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Christian Neumeier
University of Konstanz

Todd Sørensen
University of Nevada, Reno and IZA

Douglas Webber
Temple University and IZA

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Implicit Costs of Motherhood over the Lifecycle: Cross-Cohort Evidence from Administrative Longitudinal Data*

The explicit costs of raising a child have grown over the past several decades. Less well understood are the implicit costs of having a child, and how they have changed over time. In this paper we use longitudinal administrative data from over 70,000 individuals in the Synthetic SIPP Beta to examine the earnings gap between mothers and non-mothers over the lifecycle and between cohorts. We observe women who never have children beginning to out earn women who will have children during their 20s. Gaps increase monotonically over the lifecycle, and decrease monotonically between cohorts from age 26 onwards. In our oldest cohort, lifetime gaps approach $350,000 by age 62. Cumulative labor market experience profiles show similar patterns, with experience gaps between mothers and non-mothers generally increasing over the lifecycle and decreasing between cohorts. We decompose this cumulative gap in earnings (up to age 43) into portions attributable to time spent out of the labor force, differing levels of education, years of marriage and a number of demographic controls. We find that this gap between mothers and non-mothers declines from around $220,000 for women born in the late 1940s to around $160,000 for women born in the late 1960s. Over 80% of the change in this gap can be explained by variables in our model, with changes in labor force participation by far the best explanation for the declining gap. Comparing our oldest cohort as they approach retirement to the projected lifecycle behavior of the 1965 cohort, we find that the earnings gap is estimated to drop from $350,000 (observed) to $282,000 (expected) and that the experience gap drops from 3.7 to 2.1 years. We also explore the intensive margin costs of having a child. A decomposition of earnings gaps between mothers of one child and mothers of two children also controls for age at first birth. Here, we find a decline in the gap from around $78,000 for our oldest cohorts to around $37,000 for our youngest cohorts. Our model explains a smaller share of the intensive margin decline. Changes in absences from the labor market again explain a large amount of the decline, while differences in age at first birth widen the gap.

JEL Classification: J11, J13, J16, J17

Keywords: family gap, opportunity cost of children, gender pay gap

Corresponding author:
Todd Sørensen
Department of Economics
University of Nevada, Reno
1664 N. Virginia Street
Reno, NV 89557
USA

E-mail: tsorensen@unr.edu

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1 Introduction

The gender wage gap, and its evolution over time, is among the most studied topics at the intersection of economics and demography. One often touted explanation for this phenomenon is the variety of constraints typically placed upon women as a result of motherhood, generating what the literature refers to as the 'family gap', or the earnings gap between mothers and non-mothers. The historical lack of family-friendly labor market policies in the United States, likely widening the family gap, is cited as one reason that the U.S. has a large gender wage gap relative to many other developed countries (Waldfogel, 1998).

The U.S. Department of Agriculture has calculated the explicit costs of raising a child since 1960, when children were estimated to cost parents around $202,000 in 2015 dollars. Since 1960 the average costs have increased by roughly 25%.[1] Much less is known however about the implicit costs of having a child, arising from factors such as foregone earnings and altered labor market behavior. The relationship between motherhood and labor market outcomes is undoubtedly complex, operating through a number of different channels. These channels include direct effects, such as lost earnings from reduced labor supply, as well as indirect effects, such as reduced earnings potentially resulting from foregone experience or education. Existing research has focused on uncovering what share of the family gap can be attributed to each of these factors. However, previous data limitations have typically forced researchers to focus either on a single cross-sectional snapshot of earnings or to follow one cohort over time. Here, we contribute to this literature by analyzing the SIPP Synthetic Beta (SSB), a novel data source which links several decades of administrative earnings records to detailed survey data. The SSB allows us to comprehensively examine how factors that contribute to the family wage gap have changed across cohorts and

[1] https://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2014/08/0179.xml

over the lifecycle.

