECD countries — compared, for example, with two in the United States or 1.6 in the United Kingdom — which is also consistent with problems reconciling work and family in Spain.

Little is known about the motherhood wage differential across different segments of the labor market in general, and in Spain, more specifically.⁸ To the best of our knowledge the only paper studying the motherhood wage differential in Spain is the one of Molina and Montuenga 2009. Using the 1994–2001 European Household Panel and individual-fixed effect estimators, these authors find evidence of a wage motherhood penalty in Spain. Moreover, they find that there is positive self-selection into motherhood in Spain, and that female workers with higher human capital accumulation and better paid jobs are more likely to become mothers. Methodologically, our work differs from Molina and Motuenga 2009 study in the following three ways: First, we estimate not only the effect of motherhood on earnings, but also on women's earnings profile before and after birth. Second, in addition to individual-level FE, we estimate models with job-match FE. Third, we estimate the motherhood differential by type of contract. While our findings are consistent with those of Molina and Motuenga 2009, they bring to light important novel results, such as the existence of a motherhood dip in the earnings' trajectories, the channels through which this emerges, and the differential motherhood effect by type of contract.

IV. The Data and Descriptive Statistics

A. *The CSWH Data*

We use data from the 2006 wave of the Continuous Sample of Working Histories (hereafter CSWH), which is a 4 percent nonstratified random sample of the population registered with the Social Security Administration in 2006.⁹ The CSWH provides information on: (1) sociodemographic characteristics of the worker (such as sex, education, nationality, province of residence); (2) worker's job information (such as type of contract, part-time status, occupation, the dates the employment spell started and ended, and monthly earnings); (3) employer's information (such as industry, public versus private sector, the number of workers in the firm, and the location). Although not reported in the CSWH, other variables such as experience and tenure can be eas-

8. Recently, several authors have investigated whether the effect of motherhood on earnings differs by skill level (Taniguchi 1999; Todd 2001; Budig and England 2001; Anderson, Binder, and Krause 2002, 2003; Amuedo-Dorantes and Kimmel 2005; Loughren and Zissimopoulos 2009; Kunze and Kenneth 2009; and Ellwood, Batchelder, and Wilde 2010) or mothers' age (Geronimus and Korenman 1992; Hotz, McElroy, and Sanders 1997, 2005; Hoffman 1998; Taniguchi 1999; Cherlin 2001; Amuedo-Dorantes and Kimmel 2005; and Miller 2008).

9. The panel is available on request at www.seg-social.es.

ily calculated.¹⁰ In addition, information on the individual's education level, and the number and date of birth of children living in the household at the time of the interview (including but not distinguishing own natural, adopted, step and foster children) is available in the 2006 Spanish Municipal Registry of Inhabitants, which is matched at the person level with the Social Security records.

Because the CSWH does not have reliable information on type of contract prior to 1996, our analysis focuses on work histories from 1996 to 2006. However, we use information back to 1985 to calculate variables such as workers' experience and tenure. In the CSWH, we observe the work history of individuals: (i) working in 2006, or (ii) not working in 2006, but receiving Social Security benefits, which include unemployment benefits, disability, survivor pension, and maternity leave. Thus, individuals without a valid relationship with the Social Security in 2006 are not present in the database.¹¹

Because earnings for the self-employed are not relevant for Social Security's administrative purposes, they are not reliable in the CSWH. Thus, our analysis focuses on wage and salary workers.¹² We confine our selection to birth cohorts between 1961 and 1971, implying that women in our sample will be aged between 25 and 45 years. The reason for restricting the minimum age in our sample to 25 years is that we want to ensure that childless women in our sample would be very unlikely to become mothers even after 2006.¹³ The reason for restricting the maximum age in 2006 to be 45 years is that we do not want to classify as childless women those women whose child has already left the household.¹⁴ Further, we restrict the sample to person-year observations in which yearly earnings are positive. This restriction implies losing 7,210 person-year observations (or 8 percent of the sample of all women).

Our analysis focuses on first birth because it simplifies the estimation strategy. It can be argued that the effect of having a first child is the most important one, given that it applies to a vast majority of women, whereas the effect of having a second or higher order child only applies to a smaller subset of women (Cristia 2008). Moreover, Shapiro and Mott (1994), provide strong evidence that labor force status following first birth is an important predictor of lifetime work experience.¹⁵ Finally, because we need to observe mothers for some time prior to having their first child in our earnings' trajectory analysis, we follow Beblo, Bender, and Wolf (2009), and restrict the sample of mothers to those observed working one year before the birth of the first child,

10. As we lack information on reason for not working, we record spells of nonwork as the time the person is not employed.

11. By comparing different waves of the CSWH one can get a sense of the magnitude of this type of attrition among women between 25 and 45 years old, which are those under analysis in this paper. From our calculations we found that among those women who were in the Social Security records the previous year, as few as 3.4 percent of mothers and 3.8 percent of childless women were attrited the following year.

12. This implies losing 19 percent of our sample of female workers.

13. This restriction is not unusual in this literature (see, for instance, Anderson, Binder, and Krause 2003). In the CSWH only 4 percent of mothers had their first child at age 35 or older.

14. In the CSWH the researcher only observes children living in the same household as the mother in 2006. Thus by including older women in our sample, we run the risk of misclassifying them as childless when instead their children have already moved out of the household by 2006.

15. We recalculated the results including women with more than one child and found that most of the results found in this paper for the first child also apply for the second child (results available from authors upon request). While we find that the effect of the second child is as important as the effect of the first child, we do not find any effects of having more than two children on earnings.

which results in dropping 5,369 person-year observations (or 20 percent of the total of person-year observations for the group of mothers). This restriction implies that our analysis focuses on women highly attached to the labor force, which is not an unusual restriction in the part-time literature (Connolly and Gregory 2009).

The final sample includes an unbalanced panel of 11,046 women observed between 1996 and 2006. Of these, 2,347 women (or 21 percent) become mothers at some point in time by 2006. In our sample, those with permanent contracts represent 61 percent of the sample. However, the percentage of mothers-year working under a permanent contract (72 percent) is considerably higher than the percentage of childless women with permanent contract (59 percent). Although our econometric analysis focuses on the time period between 1996 and 2006, individuals are in the CSWH between 3 and 21 years. In our sample, each woman is observed about eight times on average, resulting in 83,403 woman-year observations, of which 21,470 correspond to women who are or will become mothers during the sample period.

B. Descriptive Statistics

Columns 1 and 2 in Table 1 provide summary statistics for the pooled cross-section (83,403 woman-year observations) presented separately for mothers (including mothers-to-be) and childless women. When comparing mothers to childless women, Table 1 shows that mothers earn higher yearly earnings despite working lower weekly hours than childless women. However, this cannot be used as a reliable estimate of the motherhood premium because mothers are very different from childless women, as found in the subsequent rows of this table. For instance, we observe that mothers are more educated and more likely to be cohabitating than childless female workers. Looking at job differences across the two groups, mothers are more likely to work part-time than childless women. Moreover, mothers have more experience and tenure than childless women.

Because one of the purposes of the present study is to analyze how the earnings trajectories vary for mothers versus childless women by contract type (fixed-term versus permanent), the data in the last four columns of Table 1 are divided in four groups, classified by motherhood status and contract type (defined as the contract observed each year). Several different patterns emerge when comparing mothers and childless women in different segments of the labor market. For instance, among permanent contract workers, mothers are more likely to work in the public sector and, in larger firms, experience fewer months of inactivity and turnover, and are more likely to return to the same employer after a period of inactivity than childless women. In contrast, among fixed-term contract workers, mothers experience the same level of turnover, and are considerably less likely to return to the same employer after a period of inactivity than childless women.

