MOTHERHOOD, LABOR FORCE BEHAVIOR, AND WOMEN'S CAREERS: AN EMPIRICAL ASSESSMENT OF THE WAGE PENALTY FOR MOTHERHOOD IN BRITAIN, GERMANY, AND THE UNITED STATES*

MARKUS GANGL AND ANDREA ZIEFLE

Using harmonized longitudinal data from the British Household Panel Survey (BHPS), the German Socio-Economic Panel (GSOEP), and the National Longitudinal Survey of Youth (NLSY), we trace career prospects after motherhood for five cohorts of American, British, and West German women around the 1960s. We establish wage penalties for motherhood between 9% and 18% per child, with wage losses among American and British mothers being lower than those experienced by mothers in Germany. Labor market mechanisms generating the observed wage penalty for motherhood differ markedly across countries, however. For British and American women, work interruptions and subsequent mobility into mother-friendly jobs fully account for mothers' wage losses. In contrast, respective penalties are considerably smaller in Germany, yet we observe a substantial residual wage penalty that is unaccounted for by mothers' observable labor market behavior. We interpret this finding as indicating a comparatively more pronounced role for statistical discrimination against mothers in the German labor market.

With the historical decline in the gender wage gap leveling off during the 1980s and 1990s, research across the social sciences has increasingly sought to identify processes that might explain the persistence of a significant gender wage gap in the United States as well as abroad despite sharp increases in women's educational attainment and career aspirations (cf. DiPrete and Buchmann 2006). Motherhood and women's traditional role as caregivers come in as a natural candidate factor, more particularly so since recent research has demonstrated that much of the gender wage gap is perhaps better termed a family wage gap: in a survey of gender wage gaps in industrial countries, Waldfogel (1998b) and Polachek (2006) argued that wage gaps between men and single women are relatively minor, whereas wage gaps between men and married women have remained highly significant. Given the equally persistent correlation of marital status and motherhood throughout the Western world, it would seem that motherhood may indeed be a critical event behind much of the gender wage gap.

Also, labor market mechanisms abound that might put working mothers at a disadvantage. Because motherhood can be an exhausting responsibility, women's effort

and productivity on the job might fall. Or even if productivity does not fall, employer perceptions that mothers might be less productive could form barriers to women's careers. Furthermore, there might be wage costs to mothers' work interruptions because these disrupt the accumulation of human capital or involve the depreciation of existing skills. And finally, women's adaptation to their caregiver role might trigger changes in their labor market behavior—job mobility into more mother-friendly employment and curbed occupational aspirations, in particular—that carry a wage penalty relative to their pre-birth careers.

Recognizing the strains involved for women in combining family and work, a broad range of family policies has, in fact, been advocated and enacted over the past decades across the industrial world to ease women's fertility and career choices by partially undermining those market processes conducive to putting mothers at an economic disadvantage (cf. Brewster and Rindfuss 2000; Waldfogel 2001). Key among those are maternity and parental leave systems that provide job guarantees to women who temporarily interrupt work for childcare, and subsidized or public childcare arrangements that partially free mothers from their caregiver roles. Because there is considerable variation in the thrust and generosity of policies adopted across countries, comparative research may provide important insights into whether and how the level and nature of public support available to mothers mitigates any adverse economic consequences of motherhood. At this point, however, systematic analyses of cross-country differences in the wage penalty for motherhood have been rare and, when available, have been hampered by a lack of access to comparable longitudinal data that would have permitted researchers to control for cohort effects, unobserved heterogeneity, and sample selection bias.

Against this background, this article seeks to contribute new empirical evidence on the issue by assessing the wage penalty for motherhood as well as its sources from harmonized longitudinal data for five cohorts of women in three countries. More specifically, we use the British Household Panel Survey (BHPS), the German Socio-Economic Panel (GSOEP), and the National Longitudinal Survey of Youth (NLSY) to contrast the labor market experiences of two cohorts of German women with those of one cohort of British and two cohorts of American women born around the 1960s. These three data sets are unique in providing prospectively collected survey data on women's fertility and labor market histories over sufficiently long observation windows to permit identification of wage penalties for motherhood even for women who interrupt their careers over extended periods of time. In addition, these data sets offer a broad range of data on women's labor market behavior that will enable us to conduct a differentiated analysis of the sources of the motherhood wage penalty in the three countries. Finally, the particular cross-country comparison is of substantive interest in its own right because the three countries under study exhibit quite distinctive approaches to family policy, with both Britain and Germany exhibiting stronger government intervention aimed at reconciling mothers' family and working roles than is common in the United States.

Empirically, our study confirms that wage costs of motherhood differ across countries. However, despite its more generous family policies, Germany displays the highest wage penalty for motherhood. What is more, the sources underlying the wage penalty for motherhood also differ sharply between the German labor market on the one hand, and the British and American labor markets on the other. Whereas among British and American women, work interruptions and mothers' post-birth labor force behavior fully account for the wage penalty for motherhood, a considerable residual wage penalty remains among German women even after extensive controls for women's actual job histories. Unlike in Britain and the United States, but consistent with institutional differences between these countries, German mothers are not found to be penalized for lengthy work interruptions, for employer change at returning to the labor market after a childcare break, or for mobility into more mother-friendly jobs. Because motherhood still results in significant wage losses

for German women, we conclude that either employers respond to Germany's more favorable institutional environment by more strongly discriminating against mothers as a group, or that motherhood disproportionately weakens women's bargaining power in the German labor market. Within the next two sections, we develop the theoretical background of our analysis and then discuss our data sources and statistical methodology before presenting the results of our empirical analysis in greater detail.

CHILDBIRTH, WORK INTERRUPTIONS, AND WOMEN'S CAREERS

In a competitive labor market that rewards the economically productive human capital of individual workers, children and any associated work interruption are likely to threaten the economic position of the caretaker—and, because women still take charge of childcare in most families, the costs of doing so will typically fall on mothers. Whether and how these costs may be alleviated very much depend on the precise source of competitive disadvantages associated with motherhood and subsequent childcare breaks, however. In fact, much of the theoretical literature on the issue may be summarized as seeing one or more of several complementary mechanisms operating: namely, patterns of human capital accumulation and depreciation, effects of compensating wage differentials in conjunction with mothers' labor market choices, and noncompetitive mechanisms that create disadvantages for mothers from reduced bargaining power or employer discrimination.

To begin, wage losses following care-related work interruptions may be derived from standard human capital theory (cf. Becker 1993). Where market wages reflect individual productivity and worker productivity is given by formal skills, experience, and routine, any period of nonmarket activity is likely to generate wage losses due to processes of human capital depreciation as well as lack of further human capital investment (Becker 1985; Mertens, Schippers, and Siegers 1995; Mincer and Ofek 1982). The latter effect is an obvious implication of the work interruption in itself: as continuous employment generates human capital accumulation through constant application of work skills, the theory predicts that mothers' wages will fall relative to those of continuously employed workers (or, rather, fail to rise further) if mothers stay home. Hence, at any biographical time point, mothers who interrupted their careers will have accumulated a smaller stock of human capital than continuously employed women. In consequence, family-related work interruptions should imply a permanent wage loss for mothers even absent any further distortion of market processes.[1]

In addition, further wage losses may follow from mothers' subsequent labor market choices—or more precisely, from the fact that childbirth may reinforce the traditional division of labor between spouses (e.g., Becker 1985) and the associated changes in women's labor market behavior that follow from the constraint that mothers typically take charge of child rearing. Although traditionally, childbirth often implied mothers' complete withdrawal from the labor market for extensive periods of time, women nowadays reenter the labor market fairly quickly (e.g., Goldin 2006; Rosenfeld 1996). More often than not, however, women might nevertheless seek to accommodate to the demands of their dual role of worker and caregiver by curbing their personal career aspirations in favor of family and children.

In consequence, women might reduce work hours (Drobnic, Blossfeld, and Rohwer 1999), shift to occupations and industries offering predictable work schedules or job security (Desai and Waite 1991), or search for employers offering family-friendly work arrangements (Estes and Glass 1996; Glass 2004). Moreover, part of the observed changes

---

1. The human capital prediction of a permanent wage gap is somewhat qualified by the standard assumption of concave wage profiles, in which wage convergence between childless women and mothers will result from ceiling effects in later working life. Also, earnings rebound effects may account for temporarily stronger wage convergence immediately after reentry because women are able to partially restore depreciated capabilities quickly and recapture respective wage returns early on.

in women's labor force behavior may reflect mothers' response to work conditions with their pre-birth employer or to the fact that their former employers have discontinued work contracts anyway. In purely economic terms, however, mothers' search for more mother-friendly employment means that women are substituting nonpecuniary for monetary returns to working, resulting in lower wages for these jobs. Also, job changes may imply loss of firm-, occupation-, or industry-specific human capital and will then similarly result in wage losses (Budig and England 2001; Jacobs 1997; Mertens et al. 1995; Waldfogel 1998a). And unless such career choices are easily reversed, wage losses after childbirth are likely to be permanent as well.

Finally, the wage penalty for motherhood could also result from a range of noncompetitive mechanisms triggered by motherhood. By assuming child rearing responsibilities, women clearly restrict their geographical mobility and hence limit their set of available job opportunities. As a result, mothers are likely to forgo some wage growth in the first place, and any such restriction on job search behavior is also likely to decrease their bargaining power relative to both current and prospective employers (e.g., Manning 2003). Alternatively, wage penalties for motherhood might result from processes of statistical discrimination against mothers as employers resort to this easily observable status to infer unobservable worker productivity when making decisions on recruitment, training provision, promotion, or remuneration (Correll, Benard, and Paik 2007; Petersen and Saporta 2004; Spence 1973). As with many other traits and behaviors, motherhood or taking time off for childcare may have little real productivity effects in itself but may nevertheless generate significant wage effects whenever employers believe more family-oriented behaviors to be correlated with mothers' lower productivity on the job and consequently decide to stigmatize working mothers.

INTERNATIONAL VARIATION IN FAMILY POLICY AND THE COST OF MOTHERHOOD

The operation of the aforementioned mechanisms generating wage losses to mothers may in fact critically depend on the wider institutional and cultural context in which employer and worker behavior is embedded, so that the wage penalty for motherhood may be expected to vary across countries. Regarding women's economic responses to motherhood, explicit family policies designed to relieve some of the costs associated with childbirth are likely to be salient public policy interventions that generate behavioral effects on the part of both mothers and their employers. Key among these are subsidies to childcare or public provision of childcare on the one hand, and maternity or parental leave policies on the other.

Although often considered complementary interventions, their economic implications are likely to differ considerably. In a nutshell, subsidized or publicly provided childcare will raise women's incentives to paid work both by directly raising their earnings net of childcare cost and by lowering the opportunity cost of employment through access to quality childcare (Anderson and Levine 2000; Blau and Robins 1991). Higher public childcare support should hence, all other things being equal, reduce the duration of post-birth work interruptions (e.g., Anderson and Levine 2000; Bainbridge, Meyers, and Waldfogel 2003; Baum 2002a; Blau and Robins 1998; Meyers, Heintze, and Wolf 2002), thus also limiting potential loss of women's human capital. Furthermore, because of the tax-based funding of childcare support, policy costs will not be—directly or indirectly— passed on to either working mothers or working women in general, but rather be borne by taxpayers, workers, and consumers; at best, these costs shift overall labor demand toward the care services sector.