The main contribution of this paper is to leverage the nature of the rich SIPP Synthetic Beta dataset in order to examine earnings over the lifecycle for over 70,000 women and to compare the family gap across five different birth cohorts that span nearly a quarter century. We first document the size of the family gap and how it has changed across cohorts. Our data allows us to observe the evolution of the gap in cumulative earnings and experience in four 5-year birth cohorts and one 4-year birth cohort spanning the years 1945 to 1968. For our oldest cohort, lifetime gaps between mothers and non-mothers exceed $350,000 by age 62. The lifetime earnings of women who never have children ("never-mothers") begins to exceed the lifetime earnings of mothers by their mid-twenties; the gap increases as the women age. A key driver of this is likely the higher labor force participation rates of never-mothers. Higher participation will yield higher lifetime earnings directly, and also indirectly through increased future earnings from higher levels of labor market experience. Indeed, cumulative labor market experience profiles demonstrate that the experience gap increases between mothers and never-mothers over the lifecycle (in 169 of 171 cohort/age observations). While this is true across cohorts, the magnitude of the gap between mothers and non-mothers in both experience and income at a given age declines as we move from older to younger cohorts.

Comparing cumulative earnings for all birth cohorts up to age 43 (the oldest age at which we have data from all cohorts) in the lifecycle, we find gaps ranging from around $220,000 for our earliest cohorts to less than $160,000 for our more recent cohorts. We then decompose the sources of the family gap to explore the relative contribution of various factors, including years of marriage, educational attainment, years of labor market experience and some demographic control variables. For each cohort, these variables always explain nearly three quarters

of the gap. In addition, over 80% of the change in this gap over time can be explained by variables in our model, with changes in labor force participation by far the best explanation for the declining gap. We also explore changes in the opportunity cost of having a child along the intensive margin. A decomposition of earnings gaps between mothers of one child and mothers of two children reveals a decline in the gap from around $78,000 for the oldest cohorts to around $37,000 for the youngest cohorts. Our model explains a smaller share of the intensive margin decline, but changes in absences from the labor market again explain a large amount of the decline.

The paper proceeds as follows. Section 2 discusses the relevant literature. Section 3 describes the data and presents some initial descriptive statistics. Section 4 presents our full set of results, Section 5 discusses the results and Section 6 concludes.

2 Literature Review

The so-called family gap describes the disparity in earnings between mothers and non-mothers. While this literature is too large to allow for a summary of every study, the discussion below reviews the research that is most closely related to our work.

Korenman and Neumark (1992) is arguably the closest paper in terms of research question to our study. This key study decomposes the family gap into direct and indirect impacts. Indirect impacts work through the mechanisms of experience and job tenure, while direct impacts are defined as the causal effect of children on earnings when the above are controlled for. Using both fixed effects and instrumental variables strategies, Korenman and Neumark (1992) find evidence of both types of impacts.

The family gap is often framed as an important determinant of the gender

pay gap. Indeed, Kleven et al. (2015) conclude that nearly the entire contemporaneous gap in earnings between men and women can be attributed to either direct or indirect (e.g. occupational choice) effects of having children. Webber (2016) shows that women who have children face greater job mobility constraints than men, which explains part of the gender pay gap. Additionally, Kleven and Landais (2016) shows that the differential penalty that women face for having children persists across many countries, and has strong implications for women in an economic development context.

Our study also builds upon a body of work examining the impact of timing of first birth on the family gap. Unsurprisingly, this literature generally finds that postponement of fertility reduces the family gap (Gustafsson et al., 1996; Hotz et al., 2005; Miller, 2011). This finding works through both a direct causal effect (Miller, 2011), increased human capital accumulation (Troske and Voicu, 2013), and reduced future fertility (Heckman et al., 1985; Heckman and Walker, 1990).