Table 2 shows the transition probabilities between contract types for each year (Panel A) and over the course of the sample (Panel B). Focusing first on year-to-year transitions, Panel A in Table 2 shows that, on average, only 5.4 percent of women in our sample move from a fixed-term contract to a permanent one every year (about two-thirds of these transitions are promotions within the same firm). This is consistent with earlier results found by Bover and Gómez (2004); and Güell and Petrongolo (2007), suggesting that fixed-term contracts are not stepping stones to permanent con-

Table 1
Descriptive Statistics (Percentage except where noted)

	All Contract Types		Permanent Contracts		Fixed-Term Contracts	
	Mothers	Childless	Mothers	Childless	Mothers	Childless
Mean log of yearly earnings (cents of €)	13.97 (0.55)	13.91† (0.60)	14.07 (0.46)	14.02† (0.52)	13.77 (0.66)	13.79† (0.68)
Mean usual weekly hours	35.08 (9.07)	35.14† (9.37)	36.43 (7.56)	36.69† (7.75)	32.20 (11.11)	33.26† (10.73)
Age 35 to 39 years old	32.67	35.22†	35.70	38.20†	26.23	31.58†
Age 40 to 45 years old	9.67	13.81†	11.31	15.26†	6.18	12.05†
Cohabiting	83.74	70.44†	83.78	69.17†	83.64	72.00†
Children younger than three years	24.29	0.00†	25.62	0.00†	21.47	0.00†
Children three years old	6.90	0.00†	7.33	0.00†	6.00	0.00†
Children 4–6 years old	14.97	0.00†	16.50	0.00†	11.74	0.00†
Children older than six years	13.72	0.00†	16.38	0.00†	8.07	0.00†
High-school dropout	40.03	42.58†	39.13	41.47†	41.93	43.93†
High-school graduate	49.97	46.35†	52.27	47.85†	45.09	44.53
College graduate or above	10.00	11.07†	8.60	10.68†	12.98	11.55†
Working part-time	26.85	24.82†	21.58	18.33†	38.06	32.72†
Mean years of experience	8.42 (5.66)	5.94† (5.07)	10.25 (5.39)	8.18† (5.19)	4.54 (4.00)	3.21† (3.27)
Years of experience in FT jobs	6.44 (6.28)	4.63† (5.31)	8.34 (6.39)	6.90† (5.77)	2.41 (3.55)	1.88† (2.87)
Years of experience in PT jobs	1.98 (4.18)	1.30† (3.00)	1.91 (4.41)	1.28† (3.27)	2.13 (3.62)	1.33† (2.64)

(continued)

Table 1 (continued)

	All Contract Types		Permanent Contracts		Fixed-Term Contracts	
	Mothers	Childless	Mothers	Childless	Mothers	Childless
Mean years of tenure	6.14 (5.51)	4.12† (4.66)	7.94 (5.50)	6.15† (5.09)	2.33 (3.00)	1.64† (2.32)
Public servant	5.17	4.32†	5.61	4.55†	4.24	4.04
Mean firm size (number of workers)	521.74 (2180.86)	394.08† (1694.29)	598.94 (2454.30)	442.36† (1995.76)	357.53 (1421.67)	335.29 (1228.68)
White collar	13.11	12.98†	12.72	12.80	13.95	13.21†
Months of inactivity	11.48 (17.72)	15.47† (19.61)	6.98 (12.85)	9.99† (15.44)	21.05 (22.27)	22.15† (21.94)
Times changed employer	0.57 (1.20)	0.71† (1.33)	0.45 (1.05)	0.60† (1.19)	0.85 (1.45)	0.86 (1.48)
Returns to same employer after inactivity	19.02 (1.37)	17.93† (0.70)	0.35 (0.47)	0.17† (0.38)	0.14 (0.35)	0.17† (0.38)
Number of woman-year observations	21,470	61,933	14,604	34,008	6,866	27,925

Notes: Observation by women-year, individual retrospective information from the CSWH-2006. The numbers in parenthesis are standard deviations. All hourly wages are deflated by the gross domestic product (GDP) deflator (base year = 2006). Mothers include mothers to be. Childless are those who will never have a child. † childless mean significantly different from mothers' mean at the 90 percent confidence level.

Table 2
Transitions Probabilities from one Type of Contract to Another

	All	Would be Mothers	Always Childless
Panel A. Year-to-Year Transition Probabilities			
From fixed-term contract to permanent contract	5.44 [3.61]	4.48 [3.03]	5.77 [3.81]
From fixed-term contract to nonwork	3.16 [0.00]	2.44 [0.00]	3.41 [0.00]
From permanent contract to fixed-term contract	1.63 [0.19]	1.49 [0.24]	1.67 [0.17]
From permanent contract to nonwork	0.82 [0.00]	1.09 [0.00]	0.72 [0.00]
From nonwork to fixed-term contract	3.30 [0.00]	2.78 [0.00]	3.48 [0.00]
From nonwork to permanent contract	0.68 [0.00]	0.75 [0.00]	0.65 [0.00]
Panel B. Transition Probabilities over the Course of the Sample			
From fixed-term contract to permanent contract	43.94 [21.01]	39.54 [19.82]	45.43 [21.42]
From fixed-term contract to nonwork	23.36 [0.00]	19.72 [0.00]	24.60 [0.00]
From permanent contract to fixed-term contract	14.23 [1.27]	14.14 [1.67]	14.26 [1.13]
From permanent contract to nonwork	7.77 [0.00]	10.90 [0.00]	6.70 [0.00]
From nonwork to fixed-term contract	24.65 [0.00]	22.90 [0.00]	25.24 [0.00]
From nonwork to permanent contract	6.40 [0.00]	7.38 [0.00]	6.07 [0.00]

Notes: Number of woman-year observations: 83,403. Numbers in brackets show percent of individuals making such transition while working for the same employer.

tracts. Year-to-year transitions from permanent to fixed-term contract are considerably less frequent (and practically inexistent within the firm). That said, it is important for our analysis that over the course of the sample we observe enough movement across contract types. Panel B in Table 2 shows that indeed this is the case. Over the course of the whole sample period, 44 percent of the women in our sample transition from a fixed-term to a permanent contract (21 percent make such transition while working

with the same employer). The reverse transition (from a permanent contract to a fixed-term contract) is considerably less frequent, but far from negligible: 14 percent of women in our sample transition from a permanent to a fixed-term contract.

C. Sample Sizes

Finally, it is important to note that we have both a large number of workers who become mothers and a large number of workers who switch jobs to estimate with precision the FE models. Specifically, in the worker-specific FE model, identification comes from those women that we observe working before and after becoming mothers. In our sample there are 1,910 women who become mothers over the sample period, and thus help us in identifying the individual FE estimator. When the analysis is done by contract type, there are 1,219 (and 691) women working with a permanent (fixed-term) contract the year prior to giving birth to their first child. On the other hand, in order to identify the job-match FE model it is of vital importance that the individuals in our sample change employer. We have 6,846 women in our sample who change firms at least once over the sample period. Among mothers (or mothers-to-be), those who switch firms are 1,409, and among childless women, those who switch firms are 5,437. Again, the sample sizes of job-switchers by contract type are large—751 mothers and 3,814 childless women for those with a permanent contract and 658 mothers and 4,971 childless women for those with a fixed-term contract.

V. Methodology and Results

A. The Motherhood Earnings Differential

We begin our analysis by estimating the average effect of becoming a mother on yearly earnings. Table 3 presents our estimates using a variety of approaches. For ease of the exposition, we use a simple dummy variable approach to measure the log yearly earnings difference associated with becoming a mother, conditional on controls. We begin by estimating the following equation using pooled OLS:

$$(1) \quad \ln W_{ijt} = X'_{ijt} \beta + \theta \text{CHILD}_{it} + \phi_i + \psi_{ij} + \mu_{ijt}$$

Here, $\ln W_{ijt}$ is the natural log of real yearly earnings of individual i in firm j at year t ; X_{ijt} is a vector of observable worker and firm characteristics for individual i in firm j at time t , with β the corresponding coefficient vector (including an intercept). Because there has been much debate on whether variables that control for job characteristics, industry, or occupation ought to be included in the specification, we present alternative specifications to evaluate the robustness of the results. CHILD_{it} is a binary variable equal to one if the woman has a child in year t . The error term includes a random component μ_{ijt} with mean zero and constant variance, a worker-specific fixed effects ϕ_i , and a job-match fixed effect, ψ_{ij} —the effect of unmeasured worker-firm characteristics. All regressions use the Huber/White estimator of variance and allow for observations not being independent within individual clusters.