These effects contrast with the implications of maternity or parental leave mandates that establish job retention rights over a specified period around childbirth. Evidently, protecting mothers from labor market risk associated with leave-taking will encourage

parents to take time off for childcare (Han and Waldfogel 2003). Moreover, job reinstatement rights will limit the wage effects of extended work interruptions by aiming to retain workers' firm-specific human capital—and the wage return to it—across the childcare break (e.g., Waldfogel 1998a). However, because maternity and parental leave mandates impose potentially significant nonwage costs to employers, they potentially also generate important equilibrium effects disadvantaging working women because employers would either directly pass on these costs by lowering wages for women in a competitive labor market (cf. Ruhm 1998) or, under imperfect competition, would be able to pass on these costs through statistical discrimination against women or working mothers in hiring and promotion decisions (e.g., Blau and Kahn 1996). The latter effect might be particularly important with lengthy statutory leave periods that strongly affect the expected duration of work interruptions following childbirth.

Because the extent and emphasis of family policy interventions vary considerably between Britain, Germany, and the United States (cf. Gornick and Meyers 2003; Gornick, Meyers, and Ross 1997; Kamerman 2000; OECD 1996, 2001, 2007; Sainsbury 1994, 1996; Waldfogel 2001 for overviews), the aforementioned processes might be important in generating cross-country differences in the wage penalty for motherhood as well as its sources. Historically, the United States has often been considered a laggard of welfare state development, and this also applies with respect to family policy (cf. Kamerman 2000). Compared with European countries, support for reconciling working and caregiving roles is typically institutionally more fragmented, locally variable, and targeted toward disadvantaged groups—and more often, employer-based rather than statutory. In line with this, private providers play a very significant role in childcare provision, childcare costs are significant, and public policies to subsidize childcare are strongly directed toward fostering the employment of single mothers (Bainbridge et al. 2003). Also, the United States lagged behind other industrial economies in introducing a statutory, although unpaid, 12-week parental leave mandate only as recently as 1993 with the passing of the Family and Medical Leave Act (FMLA), which still failed to extend coverage beyond about 50%–55% of the female labor force because of both the requirement of a minimum of 12 months and 1,250 hours pre-leave service and the exemption of small to mid-sized businesses.

This relatively meager level of public support contrasts with the institutional environments of both Britain and (West) Germany, even though neither country features nearly as generous public support as would be common in Scandinavia. Britain, for example, had established job retention rights with the Employment Protection (Consolidation) Act of 1976 that established a right of job reinstatement for as many as 29 weeks after birth. In addition, the period of job-protected leave was accompanied by statutory maternity pay at as much as 90% of previous earnings for six weeks and a flat-rate benefit for an additional 12 weeks. However, like in the United States, coverage for statutory job reinstatement rights was heavily restricted by the requirement of two years of continuous service with the current employer (and five years even for women in marginal employment) so that only between 50% and 60% of women qualified during the late 1970s and 1980s (McRae 1991). Maternity rights were extended with the introduction of 13 weeks of unpaid parental leave in 1993 and universal (ordinary) maternity leave of 14 weeks in 1994. Further reform, effective in 2000, 2003, and 2007, extended ordinary maternity leave first to 18 and then 26 weeks; weakened pre-leave service restrictions for extended job reinstatement rights in 2000 and then completely abolished these in 2007; and extended job reinstatement rights to a 52-week period in 2003 (cf. Mair 2000). Parallel to these reforms, Britain's Labour government also extended the statutory maternity pay benefit duration to 26 weeks in 2003 and also upgraded childcare subsidies through reforms of the Working (Family) Tax Credit and Child Tax Credit systems in 1999 and 2003.

Even so, for most of the 1980s and 1990s—that is, the critical family formation stage of women born around the 1960s that form the backbone of our subsequent empirical

study—public support for working mothers in Britain fell short of that available to (West) German women. In terms of childcare facilities, Germany traditionally relied on broad coverage through its semi-public and heavily subsidized kindergarten system and, during the 1990s, established statutory coverage rights for children aged 3 and older. On the other hand, pre-kindergarten childcare has remained weak, and private-market alternatives are underdeveloped relative to both Britain and the United States. Partly as a deliberate policy response by its then conservative government, but also building upon a strongly paternalistic tradition that had established maternity leave rights as early as 1878, Germany sharply extended its maternity leave provisions in a succession of reforms from the universal maternity leave entitlement of six months that had been in effect since 1979 to a three-year, parental-leave entitlement that took effect in 1992 (cf. Dienel 2002). In addition, Germany provides maternity-leave benefits that fully replace earnings during the first 14 weeks of maternity leave and a subsequent flat-rate parental-leave benefit that was set at the equivalent of half the average female earnings at its introduction in 1979 but never adjusted for inflation afterward.

Eventually, these institutional differences between the three countries clearly create variation in women's incentives to maintain labor market attachment following childbirth, which then may also result in cross-country differences in the wage penalty for motherhood. More specifically, the relative lack of public support for reconciling family and work in the United States implies that mothers, much like anybody else, are exposed to the unfettered operation of the economic forces of labor markets, notably including the cost of lengthy work interruptions, of loss of firm-specific human capital through involuntary job change, or any compensating wage differential attached to more family-friendly occupations and industries. Compared with those in the United States, mothers both in Britain and especially in Germany are institutionally partly sheltered from market forces and may hence find longer work interruptions economically feasible because the penalty attached to these should be more limited and the risk of involuntary employer change much reduced. On the other hand, if generous policy provisions, especially like those in Germany, generate or reinforce strong norms about mothers' noninvolvement in the labor force, this may result in more pronounced statistical discrimination against mothers or may in other ways weaken their overall bargaining power in the market.

AVAILABLE EMPIRICAL EVIDENCE

In recent years, considerable efforts have been made to address the wage effect of motherhood as well as its sources, typically using longitudinal data and panel regression modeling to account for unobserved heterogeneity bias in the analysis. Starting the surge of interest in the issue, Waldfogel (1997) estimated mothers' wage losses at some 6% per child using data from the Panel Study of Income Dynamics; more recently, Budig and England (2001) obtained very similar evidence based on NLSY data. Waldfogel, as well as Budig and England, concluded that wage effects of motherhood are partly explained by mothers' work interruptions and subsequent entry into part-time jobs. Baum (2002b) obtained evidence of high wage costs of childcare breaks at around 3% for one year of work interruption—a wage penalty that was significantly above penalties associated with other types of work interruption considered in that study. Furthermore, according to Waldfogel (1997) and Lundberg and Rose (2000), wage losses of mothers tend to persist over time, although results in Anderson, Binder, and Krause (2003) showed that mothers' wage losses at least partly decline as the youngest child in the household matures.

Compared with the wealth of American evidence that uses longitudinal data and fixed-effects estimators to identify the impact of childbirth, corresponding analyses for other countries still tend to be rare. For Britain, a study by Waldfogel (1995) provided estimates of a 9% wage penalty for the first child and a 16% wage penalty for the second child. Like in the United States, accounting for entry into part-time employment explained some of the

wage penalty for motherhood but fell short of eliminating the penalty altogether. In a Swedish study, Albrecht et al. (1999) established wage costs of some 2% per year of child-related work interruption for women and 7%–8% for men. For Denmark, Datta Gupta and Smith (2002) even failed to find evidence of a residual wage penalty for motherhood after adjusting for actual labor force experience, yet more recent estimates by Nielsen, Simonsen, and Verner (2004) suggested that private-sector employees suffer a 6% wage penalty per child. For German women, Ondrich, Spiess, and Yang (2003) established that one month of parental leave reduces post-break wage growth by 1.5%. This result was replicated in a study by Ziefle (2004), who showed persistent wage losses of German mothers on the order of 5% per year of work interruption.

At the same time, even though all the preceding studies were based on longitudinal data, differences in target populations, measurement, and model specification render a comparative reading of the evidence less straightforward than warranted. So far, there are but three studies that have provided explicitly comparative analyses of the wage penalty to motherhood in various advanced economies (Harkness and Waldfogel 2003; Sigle-Rushton and Waldfogel 2007; Stier, Lewin-Epstein, and Braun 2001). In their seven-country comparison, Harkness and Waldfogel (2003) established small wage costs to the first child in general, wage penalties of some 4%–5% to the birth of a second child in the United States and Sweden, but fairly significant wage losses of 10% and more after a second birth in Germany, the United Kingdom, and Canada. This basic pattern is confirmed by Sigle-Rushton and Waldfogel (2007) and also in the Stier et al. (2001) analysis of the wage effects of discontinuity in women's job histories. However, because all three studies are based on cross-sectional data, cohort effects as well as other omitted variables might lead to bias in their empirical estimates. In addition, because detailed job history data are lacking in their data sources, none of these studies could address the relative role of different economic mechanisms that generate the wage penalty for motherhood.

Some of these more policy-relevant mechanisms have been addressed in longitudinal studies, though, where a particular focus has been on the role of employer change and mothers' job mobility following childbirth. For example, Baum (2002b) provided evidence that wage losses attributable to motherhood are minimized for mothers who are able to return to their pre-birth employer after child-related work interruptions. This result was replicated in a British-American comparison by Waldfogel (1998a); a Canadian study by Phipps, Burton, and Lethbridge (2001); and a German study by Ziefle (2004), who similarly found positive wage returns to staying with pre-birth employers. In consequence, these studies concluded that parental leave regulations may be effective in limiting the wage costs to motherhood by retaining the wage returns to women's firm-specific human capital. More critically, however, Glass (2004) established generally poorer wage growth for mothers employed with family-friendly employers who operate flexible work schedules or permit temporary reductions of working hours. Based on aggregate data, Ruhm (1998) also presented evidence for negative wage effects of the introduction of parental leave policies in Europe, especially for more extensive mandates.

DATA AND STATISTICAL MODELING

We base our own estimates of wage penalties for motherhood on cross-nationally harmonized longitudinal data on women's labor market and family behavior in Britain, West Germany, and the United States. More specifically, we use data from the NLSY 1979, the GSOEP, and the BHPS to compare women's wage trajectories around childbirth in the three countries.

In our analysis, we adopt a cohort design and hence trace the labor market careers of five cohorts of women largely born during the 1960s in Britain, West Germany, and the United States in the following. First, focusing on cohorts of women permits us to trace the family and labor market experiences of women who shared identifiable macroeconomic

and institutional environments during their critical family formation stage. Also, because we have longitudinal wage observations at our disposal, we do not have to rely on the assumption of market equilibrium across cohorts of women in estimating the wage penalty for motherhood from pooled data where cohort effects might bias the results. In addition, each of our panel surveys features annually repeated survey interviews and hence provides high-frequency and prospectively collected information on women's family and job histories.[2]

To permit a meaningful analysis, we construct birth cohort data in a way to ensure that our observation window would cover women's life courses between at least their early twenties and up to about their mid- to late thirties. With that requirement at hand, we can empirically track women's wage trajectories for 5 five-year birth cohorts: namely, American women born from 1955–1959[3] and 1960–1964, West German women from birth cohorts 1960–1964 and 1965–1969, and a cohort of British women born between 1965 and 1969. Because we use data up to the 2001 wave of each survey, we standardize our observation window to 18 years for the NLSY and GSOEP: that is, we use NLSY 1979–1996 and GSOEP 1984–2001 information. Because the BHPS was started in 1991, we have a shorter observation window of but 11 years available in the British case. Besides that temporal fact itself, the most unfortunate implication is perhaps that, unlike in the U.S. and German cases, the BHPS does not permit the construction of data for another five-year birth cohort that could serve as a ready reliability check for the consistency of our empirical estimates within countries over time.[4]

Work History Data

For our specific analysis of women's wage trajectories around childbirth, it is evidently paramount to construct data that are substantively and behaviorally comparable across countries. To that end, we standardize the data on current jobs at the time of the survey interview to obtain annual panel data on women's wages and job characteristics in the three countries.[5] Most basically, we adopt standard ILO conventions (cf. International Labour Organization 1990) in determining employment status and hence consider wages from any paid work conducted for at least one hour per week at the time of the survey interview, irrespective of legal or tax status of the job in question. In case of multiple job holding, we retain wages only from respondents' main job, which is equated with the job at which respondents worked the longest hours. For respondents' main job so defined, we compute gross hourly wages (including per-time shares of bonuses or other extra remuneration) and deflate the wage data by national Consumer Price Indices to year 2000 prices in national currency units.

