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Specialization Then and Now: Marriage, Children, and the Gender Earnings Gap across Cohorts

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The ratio of female-to-male median annual earnings for full-time/full-year workers stood at 0.79 in 2014 (DeNavas-Walt and Proctor 2015). While this ratio is up from the 1960 level of 0.61, a substantial gap remains. Moreover, convergence has slowed since 2000. A recent survey article by Blau and Kahn (2016) finds that while women's gains in market skills measured by education and work experience were important in explaining convergence over the period 1980–2000, these human capital variables account for only a negligible portion of the gap that remains. In fact, women now surpass men on most measures of educational attainment, but this advantage has not filtered through to parity in wages (Goldin, Katz, and Kuziemko 2006; Murphy and Topel 2014).

The career dynamics of the gender gap for graduates of the Chicago Business School, as studied by Bertrand, Goldin, and Katz (2010), illustrate a common pattern. While women and men start their careers with similar earnings, a substantial gap arises over time, and the arrival of children is a major concurrent factor in the rising earnings gap. At least in this highly (and homogeneously) educated population, only a small share of the gender gap is due to premarket factors such as training and coursework; instead, family formation sets the gap in motion. Wood, Corcoran, and Courant (1993) and Goldin (2014) document similar patterns among graduates of the University of Michigan and Harvard law schools. Wilde, Batchelder, and

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Ellwood (2010) offer evidence that the wage gap associated with children is larger for skilled women. An interesting and important question is whether this pattern holds true for the broader population of women as well.

In this paper, we examine the evolution of the gender gap associated with marriage and parental status, comparing cohorts born between 1936 and 1985. Women's early-in-life decisions about schooling, marriage, fertility, and work have repercussions throughout their lifetimes. This means we expect gains across cohorts to be an important part of the convergence. Those born early in this period typically began their careers with more-limited opportunities and different expectations than those born towards the end. These decisions are also clearly the outcomes of a complex and dynamic decision-making process. We do not attempt to build a structural model here, but rather document how changing associations between marriage and earnings, and between children and earnings, have contributed to the gender gap in an "accounting" sense.[1]

The model of household specialization and division of labor introduced by Becker (1981) has been the workhorse in this literature. Drawing insight from models of comparative advantage and trade, the model posits that when forming households, couples will exploit the gains from trade by having one spouse specialize in market work while the other specializes in household work. Given the historical advantage of men in the labor market, the model predicts specialization by gender and therefore an earnings advantage for married men and an earnings disadvantage for married women.[2]

Is this model of specialization useful for understanding the evolution of the gender gap across generations of women? There have been dramatic changes in both market and household production over the decades. Women's labor market opportunities have increased for a variety of reasons, making it more costly for them to stay home. Industrial change marked by a shift away from manufacturing jobs and technological change driven by advances in computing have favored cognitive over physical skills (Welch 2000; Beaudry and Lewis 2014; Weinberg 2000). The introduction of labor-saving devices such as washing machines, microwave ovens, and vacuum cleaners have freed up time that had previously been devoted to household tasks (Greenwood and Guner 2008). Improved birth control made it easier for women to control and time their fertility, making career-oriented investments less risky (Goldin and Katz 2002; Bailey, Hershbein, and Miller 2012). As a result of these and other changes, women and men have become more similar in terms of both market and household productivity. There can be gains to specialization within

[1] Adda, Dustmann, and Stevens (2015) build a structural model, which they estimate using German data. They find a "career cost" of children—the net present value of lifetime earnings of mothers relative to a no fertility scenario—of 35 percent, three-quarters of which result from labor supply reductions.

[2] Marriage and children can also lead to wage changes reinforced by employer discrimination, an explanation we do not address here. Correll, Bernard, and Paik (2007) present convincing evidence that this is an important contributor to the gender gap related to marriage and parenthood. In laboratory studies, they find that subjects penalize mothers and favor fathers in terms of perceived competence and make salary recommendations accordingly. A follow up audit-study involving resumes led to similar results.

the household even when women and men have identical capabilities, but there is less reason to expect specialization to remain starkly gendered—men at work, women at home. In this journal, Stevenson and Wolfers (2007) hypothesize that the returns to marriage based on production complementarities have diminished over time. In addition, greater longevity and leisure may have increased the importance of spousal consumption and leisure complementarities (Aguiar and Hurst 2007). These ongoing changes suggest that couples may increasingly match on similarities, rather than potential gains from trade. Couples are now increasingly likely to marry within education group (Schwartz and Mare 2005), and the incidence of dual-earner couples who are both highly educated, the so-called "power couples," has increased (Costa and Kahn 2000). These trends would lead to narrowing of the difference in wives' and husbands' earnings trajectories after marriage within couples, although the same trends may contribute to rising inequality across households overall.

But what about children? Women's gains in the labor market likewise predict declining gender gaps associated with children as well, but recent evidence seems to suggest otherwise. The profile of Chicago MBAs by Bertrand, Goldin, and Katz (2010) mentioned earlier suggests that even for women who have made costly investments in skills that are highly valued in market work, the extent to which women are willing or able to substitute for their time is limited when it comes to care of children. These issues have received much recent attention in popular media such as Lisa Belkin's (2003) article "The Opt-Out Revolution" and Anne-Marie Slaughter's (2012) "Why Women Still Can't Have it All."

Academic papers focusing on the "motherhood penalty" or "family gap" have shown that wages of mothers are significantly lower than those of non-mothers with similar human capital characteristics. For example, Waldfogel (1997) finds a wage gap of 6 log points for mothers with one child and 13 log points for mothers with two children. Budig and England (2001) also report a wage gap of approximately 5 log points per child for mothers versus non-mothers, even taking into account mother fixed effects.[3] Wilde, Batchelder, and Ellwood (2010) find larger wage gaps of 17 log points at ten or more years after birth, suggesting that the wage gap accumulates, particularly among more-skilled women. Each of these studies focus on hourly wages rather than annual earnings. The gaps in annual earnings are even larger as mothers are significantly more likely to work part-time and part-year.