On average, the unconditional OLS estimate of the motherhood yearly earnings differential in Spain (shown in the first column of the first row of Table 3) is a 4

Table 3
Effect of Motherhood on Ln(Real Yearly Earnings)

	Pooled OLS	Individual FE	Job-match FE
Unconditional	0.036*** (0.011)	-0.091*** (0.006)	-0.051*** (0.005)
+ education	0.039*** (0.011)	-0.091*** (0.006)	-0.051*** (0.005)
+ part-time status	0.069*** (0.008)	-0.034*** (0.006)	-0.027*** (0.005)
+ actual experience	0.000 (0.008)	-0.028*** (0.006)	-0.022*** (0.005)
+ tenure	0.000 (0.008)	-0.028*** (0.006)	-0.022*** (0.005)
+firm size	0.000 (0.008)	-0.028*** (0.006)	-0.022*** (0.005)
+ occupation	0.001 (0.008)	-0.027*** (0.006)	-0.023*** (0.005)
+ industry	0.001 (0.008)	-0.026*** (0.005)	-0.023*** (0.005)
+ contract	0.001 (0.008)	-0.026*** (0.005)	-0.023*** (0.005)

Notes: Total number of person-year observations: 83,403 of which 61,933 correspond to “always childless” women and 21,470 to “mothers or mothers to be.” Unconditional specification includes year, age, and province dummies.

*** Significant at 1 percent level; ** Significant at 5 percent level; * Significant at 10 percent level.

percent premium for mothers. The subsequent rows estimate the motherhood earnings differential adding additional controls. The inclusion of a “part-time job” control increases the premium even further to 7 percent. However, this estimate is likely to be upward bias because actual experience has not yet been included in the specification. When we do so, the motherhood earnings differential goes to zero. These findings are consistent with earlier evidence that suggest that Spanish women prefer to wait and secure a good job before engaging in motherhood (Ahn and Mira 2001; de la Rica and Iza 2005; Gutiérrez-Domènech 2005; Baizan 2009).

Nonetheless OLS estimates are based on a strong assumption that becoming a mother is exogenous (conditional on the included covariates). Clearly this is not the case, as discussed earlier in Section II. To deal with individual time-invariant unobserved heterogeneity, we proceed to estimate the following within estimator, individual FE equation, with results shown in Row 2 of Table 3:

$$(2) \quad \overline{LnW_{ijt}} - \overline{LnW_i} = (X_{ijt} - \overline{X_i})\beta + \theta(CHILD_{it} - \overline{CHILD_i}) + (\psi_{ij} - \overline{\psi_i}) + (\mu_{ijt} - \overline{\mu_i})$$

Notice that the estimator of interest is the coefficient, θ , which is capturing the change in earnings of mothers upon the child birth. Because of the inclusion of individual FE, identification of θ comes solely from mothers observed working before and

after the birth of the first child. Comparing the OLS and FE specification, we find (as in Molina and Motuenga 2009) that there is positive self-selection on unobservables into motherhood in Spain. This finding of positive unobserved heterogeneity contrasts with U.S. findings of negative or negligible unobserved heterogeneity among mothers — even among those continuously attached to the labor force.¹⁶

Our individual-level FE unconditional specification shows that becoming a mother lowers yearly earnings by about 9.5 percent. Row 3 shows that about two-thirds of this earnings differential is explained by the worker's part-time status, as the motherhood penalty decreases to 3.5 percent after controlling for part-time status. Once experience is controlled for (in Row 4), the gap narrows further to 2.8 percent. This suggests that actual work experience accounts for an additional 7 percent reduction of the total earnings penalty for motherhood among Spanish mothers. Adding additional job controls reduces further the gap, albeit only by a small amount.¹⁷

Even though in the previous specification we have controlled for several firm characteristics, it is still possible that the motherhood yearly earnings differential is driven by the selection of mothers into firms that pay lower wages and that the characteristics of these firms are unobserved. For example, it is possible that mothers self-select into family-friendly jobs with attributes that make it easier to combine work and family life but pay lower wages. If there are compensating wage effects at play, then the individual “within” estimator of the motherhood wage gap would overstate the true effect. To address this concern, we estimate the following within estimator, job-match FE specification (shown in Column 3 of Table 3):

$$(3) \quad \ln W_{ijt} - \overline{\ln W_{ij}} = (X_{ijt} - \overline{X_{ij}})\beta + \theta(\text{CHILD}_{it} - \overline{\text{CHILD}_{ij}}) + (\mu_{ijt} - \overline{\mu_{ij}})$$

where now a worker-job-match is defined by ij . Here the fixed-effect μ_{ij} refers to a job-match specific fixed-effect.¹⁸ Because of the inclusion of the job-match fixed effect, identification of θ comes from those mothers observed working before and after childbirth who do not change employer that same year. We have preferred this specification to the individual- and firm-level FE specification because Specification 3 controls for the fixed-effects of a given worker-job-match (as opposed to the firm fixed-effects that affect all workers within a firm on average). We have estimated worker and firm FE (estimates available from the authors upon request), and have found very similar motherhood earnings penalty to those obtained from job-match FE presented in the main paper, which is not that surprising since most firm effects are found in a small number of women.

Comparing the coefficients from this specification (Column 3) to those from the individual-FE specification (Column 2), we observe that the former are smaller in

16. While Korenman and Neumark (1992); and Lundberg and Rose (2000), find evidence of negative unobserved heterogeneity among mothers in the United States, Waldfogel (1997, 1998); Budig and England (2001) find only slight negative selectivity.

17. We reestimated Table 3 adding one control variable at a time to get a sense of which covariates move the motherhood point estimate down to 0.028. This analysis (available from the authors upon request) shows that the most relevant variables that move the motherhood earnings penalty down are “part-time status” (which decreases the motherhood penalty by two-thirds) followed by “experience” (which decreases the motherhood penalty by 12 percent).

18. Notice that in this specification we are taking means over a given worker-job-match, which is different from what we would do in an individual and firm FE specification. In either case, it is of vital importance for identification of the model that the individuals change employers.

size than the latter, consistent with part of the motherhood earnings differential being explained by mothers moving to lower-paying firms. This is particularly striking for the unconditional estimator of the motherhood earnings differential, which drops by almost half—from minus 9 percentage points difference to minus 5 percentage points, suggesting that changing firms accounts for over two-fifths of the reduction of the “raw” earnings penalty for motherhood among Spanish mothers. After controlling for part-time status, we observe that the difference in the estimated motherhood gap between the two specifications (Column 3 versus Column 2) is considerably reduced, implying that some of the motherhood gap is explained by mothers having to change employers to be able to work part-time. However, even for those who remain with the same employer, almost half of the motherhood earnings differential is explained by mothers’ reduction in hours worked. Controlling for actual experience removes the effect on pay of any leave of absence or periods not working. We observe that controlling for actual experience narrows even further the motherhood earnings differential (regardless of whether the worker remains with the same employer or not). At the end, after controlling for firm size, occupation, and industry, the difference between the individual FE and the job-match FE is small, suggesting that our job characteristics approximate well low- versus high-paying jobs. This finding suggest that the individual-FE estimator of the family gap with good quality data on job characteristics is able to control for mothers’ selection into lower-paying firms. All in all, and combining the results from specifications in Column 2 and 3, we explain 71 percent of the 9.5 percent unconditional motherhood earnings gap.