Our key independent variable that identifies the wage penalty of motherhood is simply the number of children born to respondents up to the current survey interview. For the sake of model parsimony, we enter this measure linearly into our regression specification. In preliminary analyses, we also estimated nonparametric specifications for this measure. Because we do not find significant evidence for economies of scale in any of our cohorts and countries (cf. also Waldfogel 1998a for similar results in a comparable American-British

---

2. The NLSY switched to a biannual interview schedule after 1994. Because we use only the NLSY up to the 1996 survey in this article, the only gap in the data is the missing 1995 survey—which we doubt will critically affect our comparative inferences and results.

3. Our analysis incorporates the few cases born earlier than January 1, 1957, in the NLSY data. In practice, the vast majority of cases in the NLSY pre-1960 cohort were born between 1957 and 1959.

4. In preliminary analyses, we also ran analyses using single-year cohorts. Because respective results add few insights to those to be presented later in the article, we pragmatically decided to form five-year cohorts mainly to retain sufficiently large sample sizes and to hence improve on the precision of the estimates reported here. Detailed estimation results are available from the authors upon request.

5. The BHPS and GSOEP, unfortunately, do not provide sufficient information on jobs held between interviews to permit the construction of job history data at an even greater level of detail.

study), however, our substantive inferences are unaffected by functional form considerations, and we hence report the more parsimonious specifications here. Also, because data quality on the presence and date of birth of any adopted children or stepchildren in the household varied across surveys, we omit from the analysis consideration of the impact of nonbiological children on women's careers.

To assess the role of mothers' labor force behavior as a source of the motherhood wage penalty, we further introduce a set of controls that aim to capture essential aspects of mothers' careers around childbirth. Prime among these is women's actual labor force experience and the duration of child-related work interruptions. We construct actual labor force experience from the monthly (BHPS, GSOEP) and weekly (NLSY) employment history calendars provided in the surveys.[6] In addition, we construct the duration of care-related work interruptions as the total number of months spent out of the labor force while the youngest (biological) child at home was younger than age 6. To ensure the validity of this measure, any spell of reported unemployment, education, and training activities or military service is excluded from consideration. Clearly, this rigid definition may fall short of capturing the true duration of women's work interruptions because mothers may choose to stay at home for the sake of older children or because some period of inactivity recorded as a childcare break (according to our definition) might have been subjectively classified as inactivity because of illness, elder care, or some reason other than childcare. Nevertheless, this measure has the advantage of providing a *behaviorally consistent* definition of (largely) child-related work interruptions across countries. In much the same vein, we also record whether mothers have changed employers at reentry to the labor force after a childcare break, irrespective of whether women actually had access to maternity leave from their pre-birth employer.

Furthermore, our regression specifications will also incorporate a range of human capital measures and job characteristics: years of education; the number of employer changes (other than at reentry after a childcare break); tenure with current employer to full-time versus part-time status (the latter being defined as working fewer than 30 hours per week); public sector employment; self-employment; and, based on the 1988 International Standard Classification of Occupations (ISCO-88), occupational prestige as measured by the Standard International Occupational Prestige Scale (SIOPS; cf. Ganzeboom and Treiman 1996). Also, we control for any potential cultural or structural devaluation of female occupations (see, e.g., Kilbourne et al. 1994) by including the percentage of women in the current occupation at the two-digit level of ISCO-88. In preliminary analyses, we established that these job-status measures exhaust the relevant information in the data. In particular, our substantive inferences are not affected by including detailed industry and detailed occupation instead of the aforementioned measures into our regression specifications. In preliminary work, we also estimated enhanced specifications that additionally include firm size (for employees) and, for the GSOEP and the BHPS, the size of women's own businesses (for self-employed workers). However, because the NLSY data provide only business-size information since the 2000 wave and also have an incomplete coverage of firm-size information, we do not present the detailed results from these specifications here, but rather provide estimation results for cross-nationally comparable specifications only and comment on supplementary results where appropriate.

Under these restrictions, we retain data on more than 2,200 American women born between 1955 and 1959, more than 3,500 American women born between 1960 and 1964, about 1,000 British women born between 1965 and 1969, and some 1,100 German women from each of the two birth cohorts with valid covariate data for this analysis. We observe these women for an average of 10 years in the NLSY and 4 to 5 years in the BHPS and

---

6. In the BHPS and GSOEP, we supplement the monthly status information collected at each interview with retrospective annual calendar data on respondents' labor force attachment prior to the first survey interview.

GSOEP: that is, we have wage rate observations for some 22,000 (first cohort) and 37,000 (second cohort) American women, and about 4,000 to 5,000 wage observations for women from the three European cohorts. Appendix Table A1 provides full descriptive statistics for the estimation samples.

Estimating the Wage Effects of Motherhood

To estimate the wage penalty for motherhood, we rely on fixed-effects panel data regression models now standard in the empirical analysis on the subject (e.g., Budig and England 2001; Waldfogel 1997). More specifically, we estimate a series of regression models of the form

$$\ln(\text{wage}_{it}) = \alpha + \delta\ \text{children}_{it} + \gamma\mathbf{Z}_{it} + \beta_1\text{age}_{it} + \beta_2\text{age}^2_{it} + \beta\mathbf{W}_{it} + v_i + \varepsilon_{it} \tag{1}$$

that relate the log hourly real wage observed for respondent i at time point t to the set of covariates described above. Our key interest naturally centers on the parameter estimates for δ that provides the wage penalty for motherhood, and on the changes observed in δ after measures of mothers' labor force behavior and observable job characteristics are entered into the specification via the covariate vector, $\mathbf{Z}_{it}$. Over and above these effects of primary interest, our regression specification accounts for pure aging effects by including age and its square, and also controls for period-specific factors by estimating fixed survey wave effects via the vector of dummy variables, $\mathbf{W}_{it}$.

In addition, we use the fact that we have multiple observations per individual respondent to decompose the error term into a person-specific error term, v_i, and an observation-specific error term, e_{it}. Estimating Eq. (1) by fixed effects, in fact, has a number of desirable statistical implications in the analysis of the impact of the event of motherhood on women's career prospects (cf. Allison 1994; Greene 2005; Wooldridge 2002). Incorporating the person-level error, v_i, ensures that the impact of any unobserved, but time-constant, factor affecting women's wages is accounted for by the model, thus eliminating the need to control for time-invariant demographic characteristics, such as race, class background, or women's temporally stable attitudes and preferences. In removing all time-constant differences between women, the fixed-effects (FE) estimator effectively identifies the effect of interest from variation over time (the within-component) exclusively: that is, from the *changes* in women's wages after a *change* in the number of children.[7]

It is important to recognize that in removing the effect of any time-invariant control, the FE estimator indirectly also accounts for potential sample selection into employment due to any observed or unobserved, yet temporally stable, factors. However, when studying the relationship between childbirth and women's career prospects, it is quite plausible that it is *dynamic* sample selection around childbirth that is more problematic because temporary factors related to, for example, childcare arrangements or the household's economic situation may determine how quickly women return to the labor force. Moreover, dynamic sample selection might affect our comparative inferences whenever the relationship between childbirth and women's employment patterns differs across countries—that is, when, as will be evident from descriptive data, mothers' quick return to work after childbirth is less common in some countries than in others, so that our cross-country inferences were

---

7. Furthermore, the FE estimator also permits a correlation between the person-level error, v_i (i.e., unobserved time-constant characteristics of respondents and their environments), and observed covariates, $\mathbf{Z}_{it}$, thus accounting for potential selection of women into motherhood by any unobserved, but economically relevant, characteristics. Empirically, we do find evidence of a small negative selection into motherhood in the order of $r(v_i, \text{children}_{it})$ = –0.05 in all five cohorts of women in our study. Moreover, although our observed time-varying measures of women's human capital and job characteristics are able to fully account for this correlation in Germany and the United States, negative selection into motherhood appears even more pronounced after full covariate controls ($r(v_i, \text{children}_{it})$ = –0.09) among British women.

biased if working mothers represent a more or less positively select group in different countries (cf. Heckman 1974). To account for this possible source of bias, we present estimation results for selectivity-corrected versions of the FE regression specification of Eq. (1), applying the panel data estimator proposed by Wooldridge (1995). To identify the sample-selection models, we use information on the age of the youngest child in the household, women's marital status (never married, married, separated/divorced/widowed), and their interaction as the exclusion restrictions.[8]

Using this setup, we present empirical estimates from a series of selectivity-corrected, FE log wage regressions for each of the five cohorts of women. As a first important quantity, we estimate the gross wage penalty of motherhood in each cohort: that is, the wage opportunity cost per additional child. From this starting point, we will report results from a series of model specifications that sequentially include additional observed covariates, $\mathbf{Z}_{it}$, in order to decompose the gross wage penalty into its underlying sources. In that way, we assess the part of motherhood wage penalties attributable to mothers' lack of labor force experience, wage penalties for childcare breaks, wage penalties for employer change at reentry into the labor market, and wage penalties arising from mothers' constrained labor market choices and mobility into mother-friendly employment. We also assess the size of the residual wage penalty that is attributable to either mothers' lower bargaining power or employer discrimination and associated stigma effects of motherhood. To assess the robustness of our results across mothers facing different economic constraints during the key childrearing phase, we finally also provide separate estimates of motherhood penalties by marital status.

WAGE PENALTIES TO MOTHERHOOD IN BRITAIN, GERMANY, AND THE UNITED STATES

### Motherhood and Women's Careers in Britain, Germany, and the United States

We begin our analysis by first providing some background data on family formation and women's employment patterns in the three countries under study. With respect to family formation, Figure 1 displays cross-country similarities and differences in the timing of first births from the proportion of women having given birth by age. For all five cohorts of women considered here, the median age at first birth clearly is in women's mid- to late twenties, yet German women are more likely to avoid early family formation than both British and American women. By their early twenties, the proportion of American and British women who have already given birth is some 10 percentage points higher than the corresponding figures among West German women, although this difference narrows quickly afterward. By age 35, the proportion of women without children is, in fact, lowest among the older cohort of German women at around 20%, while around 25% of American women from both cohorts—and almost 30% of women from the two younger European cohorts—remain childless to that point.[9]

However, despite the fact that cross-country differences in family formation appear relatively minor, there are significant cross-country differences in the extent to which women are able to maintain their attachment to the labor market over the key family-formation stage.

---

8. In other words, we make the substantive assumption that marital status and children's age affect women's decision to work, but not employers' decisions about wages, and therefore we do not include measures of marital status or children's age in the main regression equation directly.

9. Total fertility levels are also relatively similar across the three countries: by the age of 35, the average number of children per woman is about 1.7 in all cohorts except for women from the more recent German cohort, for whom total fertility by age 35 drops to about 1.5 children per woman. Combined with the evidence of Figure 1, this implies that, again, by age 35, the average number of children per mother is between 1.75 and 1.9 in the two German cohorts but about 2.3 in Britain and in the United States.