Is there a corresponding fatherhood premium when comparing men who have children with men who do not? Researchers generally find a small positive fatherhood premium, although the results seem sensitive to specification. Lundberg and Rose (2000) find a premium of 9 percent on average, although with no effect among couples in which both parents continue working. Budig (2014) finds a fatherhood premium of about 6 percent, while Killewald (2013) finds a premium of about 4 percent—but only for married, co-resident, and biological fathers. In

[3] These estimates are somewhat larger than those found in earlier papers like Korenman and Neumark (1992) and Neumark and Korenman (1994), who use first difference and sibling fixed-effects models, respectively.

contrast, Wilde, Batchelder, and Ellwood (2010), find little evidence of a positive fatherhood wage premium.

In contrast, there is a well-established marriage premium for men. Cross-sectional estimates suggest that married men earn somewhere between 10 to 40 percent higher wages compared to observationally equivalent single men (for example, Hill 1979; Korenman and Neumark 1991; Antonovics and Town 2004). Korenman and Neumark (1991) find evidence of positive selection of men into marriage based on earnings—that is, men with higher earnings are more likely to marry. But they also find that much of the male marriage premium accrues from faster wage growth after marriage, which is consistent with marriage allowing men to shift towards more market work and less home production. The effect of marriage on women's wages is less well established. Waldfogel (1998), Budig and England (2001), and Killewald and Gough (2013) find that for recent cohorts, married women also command a wage premium, results consistent with what we find here.[4]

Previous studies have not, for the most part, focused on how these gaps have evolved over time.[5] We bring this longer-run perspective here. We examine whether the gaps associated with marriage and children have narrowed as the specialization model predicts. We separate the patterns associated with marriage and children because the two have become less intertwined over time with increases in single parenthood and prolonged periods of childlessness among couples due to delayed childbearing.

The Evolution of the Gender Gap

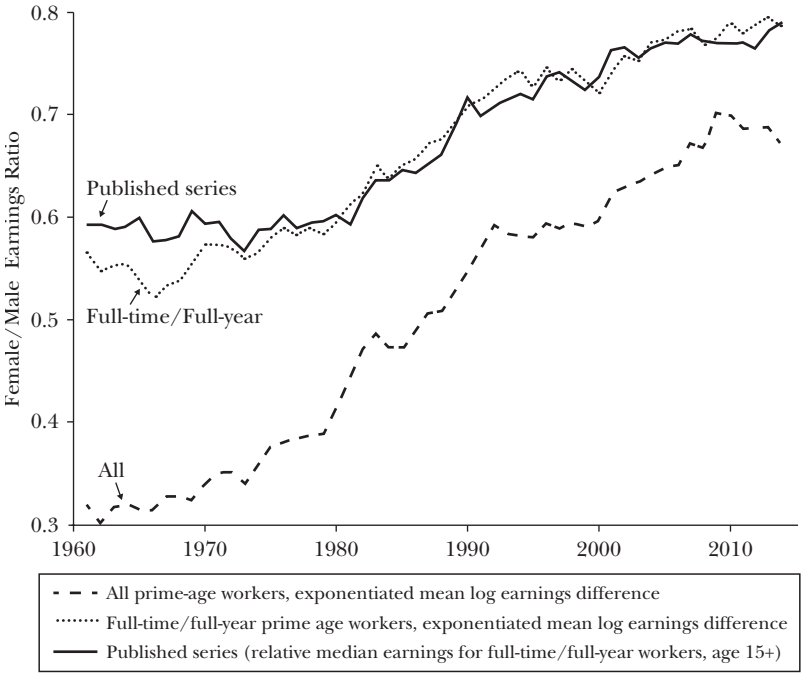
Figure 1 shows several measures of the growth of the female–male earnings ratio since the early 1960s. The figure illustrates median full-time, full-year relative earnings published in the Current Population Reports (DeNavas-Walt and Proctor 2015, Table A-4) along with two other series we constructed from 1962–2015 March Current Population Surveys (CPS) public-use files.[6] Our sample consists of prime-aged women and men, defined as those with 1 to 35 years of potential experience. Prime age differs for those with different levels of education to reflect the fact that their prime years start after their education is finished. Our earnings measure

[4] In Juhn and McCue (2016), we show that the positive marriage premium is entirely due to the most recent cohorts of college-educated women without children. This may indeed reflect the fact that career-minded men and women are increasingly likely to marry one another and that specialization plays a minor role when children are not involved.

[5] Exceptions include Blackburn and Korenman (1994) and Gray (1997), who find that the male marriage premium narrowed in the 1970s and 1980s. Pal and Waldfogel (2016) find a decline in the motherhood wage gap in the more recent period, 1993–2013. On the other hand, using data from the National Longitudinal Survey of Young Women and the National Longitudinal Survey of Youth, Avellar and Smock (2003) find no changes in the motherhood penalty.

[6] We use the 1962–2015 March CPS surveys downloaded from the IPUMS-CPS. The annual earnings information refers to the previous year, so the data series cover earnings for 1961–2014. Later, for our analysis using children, we use 1968–2015 surveys due to the fact that consistent measures of number and ages of children are not available in the earlier years.

Figure 1
Growth of the Female/Male Earnings Ratio



Notes and Source: The figure illustrates median full-time, full-year relative earnings published in the Current Population Reports (DeNavas-Walt and Proctor 2015, Table A-4) along with two other series we constructed from 1962–2015 March Current Population Surveys (CPS) public-use files. The published series use a direct ratio, while ours uses an approximated ratio: we use the exponent of (mean log female annual earnings – mean log male annual earnings) to approximate female/male earnings ratios. In our analysis, "Prime age" is defined as those with 1 to 35 years of potential experience. More specifically, for those who finished high school or less, the age range is 18–53 for high school dropouts and high school graduates. For those with some college, the age range is 21–56. For college graduates, the age range is 23–58. For those with post-college education, the age range is 25–60. In our analysis we define full-time/full-year as working 35 hours or more and working 40 weeks or more. We adjust top-coded income categories by multiplying the top-code value by 1.5.

includes wage and salary, self-employment, and farm income. We use the exponent of (mean log female annual earnings – mean log male annual earnings) to approximate female/male earnings ratios. We examine these approximated female/male earnings ratios for all workers with nonzero earnings, and for a sample of full-time/full-year workers. In our analysis we define full-time/full-year as working 35 hours or more and working 40 weeks or more.[7]

[7] The Current Population Report defines full-time, year-round workers in a slightly different way: "A full-time, year-round worker is a person who worked 35 or more hours per week (full time) and 50 or more weeks during the previous calendar year (year round). For school personnel, summer vacation is counted as weeks worked if they are scheduled to return to their job in the fall.