The other 29 percent, or 2.3 log points, remains unexplained even after controlling for individual and job-match observed and (time invariant) unobserved heterogeneity. To put this coefficient into context, the unexplained component of the motherhood penalty in Spain is equivalent to a net loss in annual earnings as large as one-third the gains from the returns to a year of schooling. We don’t know whether this unexplained earnings gap is the result of employer discrimination or instead a reflection of unmeasured job or worker characteristics. For instance, our part-time indicator may only partially account for hours differences across time and employers for a woman, in which case the remaining “motherhood penalty” could simply be a reflection of women ramping up hours prior to the birth of a child and reducing hours after the child’s birth.

B. Motherhood Earnings Differentials Before and After Birth

To examine how the earnings differential between mothers and childless women evolve over time, Figure 1 displays estimates of the effect of motherhood on women’s earnings profiles several years before and after giving birth using alternative specifications of the following equation:

$$(4) \quad \ln W_{ijt} = X'_{ijt}\beta + \sum_{k=0}^t \theta_k CHILD_{it-k} + \sum_{f=1}^{T-t} \phi_f CHILD_{it+f} + \phi_i + \psi_{jt} + \mu_{ijt}$$

Where $\sum_{k=0}^t CHILD_{it-k}$ is a vector of dummies indicating whether the individual has had the first child this year, the last year, the previous two years, and so on. Similarly, $\sum_{f=1}^{T-t} CHILD_{it+f}$ is a vector of dummies indicating whether the individual will have the first child in one year, in two years, and so on. The estimators of interest are:

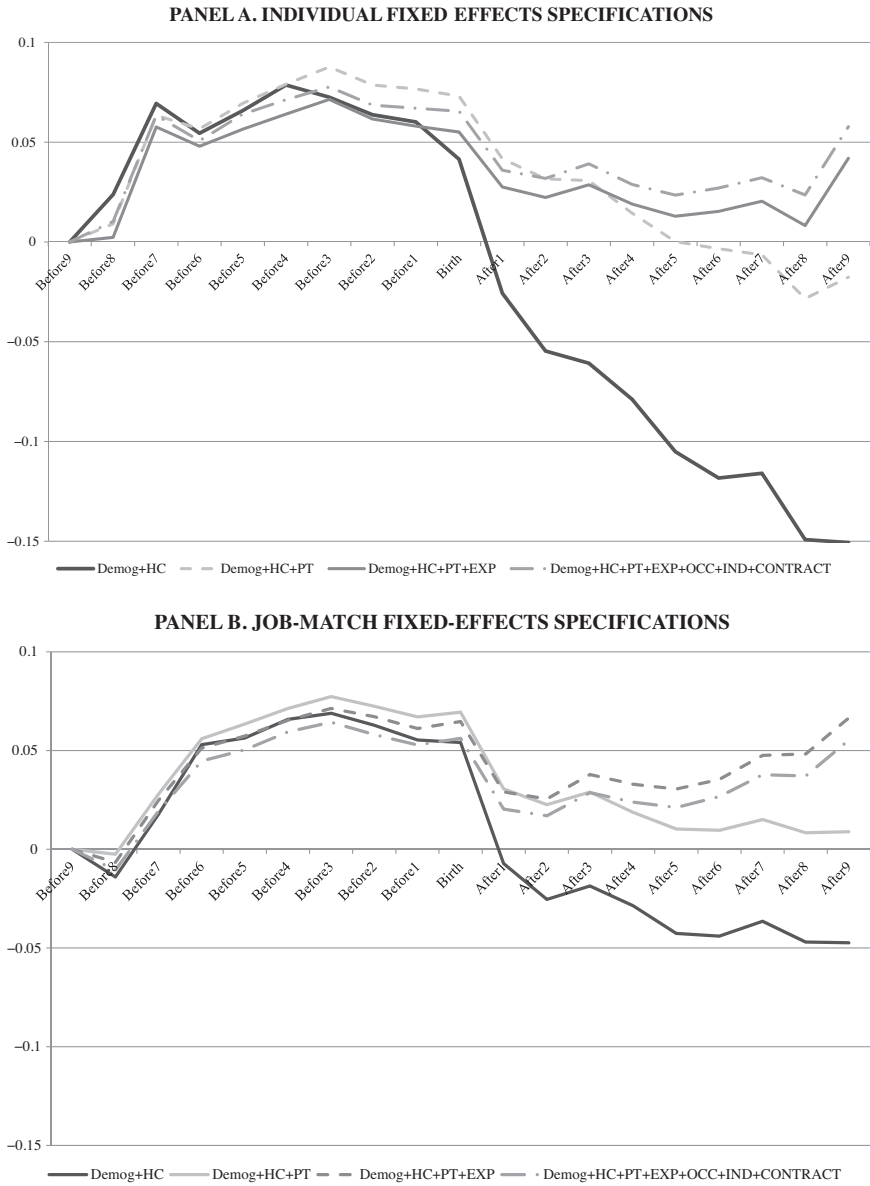


Figure 1
Motherhood Earnings Gap Over-Time

(i) the coefficient, θ_k , which captures the relative earnings within a woman in the year k after to birth; and (ii) the coefficient, ϕ_f , which captures the relative earnings of the woman in the year k prior to birth.

Equation 4 can be estimated by taking within- i deviations from worker-specific means (individual-level FE), which is essentially a similar specification as the one from Jacobson, LaLonde and Sullivan 1993; Hijzen, Upward, and Wright 2010. Equation 4 can also be estimated by taking within- ij deviations from worker-job-match means (that is, job-match FE). These estimations allow earnings of mothers to vary respect to their average by the number of years relative to birth. The coefficients of interest for each of these specifications, θ_k and ϕ_f , are plotted in Panels A and B of Figure 1. As either estimation delivers similar profiles (with, as major difference, the size of the motherhood earnings' gap), the discussion is centered in the specification that controls for job-match specific FE.

Panel B in Figure 1 shows that, after controlling for job-match unobserved heterogeneity, as well as sociodemographic characteristics, “mothers to be” in Spain experience important relative earnings gains, representing up to 6 percent higher earnings, several years prior to giving birth to their first child. This finding is consistent with earlier evidence that suggests that women in Spain wait to secure a good job prior to becoming mothers. An alternative explanation for mothers' higher earnings prior to giving birth is that mothers who stay in the labor force over time are those with higher productivity. To explore whether participation bias could be affecting our results, we compared different waves of the CSWH, and constructed an indicator of nonparticipation (as we were able to identify those individuals who were present in one wave but not in the next one)—unfortunately, given the nature of the CSWH, this was only possible after 2004. We then estimated whether there was a differential effect on earnings levels and growth for women exiting the labor force as opposed to those who stayed, paying special attention to a potential differential effect by motherhood status. While we did find that those women who exited the labor market had lower earnings both in levels and growth compared to those who stayed in the labor force, we could not reject the null hypothesis that these differences did not varied with motherhood status, suggesting that any differences driven by (lack of) participation are wiped out in our analysis, given that we always compare mothers and childless women, and implying that our estimates ought not to be seriously affected by a participation bias.

Panel B in Figure 1 also shows that there is a far-from-insignificant earnings' dip emerging right after giving birth and lasting until the child is around nine years old. The relative decrease in earnings right after birth represents almost 4 percent, reducing by more than half the prebirth “mothers to be” earnings advantage. As the children age, mothers eventually return to their relative earnings levels before birth.¹⁹ Panel B in Figure 1 also shows that about half of the motherhood dip is explained by a decrease in hours worked as mothers move into part-time work. Controlling by women's experience further reduces the mother's dip.

Our finding of a motherhood earnings dip is consistent with Becker's 1985 and 1991 models illustrating that mothers might optimally choose to decline work and

19. The findings on Spanish mothers' earnings trajectories before and after giving birth are robust to using a balanced panel of women five years before and after giving birth and plotting those trajectories by women's age.

effort outside the home after their first child is born (absent a change in marginal utility of income). Alternatively, our finding is also consistent with the view that argues that this drop is likely to be explained by the employers moving mothers off the “fast track” as they, rightly or wrongly, perceive them as less committed to their jobs and less likely to rearrange work schedules to deal with immediate crises at work. Distinguishing between the first and the second interpretation is always difficult in this literature. However, as we will explain in the next section, our analysis of the motherhood earnings loss by type of contract suggests an important role for mothers’ decision to reduce time and effort spent outside home.