**Figure 1.   Entry Into Motherhood by Country, Birth Cohort, and Age**
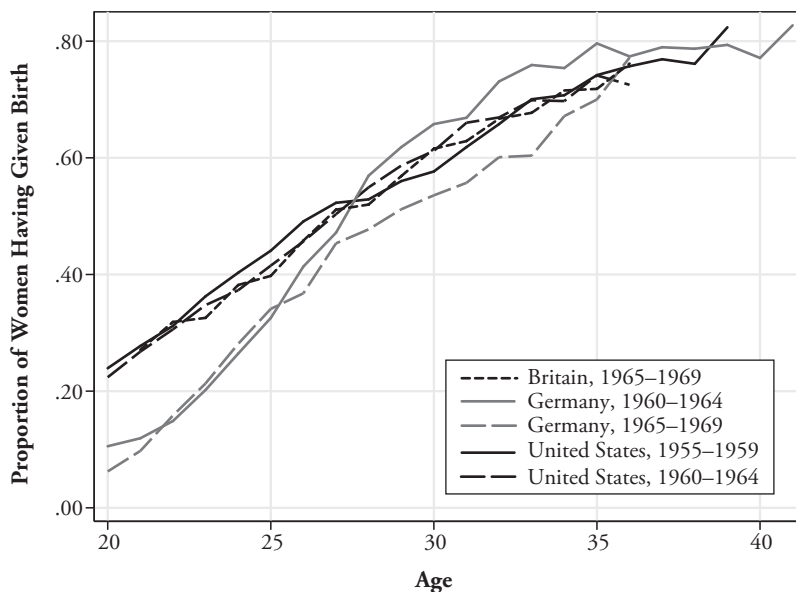
Sources: GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

As Figure 2 shows, it is only among the two German cohorts that women's employment rates tend to fall sharply when they are in about their mid-twenties. With employment rates of 60% and higher during their early twenties, women in all five cohorts and three countries have evidently made important inroads into the labor market. However, although American and British women are able to maintain overall employment rates of their mid-twenties into the early and mid-thirties (when they again rise, at least among U.S. women), employment falls by a full 10 percentage points among German women by their early thirties and rebounds to its earlier level only by their late thirties.

The key factor behind this result clearly is women's labor force attachment around childbirth. Even focusing on the subgroup of women working up to childbirth—that is, the group of mothers highly attached to the labor market—the data compiled in Figure 3 document sharp country differences in mother's employment behavior during the first five years after having given birth at time point $T + 0$. Pooling data on births across all levels of parity for sample size considerations, we see a strong commitment to continuous labor market attachment among American mothers from both cohorts. In fact, after any childbirth, employment rates immediately jump back to some 65% and remain so during the next years. That is, the majority of mothers in the United States return to work immediately after childbirth and maintain a high level of labor market attachment subsequently, whereas only a minority of mothers drop out of the labor force for extended periods of time—despite the fact that many American mothers will have a second or even third birth. The picture is quite similar in Britain, with the only difference being that British mothers are much more likely to take off the first year after childbirth. For German women, however, Figure 3 shows a pronounced tendency to take long childcare breaks, of course entirely consistent with the country's generous system of statutory parental leave. In fact, even among women working

Figure 2.   Women's Employment Rates by Country, Birth Cohort, and Age
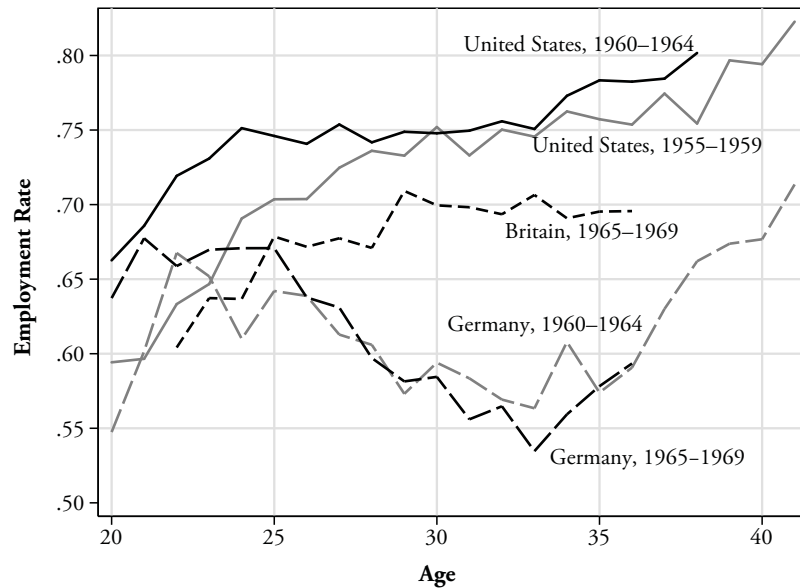
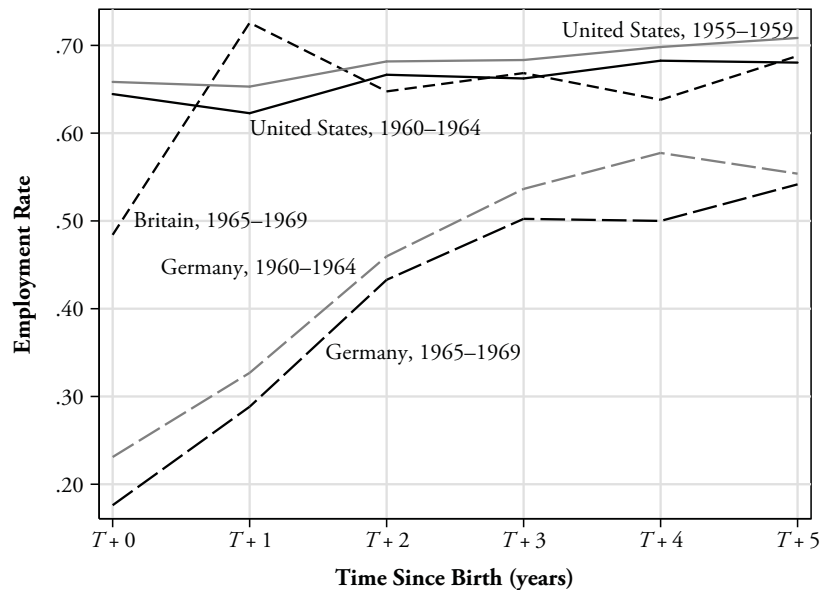*Sources:* GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

pre-birth, only about 20% maintain a continuous attachment to the labor force. Moreover, although employment rates steadily rise as mothers return to work, mothers' employment rates in Germany are a full 15 percentage points below those for British and American mothers even five years after childbirth.[10]

Changes in Women's Labor Force Behavior Around Childbirth

Childbirth often implies broader changes in women's labor market behavior than merely interrupting work for a shorter or longer period. Rather, in seeking to realize adequate work-family arrangements, women may opt for continuing careers in more mother-friendly environments, such as in occupations, firms, and industries that offer the necessary flexibility or more appropriate work conditions, even if at the price of lower wages. To obtain some comparative insights into the strength of women's economic response to childbirth, we turn to Table 1, which presents estimates of partial correlation coefficients $r_{\Delta x \Delta z \cdot \Delta age, \Delta time, vi}$ between motherhood and the *change* in women's observed labor market status. That is, and consistent with the FE estimates to be presented later in the article, we report partial

---

10. In fact, neither pooling data on all births nor focusing on working women affects our inferences about cross-country differences in this case. Because there is a negative relationship between parity and labor force attachment in all cohorts, pooling the data affects the estimated level of the employment rate (compared with Figure 3, rates would be about five percentage points higher in all cohorts and countries if only first births were considered), but does not drive any of the cross-country differences we observe. Similarly, there is a positive relationship between women's pre- and post-birth employment status, so that employment rates provided in Figure 3 are well above those for the population of all mothers. Yet again, because this level effect occurs in all countries and cohorts, this does not significantly affect our inferences about cross-country differences in women's employment behavior around childbirth.

Figure 3.   Employment Rate After Childbirth by Country and Birth Cohort: Births to Women Working Prior to Birth Only

Note: Births of all parities to mothers who were working pre-birth (i.e., at $T-1$) only. $T+0$ is the year of birth.

Sources: GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

correlations between number of children and various aspects of labor market activity using de-meaned data in order to control for individual fixed effects, v_i, and to focus on the dynamic components of variation in human capital and job characteristics exclusively. Moreover, the correlations between motherhood and job status have been purged from their temporal association with respondents' age as well as survey-year fixed effects.

Unsurprisingly, the most readily apparent economic response of women to motherhood is to take some time out for childcare. For all three countries and in each of the five cohorts, we find a strongly negative correlation between women's actual labor force experience and the number of children. Similarly, the duration of childcare work interruptions sharply increases with the number of children for all five cohorts of women. In addition to taking time out for childcare, motherhood also implies significant changes in women's job status and labor force behavior after they return to the labor force, however. First, returning to the labor force is often associated with a change of employer, as evident from the strong linear association between number of children and number of employer changes at reentry.[11] On the

---

11. Because, by definition, that variable is conditional on motherhood, the linear correlation reported in Table 1 downplays cross-country differences in the prevalence of employer change at reentry, however. As evident from the descriptive data in Appendix Table A1, rates of employer change at return to the labor market are clearly far lower among German mothers than in both Britain and the United States, as would be expected from Germany's more extensive statutory parental leave arrangements. The striking cross-country difference evident in Table A1 is easily reconciled with the evidence of Table 1 by the recognition that German mothers make fewer reentries to the labor market overall because their long parental leave entitlements often permit continuous, yet still protected, absence from work across multiple births.

Table 1.   Behavioral Changes After Motherhood: Partial Correlation Coefficients

Variable	Germany, 1960–1964	Germany, 1965–1969	Britain, 1965–1969	United States, 1955–1959	United States, 1960–1964
Actual Labor Force Experience	–.496**	–.382**	–.352**	–.152**	–.224**
Duration of Work Interruption	.707**	.727**	.503**	.439**	.493**
Number of Job Changes	–.023	–.059**	.058**	–.061**	–.028**
At reentry	.491**	.507**	.577**	.483**	.551**
Other job changes	–.165**	–.206**	–.116**	–.166**	–.175**
Tenure	–.132**	.067**	–.076**	–.012	–.027**
Level of Education	–.054**	–.063**	–.078**	–.087**	–.162**
Part-time Job	.397**	.417**	.376**	.138**	.114**
SIOPS Occupational Prestige	–.119**	–.099**	–.116**	–.069**	–.070**
Female Occupation	.026	.023	.063**	.017*	.015**
Public Sector	–.073**	–.033*	.050**	–.010	–.011*
Self-employment	.095**	.045**	.073**	.049**	.054**

Notes: Figures are partial correlation coefficients between the change in the number of children and the change in the row variable (within-transformed data), controlling for age and its square, and person and year fixed effects.