Our ratio based on average earnings of full-time/full-year workers tracks the published series fairly well.[8] The female/male earnings ratio hovers around 0.6 until 1980 and increases rapidly during the 1980s. The pattern of male/female earnings convergence is even more dramatic when we expand our sample to include part-time and part-year workers, reflecting women's gains in annual hours and weeks worked. The rapid convergence during the 1980s reflects women's gains in education and experience along with shifts in the labor market that worked to women's relative advantage (Blau and Kahn 1997). For college-educated women, occupational upgrading certainly played a role as women moved into professional occupations, especially high-wage occupations traditionally dominated by men (Black and Juhn 2000). Among less-educated workers, industrial shifts such as the decline in manufacturing jobs had a larger negative impact on earnings of men than those of women. Welch (2000) notes the striking similarity of movements in the education premium and female–male relative earnings over this period, arguing that the two phenomena both reflect rising returns to cognitive skills over physical skills.

Since the 1980s, convergence in earnings between males and females has been slower and uneven. The slowdown has been particularly pronounced at the top. Blau and Kahn (2016) report that at the 90th percentile, women essentially made no gains relative to men from 1998–2010. Similarly, among full-time/full-year workers holding a bachelor's degree and higher, women's weekly earnings as a percentage of men's earnings remained at 74.1 from 2000 to 2010 (US Bureau of Labor Statistics 2015). The notion of "swimming upstream" is likely relevant for college-educated women as overall wage inequality continued to increase at the very top. To the extent that college educated women are still positioned below college-educated men in the overall wage distribution, growth in inequality at the top puts them at a disadvantage. While women have made much progress, they are still underrepresented in the highest earnings occupations such as finance, and the science, technology, engineering, and mathematics fields. Even when women work in highly paid occupations, their earnings lag behind men (as previous studies of women with MBAs and law degrees have shown). One possible explanation is that as women enter more-demanding occupations, they have hit a "motherhood wall," and they struggle to balance work and family.[9]

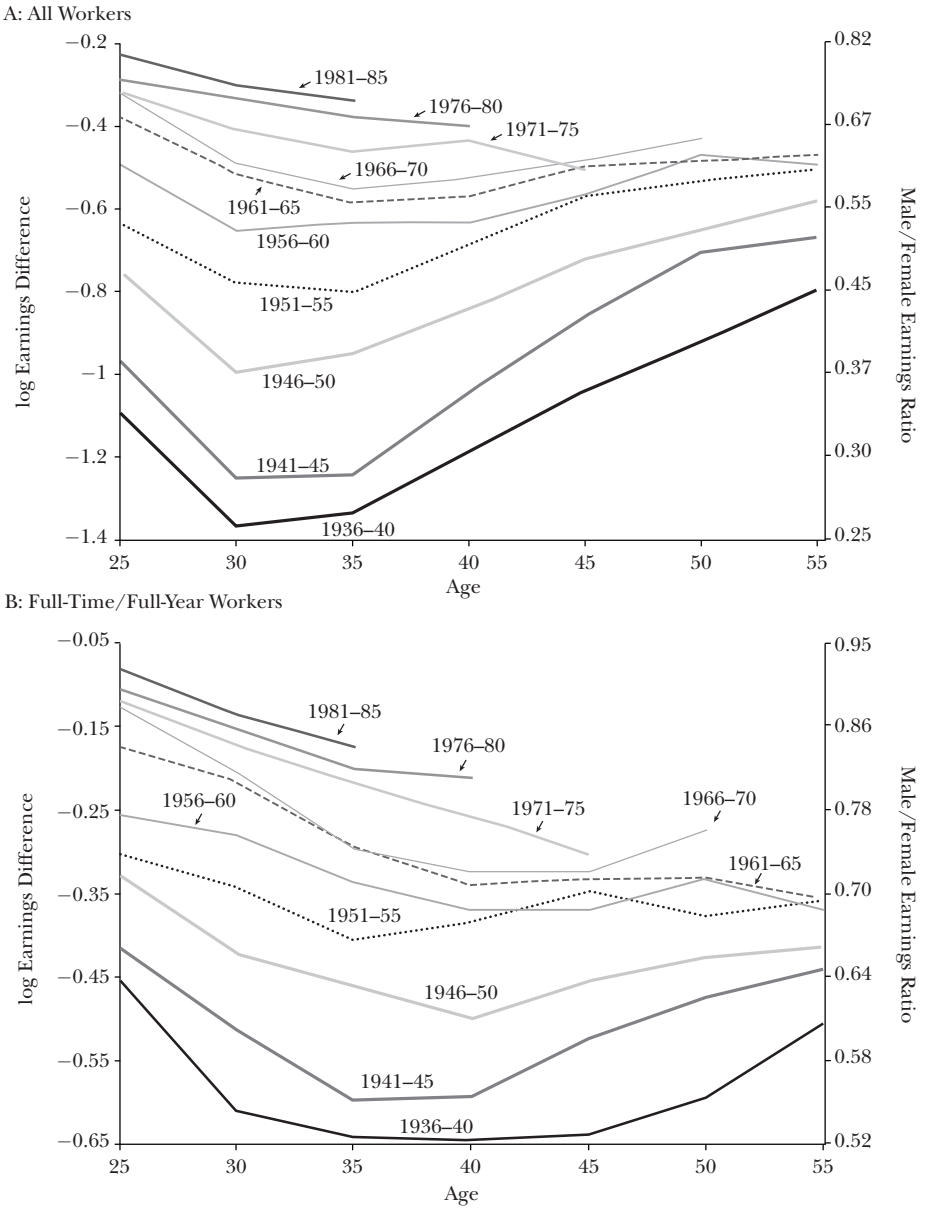
Figure 2 illustrates the varying experiences of five-year birth cohorts spanning the birth years from 1936–1985. The left axis reports the log earnings difference: that is, mean log female annual earnings minus mean log male annual earnings. The right axis shows the exponent of log earnings difference, which approximates female/male earnings ratios. The top panel covers all workers, while the bottom panel covers only full-time/full-year workers. The figures highlight the large gains

[8] Our measure tracks the published series even better if we delete low values that fall below one-half of the 2012 minimum wage on a full-time, full-year basis. Since measurement error in earnings is less of a concern than in constructed hourly wages, however, we forego making this adjustment in our analysis.