C. The Motherhood Earnings Differential by Contract Type

In what follows, we study the motherhood yearly earnings differential by type of contract. The rationale being that the effect of motherhood on earnings and the channels through which it operates may well differ by the level of job protection the worker has at the moment of childbirth, and whether she is in the primary labor market (with a permanent contract) or in the secondary labor market (with a fixed-term contract). For instance in Becker’s models, marginal utility of income would likely also rise after birth due to the need for increased food, housing, diapers, and childcare (a point not emphasized by Becker). As a result, whether time or energy spent in market work decline depends on the relative changes in the marginal utility of income and time spent at home. These relative changes may well differ for women in the primary (with secure jobs) versus the secondary labor market (with unstable jobs). Those with a permanent contract might see less of a change in the utility of income and be more inclined to cut back on market work time. On the other hand, they may also be in jobs where the impact of effort on wages is greater, leading to a smaller reduction in effort. Alternatively, Ellwood, Batchelder, and Wilde 2010, develop a model where wages and wage growth depend on labor market experience in addition to effort. In their model, the effect of children on careers is likely to differ for high- and low-skill parents because they may be in jobs that differ in their sensitivity to effort and because they might make different choices regarding their work effort upon childbearing. Such model could easily be modified to apply to women in the primary versus secondary labor market.

Table 4 presents the OLS, and the individual-level FE results from Equation 5 below:

$$(5) \quad \ln W_{ijt} = X'_{ijt}\beta + \gamma_1 \text{FIXED}_{ijt} + \delta_1 \text{CHILD}_{it} + \delta_2 (\text{CHILD}_{it} * \text{FIXEDBIRTH}_i) \\ + \phi_i + \psi_{ij} + \mu_{ijt}$$

where CHILD_{it} is a binary variable equal to one if the individual has a child in year t , FIXEDBIRTH_i is a time-invariant binary variable equal to one if the mother has a fixed-term contract one year before the birth of her first child. In addition to the usual controls, X_{ijt} , Equation 5 includes a control for the type of contract that each individual has at year t (FIXED_{ijt}). The error term includes both a random component μ_{ijt} with mean zero and constant variance, a worker-specific fixed effect ϕ_i , and a job-match fixed effect, ψ_{ij} .

Table 4 shows the coefficients δ_1 and $(\delta_1 + \delta_2)$. In the OLS estimator columns, they

Table 4
Effect of Motherhood on Ln (Real Yearly Earnings), By Type of Contract at Childbirth

	Pooled OLS		Individual FE		Job-match FE	
	With permanent contract at childbirth	With fixed-term contract at childbirth	With permanent contract at childbirth	With fixed-term contract at childbirth	With permanent contract at childbirth	With permanent contract at childbirth
Unconditional	0.076*** (0.012)	-0.125***† (0.020)	-0.109*** (0.008)	-0.036***† (0.011)	-0.060*** (0.006)	
+ education	0.076*** (0.011)	-0.114***† (0.019)	-0.0109*** (0.008)	-0.036***† (0.011)	-0.060*** (0.006)	
+ PT status	0.061*** (0.009)	0.016† (0.012)	-0.036*** (0.006)	-0.025*** (0.009)	-0.031*** (0.005)	
+ actual experience	0.004 (0.009)	-0.008 (0.012)	-0.035*** (0.006)	-0.020*** (0.009)	-0.026*** (0.005)	
+ tenure	0.001 (0.009)	-0.004 (0.012)	-0.035*** (0.006)	-0.020*** (0.009)	-0.027*** (0.005)	
+ firm size	0.000 (0.009)	-0.004 (0.012)	-0.034*** (0.006)	-0.020*** (0.009)	-0.027*** (0.005)	
+ occupation	0.001 (0.008)	-0.000 (0.011)	-0.034*** (0.006)	-0.018*** (0.009)	-0.027*** (0.005)	
+ industry	-0.003 (0.008)	0.002 (0.011)	-0.033*** (0.006)	-0.018*** (0.009)	-0.027*** (0.005)	

Notes: Total number of person-year observations: 83,403 of which 61,933 correspond to “always childless” women and 21,470 to “mothers or mothers to be”. Unconditional specification includes year, age and province dummies, and a control for type of contract in the current year. Mothers are classified by the contract type they had the year prior to giving birth and childless women are classified by the type of contract they have the current year. *** Significant at 1 percent level; ** Significant at 5 percent level; * Significant at 10 percent level.

† Statistically significantly different effect by contract type at 10 percent level.

measure the effect of becoming a mother on earnings for women working under a permanent (δ_1) versus a fixed-term contract ($\delta_1 + \delta_2$) one year prior to giving birth after controlling for women's sociodemographic variables and for the type of contract at year t . In the individual FE estimator columns, they measure the individual within-effect of motherhood on earnings for women working under a permanent (δ_1) versus a fixed-term contract ($\delta_1 + \delta_2$) one year prior to giving birth to the first child after controlling for women's observable and (time-invariant) unobservable characteristics (including contract type at year t). All regressions use the Huber/White estimator of variance and allow for observations not being independent within cluster-individuals.

Note that although the specifications that controlled for job-match FE is our preferred specification when estimates are tabulated on average for all women, this is not necessarily the case when the analysis is done by type of contract. The reason for this is that in the job-match FE specification, identification of the motherhood coefficient comes from those individual-job matches, in which the worker is observed working for the same employer before and after the birth of the first child. However, remaining with the same employer is quite infrequent among fixed-term contract mothers. Thus the job-match FE estimator is only estimated for women working with permanent contracts in the last column of Table 4.

According to our preferred specification (the individual-level FE estimator), the main finding is that the motherhood earnings differential found in Section VA is driven by women working in the primary labor market (that is, those with permanent contracts). While the unconditional motherhood earnings gap is 11.5 percent among women with permanent contracts, a 3.7 percent differential is observed among women with fixed-term contracts. Among women with permanent contracts, two-thirds of the motherhood earnings differential are explained by part-time work. In contrast, differences in accumulated experience after birth explain much more of the motherhood earnings differential of workers with a fixed-term contract (20 percent) than of mothers with a permanent contract (less than 3 percent). This is consistent with earlier findings that combining family life and work in Spain is considerably easier for workers under a permanent contract than for those under a fixed-term one. It is also worth highlighting that although there is positive self-selection of unobservables into motherhood in the primary labor market, the opposite is true among women with fixed-term contracts.

As observed earlier in Section VA, including part-time status as a control has a smaller effect reducing the motherhood earnings gap among women with permanent contracts when one controls for job-match FE than in our individual FE specification. This suggests that part of the motherhood earnings differential in the primary labor market is explained by mothers changing employers when moving into part-time work. In contrast, the reduction in the motherhood earnings gap when one controls for experience is greater in job-match FE specification than in the individual FE one, suggesting that among those workers who stay with their former employer, much of the motherhood earnings gap is explained by mothers accumulating less experience, that is, taking leave of absence.