Sources: GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

*p < .05; **p < .01

other hand, these job change risks specifically faced by returning mothers do not translate into higher job mobility among mothers overall. In fact, the overall correlation between number of children and number of employer changes is negative because other than at the point of reentry to the labor market after a childcare break, mothers tend to be significantly less likely to switch employers than childless women. In consequence, the observation that mothers tend to have accumulated less tenure with their current employer largely stems from their lower level of actual experience relative to women without children, whereas the partial correlation between tenure and number of children becomes zero or even positive after differences in actual experience are accounted for.[12]

Besides these immediate effects of work interruptions due to childcare responsibilities, a range of changes in women's economic behavior after motherhood are apparent in all five cohorts and in each of the three countries. In all three countries, mothers apparently tend to invest less in formal education and training than comparable childless women and hence tend to fall behind in terms of levels of education. Also, mothers' tendency to seek out more mother-friendly job environments that permit a more flexible integration of work and caregiver roles is readily apparent from Table 1. For all the cohorts and countries in this study, motherhood increases the likelihood of working part-time, and implies mobility into lower-prestige and typically female occupations as well as entry into self-employment. It is interesting that there is no consistent relationship between the number of children and employment in the public sector in our data.

Although it is important to note these broad similarities in women's labor market responses to motherhood, it is of equal interest to point out systematic differences in mothers' behavior across countries. In fact, Table 1 provides consistent evidence of a striking difference between American women on the one hand, and British and German women on

---

12. Partial correlation coefficients between tenure and number of children after differences in actual experience are accounted for are –0.003 for Germany, 1960–1964; 0.044 for Germany, 1965–1969 (significant at the .01 level); –0.025 for Britain, 1965–1969; 0.053 for the United States, 1955–1959 (significant at .01); and 0.069 for United States, 1960–1964 (significant at .01).

the other. On many of the observed human capital and job status measures, mothers from the two European countries apparently make much more strongly family-oriented labor market choices in response to motherhood than do American women, despite the fact that the two American cohorts are 5–10 years older and hence, for example, might have had less exposure to the changes brought by the women's liberation movement. This observation applies in particular to the loss of actual labor force experience, but also to mobility into part-time jobs and low-prestige occupations. In each of these cases, the partial correlation coefficients among both British and German women are at least about twice as high as in the American data.[13]

In addition, Germany seems unique in terms of a disproportionately strong linear relationship between number of children and duration of work interruptions. This strong relationship suggests that scale effects in childcare time are smaller in Germany than in both Britain and the United States, where, at the margin, mothers seem to devote less time off to their second and subsequent children; on the other hand, German mothers also experience fewer employer changes at reentry than both British and American mothers (cf. Appendix Table A1). Also, we observe particularly strong evidence of systematic mobility into female occupations among British women, which has no parallel among either American or German mothers. Taken together, however, it is evident that German and British mothers are much more likely than American mothers to curb their own careers by, for example, downgrading occupational aspirations and sharply reducing hours of work in response to motherhood.

The Wage Penalty for Motherhood in Britain, Germany, and the United States

To assess whether and how these changes in women's labor force attachment translate into differential wage trajectories following childbirth, Table 2 provides our parameter estimates for the wage penalty for motherhood in the five birth cohorts and three countries included in our study. More specifically, Table 2 shows parameter estimates from a series of FE regression specifications that seek first to establish the per child wage penalty faced by mothers in the three countries, and then to decompose the raw wage penalty into its constituent sources by successively including a broader set of observed covariates, $\mathbf{Z}_{it}$, into the regression specification. In this vein, we present five estimates of the wage penalty for motherhood for each of the five birth cohorts of German, British, and American women: specification A provides our estimate of the raw wage penalty for motherhood from a specification that excludes any control for women's actual labor market behavior (that is, the covariate vector, $\mathbf{Z}_{it}$, is empty). From this baseline, we elaborate on our regression specification by including actual labor force experience (specification B). We then add the total duration of childcare-related work interruptions (specification C); employer change at reentry to the labor market after a childcare break (specification D); and, finally, our full set of human capital and job status variables (specification E). Because our observed covariates should tap key aspects of the human capital and the compensating differentials explanation of the wage penalty for motherhood, observing a residual wage penalty in the final specification would indicate that noncompetitive mechanisms, such as mothers' reduced bargaining power or statistical discrimination by employers, are potentially important elements of an explanation for why children lower women's wages.

---

13. Because of the shorter observation window available from the BHPS, the negative correlation reported for actual labor force experience in Table 1 probably overstates the respective behavioral change among British mothers. In consequence, a country comparison using similar observation windows should probably have Britain more clearly located in an intermediate position between the American and German cases.

Table 2. **Wage Penalties for Motherhood by Country and Birth Cohort: Selectivity-Corrected Fixed-Effects Estimates**

Model	Germany, 1960–1964	Germany, 1965–1969	Britain, 1965–1969	United States, 1955–1959	United States, 1960–1964
Specification A: Gross Wage Penalty	–0.179** (0.019)	–0.159** (0.022)	–0.126** (0.024)	–0.093** (0.008)	–0.161** (0.008)
Specification B: Wage Penalty Net of Actual Labor Force Experience	–0.129** (0.017)	–0.150** (0.019)	–0.086** (0.022)	–0.041** (0.007)	–0.072** (0.005)
Specification C: Wage Penalty Net of Actual Experience and Work Interruptions	–0.117** (0.020)	–0.116** (0.024)	–0.022 (0.025)	–0.031** (0.008)	–0.050** (0.006)
Specification D: Wage Penalty Net of Actual Experience, Work Interruption, and Employer Change at Reentry	–0.113** (0.020)	–0.114** (0.024)	0.010 (0.022)	–0.023** (0.009)	–0.042** (0.006)
Specification E: Wage Penalty Net of Labor Market Behavior	–0.105** (0.020)	–0.122** (0.023)	0.007 (0.022)	–0.008 (0.008)	–0.029** (0.006)
Number of Observations	4,865	4,609	4,276	21,991	37,101
Number of Persons	1,087	1,101	961	2,228	3,543

Notes: Coefficients are for the per child penalty in log wage regressions for the female labor force only. Parameter estimates for controls are omitted for presentation; full results are available from the authors upon request. Tables 3 and 4 provide full estimation results for models D and E. Selectivity-correction terms are identified from age of the youngest child in the household, marital status (never married, married, separated/divorced/widowed), and their interaction. Asymptotic standard errors are in parentheses.

Sources: GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

**$p < .01$

As shown in Table 2, motherhood is consistently associated with a significant wage penalty in each of the five cohorts and three countries, but the magnitude of the wage penalty differs across countries and cohorts. Consistent with earlier comparative research based on cross-sectional data, we find the wage penalty for motherhood to be highest among German women, where we establish a wage penalty on the order of 16%–18% per child in both birth cohorts. In comparison, the raw wage penalty for motherhood was 13% among British women born between 1965 and 1969, but only around 9% for American women born in the late 1950s. In the younger cohort of American women, the wage penalty for motherhood has increased to 16% per child, however. Because of the incorporation of a sample selection correction, our FE estimates of the wage penalty for motherhood tend to be on the high end of those reported in earlier longitudinal studies for Britain (e.g., Waldfogel 1995) and the United States (e.g., Budig and England 2001; Waldfogel 1997). However, because neither the relative ranking of countries and cohorts nor the decomposition of the wage penalty into its constituent sources is affected by the dynamic sample selection correction, differential selectivity of mothers into employment cannot account for the cross-national differences we observe.[14] Also, our results are unaffected by the linear

---

14. Full estimation results for standard FE specifications without dynamic selectivity correction are available from the authors upon request.

specification for number of children adopted here, since we do not find evidence of relevant economies of scale in supplementary analyses.

The finding that mothers face significant wage penalties in all the cohorts and countries in our study is a far cry from any presumption that the same economic mechanisms would be driving these penalties, however. To be sure, the fact that mothers tend to accumulate less work experience is of some importance in explaining the wage penalty for motherhood in each cohort, although it is equally clear that differential human capital accumulation is, at best, one among several relevant economic processes. For each of the five cohorts in our study, our estimate of the wage penalty for motherhood in specification B, which incorporates actual labor force experience, is considerably below the raw penalty obtained from model A. Net of differential work experience, the wage penalty is, respectively, about 4% and 7% per child in the older and younger U.S. cohorts; this suggests that actual work experience alone accounts for more than half the total wage penalty for motherhood among American mothers. Similar, although somewhat weaker, relationships are evident for both Britain and Germany, where wage penalties for motherhood amount to about 9% and 13%–15%, respectively, in specification B. That is, although mothers' lower labor force experience accounts for a significant fraction of the overall wage penalty for motherhood, other factors apparently come into play as well.

Even more interesting is that Table 2 provides clear-cut evidence that the processes driving the wage penalty for motherhood differ across countries. The incorporation of additional covariates that describe women's labor force behavior in specifications C–E successfully accounts for the wage penalty for motherhood among British and American women but contributes very little to our understanding of the nature of mothers' disadvantages in the German labor market. In fact, work interruptions for childcare, employer change at reentry to the market, and any of the other measures of labor force behavior included in the final specification E do not seem to have much of an effect on the wage penalty for motherhood in Germany. Throughout models C–E, the wage penalty for motherhood among German women of both cohorts steadfastly remains at about 11%–12% per child and is hence, especially for the older German cohort, virtually unchanged from the evidence obtained from specification B, which controlled for actual labor force experience only.

This finding is in stark contrast to our results for British and American women. In the American labor market, each of the additional factors considered in specifications C–E has its role to play in explaining why mothers experience wage losses relative to childless women. The duration of care-related work interruptions, employer change at reentry into the labor market, and women's other economic responses to motherhood as captured in model E all contribute to the explanation of the wage penalty for motherhood. In quantitative terms, work interruptions are estimated to imply a penalty of 1 to 2 percentage points per child, employer change at reentry about another 1 percentage point, and other labor force behaviors combined account for about 1.5 percentage points of the wage penalty for motherhood in the two American cohorts. Taken together, these various factors then explain virtually all the wage penalty for motherhood in the older U.S. cohort and reduce the wage penalty to about 3% per child among American women born in the early 1960s.

The picture for British women is yet different again, although like in the U.S. data, women's observed labor market behavior is fully sufficient to account for the wage penalty for motherhood. What is more, and unlike what is observed for American women, the key factor that entirely explains the wage penalty of motherhood net of actual experience is mothers' work interruptions for childcare. These alone are associated with a sufficiently large penalty to account for more than 6 percentage points of the wage penalty for motherhood that remained after controlling for actual labor force experience. In addition, employer change at reentry to the labor force similarly is associated with significant

wage losses and fully picks up what has remained of the wage penalty for motherhood in specification C.[15]

Choices That Count: Mothers' Labor Market Behavior and Wage Determination

The preceding results strongly suggest significant country differences in processes of wage determination, and specifically in the role that mothers' labor force behavior following childbirth plays for their wages. To assess these differences in wage structures in somewhat greater detail, Table 3 provides the estimates from our full model, which incorporates the impact of mother's interruption and reentry behavior as well as the impact of changes in job characteristics following childbirth (i.e., specification E of Table 2). In particular, our full model incorporates a range of human capital variables, controls for a broad range of job characteristics, and systematically addresses potential interaction effects between job characteristics and part-time status.