[9] The phrase "motherhood wall" is borrowed from a 2010 book by Joan C. Williams, *Reshaping the Work-Family Debate: Why Men and Class Matter.*

Figure 2

Age Profiles of Female/Male Earnings Ratios across Five-Year Birth Cohorts, Born 1936–1985



Source: 1962–2015 March Current Population Surveys.

Notes: The left axis reports the log earning difference, that is, mean log female annual earnings minus mean log male annual earnings. The right axis shows the exponent of log earnings difference, which approximates the female/male earnings ratio. The sample includes prime age workers (1–35 years of potential experience; see notes to Figure 1 for details). The sample used in the top panel includes all workers with nonzero earnings while the bottom panel sample includes only full-time/full-year workers. The figure reports averages over five-year age groups.

each new birth cohort experienced relative to the previous cohort up to the last baby-boomer cohort (those born in 1961–65). Goldin (2006) describes the "Quiet Revolution," which began with baby-boomer cohorts who entered the labor market in the early 1970s. For more-educated women in particular, the notion of a career took shape as barriers to entry fell and women entered elite schools and professional occupations. These cohorts of women were less likely to drop out of the labor force upon marriage and have children than previous generations, and when they did drop out, were more likely to return (as Goldin and Mitchell discuss in this issue). Women's increased labor force attachment is also apparent when we compare gains in annual earnings for all workers, which reflect increases in weeks and hours worked (Figure 2A) to the gains among full-time/full-year workers (Figure 2B). Note that the range of the y-axis scale is much wider for Figure 2A, covering all workers, reflecting the fact that the pace of convergence is particularly strong for this broader sample.

Why has progress slowed across more recent cohorts of women? Among full-time/full-year workers born in 1971 and later, women started at about 0.1 log points behind or at about 90 percent of male earnings at age 25. Remaining occupational differences may explain some of this gap. While women have increasingly entered traditionally male-dominated occupations, they are still underrepresented in some highly paid fields including science, technology, engineering, and mathematics (Ceci, Ginther, Kahn, and Williams 2014).

The relatively small gap upon labor market entry, however, paints an overly optimistic picture of what is to follow. Earnings of women drop relative to those of men as they progress through their career, reaching a low point somewhere around age 30 to 40. The trough occurs at older ages with each successive cohort, but it does not disappear. Among full-time/full-year workers, it is not entirely clear that earnings will recover at later ages among the most recent cohorts. In the following section, we investigate to what extent this drop in relative earnings correlates with marriage and children.

Marriage, Children, and Earnings

To investigate the association between earnings and both marital status and presence of children, we start with the following statistical model:

$$\ln Y_{it} = \beta X_{it} + \gamma^c M_{it} + \pi^c K_{it} + \varepsilon^c_{it}$$

where i indexes an individual, C indexes birth cohort, and t indexes time. The M variable is an indicator for "married." We distinguish between currently married and nonmarried individuals, implicitly assuming "divorced/widowed" and "never married" are equivalent states in terms of their effects on earnings, but our investigation of more-elaborate specifications of the relationship between marriage and earnings yielded similar qualitative results. K actually refers to two parenting-related variables: the number of children less than 18 years old and the presence of a child

younger than six. We top code the count of children at three, because in specifications in which we use a series of dummy variables to control for children, additions beyond age 3 had little additional effect on our estimates. Given this specification, the effect of having a single child aged less than six is given by the sum of the two child coefficients, while the effect of a second child under six or of an older child is given by the coefficient on the count.

In this equation, X refers to other controls, which here include a quartic function in age and indicator variables for education, year, race, and ethnicity. As we will see, adding interaction terms between marital status and ten-year birth cohort dummies allows us to examine how the marriage gap varies across cohorts. We include analogous interactions between children variables and cohort dummies. Prior studies on the family gap have typically included measures of actual labor market experience, thereby parceling out the effects of children that occur through reduced experience. Unfortunately, the Current Population Survey data that we are using does not collect measures of actual experience, so we are unable to do this additional decomposition exercise. The marital status and children coefficients we estimate here should thus be thought of as the gross impact, including the effect of children on women's labor market experience.

We estimate separate regressions for women and men, and for two samples—all workers with nonzero earnings and full-time/full-year workers. The detailed estimates for all coefficients are reported in the online appendix available with this paper at http://e-jep.org. We focus in Table 1 on presenting the cohort-specific associations between earnings, marital status, and the two children variables.

Panel A of Table 1 presents the earnings gap associated with marriage for women and men in our samples. The two left-hand columns of Table 1 are based on all workers with nonzero earnings while the two right-hand columns are based on full-time/full-year workers. Married male workers earn a premium of about 30 log points relative to nonmarried male workers, with only modest change in this cross-sectional relationship across our cohorts. In contrast, married women born in 1936–1945 earned 32 log points less than single women, but that marriage gap declines dramatically and then turns positive across cohorts. Among women born in years 1965–1975, married women earn a premium of 7 log points. The age range for the 1976–1985 cohort in 2014 is 29–39, so results for this group put less weight on earnings differences accompanying marriages and births at older ages than do results for other cohorts, but the available data indicates that the trend continues with that cohort. Among full-time/full-year workers, the size of the initial marriage gender gap as well as the changes across cohorts are more muted, but the basic patterns of a small decline among men and a reversal in sign among women are preserved.