Although we cannot reject the null hypothesis that the motherhood earnings gap differs by type of contract once all controls have been accounted for, the size of the motherhood "penalty" under permanent contract almost doubles that of fixed-term

contract. What may explain this? One explanation is that mothers with permanent contracts can reconcile family life and work either because they take (unpaid) leave of absence to take care of their small children or they move to part-time work if they stay with their former employer. In contrast, women with fixed-term contracts are less able to reconcile family and work through hours worked as their jobs are considerably more unstable. This evidence is consistent with findings from Fernández-Kranz and Rodríguez-Planas (2011b) that indicate that a 1999 law aiming at reconciling work and family life in Spain and giving the right to reduced work arrangements to care for children under seven was only effective in the primary labor market as employers who do not want to offer reduced work hours to workers with fixed-term contracts only have to wait for their contract to expire to terminate the employment. It is also important to note that, although one might expect a greater motherhood penalty on earnings for women working in the secondary than in the primary labor market—as the former are in more vulnerable positions than the latter—what really matters is the *changes* in work behavior after the birth of the child, and those are actually somewhat greater for women in the primary labor market, especially with respect to part-time work. For instance, women with permanent contracts work full-time all year much more than those with fixed-term contracts do one year prior to their first birth, 80 percent versus 65 percent. However, one year after birth only 73 percent of mothers with a permanent contract continue to work full time, whereas the number for those with a fixed-term contract working full-time remains practically unchanged at 63 percent. A third possibility is that wages decline in response to mothers leaving their previous employer when they give birth (either by choice or because they cannot get back their previous job). Women in the primary sector who make such a change give up any benefits they were gaining from firm-specific human capital and presumably lose their returns to tenure. Finally, it is possible that mothers are perceived (rightly or wrongly) as less willing or able to spend the extra hour that superiors may use as a signal of commitment to the enterprise, and are thus less likely to gain promotions.

D. Motherhood Earnings Differentials Before and After Birth

In this section, we examine how the earnings differential between mothers and childless women evolve over time and how these earnings profiles differ by type of contracts, mimicking the analysis done in Figure 1, but interacting the coefficients by a dummy indicating the contract type. Consistent with our earlier findings from Table 4, Figure 2 shows that the higher earnings for “mothers to be” and the subsequent dip observed in Figure 1 are mainly driven by women working in the primary labor market (Panels B and C). In contrast, for women with fixed-term contracts the motherhood dip is less apparent (Panel A).

Figure 2 also reveals that, for women with permanent contracts, moving to part-time work explains close to half of the motherhood gap in Panel B (and in Panel C) corroborating our earlier results that much of the motherhood dip is explained by mothers with permanent contracts changing to part-time. Most importantly, results from Panel C of Figure 2 show that a far-from-insignificant motherhood dip remains among women with permanent contracts who stay with the same employer, suggesting that even when they remain in the same firm, mothers are removed off the “fast track”

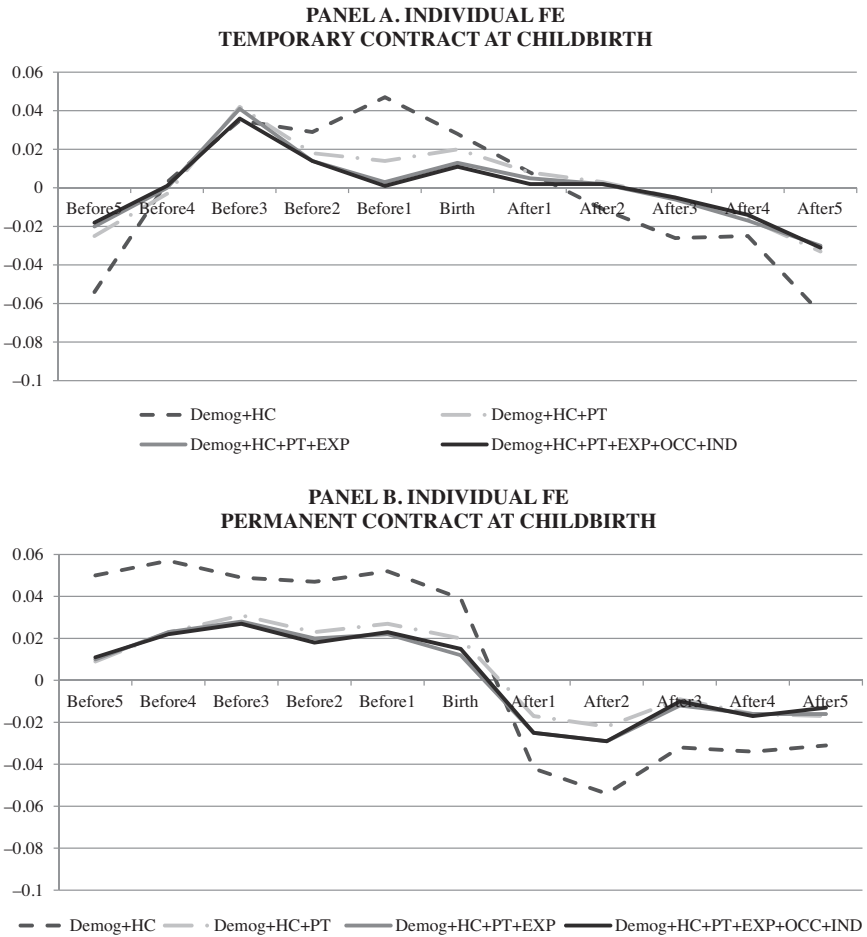


Figure 2
Motherhood Earnings Gap Over-Time, by Type of Contract

as employers rightly or wrongly perceive them as less committed to their jobs and less likely to rearrange work schedules to deal with immediate crises at work.

VI. Conclusion

Using rich data from Spanish Social Security records, we estimate the motherhood wage gap and document the channels through which mothers fall onto a lower earning track, such as shifting into part-time work, accumulating lower experience, or transitioning to lower-paying jobs. Many of our results are similar to those found in the literature. For instance, the magnitude of Spanish unconditional mother-

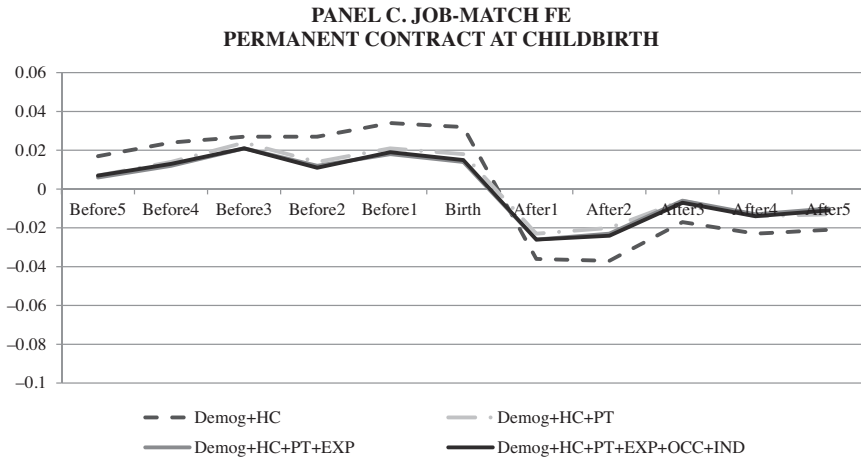


Figure 2 (continued)

hood wage gap is within the range of the estimates found in other studies that use longitudinal data and individual FE modeling to account for time-invariant unobserved heterogeneity. Indeed, the estimated wage losses for the first child is around 6 percent in the United States (Waldfogel 1998b; Budig and England 2001; Anderson, Binder, and Krause 2002), and 9 percent in the United Kingdom (Waldfogel 1998b), not far from our estimate of 9 percent.²⁰ We also find that both actual experience and part-time status are important factors in reducing the estimated child penalty. Although, part-time status is more relevant in explaining the motherhood gap in Spain than actual experience is—in contrast with most U.S. and U.K. findings. Our job-match FE finding that the motherhood penalty diminishes among mothers who retain their job is also consistent with evidence that the wage losses attributable to motherhood are reduced for mothers who are able to return to their prebirth employer after child-related work interruptions (as in Baum 2002; Waldfogel 1998a; Ziefle 2004; Beblo, Bender, and Wolf 2009; and Gangl and Ziefle 2009). However, with the exception of Beblo, Bender, and Wolf 2009, none of these earlier studies control for within (firm or) job-match FE as we do.