With respect to the role of women's return behavior, the regression estimates in fact underscore the sources of the striking cross-country differences that were apparent in the preceding decomposition of the wage penalty for motherhood. Consistent with earlier American research (cf. Budig and England 2001; Waldfogel 1998a in particular), our estimates imply that time out of the labor market is costly to American women because human capital accumulation is such an important determinant of wages since returns to experience are clearly well above those for women in Europe. Over and above human capital accumulation forgone, however, American mothers also incur significant wage penalties for care-related work interruptions and employer changes at returning to the labor market after a childcare break. Although respective effects on the order of 2 to 3 percentage points may appear small from the evidence of Table 3, the full specification includes many variables—namely all job characteristics (i.e., our controls for job and occupational mobility)—that are better perceived as intervening variables that already partly explain why interruptions and employer change generate wage losses for mothers. In our estimates from the specification that omits these controls (that is, specification D of Table 2), the wage penalty for the first year of a child-related work interruption amounts to some 7% in the older U.S. cohort and even 11% in the younger one, and the full wage penalty of an employer change at return to the labor market is estimated at 3%–4%.[16]

In many respects, mothers' return behavior is even more important in the British labor market. Besides the fact that returns to actual experience are meager after the duration of work interruptions has been controlled for, women are more strongly penalized for extensive child-related work interruptions as well as for employer changes at return to the labor market than was evident from the U.S. data. In fact, one year of childcare-related work interruption carries a wage penalty of a full 16% (cf. also Joshi, Paci, and Waldfogel 1999); moreover, the nonlinearity apparent for this relationship is much weaker than in the U.S. labor market. Furthermore, as in Waldfogel (1995; 1998a), employer change at reentry after childcare breaks implies a 5%–6% wage cost to British women, which is almost twice as high as for American women.[17] However, both the British and the American results sharply contrast with those of German women, for whom we

---

15. These results are qualitatively also robust to the inclusion of firm size and, for Britain and Germany at least, size of own businesses as additional controls. Clearly, both increasing firm size and running a self-employed business with employees confer wage returns to women. Accounting for this effect does not at all affect the motherhood wage penalty among American and British women, however, because mothers do not allocate themselves differently by employer size in either labor market. Among German women, though, firm size accounts for up to one-half percentage point of the wage penalty because these mothers tend to leave large enterprises for entering small establishments.

16. Full results are available from the authors upon request.

17. Our parameter estimate from the model without controls for job characteristics is –6.2%.

Table 3. **Wage Determination by Country and Birth Cohort: Selectivity-Corrected Fixed-Effects Estimates**

Variable	Germany, 1960–1964	Germany, 1965–1969	Britain, 1965–1969	United States, 1955–1959	United States, 1960–1964
Number of Children	–0.105**	–0.122**	0.006	–0.008	–0.030**
	(0.020)	(0.023)	(0.022)	(0.008)	(0.006)
Work Interruption (years)	0.012	–0.041	–0.160**	–0.050	–0.056**
	(0.018)	(0.021)	(0.037)	(0.026)	(0.018)
Work Interruption, Squared	–0.001	0.003	0.015**	0.031**	0.034**
	(0.001)	(0.003)	(0.004)	(0.007)	(0.005)
Number of Post-birth Employer Changes	0.006	0.084*	–0.052	–0.034*	–0.022**
	(0.035)	(0.035)	(0.032)	(0.016)	(0.010)
Actual Labor Force Experience (years)	0.067**	–0.026	0.013	0.070**	0.085**
	(0.014)	(0.015)	(0.020)	(0.008)	(0.006)
Actual Labor Force Experience, Squared	–0.002**	0.000	0.000	–0.000	–0.002**
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Education (years)	0.069**	0.044**	–0.014	0.074**	0.065**
	(0.009)	(0.007)	(0.008)	(0.005)	(0.003)
Number of Employer Changes	0.032	0.166**	0.029	0.044**	0.034**
	(0.020)	(0.021)	(0.017)	(0.008)	(0.006)
Number of Employer Changes, Squared	–0.001	–0.019**	–0.002	–0.001*	–0.001**
	(0.003)	(0.003)	(0.002)	(0.001)	(0.000)
Tenure (years)	0.012**	0.028**	0.008	0.052**	0.049**
	(0.004)	(0.005)	(0.006)	(0.003)	(0.003)
Tenure, Squared	–0.000	–0.001**	–0.001	–0.002**	–0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Part-time Job	0.025	–0.115	–0.073	–0.028	0.082**
	(0.062)	(0.077)	(0.088)	(0.030)	(0.021)
Female Occupation	0.022	–0.090**	–0.127**	–0.264**	–0.233**
	(0.035)	(0.034)	(0.042)	(0.018)	(0.013)
Part-time Job × Female Occupation	–0.056	0.096	0.039	–0.064	–0.093**
	(0.053)	(0.068)	(0.076)	(0.035)	(0.025)
SIOPS Occupational Prestige Score	0.006**	0.002*	0.003**	0.004**	0.004**
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Part-time Job × SIOPS Prestige	0.001	0.001	0.003*	0.001*	–0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Public Sector	0.041	–0.016	–0.054*	0.056**	0.027**
	(0.022)	(0.021)	(0.027)	(0.012)	(0.010)
Part-time Job × Public Sector	0.058	0.121**	0.006	–0.069**	–0.043**
	(0.030)	(0.033)	(0.036)	(0.022)	(0.016)
Self-employment	–0.064	–0.109*	–0.721**	–0.349**	–0.462**
	(0.042)	(0.045)	(0.051)	(0.019)	(0.017)
Part-time Job × Self-employment	–0.059	0.267**	0.313**	0.322**	0.420**
	(0.062)	(0.079)	(0.084)	(0.029)	(0.025)
Constant	1.077*	–1.578**	–0.789	0.620	–0.542**
	(0.424)	(0.441)	(0.765)	(0.358)	(0.162)
λ_{it}	0.095*	–0.058	–0.040	0.050	0.150**
	(0.048)	(0.038)	(0.062)	(0.030)	(0.022)
v_i	FE	FE	FE	FE	FE

(continued)

(Table 3, continued)

Variable	Germany, 1960–1964	Germany, 1965–1969	Britain, 1965–1969	United States, 1955–1959	United States, 1960–1964
Number of Observations	4,865	4,609	4,276	21,991	37,101
Number of Persons	1,087	1,101	961	2,228	3,543
R^2 Within	.266	.369	.194	.184	.298

Notes: Figures are from log wage regressions for the female labor force only (model E of Table 2). Additional controls are age, age squared, and fixed effects for survey year. Selectivity-correction terms are identified from age of the youngest child in the household, marital status (never married, married, separated/divorced/widowed), and their interaction. Asymptotic standard errors are in parentheses.

Sources: GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

$^*p < .05$; $^{**}p < .01$

find no evidence of any negative effect of employer change at return to the labor market nor any marked negative effects of work interruptions (particularly for the older cohort of German women).[18]

On the other hand, our results from Table 2 suggest that the implications of job characteristics and hence the relationship between post-birth job mobility and the wage penalty for motherhood differ across countries. More specifically, job mobility seemed most clearly to create wage disadvantages for U.S. mothers in the sense that controlling for job mobility accounted for a combined wage penalty of around 1.5% per child (cf. Budig and England 2001 for similar results), an effect that is present for neither Germany nor Britain. To understand the sources of this cross-country difference, we note that although mobility into low-prestige and female occupations and mobility into self-employment are associated with lower wages for women in all cohorts and countries, respective wage effects are typically more pronounced in the American labor market. For example, self-employment has more negative wage implications for American than for German women,[19] and mobility into female occupations is more heavily penalized among American women than among both British and German women (cf. also Kilbourne et al. 1994). Also, tenure with the current employer, which mothers tend to lack, has more positive wage effects for American women than for British or German women.

Furthermore, we observe some fairly complex interactions of these effects with part-time status that also vary across countries. First, the evidence on the main effect of part-time status is quite mixed across countries and cohorts, suggesting that mobility into part-time employment in itself is not clearly associated with lower wages. However, if entering part-time employment occurs in conjunction with mobility into a more female occupation, then, at least in the U.S. labor market, this clearly further exacerbates the wage loss associated with entering female occupations in the first place. Also, entering low-prestige occupations on part-time status exacerbates women's wage losses for women in Britain and for women in the older U.S. cohort. Finally, entering self-employment on a part-time basis clearly has much less negative wage consequences in all

---

18. This also holds true in models without controls for job characteristics: that is, those reported as specification D in Table 2.

19. Closer analysis suggests that lower wage penalties to entering self-employment in Germany may be explained from compositional differences. Disaggregating the self-employed by business size (as possible in the German and British data) results in relatively similar wage effects that increase with business size. The key difference between German and British women—and by implication, perhaps, also American women—would then lie in the extent to which women are able to enter larger businesses—potentially by joining existing or family-run ones—that provide earnings stability during the family formation stage. Relative to female self-employment in Germany, the proportion of female solo entrepreneurship is significantly higher in Britain.

cohorts but the older German cohort (where self-employment is not associated with any wage loss to begin with). In Germany, part-time jobs in the public sector are particularly attractive, whereas in the U.S. labor market, it is full-time jobs in the public sector that provide a wage advantage to women. Taking these observations together, and short of conducting a formal decomposition analysis at this point, it would seem that it is mainly the stronger devaluation of female occupations, and especially part-time employment in these occupations, seen in the U.S. labor market that explains why mothers' post-birth job mobility is associated with a wage penalty in the United States but not in the two European countries.

A Robustness Check: The Wage Penalty for Motherhood by Family Status

To assess the robustness of our findings before concluding, Table 4 provides disaggregated estimates of the wage penalty for motherhood by family status in our five cohorts. More specifically, we distinguish whether mothers were able to draw on continuous spousal support during the key childrearing ages or whether mothers experienced any spell of single parenthood while children younger than the age of 6 were present in her household. Presumably, and despite various targeted programs existent in each country, economic constraints will be more severe for single mothers who are then less likely to be able to withdraw from the labor force for childcare, let alone for an extended period of time. If so, the wage penalty among single mothers should generally be lower than that experienced by married or cohabiting women, who will be more likely to fall back on the traditional gender division of labor for at least some time after childbirth. Also, the component of the wage penalty for motherhood that is related to lack of work experience and the duration of work interruptions should be smaller among single mothers in this case. On the other hand, the lack of a partner may also imply that single mothers assume—or, for that matter, are believed to assume—extra responsibility for the well-being of their children such that the residual wage penalty for motherhood is particularly pronounced because of either real declines in productivity or bargaining power, or increased statistical discrimination as a consequence of respective employer beliefs.

Our empirical results actually largely bear out these expectations, particularly for single mothers in the two European countries. That is, like Budig and England (2001), we find virtually no evidence of differences in the wage penalty for motherhood between married and single mothers in the U.S. data; yet for both Britain and both German cohorts, we observe much smaller penalties among single mothers. In Germany, the wage penalty for motherhood among single mothers is less than 10% per child and thus merely half the wage penalty experienced by married women. Similarly, we establish a modest and, largely because of small sample size, statistically insignificant wage penalty of 4.4% per child among single mothers in Britain, which is merely about one-third of the 13.5% wage penalty faced by married women in Britain.

In addition, because of the shorter duration of work interruptions among single mothers, the impact of lack of work experience and work interruptions on the wage penalty generally tends to be smaller among single mothers than among married mothers. Finally, at least among the younger German and American cohorts, there is evidence of a substantial residual wage penalty for motherhood among single mothers. Because we observe no residual wage penalty for motherhood for married mothers in the U.S. labor market, this may indicate that either discrimination against lone mothers became more serious or actual care demands on single mothers have risen in the younger cohort of American women.