Panel B of Table 1 shows the results from the same regressions but now reporting the effect of having younger children at home, while regressions in panel C report the effects of having school-aged children. Among all women workers, the earnings gap associated with young children declined dramatically from as much as 50 log points for the 1936–45 birth cohort to 23 log points for the 1966–75 birth

Table 1
Earnings Differences Associated with Marriage and Children

	All workers		*Full-Time/Full-Year workers*	
Birth cohort	*Women*	*Men*	*Women*	*Men*
A: Marriage				
1936–45	–0.316	0.331	–0.094	0.201
	(0.006)	(0.006)	(0.005)	(0.005)
1946–55	–0.130	0.368	–0.033	0.198
	(0.004)	(0.004)	(0.003)	(0.003)
1956–65	–0.023	0.340	0.008	0.179
	(0.004)	(0.004)	(0.003)	(0.003)
1966–75	0.069	0.292	0.055	0.150
	(0.005)	(0.005)	(0.004)	(0.004)
1976+	0.099	0.277	0.061	0.139
	(0.006)	(0.006)	(0.005)	(0.005)
B: Child <6				
1936–45	–0.495	0.022	–0.062	0.016
	(0.009)	(0.005)	(0.009)	(0.004)
1946–55	–0.419	0.071	–0.024	0.028
	(0.006)	(0.004)	(0.005)	(0.003)
1956–65	–0.297	0.080	–0.003	0.055
	(0.005)	(0.004)	(0.004)	(0.003)
1966–75	–0.230	0.081	–0.006	0.061
	(0.005)	(0.005)	(0.004)	(0.004)
1976+	–0.161	0.103	–0.013	0.062
	(0.006)	(0.007)	(0.005)	(0.005)
C: Child 6–17				
1936–45	–0.195	0.049	–0.052	0.032
	(0.003)	(0.002)	(0.003)	(0.002)
1946–55	–0.193	0.046	–0.043	0.037
	(0.002)	(0.002)	(0.002)	(0.002)
1956–65	–0.174	0.044	–0.043	0.045
	(0.002)	(0.002)	(0.002)	(0.002)
1966–75	–0.140	0.048	–0.043	0.043
	(0.003)	(0.002)	(0.002)	(0.002)
1976+	–0.132	0.002	–0.041	0.009
	(0.004)	(0.004)	(0.003)	(0.003)

Source: Authors' estimates based on CPS-ASEC 1968–2014 IPUMS-CPS files.
Notes: The estimates are log earnings differences. Estimates are derived from coefficients from specifications (3) and (7) in tables A1 and A2 available in the online appendix for this paper at http://e-jep.org. The samples used include working men and women with 1–35 years of potential experience. Regressions include controls for age, year, birth cohort, and education, as well as marital status and presence of children. Interactions between cohort dummies and marital/child variables are used to estimate changes across cohorts. Standard errors are reported in parentheses. See text for more detail.

cohort, and to 16 log points for the 1976–85 cohort. There have been real reductions in the motherhood gap associated with young children, particularly as women are less likely to withdraw from the labor force and cut back in terms of hours and weeks worked. The effect of having school-aged children also declines, but by a smaller amount, from about 20 log points to about 13–14 log points. Again, patterns among full-time/full-year workers are qualitatively similar although much muted in size. As we will show later, these cross-sectional patterns are likely to overstate the reductions in motherhood gaps as mothers became more positively selected in terms of earnings potential than previously.

How important is the family gap—by which we mean the gender differences in coefficients associated with marital and parental status—in explaining the gender gap? Table 2 shows an Oaxaca-style decomposition of the gender gap. The first column of the table shows the raw gender gap by cohort. The following columns show the cohort-specific predicted gap based on the differences between men and women in the associations illustrated in Table 1. Because mean age in our sample varies across cohorts, we make the comparisons using means at specific ages 30 and 40.

Thus, the first row of the table shows that at age 30 for the full sample, the gender gap in earnings is 1.34 for the 1936–45 birth cohort, (which roughly corresponds to a female/male earnings ratio of 0.26). The gender gap predicted by the difference in marriage coefficients is 0.49 while the gap predicted by differences in children coefficients is 0.52. Thus they account for about 36 and 39 percent of the overall gap, respectively. With each successive cohort, the contribution of marriage to the gender earnings gap has declined. The contributions of children to wage inequality between males and females have also declined, but not as rapidly as the overall gender gap. As a result, the contribution of the child-related variables as a share of the overall gender gap has increased from 39 percent for the oldest cohort to 56 percent for the women born in 1966–75.

The contribution of children to the gender gap is falling somewhat more rapidly at age 30 than at age 40, as shown by the second set of rows in Table 2. This pattern seems due to two effects: first, the gap associated with the presence of a preschool-aged child has fallen dramatically, and women in all cohorts are more likely to have a young child at age 30 than at age 40; second, delayed childbearing has reduced the share of women with a young child at age 30 while having less consistent effects on the child variables at age 40. The overall gender gap is falling more rapidly at age 30 than at age 40, however, so the contribution of children as a share of the total rises similarly at both ages across cohorts.

Panel B of Table 2 shows the parallel results for full-time/full-year workers. The contribution of children to the overall gender gap is much smaller in this sample, reflecting the fact that a large portion of the gender gap related to children stems from reduced hours and weeks of work. However, the stability of children's contributions across cohorts to the gender gap is notable. For women at age 40, the contribution of children is 0.10 for the 1936–45 cohort as well as for the 1965–75 cohort. Again, the predicted gap associated with children has been

Table 2
Contribution of Family Variables in Accounting for the Gender Earnings Gap

		Marriage		*Number of Children*		*Child < 6*	
Birth cohort	*Gender earnings gap*	*Mean*	*Contribution to earnings gap*	*Mean*	*Contribution to earnings gap*	*Mean*	*Contribution to earnings gap*
A. All Workers							
At age 30							
1936–45	1.340	0.752	0.486	1.613	0.394	0.446	0.122
1946–55	0.840	0.670	0.334	1.201	0.287	0.395	0.099
1956–65	0.575	0.631	0.229	1.100	0.240	0.407	0.064
1966–75	0.442	0.583	0.130	1.060	0.199	0.396	0.049
1976–85	0.300	0.526	0.094	0.990	0.133	0.387	0.050
At age 40							
1936–45	1.114	0.721	0.466	1.381	0.337	0.073	0.020
1946–55	0.742	0.683	0.341	1.167	0.279	0.117	0.029
1956–65	0.609	0.662	0.240	1.245	0.272	0.149	0.024
1966–75	0.484	0.643	0.144	1.299	0.243	0.199	0.024
B. Full-Time/Full-Year Workers							
At age 30							
1936–45	0.542	0.649	0.192	1.227	0.103	0.311	–0.002
1946–55	0.340	0.585	0.135	0.909	0.073	0.282	–0.006
1956–65	0.235	0.580	0.099	0.872	0.077	0.326	–0.008
1966–75	0.172	0.549	0.052	0.888	0.076	0.333	–0.004
1976–85	0.135	0.519	0.041	0.850	0.042	0.338	0.010
At age 40							
1936–45	0.632	0.654	0.193	1.187	0.100	0.059	–0.000
1946–55	0.445	0.626	0.144	1.025	0.082	0.097	–0.002
1956–65	0.358	0.618	0.106	1.116	0.099	0.128	–0.003
1966–75	0.307	0.612	0.058	1.189	0.102	0.181	–0.002