Other novel results in this paper follow. First, we are able to explain up to 71 percent of the unconditional individual FE motherhood wage gap thanks to a large and rich longitudinal data set. This contrasts with most studies in the United States, the United Kingdom, and Germany. For instance, Budig and England (2001) explain no more than 46 percent of the motherhood gap, while Anderson, Binder, and Krause (2002) explain 17 percent of the first child penalty. Similarly, Gangl and Ziefle (2009) are unable to explain a substantial size of the motherhood wage gap in Germany.²¹

20. Using a siblings FE approach, Korenman and Neumark (1994), found a 7 percent motherhood penalty. And Gangl and Ziefle (2009) estimate a raw motherhood penalty per child ranging between 9 and 16 percent after the incorporation of the sample selection correction in their estimation.

21. They are, however, able to explain most of the motherhood wage gap in the United States and the United Kingdom when they use extensive controls for human capital at the micro level.

Second, our finding that by nine years post first birth, mothers in Spain seem to have regained their earnings premium contrasts with evidence from the United States and Germany showing that mothers' wage losses tend to persist over time (Waldfoegel 1997; Lundberg and Rose 2000; and Ziefle 2004). Finally, we find that both the "adjusted" motherhood earnings differential and the motherhood dip are driven by women with permanent contracts prior to giving birth. For these women, about half of the earnings losses occur because mothers change employers to work part-time, or (if they stay with their former employer) they take leave of absence.

Our paper contributes to the literature that hints to institutional differences as well as differences in policies aiming at reconciling family and work as possible explanations behind the wage differences observed between mothers and childless women (see for instance, Blossfeld 1997; Davies and Pierre 2005; and Gangl and Ziefle 2009). Indeed, our results suggest that mothers use the leeway granted by job protection in Spain to trade off wages for more family friendly work arrangements, implying that work-family conciliation comes at a wage cost. Moreover, our findings also reveal that mothers not benefiting from job protection might not even have the choice of balancing work and life at a wage cut cost. Future research ought to investigate the possibilities of combining work and family life in a segmented labor market, such as the Spanish one. Finally, the results in this paper inform us that whatever policies are currently in place in Spain to reconcile family and work, they are clearly not sufficient. Our results suggest that mothers with permanent contracts in Spain see their labor careers move to a slower track so that they have more time to spend with their child. Other policies such as raising the availability of affordable good-quality childcare or increasing flexible work arrangements ought to be used to help women turn to full-time jobs with more prospects.

References

- Adserà, Alicia. 2004 "Changing Fertility Rates in Developed Countries. The Impact of Labor Market Institutions." *Journal of Population Economics* 17(1):17–43.
- Adserà, Alicia. 2005. "Where are the Babies? Labor Market Conditions and Fertility in Europe." *IZA Discussion Paper* 1576.
- Ahn, Namkee, and Pedro Mira. 2001. "Job Bust, Baby Bust?: Evidence from Spain." *Journal of Population Economics* 14(3):505–21.
- Amuedo-Dorantes, Catalina, and Jeanne Kimmel. 2005. "The Motherhood Wage Gap for Women in the United States: The Importance of College and Fertility Delay." *Review of Economics of the Household* 3(1):17–48.
- Amuedo-Dorantes, Catalina, and Ricardo Serrano-Padial. 2007. "Wage Growth Implications of Fixed-Term Employment: An Analysis by Contract Duration and Job Mobility." *Labour Economics* 14(5):829–47.
- Anderson, Deborah J., Melissa Binder, and Kate Krause. 2002. "The Motherhood Wage Penalty: Which Mothers Pay it and Why?" *American Economic Review Papers and Proceedings* 92(3):354–58.
- . 2003. "The Motherhood Wage Penalty Revisited: Experience, Heterogeneity, Work Effort and Work-Schedule Flexibility." *Industrial and Labor Relations Review* 56 (2):273–94.
- Angrist, Joshua and William Evans. 1998. "Children and Their Parents' Labor Supply:

- Evidence from Exogenous Variation in Family Size." *American Economic Review* 88(3): 450–77.
- Baizan, Pau 2009. "Regional Childcare Availability and Fertility Decisions in Spain." *Demographic Research* 21(27):803–42.
- Baum, Charles L. 2002. "The Effect of Work Interruptions on Women's Wages." *Labour* 16(1):1–36.
- Beblo, Miriam, Stefan Bender, and Elke Wolf. 2009. "Establishment-Level Wage Effects of Entering Motherhood." *Oxford Economic Papers* 61(S1):11–34.
- Becker, Gary S. 1985. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics* 3(2):33–58.
- . 1991. *A Treatise on the Family*. Cambridge, MA: Harvard University Press.
- Beninger, Denis. 2005. "Emploi et social en France: Description et Evaluation." *ZEW Documentation* 03–05. Unpublished.
- Bentolila, Samuel, Juan J. Dolado, Wolfgang Franz and Christopher Pissarides. 1994. "Labour Flexibility and Wages: Lessons from Spain." *Economic Policy* 18(2):55–99.
- Bertola, Giuseppe, Francine D. Blau, and Lawrence M. Kahn. 2007. "Labor Market Institutions and Demographic Employment Patterns." *Journal of Population Economics* 20(4):833–67.
- Bettio, Francesca, and Paola Villa. 1998. "A Mediterranean Perspective on the Breakdown of the Relationship Between Participation and Fertility." *Cambridge Journal of Economics*. 22 (2):137–71.
- Blanchard, Olivier, and Augustin Landier. 2002. "The Perverse Effects of Partial Labor Market Reform: Fixed Duration Contracts in France." *The Economic Journal* 112(480): 214–44.
- Blossfeld, Hans-Peter. 1997. "Women's Part-Time Employment and the Family Cycle: A Crossnational Comparison." In *Between Equalization and Marginalization: Women Working Part-Time in Europe and the United States of America*, eds. Hans-Peter Blossfeld and Catherine Hakim. Oxford University Press.
- Bover, Olympia, and Ramón Gómez. 2004. "Another Look at Unemployment Duration: Exit to a Permanent Job vs. a Temporary Job." *Investigaciones Economicas* 28(2):285–314.
- Brewster, Karin L., and Ronald R. Rindfuss. 2000. "Fertility and Women's Employment in Industrialized Nations." *Annual Review of Sociology* 26:271–96.
- Bronars, Stephen, and Jeff Grogger. 1994. "The Economic Consequences of Unwed Motherhood: Using Twin Births as a Natural Experiment." *American Economic Review* 84(5):1141–56.
- Budig, Michelle J., and Paula England. 2001. "The Wage Penalty for Motherhood." *American Sociological Review* 66(2):204–25.
- Cahuc, Pierre, and Francis Kramarz. 2004. "De la Précarité à la Mobilité: Vers une Sécurité Sociale Professionnelle." Rapport au Ministre d'Etat, Ministre de l'Economie, des Finances et de l'Industrie et au Ministre de l'Emploi, du Travail et de la Cohésion Sociale, Paris.
- Cherlin, Andrew J. 2001. "New Developments in the Study of Nonmarital Childbearing." In *Out of Wedlock. Causes and Consequences of Nonmarital Fertility*, eds. Lawrence L. Wu and Barbara Wolfe, 143–72. New York: Russell Sage Foundation.
- Connolly, Sara, and Mary Gregory. 2009. "The Part-Time Pay Penalty: Earnings Trajectories of British Women." *Oxford Economic Papers* 61(1):76–97.
- Cristia, Julian P. 2008. "The Effect of a First Child on Female Labor Supply: Evidence from Women Seeking Fertility Services." *Journal of Human Resources* 43(3):487–510.
- Davies, Rhys, and Gaelle Pierre. 2005. "The Family Gap in Pay in Europe: A Cross-Country Study." *Labour Economics* 12(4):469–86.
- Del Boca, Daniela. 2002. "The Effect of Childcare and Part-Time on Participation and Fertility of Italian Women." *Journal of Population Economics* 15(3):549–73.