Taken together, however, the evidence presented in Table 4 then also implies that cross-country differences in the wage penalty for motherhood as well as its sources are particularly pronounced among married women. It is for married women that we clearly observe the largest wage penalty in Germany and the smallest one for the older U.S. cohort. Also, there is an even more striking contrast between the fact that lack of experience, the

Table 4. **Wage Penalties for Motherhood by Country, Birth Cohort, and Marital Status: Selectivity-Corrected Fixed-Effects Estimates**

Model	Germany, 1960–1964	Germany, 1965–1969	Britain, 1965–1969	United States, 1955–1959	United States, 1960–1964
Married and Cohabiting Mothers					
Specification A: Gross wage penalty	–0.194** (0.019)	–0.180** (0.024)	–0.135** (0.025)	–0.085** (0.010)	–0.147** (0.010)
Specification B: Net of actual experience	–0.148** (0.019)	–0.163** (0.020)	–0.088** (0.024)	–0.036** (0.009)	–0.065** (0.007)
Specification C: Net of actual experience and work interruptions	–0.125** (0.022)	–0.107** (0.026)	–0.004 (0.021)	–0.014 (0.010)	–0.016* (0.008)
Specification D: Net of actual experience, interruption, and employer change at reentry	–0.126** (0.023)	–0.109** (0.026)	0.017 (0.023)	–0.007 (0.011)	–0.009 (0.009)
Specification E: Wage penalty net of labor market behavior	–0.118** (0.022)	–0.117** (0.026)	0.010 (0.023)	0.010 (0.011)	–0.003 (0.008)
Number of observations	4,347	4,151	3,902	15,798	27,030
Number of persons	1,010	1,024	855	1,790	3,001
Single Mothers					
Specification A: Gross wage penalty	–0.093** (0.029)	–0.094** (0.033)	–0.044 (0.049)	–0.092** (0.010)	–0.147** (0.009)
Specification B: Net of actual experience	–0.048 (0.029)	–0.088** (0.030)	–0.004 (0.047)	–0.044** (0.009)	–0.076** (0.006)
Specification C: Net of actual experience and work interruptions	–0.045 (0.034)	–0.076 (0.042)	0.012 (0.048)	–0.046** (0.011)	–0.075** (0.008)
Specification D: Net of actual experience, interruption, and employer change at reentry	–0.028 (0.035)	–0.091* (0.043)	0.042 (0.070)	–0.037** (0.012)	–0.070** (0.009)
Specification E: Wage penalty net of labor market behavior	–0.012 (0.034)	–0.092* (0.042)	0.060 (0.068)	–0.019 (0.011)	–0.055** (0.008)
Number of observations	2,469	3,276	2,217	17,314	30,721
Number of persons	615	817	556	2,011	3,431

Notes: Coefficients are for the per child penalty in log wage regressions for the female labor force only. Parameter estimates for controls are omitted for presentation; full results are available from the authors upon request. Selectivity-correction terms are identified from age of the youngest child in the household, marital status (never married, married, separated/divorced/widowed), and their interaction. Asymptotic standard errors are shown in parentheses.

Sources: GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

*$p < .05$; **$p < .01$

duration of work interruptions, and (more often involuntary) employer change at reentry are entirely sufficient to account for the wage penalty in Britain and the United States on the one hand, and the observation that fully two-thirds of the truly sizeable wage penalty for motherhood in Germany is residual to our final model specification. Because the traditional gender division of labor and concomitant changes in women's labor force behavior after

childbirth are more pronounced among married mothers, and especially so in Germany, the observed patterns seem to suggest a direct nexus between the traditional gender division of labor and the wage cost to motherhood. For the German results in particular, this implies that even though parental leave policy is clearly effective in limiting involuntary employer change and other adverse direct effects of lengthy work interruptions, a more worrisome side effect of Germany's extensive entitlements may be that traditional gender roles are re-inforced, which then also indirectly weakens mothers' position in the labor market through reinforcing respective employer expectations.

SUMMARY AND CONCLUSIONS

Using extensive and cross-nationally harmonized panel data on women's job histories around childbirth, this article has documented significant wage penalties for motherhood in three advanced economies. Accounting for the potential selectivity of women's employment after childbirth, we obtain estimates of the wage penalty for motherhood between about 10% and 18% per child in fixed-effects regression models, with the penalty for German mothers tending to be at the top end and wage penalties for British and American mothers being somewhat smaller and more in the lower end of that range. Our estimates are thus consistent with country rankings reported in earlier comparative studies based on cross-sectional data (cf. in particular Harkness and Waldfogel 2003; Sigle-Rushton and Waldfogel 2007; and Stier et al. 2001) although the quantitative estimates of the wage penalty from our preferred specifications tend to be well in the upper range of estimates reported in previous research, and more often than not exceed them by a significant margin.

Largely, we find that previous research has tended to underestimate the wage penalty for motherhood because dynamic sample selection into employment has not been systematically accounted for. Since we find some positive sample selection to be an empirical feature of mothers' careers in all three countries in this study, conventional estimators will underestimate the wage penalty for motherhood. In fact, the resulting misspecification may also be responsible for some discrepancies between results reported in longitudinal studies and those reported in earlier comparative research based on cross-sectional data. For example, unlike the cross-sectional cross-country studies by Harkness and Waldfogel (2003) and Sigle-Rushton and Waldfogel (2007), but like Waldfogel's (1998a) British-American comparison based on longitudinal data, we do not find evidence of any nonlinearity in the effect of the number of children on mothers' wages. These details aside, however, it seems more important to note the larger substantive implications of our study here: because we find systematic cross-country differences in the wage penalty for motherhood in an analysis that uses harmonized longitudinal data and regression specifications that account for unobserved heterogeneity and dynamic sample selection, we can rule out the possibility that the cross-country differences we and others have reported are merely a consequence of differences in survey populations, measurement, model specification, or cross-country differences in labor market participation and the resulting degree of positive sample selection into the population of working mothers (cf. Harkness and Waldfogel 2003 for a similar conclusion, although based on cross-sectional data).

How then does one explain these cross-country differences in mothers' labor market prospects, and why should the family gap in wages be systematically smaller in the unfettered labor market of the United States than in European countries like Britain and, especially, Germany that provide stronger public support to families? At first glance, this result is all the more counterintuitive because our own results show the U.S. labor market to be much less mother-friendly than its European counterparts. Whether it comes to the returns to labor force experience, job mobility, and tenure—or to the wage penalty associated with mobility into part-time jobs, low-prestige occupations, self-employment,

or employer change at reentry after a childcare break—the U.S. labor market consistently tends to most strongly reward continuous labor market attachment; the wage penalties associated with mothers' career-curbing behavior, such as entering part-time jobs and typically female or low-prestige occupations, are consistently much smaller in both Britain and Germany.

However, it is important to recognize that women in the United States seem to be acutely aware of the structure of the American labor market and act accordingly. Overall, the labor market behavior of American mothers is much more market oriented than that of their British or German counterparts: American mothers take much less time off for childcare, and they are much less likely to enter part-time jobs, typically female jobs, or low-prestige occupations in response to childbirth than mothers in Britain and Germany. In other words, our results imply that if American mothers behaved like their European sisters, they would see their total wage costs of motherhood soaring, whereas European mothers might actually see somewhat (although not very much, given weak market incentives) reduced wage penalties for motherhood if they behaved in a more market-oriented fashion.

In addition, our analyses also point out that although Britain and, especially, Germany have succeeded in containing some of the labor market processes that put U.S. mothers at a disadvantage, economic mechanisms that are less relevant in the U.S. context assume prominence in explaining the wage penalty for motherhood in Europe. Specifically, the high penalty associated with child-related work interruptions in Britain, and even more so the excessive residual wage penalty established for German mothers, strongly suggest that mothers are more strongly penalized as a group in Europe than in the U.S. labor market. Given that we have used extensive controls for human capital at the micro level, that we have no evidence for a residual wage penalty other than in the German labor market, and that raising children is a taxing responsibility for American, British, and German families alike, it seems difficult to reconcile this result with strictly productivity-based explanations. Also, given that wages are typically set collectively in Germany in particular, it seems hard to argue that mothers' reduced bargaining power vis-à-vis their individual employer would be crucial in this. Rather, the most plausible reading would seem to be that employers are actually successful in passing on the economic costs of family policy mandates to mothers through, for example, processes of statistical discrimination, and that triggering respective responses might be an unintended consequence of more generous family policy provisions, especially perhaps policies as extensive as those of the German parental leave program. As others have advanced similar arguments before (cf. Mandel and Semyonov 2006; Ruhm 1998), we hope this study contributes to an emerging body of social science research that stringently assesses contextual and institutional determinants of women's careers.

Appendix Table A1. **Summary Statistics for the Estimation Samples**

Variable	Germany, 1960–1964		Germany, 1965–1969		Britain, 1965–1969		United States, 1955–1959		United States, 1960–1964	
	Full Sample	Mothers Only	Full Sample	Mothers Only	Full Sample	Mothers Only	Full Sample	Mothers Only	Full Sample	Mothers Only
Log Real Wage (national currency)	3.03 (0.46)	3.02 (0.47)	2.99 (0.46)	2.95 (0.47)	1.85 (0.53)	1.76 (0.58)	2.22 (0.57)	2.19 (0.58)	2.12 (0.55)	2.11 (0.56)
Number of Children	0.88 (1.03)	1.73 (0.78)	0.42 (0.79)	1.56 (0.73)	0.76 (1.12)	1.94 (0.96)	0.88 (1.17)	1.99 (0.94)	0.69 (1.05)	1.81 (0.94)
Duration of Work Interruption (years)	1.56 (2.66)	3.03 (3.07)	0.69 (1.68)	2.49 (2.45)	0.68 (1.54)	1.68 (2.08)	0.35 (0.71)	0.80 (0.89)	0.33 (0.70)	0.86 (0.91)
Age	31.44 (5.71)	34.13 (4.52)	27.60 (4.64)	30.75 (3.56)	29.50 (3.52)	30.91 (3.03)	27.93 (4.86)	29.93 (4.64)	24.80 (4.80)	27.19 (4.26)
Labor Force Experience (years)	9.92 (5.50)	11.89 (4.98)	6.87 (4.18)	9.05 (3.97)	10.20 (4.35)	10.59 (4.06)	6.15 (4.38)	7.22 (4.54)	5.37 (3.98)	6.46 (4.07)
Years of Education	11.72 (2.38)	11.32 (2.24)	11.61 (2.30)	11.08 (2.10)	13.31 (2.74)	12.68 (2.73)	13.16 (2.22)	12.68 (2.04)	12.67 (2.13)	12.41 (1.96)
Number of Job Changes	0.95 (1.21)	1.08 (1.27)	1.21 (1.20)	1.29 (1.30)	1.61 (1.61)	1.92 (1.71)	3.07 (2.29)	3.49 (2.47)	3.99 (2.45)	4.64 (2.55)
Number of Job Changes at Reentry	0.06 (0.25)	0.11 (0.33)	0.05 (0.23)	0.18 (0.40)	0.15 (0.40)	0.39 (0.57)	0.17 (0.45)	0.38 (0.61)	0.23 (0.53)	0.60 (0.72)
Tenure (years)	5.82 (5.08)	6.00 (5.45)	4.24 (3.85)	5.01 (4.53)	2.91 (3.19)	3.03 (3.40)	2.75 (3.18)	3.13 (3.49)	2.15 (2.65)	2.59 (3.09)
Part-time Job	0.32 (0.47)	0.54 (0.50)	0.21 (0.41)	0.60 (0.49)	0.29 (0.45)	0.60 (0.49)	0.20 (0.40)	0.22 (0.41)	0.26 (0.44)	0.21 (0.41)
SIOPS Occupational Prestige	40.98(11.99)	38.99(12.04)	41.28(11.38)	38.65(11.86)	42.97(12.54)	39.39(12.61)	40.68(13.07)	39.23(12.72)	39.37(12.89)	38.89(12.70)
Female Occupation (% of women)	0.67 (0.25)	0.67 (0.25)	0.67 (0.24)	0.67 (0.24)	0.69 (0.23)	0.72 (0.22)	0.65 (0.22)	0.65 (0.22)	0.65 (0.22)	0.64 (0.22)
Public Sector	0.28 (0.45)	0.25 (0.44)	0.24 (0.43)	0.22 (0.41)	0.30 (0.46)	0.29 (0.45)	0.17 (0.38)	0.16 (0.37)	0.13 (0.34)	0.12 (0.33)
Self-employment	0.04 (0.18)	0.05 (0.21)	0.02 (0.15)	0.04 (0.20)	0.05 (0.21)	0.05 (0.21)	0.05 (0.22)	0.06 (0.25)	0.03 (0.18)	0.05 (0.22)
Number of Observations (person-years)	4,865	2,478	4,609	1,251	4,276	1,688	21,991	9,713	37,101	14,024

Notes: Figures for all variables are arithmetic means, with standard deviations shown in parentheses. Column "Mothers Only" includes post-birth observations only.