Source: Data is from the CPS-ASEC 1968–2014 IPUMS-CPS files.
Notes: Numbers result from a Oaxaca decomposition of the difference in mean log earnings between men and women at the specified age. Coefficients estimates used in the decomposition are based on samples of working men and women with 1–35 years of potential experience. Regressions include controls for age, year, birth cohort, and education, as well as marital status and presence of children. Interactions between cohort dummies and marital/child variables are used to estimate changes across cohorts. See text for more detail.

relatively stable, even as the overall gender gap has shrunk. Children, therefore, account for a growing share of the remaining gender gap.[10]

[10] Our findings echo the conclusions in Waldfogel (1998). She compares cohorts born 1944–1954 in data from the National Longitudinal Survey of Young Women and Young Men and cohorts born 1957–65 from the National Longitudinal Survey of Youth 1979 (NLSY79). At age 30, she finds that family variables—that is, marriage and children together—account for 35 percent of the gender gap in wages for the earlier cohort while accounting for 56 percent of the gender gap in wages for later cohort.

One way to summarize roughly how these patterns have changed across the careers of these cohorts is to take simple averages of our estimates, giving equal weight to estimates for each year of age. Using ages 25–49 for the first four cohorts (for which we have estimates to at least age 49), we find that the career ratio of women's earnings to men's earnings for our full sample rises from 33 percent to 60 percent across those cohorts. The share of the earnings gap accounted for by marriage falls from 41 percent to 28 percent, while the share associated with children rises from 26 percent to 43 percent.

What About Selection?

Up to this point, we have not addressed the possibility that the evolution of earnings gaps might stem from self-selection into marriage and parenting. For example, suppose men with the highest earnings potential were more likely to marry and have children, while women with the lowest earnings potential in the labor market were more likely to marry and have children. This combination of positive selection on earnings among fathers and negative selection on earnings among mothers would cause our estimates to overstate the impact of the family gap. Moreover, changing patterns of selection into marriage among women might plausibly account for at least some of the declining marriage gaps among women. The declining gender gap associated with marriage, for example, may reflect the fact that women with higher earnings are increasingly likely to marry. Isen and Stevenson (2010), Goldstein and Kenny (2001), and Juhn and McCue (2016) find that among recent birth cohorts, the most educated women are the ones most likely to marry—a reversal from earlier cohorts where the most educated women were least likely to marry.

Similar—and likely related—changes in selection have been found with respect to fertility. Baily, Guildi, and Hershbein (2013) find that number of children ever born has increased for the top quartile of the education distribution for women, while continuing to fall among women in the bottom quartile of the education distribution since at least the 1950 birth cohort. A related phenomenon is that childlessness—defined as not having had a live birth by age 41—has been falling among the most educated women since about the 1957 cohort. These patterns suggest that selection into motherhood may have also become more positively related to education and earnings over time.

In Juhn and McCue (2016), we investigate the possible size of such selection effects by using fixed-effects models that are closely related to the cross-sectional results presented earlier. With fixed-effects models, our estimates reflect differences in earnings *for the same individual* between periods when she is married (or has children) and periods when she is single (or has no children at home). This approach purges the estimates of persistent differences in mean earnings between married women and single women, or between mothers and non-mothers. Our specifications include controls for age, so where our fixed-effects estimates show

negative marriage gaps or motherhood gaps for women, this reflects slower wage growth for women relative to their peers during periods when they are married or have children. The difference between the cross-sectional estimates and these fixed effects estimates then provides us with the net effect of selection into marriage and motherhood.

It should be noted that fixed-effects models cannot entirely take account of selection if selection is based on differences in expected earnings trajectories rather than difference in levels of earnings. There is also a possibility of reverse causality here: that is, unanticipated shocks in earnings may sometimes cause marriage or parenthood, rather than having marriage or parenthood affect earnings. For example, men may marry after receiving a promotion or women may decide to have children if they are not promoted. To address this concern, another approach has been to conduct event-study analysis examining the trajectories of earnings before and after marriage or before and after the arrival of the first child.

Our evidence is based on data from Survey of Income and Program Participation (SIPP) panels matched to Social Security Administration earnings records from 1954–2011, and we use essentially the same selection rules that we apply here for the Current Population Survey. These data provide detailed earnings histories that allow us to estimate both cross-sectional effects and fixed-effect models, but we do not have information on hours or weeks worked, so we cannot separately examine full-time/full-year workers. Our last year of earnings data is 2011, so we did not include the 1976–85 cohort in this study.

We modify the earlier model by adding a fixed effect, as in:

$$\ln Y_{it} = \beta^c X_{it} + \gamma^c M_{it} + \pi^c K_{it} + \alpha_i^C + \nu_{it}^C$$

where α_i^C refers to a permanent (unobserved) skill component of earnings. We also incorporate interactions between our marriage variable M and the children variable K, to measure separately the association between children and the earnings of married and nonmarried women across cohorts. Again, detailed results for these regressions appear in the appendix with this paper available on-line at http://e-jep.org.