- De la Rica, Sara and Amaia Iza. 2005 "Career Planning in Spain: Do Fixed-Term Contracts Delay Marriage and Parenthood?" *Review of Economics of the Household* 3(1):49–73.
- De Laat, Joost, and Almudena Sevilla-Sanz. 2011. "The Fertility and Women's Labor Force Participation Puzzle in OECD Countries: The Role of Men's Home Production." *Feminist Economics* 17(2):87–119.
- Dolado, Juan J., Carlos Garcia-Serrano, and Juan F. Jimeno. 2002. "Drawing lessons from the boom of temporary jobs in Spain." *Economic Journal* 112(480):270–95.
- Dolado, Juan J., Marcel Jansen, and Juan F. Jimeno. 2007. "A Positive Analysis of Targeted Employment Protection Legislation." *B.E. Journal of Macroeconomics* 7(1):14.
- Eichhorst, Werner. 2007. "The Gradual Transformation of Continental European Labor Markets: France and Germany Compared." *IZA Discussion Paper* 2675.
- Ellwood, David, Lily Batchelder, and Elisabeth. T. Wilde. 2010. "The Mommy Track Divides: The Impact of Childbearing on Wages of Women of Differing Skill Levels." *NBER Working Paper* 16582. Unpublished.
- Estrada, Ángel, Mario Izquierdo, and Aitor Lacuesta. 2009. "The Functioning of the Labor Market and Unemployment Growth in Spain." *Economic Bulletin Banco de España* 7:105–21.
- Fernández-Kranz, Daniel, and Núria Rodríguez-Planas. 2011a. "The Part-Time Penalty in a Segmented Labor Market." *Labour Economics* 18(5):591–606.
- . 2011b. "Unintended Effects of a Family-Friendly Law." *IZA Discussion Paper* 509, May, 2011.
- Feyrer, James, Bruce Sacerdote, and Ariel D. Stern. 2008. "Will the Stork Return to Europe and Japan? Understanding Fertility within Developed Nations" *Journal of Economic Perspectives* 22(3):3–22.
- Galdón-Sánchez, José E., and Maia Güell. 2003. "Dismissal Conflicts and Unemployment." *European Economic Review* 47(2):127–39.
- Gangl Markus, and Andrea Ziefle. 2009. "Motherhood, Labor Force Behavior and Women's Careers: An Empirical Assessment of the Wage Penalty for Motherhood in Britain, Germany and the U.S." *Demography* 46(2):341–69.
- Gauthier, Anne. 2000. "Public Policies Affecting Fertility and Families in Europe: A Survey of the 15 Member States." *European Observatory on Family Matters Annual Seminar*. Unpublished.
- Geronimus, Arline, and Sanders Korenman. 1992. "The Socioeconomic Consequences of Teen Childbearing Reconsidered." *Quarterly Journal of Economics* 107(4):1187–1214.
- Güell, Maia, and Barbara Petrongolo. 2007. "How Binding are Legal Limits?: Transitions from Temporary to Permanent Work in Spain." *Labour Economics* 14(2):153–83.
- Gutiérrez-Domènech, Maria. 2005. "Employment Transitions after Motherhood in Spain." *Labour* 19(S1):123–48.
- Herrarte, Ainhoa, Julián Moral-Carcedo, and Felipe Sáez. 2007. "The Effect of Fertility on the Decision of Abandoning the Labour Market: The Case of Spain." *Working Papers in Economic Theory 2007/11, Universidad Autónoma de Madrid*. Unpublished.
- Hijzen, Alexander, Richard Upward, and Peter W. Wright. 2010. "The Income Losses of Displaced Workers." *Journal of Human Resources* 45(1):243–69.
- Hoffman, Saul D. 1998. "Teenage Childbearing Is Not So Bad After All . . . Or Is It? A Review of the New Literature." *Family Planning Perspectives* 30(5): 236–239.
- Hotz, V. Joseph., Susan. W. McElroy, and Seth. G. Sanders. 1997. "The Impacts of Teenage Childbearing on the Mothers and the Consequences of Those Impacts for Government." In *Kids Having Kids: Economic Costs and Social Consequences*, eds. Rebecca A. Maynard. Washington, D.C.: Urban Institute Press.
- . 2005. "Teen Childbearing and Its Life Cycle Consequences." *Journal of Human Resources* 45(3):683–715.

- Izquierdo, Mario, and Aitor Lacuesta. 2012. "The Contribution of Changes in Employment Composition and Relative Returns to the Evolution of Wage Inequality: The Case of Spain." *Journal of Population Economics* 25(2):511–43.
- Jacobson Louis, Robert J. LaLonde, Daniel G. Sullivan. 1993. "Earnings Losses of Displaced Workers." *American Economic Review* 83(4):685–709.
- Kahn, Lawrence M. 2007. "The Impact of Employment Protection Mandates on Demographic Temporary Employment Patterns: International Microeconomic Evidence." *Economic Journal* 117(521):333–56.
- Korenman, Sanders, and David Neumark. 1992. "Marriage, Motherhood, and Wages." *Journal of Human Resources* 27(2):233–55.
- Korenman, Sanders, and David Neumark. 1994. "Sources of Bias in Women's Wage Equations: Results Using Sibling Data." *Journal of Human Resources* 29(2):379–405.
- Loughren, David, and Julie M. Zissimopoulos. 2009. "Why Wait? The Effect of Marriage and Childbearing on the Wages of Men and Women." *Journal of Human Resources* 44(2): 326–49.
- Lundberg, Shelly, and Elaina Rose. 2000. "Parenthood and the Earnings of Married Men and Women." *Labour Economics* 7(6):689–710.
- Martínez, Carmen, Olympia Bover, and Pilar Velilla. 2005. "La Situación Patrimonial de las Familias Españolas: Una Comparación Microeconómica con Estados Unidos, Italia y Reino Unido." *Boletín Económico Banco de España* 4:113–34.
- Miller, Amalia. 2011. "The Effects of Motherhood Timing on Career Path." *Journal of Population Economics* 24(3):1071–1100.
- Molina, José and Víctor Montuenga. 2009. "The Motherhood Wage Penalty in Spain." *Journal of Family and Economic Issues* 30(3):237–51.
- OECD. 2001. "Balancing Work and Family Life: Helping Parents into Paid Employment." In *OECD Employment Outlook*.
- . 2002. "Women at Work: Who Are They and How Are They Faring?" In *OECD Employment Outlook*.
- Petrongolo, Barbara. 2004. "Gender Segregation in Employment Contracts." *Journal of European Economic Association* 2(2/3):331–45.
- Rosenzweig, Mark, and Kenneth Wolpin. 1980. "Life-Cycle Labor Supply and Fertility: Causal Inferences from Household Models." *Journal of Political Economy* 88(2):328–48.
- Shapiro, David, and Frank M. Mott. 1994. "Long-Term Employment and Earnings of Women in relation to Employment Behavior Surrounding First Birth." *Journal of Human Resources* 26(2):248–75.
- Taniguchi, Hiromi. 1999. "The Timing of Childbearing and Women's Wages." *Journal of Marriage and the Family* 61(4):1008–19.
- Tietze, Wolfgang, and Debby Cryer. 1999. "Current Trends in European Early Child Care and Education." *The Annals of the American Academy of Political and Social Science* 563(1):175–93.
- Waldfogel, Jane. 1997. "The Effect of Children on Women's Wages." *American Sociological Review* 62(2): 209–217.
- . 1998a. "Understanding the Family Gap in Pay for Women with Children." *Journal of Economic Perspectives* 12(1):137–56.
- . 1998b. "The Family Gap for Young Women in the United States and Britain: Can Maternity Leave Make a Difference?" *Journal of Labor Economics* 16(3):505–45.
- Ziefle, Andrea. 2004. "The Individual Costs of Parental Leave: An Empirical Analysis of Short- and Longer-Run Consequences for Women's Careers." *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 56:213–31.