Sources: GSOEP 1984–2001; BHPS 1991–2001; and NLSY 1979–1996.

REFERENCES

Albrecht, J.W., P.-A. Edin, M. Sundström, and S.B. Vroman. 1999. "Career Interruptions and Subsequent Earnings: A Reexamination Using Swedish Data." *Journal of Human Resources* 34:294–311.

Allison, P.D. 1994. "Using Panel Data to Estimate the Effects of Events." *Sociological Methods & Research* 23:174–99.

Anderson, D.J., M. Binder, and K. Krause. 2003. "The Motherhood Wage Penalty Revisited: Experience, Heterogeneity, Work Effort, and Work-Schedule Flexibility." *Industrial and Labor Relations Review* 56:273–394.

Anderson, P. and P. Levine. 2000. "Child Care and Mother's Employment Decisions." Pp. 420–62 in *Findings Jobs: Work and Welfare Reform,* edited by D.E. Card and R.M. Blank. New York: Russell Sage Foundation.

Bainbridge, J., M.K. Meyers, and J. Waldfogel. 2003. "Child Care Policy Reform and the Employment of Single Mothers." *Social Science Quarterly* 84:771–91.

Baum, C.L. 2002a. "A Dynamic Analysis of the Effect of Child Care Costs on the Work Decisions of Low-Income Mothers with Infants." *Demography* 39:139–64.

———. 2002b. "The Effect of Work Interruptions on Women's Wages." *Labour* 16(1):1–36.

Becker, G.S. 1985. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics* 3(2):33–58.

———. 1993. *Human Capital. A Theoretical and Empirical Analysis With Special Reference to Education*. Chicago: University of Chicago Press.

Blau, D.M. and P.K. Robins. 1991. "Child-Care Demand and Labor Supply of Young Mothers Over Time." *Demography* 28:333–51.

———. 1998. "A Dynamic Analysis of Turnover in Employment and Child Care." *Demography* 35:83–96.

Blau, F.D. and L.M. Kahn. 1996. "Wage Structure and Gender Earnings Differentials: An International Comparison." *Economica* 63:S29–S62.

Brewster, K.L. and R.R. Rindfuss. 2000. "Fertility and Women's Employment in Industrialized Nations." *Annual Review of Sociology* 26:271–96.

Budig, M.J. and P. England. 2001. "The Wage Penalty for Motherhood." *American Sociological Review* 66:204–25.

Correll, S.J., S. Benard, and I. Paik. 2007. "Getting a Job: Is There a Motherhood Penalty?" *American Journal of Sociology* 112:1297–338.

Datta Gupta, N. and N. Smith. 2002. "Children and Career Interruptions: The Family Gap in Denmark." *Economica* 69:609–29.

Desai, S. and L.J. Waite. 1991. "Women's Employment During Pregnancy and After the First Birth: Occupational Characteristics and Work Commitment." *American Sociological Review* 56:551–66.

Dienel, C. 2002. *Familienpolitik. Eine Praxisorientierte Gesamtdarstellung der Grundlagen, Handlungsfelder und Probleme* [Family policy. A pragmatical introduction to premises, policies and problems]. Weinheim: Juventa.

DiPrete, T.A. and C. Buchmann. 2006. "Gender-Specific Trends in the Value of Education and the Emerging Gender Gap in College Completion." *Demography* 43:1–24.

Drobnic, S., H.-P. Blossfeld, and G. Rohwer. 1999. "Dynamics of Women's Employment Patterns Over the Family Life Course: A Comparison of the United States and Germany." *Journal of Marriage and the Family* 61:133–46.

Estes, S.B. and J.L. Glass. 1996. "Job Changes Following Childbirth. Are Women Trading Compensation for Family-Responsive Work Conditions?" *Work and Occupations* 23:405–36.

Ganzeboom, H.B.G. and D.J. Treiman. 1996. "Internationally Comparable Measures of Occupational Status for the 1988 International Standard Classification of Occupations." *Social Science Research* 25:201–39.

Glass, J. 2004. "Blessing or Curse? Work-Family Policies and Mother's Wage Growth Over Time." *Work and Occupations* 31:367–94.

Goldin, C. 2006. "The Quiet Revolution That Transformed Women's Employment, Education, and Family." *American Economic Review* 96(2):1–21.

Gornick, J.C. and M.K. Meyers. 2003. *Families That Work. Policies for Reconciling Parenthood and Employment*. New York: Russell Sage Foundation.

Gornick, J.C., M.K. Meyers, and K.E. Ross. 1997. "Supporting the Employment of Mothers: Policy Variation Across Fourteen Welfare States." *Journal of European Social Policy* 7(1):45–70.

Greene, W.H. 2005. *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall.

Han, W.-J. and J. Waldfogel. 2003. "Parental Leave: The Impact of Recent Legislation on Parents' Leave Taking." *Demography* 40:191–200.

Harkness, S. and J. Waldfogel. 2003. "The Family Gap in Pay: Evidence From Seven Industrialized Countries." *Research in Labor Economics* 22:369–413.

Heckman, J. 1974. "Shadow Prices, Market Wages, and Labor Supply." *Econometrica* 42:679–94.

International Labour Organization. 1990. *Statistical Sources and Methods. Volume 3: Economically Active Population, Employment, Unemployment and Hours of Work (Household Surveys)*. Geneva: International Labour Organization.

Jacobs, S.C. 1997. "Employment Changes Over Childbirth: A Retrospective View." *Sociology* 31:577–90.

Joshi, H., P. Paci, and J. Waldfogel. 1999. "The Wages of Motherhood: Better or Worse?" *Cambridge Journal of Economics* 23:543–64.

Kamerman, S.B. 2000. "Parental Leave Policies: An Essential Ingredient in Early Childhood Education and Care Policies." *Social Policy Report* 14(2):3–15.

Kilbourne, B.S., G. Farkas, K. Beron, D. Weir, and P. England. 1994. "Returns To Skill, Compensating Differentials, and Gender Bias—Effects of Occupational Characteristics on the Wages of White Women and Men." *American Journal of Sociology* 100:689–719.

Lundberg, S. and E. Rose. 2000. "Parenthood and the Earnings of Married Men and Women." *Labour Economics* 7:689–710.

Mair, J. 2000. "Maternity Leave: Improved and Simplified?" *Modern Law Review* 63:877–86.

Mandel, H. and M. Semyonov. 2006. "A Welfare State Paradox: State Interventions and Women's Employment Opportunities in 22 Countries." *American Journal of Sociology* 111:1910–49.

Manning, A. 2003. *Monopsony in Motion: Imperfect Competition in Labor Markets*. Princeton, NJ: Princeton University Press.

McRae, S. 1991. *Maternity Rights in Britain. The Experience of Women and Employers*. London: Policy Studies Institute.

Mertens, N., J. Schippers, and J. Siegers. 1995. "Career Interruptions and Women's Life-time Earnings." *European Journal of Women's Studies* 2:469–91.

Meyers, M.K., T. Heintze, and D.A. Wolf. 2002. "Child Care Subsidies and the Employment of Welfare Recipients." *Demography* 39:165–79.

Mincer, J. and H. Ofek. 1982. "Interrupted Work Careers: Depreciation and Restoration of Human Capital." *Journal of Human Resources* 17(1):3–24.

Nielsen, H.S., M. Simonsen, and M. Verner. 2004. "Does the Gap in Family-Friendly Policies Drive the Family Gap?" *Scandinavian Journal of Economics* 106:721–44.

OECD. 1996. "Child Care in OECD Countries." *OECD Employment Outlook*:123–51.

———. 2001. "Balancing Work and Family Life: Helping Parents Into Paid Employment." *OECD Employment Outlook*:129–66.

———. 2007. *Babies and Bosses. Reconciling Work and Family Life. A Synthesis of Findings for OECD Countries*. Paris: Organisation for Economic Co-operation and Development.

Ondrich, J., K. Spiess, and Q. Yang. 2003. "Changes in Women's Wages After Parental Leave." *Schmollers Jahrbuch* 123(1):125–38.

Petersen, T. and I. Saporta. 2004. "The Opportunity Structure for Discrimination." *American Journal of Sociology* 109:852–901.

Phipps, S., P. Burton, and L. Lethbridge. 2001. "In and Out of the Labour Market: Long-Term Income Consequences of Child-Related Interruptions to Women's Paid Work." *Canadian Journal of Economics* 34:411–29.

Polachek, S.W. 2006. "How the Life-Cycle Human Capital Model Explains Why the Gender Wage Gap Narrowed." Pp. 102–124 in *The Declining Significance of Gender?,* edited by F.D. Blau, M.C. Brinton, and D.B. Grusky. New York: Russell Sage Foundation.

Rosenfeld, R.A. 1996. "Women's Work Histories." *Population and Development Review* 22:199–222.

Ruhm, C.J. 1998. "The Economic Consequences of Parental Leave Mandates: Lessons From Europe." *Quarterly Journal of Economics* 113(1):285–317.

Sainsbury, D. 1994. "Gendering Welfare States." London: Sage Publications.

———. 1996. *Gender, Equality and Welfare States*. Cambridge, MA: Cambridge University Press.

Sigle-Rushton, W. and J. Waldfogel. 2007. "Motherhood and Women's Earnings in Anglo-American, Continental European, and Nordic Countries." *Feminist Economics* 13(2):55–91.

Spence, M. 1973. "Job Market Signaling." *Quarterly Journal of Economics* 87:355–74.

Stier, H., N. Lewin-Epstein, and M. Braun. 2001. "Welfare Regimes, Family-Supportive Policies, and Women's Employment Along the Life-Course." *American Journal of Sociology* 106:1731–60.

Waldfogel, J. 1995. "The Price of Motherhood: Family Status and Women's Pay in a Young British Cohort." *Oxford Economic Papers* 47:584–610.

———. 1997. "The Effect of Children on Women's Wages." *American Sociological Review* 62: 209–17.

———. 1998a. "The Family Gap for Young Women in the United States and Britain: Can Maternity Leave Make a Difference?" *Journal of Labor Economics* 16:505–45.

———. 1998b. "Understanding the Family Gap in Pay for Women With Children." *Journal of Economic Perspectives* 12(1):137–56.

———. 2001. "International Policies Toward Parental Leave and Child Care." *The Future of Children* 11(1):98–111.

Wooldridge, J.M. 1995. "Selection Corrections for Panel Data Models Under Conditional Mean Independence Assumptions." *Journal of Econometrics* 68:115–32.

———. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Ziefle, A. 2004. "Die individuellen Kosten des Erziehungsurlaubs: Eine empirische Analyse der kurz- und längerfristigen Folgen für den Karriereverlauf von Frauen" [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.