Table 3 presents the cohort-specific estimates of the marriage earnings gap that condition on parental status. A comparison of the cross-sectional and fixed-effects versions of the estimates provides evidence on the importance of selection for the observed patterns. The cross-sectional estimates, shown in the first three columns, are closest to the estimates in Table 1 though some of the details differ. We present estimates of the gap for three scenarios: women without minor children, women with one child who is less than six, and women with one child aged 6–17. For each group, the marriage earnings gap narrows over time: indeed, the youngest cohort, women born in 1966–75, has a positive gap. The fixed effect estimates, shown in last three columns, illustrate that marriage is still for the most part associated with a negative earnings gap for women. The cross-sectional

Table 3
Marriage Earnings Gap by Parental Status

	Cross-section			*Fixed effects*		
Birth cohort	*No kids*	*Child <6*	*Child 6–17*	*No kids*	*Child <6*	*Child 6–17*
1936–45	–0.237	–0.302	–0.261	–0.277	–0.390	–0.302
	(0.012)	(0.026)	(0.010)	(0.006)	(0.014)	(0.005)
1946–55	–0.122	–0.163	–0.149	–0.160	–0.296	–0.199
	(0.008)	(0.016)	(0.007)	(0.004)	(0.009)	(0.003)
1956–65	–0.034	0.023	–0.029	–0.098	–0.177	–0.136
	(0.010)	(0.017)	(0.008)	(0.005)	(0.009)	(0.004)
1966–75	0.077	0.115	0.060	0.053	–0.073	–0.011
	(0.016)	(0.025)	(0.013)	(0.010)	(0.015)	(0.008)

Source: Authors' estimates based on SIPP data linked to SSA earnings records. Estimates are derived from coefficients from specifications (4) and (9) in table A3 in the online Appendix for this paper at http://e-jep.org. The samples used include working women with 1–35 years of potential experience. Regressions include controls for age, year, birth cohort, and education, as well as marital status and presence of children. Interactions between cohort dummies and marital/child variables are used to estimate changes across cohorts. Standard errors are reported in parentheses. See text for more detail.

estimates are smaller than the fixed effect estimates, suggesting that selection into marriage typically reduces the earnings gap for women. We see a significant decline in the earnings gap across cohorts however, even in fixed effect estimates. For the youngest cohort, women without children now earn a premium upon marriage. Further investigation (described in Juhn and McCue 2016) shows that this result is driven entirely by college-educated women. There is clear evidence that among couples without minor children, marriage has become less associated with specialization.

The earnings gaps associated with motherhood, conditional on whether the mother is single or married, are presented in Table 4. The left-hand columns show the cross-sectional estimates, while the right-hand columns show the fixed effect estimates. A comparison of the cross-sectional estimates in the left-hand columns and the fixed estimates in the right-hand columns shows that the motherhood gap is generally even larger when we take into account selection, particularly when it comes to the effect of having young children among married mothers. Among married women, mothers appear to be somewhat positively selected, while among single women, mothers appear to be somewhat negatively selected. The trends we identified earlier in Table 1 are largely preserved, however, even in the fixed effects estimates. The gap associated with young children has fallen across cohorts, but the gap associated with school-aged children has not. Here we see that it has even risen, so that the overall effect of children has remained more or less stable.

These findings suggest that the decline we observed in the motherhood effect on wages using Current Population Survey data may be somewhat overstated once selection is taken into account. With fixed effects, even among the 1966–75 birth

Table 4
Motherhood Earnings Gap by Marital Status

	Cross-Section		*Fixed Effects*	
Birth cohort	*Single*	*Married*	*Single*	*Married*
A: Child <6				
1936–45	–0.356	–0.421	–0.399	–0.512
	(0.023)	(0.013)	(0.013)	(0.006)
1946–55	–0.326	–0.367	–0.334	–0.470
	(0.014)	(0.008)	(0.008)	(0.004)
1956–65	–0.370	–0.313	–0.340	–0.419
	(0.015)	(0.009)	(0.008)	(0.005)
1966–75	–0.350	–0.312	–0.276	–0.402
	(0.020)	(0.014)	(0.012)	(0.008)
B: Child 6–17				
1936–45	–0.133	–0.157	–0.128	–0.153
	(0.006)	(0.004)	(0.003)	(0.002)
1946–55	–0.157	–0.184	–0.140	–0.179
	(0.005)	(0.004)	(0.002)	(0.002)
1956–65	–0.200	–0.195	–0.167	–0.205
	(0.005)	(0.005)	(0.003)	(0.002)
1966–75	–0.194	–0.211	–0.138	–0.202
	(0.008)	(0.008)	(0.005)	(0.005)

Source: Authors' estimates based on SIPP data linked to SSA earnings records. Estimates are derived from coefficients from specifications (4) and (9) in table A3 in the online Appendix for this paper at http://e-jep.org. The samples used include working men and women with 1–35 years of potential experience. Regressions include controls for age, year, birth cohort, and education, as well as marital status and presence of children. Interactions between cohort dummies and marital/child variables are used to estimate changes across cohorts. Standard errors are reported in parentheses. See text for more detail.

cohort, married women with a young child earn 40 log points less, and married women with school-aged children earn 20 log points less, compared to married women with no children.

To summarize, when no children are involved, there is little evidence that married women earn less than single women among the more recent birth cohorts. In fact, they appear to have a slight earnings advantage relative to single women, similar to what is observed for men. Married mothers have gained on single mothers. They are less likely to reduce hours and weeks as they have in the past. With regards to marriage, specialization has become less important. The presence of minor children, however, remains associated with substantially lower earnings for women, particularly those who are married. While there has been some improvement in terms of the drop associated with having very young children, the drop in earnings associated with motherhood has remained remarkably stable. In this area, it looks like specialization has remained intact.

Of course, an alternative possibility is that reduced specialization has instead taken the form of a diminished or even negative fatherhood premium so that fathers, particularly married fathers, now also experience a negative earnings gap associated with fatherhood. Unfortunately, the data from the Survey of Income and Program Participation has more-limited information on fertility of fathers, so we are not able to perform fixed effect estimates of the gap associated with children for men. But the cross-sectional estimates we present in Table 1 based on Current Population Survey data did not show much evidence of a shrinking fatherhood premium. Also, as cited earlier, recent studies, which typically control for fixed effects, find a small positive impact of fatherhood on men's earnings. Lundberg and Rose (2000) do find that among families where the mother continues working, fathers reduce labor supply. While such changes may be underway, as yet there is no consistent evidence of a changing pattern.

Previous studies have provided more evidence on the evolution of earnings gaps for highly educated women than for other groups, and we would expect career interruptions to be particularly costly for this group given large prior investments and depreciation of skills. Are motherhood gaps as large for less-educated women? In Juhn and McCue (2016), we look at marriage and motherhood gaps across three education groups: a high school degree or less, some college, and college graduate. All groups have declining marriage gaps across cohorts, but in fixed-effect estimates, marriage gaps are larger for less-educated women. With regards to the motherhood gap, the earnings gap associated with young children has shrunk most dramatically among college-educated women. The gap associated with school-aged children for this group, however, has remained surprisingly stable. The motherhood gaps are as large for women with high school or less and women with some college. While the changes have been more dramatic for college-educated women, the same general trends—declining marriage gaps and persistent motherhood gaps—also pertain to less-educated women.

Women have made remarkable progress in terms of acquiring labor market skills and in fact have surpassed men in terms of years of formal schooling. Women have also made progress in terms of labor market participation. Recent cohorts of women are much less likely to permanently leave the labor force upon having children than were previous generations of women. This means that a typical woman now has more years of labor market experience compared to previous cohorts. The life-cycle pattern of earnings is distinct from that of labor force participation however. Women may return to the labor force after having children but their earnings do not return to the promise of earlier trajectories. Since recent cohorts of women postponed childbearing and invested early in their careers, these women have in some sense more to lose in terms of labor market compensation when they are ready to have children. The experiences of the highly educated professional women catalogued in recent papers suggest that the drop in earnings reflects a combination of reduced hours, loss in human capital associated with interrupted careers, and shifts towards less-intensive career tracks.

Maternity Leave and Childcare Subsidies

In her pioneering work on the family gap, Waldfogel (1998, in this journal) pointed to family policies such as paid maternity leave and subsidized childcare as promising ways to close both the family and gender gaps. At the time, women's earnings relative to men's were much lower in the United States than in the Nordic countries with generous family leave policies and publicly provided childcare (like Sweden, Norway, and Denmark), so this argument seemed highly plausible.

But subsequent research has not always produced the expected results. Olivetti and Petrongolo (in this issue) provide a survey of this literature. The impact of family policies on reducing the gender gap appears to be stronger in cross-country studies, but these types of comparisons are likely to confound policies and prevailing social norms which affect both variables. The evidence is much weaker in microeconomic studies where policy changes within countries are investigated. Comparing across types of policies, parental leave versus subsidized child care, they find somewhat stronger case for subsidized child care. This appears to be because in many cases, particularly for longer durations of job protection and paid leave, parental leave policies may reinforce gender stereotypes and discourage hiring and promotion of women.

The experience of Scandinavian countries produces an interesting perspective. While the expansion of family policies may have increased female labor force participation, much of the increase was in part-time work, and women in these countries were less likely to be in management and professional occupations than women in the United States (Blau and Kahn 2013). Indeed, the gender gap in Sweden is larger at the upper end of the earnings distribution, consistent with the notion of underlying factors leading to a "glass ceiling" that limits women from advancing (Albrecht, Björklund, and Vroman 2003). Two recent studies using administrative data on earnings from Sweden and Denmark provide convincing evidence that mothers, but not fathers, have large reductions in relative earnings following the birth of their first child in both countries. Using Swedish data from 1986–2008, Angelov, Johansson, and Lindahl (2016) follow the within-family difference between the earnings of mothers and fathers and find that the earnings gap increases by 32 percentage points and wage gaps by 10 percentage points after birth of their first child. Using similar data for Denmark, Kleven, Landais, and Sogaard (2015) find that 10 years after childbirth, mothers' earnings have fallen 20 percent relative to non-mothers, while fathers' earnings continue to track those of non-fathers. The authors simulate the impact of these within-family gaps associated with children on the overall gender gap and find that their importance to the overall gap grew substantially between 1980 and 2011—rising from 30 percent to 80 percent of the gap. The persistence of children-related wage gaps in these countries with very generous family policies casts doubt on the notion that these policies constitute a panacea that will reduce the gender gap.

It is plausible that adopting family policies and other programs that support working families as they go about the business of bringing up children—an expensive proposition—may improve family and children's well-being. But it is not clear that such policies narrow the gender gap in earnings.

Conclusion

Given women's gains in the labor market, Becker's (1981) seminal model predicts that patterns of specialization should become less gendered. It predicts that the gender earnings gap associated with marriage should fall, and it has. However, the gender earnings gap associated with children has been more persistent, and the proportion of the remaining gender earnings gap associated with children has risen.

The persistent nature of the motherhood gap—particularly among professional women poised for high-paying careers, and among women who have access to generous leave benefits and childcare subsidies—brings home the point that women still devote much more time to child-rearing over the course of their careers than do men with similar human capital characteristics. One set of explanations put forward revolve around social norms that are slow to change and resist economic forces (Fortin 2005; Bertrand 2011; Bertrand, Kamenica, and Pan 2015). Social norms can serve as both push or pull factors. On the pull side, women may still by-and-large identify themselves as the primary caretaker of children. On the push side, work places may still be governed by norms from an earlier era of male breadwinners with stay-at-home wives. According to this set of norms, an employee is a "good" employee only if he or she is married to the job and willing to work long hours. A number of papers have shown that the gender gap is particularly large in jobs that require long hours (Goldin 2014; Gicheva 2013; Cha and Wheeden 2014; Cortes and Pan 2016).

A relevant question is whether these types of workplace practices actually lead to more-productive work places, thereby reflecting optimizing behavior by employers versus lingering practices that have outlived their usefulness. Bloom, Kretschmer, and van Reenen (2011) find that better managed firms institute family-friendly polices, but once the quality of management is controlled for, there is little correlation, either positive or negative, between family-friendly policies and productivity. More work needs to be done in this area.

The predictions of the specialization model—that specialization will be less gendered as men and women look more similar in terms of their productive capacities—point in the direction of a change that is still likely to occur over time, but it appears that closing the motherhood earnings gap may take a while longer.

■ *Any opinions and conclusions expressed herein are those of the author(s) and do not necessarily represent the views of the US Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed.*

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