One important mechanism through which the family gap may operate is through changes in labor force participation at either the extensive or intensive margins. The seminal paper on the labor supply impact of children on their parents is Angrist and Evans (1998), which uses the gender composition of a couple's first two children as an instrumental variable for the decision to have a third child. They find, consistent with more recent work (Budig and Hodges, 2010), negative labor market impacts that are concentrated among lower-skilled and lower-educated mothers. Work by Agüero and Marks (2011) uses infertility as an instrument for family size and finds effects on the type of work that a mother undertakes, though not on labor force participation. Either finding could imply negative wage effects of motherhood.

While most studies find evidence of multiple mechanisms driving the family

gap, it is important to note that Lundberg and Rose (2000) ascribe the entire gap in earnings between mothers and non-mothers to interruptions in labor market activity. Our data will allow us to not only assess how much of the gap is driven by interruptions, but also to see how this mechanism has changed across cohorts.

Two of the main contributions of our paper, facilitated by the rich SIPP Synthetic Beta dataset, are the ability to 1) precisely examine labor market outcomes for tens of thousands of women relatively late into the lifecycle and 2) make a comparison of the family gap across five groups of birth cohorts. While a number of excellent papers have utilized longitudinal data to examine the family gap (Lundberg and Rose, 2000; Anderson et al., 2003; Sigle-Rushton and Waldfogel, 2007; Miller, 2011), these studies are generally constrained by the survey window as well as by smaller sample sizes. As a result, these studies often examine impacts of child rearing on a smaller group of mothers only up through their mid-thirties. In terms of cross-cohort comparisons utilizing longitudinal data, we are aware of only one other study, Avellar and Smock (2003), which has examined more than one birth cohort. Their study examines two birth cohorts, and finds no change in the size of the family gap between them.

3 Data and Methods

The data used in this study come from the SIPP Synthetic Beta (SSB), which matches nine panels between 1984 through 2008 from the Survey of Income and Program Participation (SIPP) with administrative earnings records from the Social Security Administration. The surveys were conducted in 1984, 1990, 1991, 1992, 1993, 1996, 2001, 2004 and 2008 and yield over 70,000 observations for our analysis. The matched Social Security data provides information on earnings from 1951 through 2011 for years preceding and following an individuals

participation in the SIPP. In addition to the rich labor market information from the Social Security Administration, the SSB also supplements survey data with administrative fertility data on women. Specifically, the data gives the date of birth for first and last born children, as well as the number of children ever born.[2] The longitudinal nature of this data thus allows us to follow employment and earnings outcomes for women and estimate how these outcomes covary with the beginning of motherhood.

This rich dataset only became widely available to researchers recently, and we feel it is a promising datasource for future economic and demographic research. To date, less than 20 studies have been published using data from Cornell's Synthetic Data Server.[3] One study has examined gender issues (Bertrand et al., 2015), but none have studied the family gap. Preliminary analysis of the data is conducted on the Synthetic Data Server (SDS) housed in Ithaca, NY. Once researchers have written files (the present manuscript was analyzed in Stata) which run successfully on the synthetic data, these same files are then given to the Census Bureau to be run on the actual data. Results from this analysis are then returned to the researcher after a careful review from a disclosure officer who certifies that no private information is present in any output. In this way, researchers are able to gain access to highly sensitive data without actually viewing the data themselves, thus eliminating risks to privacy and also reducing the administrative burden on researchers who wish to access the data.

Our analysis includes earnings from ages 18 through 65, inclusively. Our study focuses on women who are at least 40 years of age in the first year they

[2]The variables about the child's birthdate come from administrative records. Both variables were created by first looking for biological children on the SIPP household roster. In order to include cases where children lived outside the household, both variables were replaced by reported values of mothers if the total number of children in the household roster was smaller than the reported number of children.

[3]This includes data from both the SSB as well as the SynLBD: https://www2.vrdc.cornell.edu/news/synthetic-data-server/sds-bibliography/

appear in the SIPP survey, in order to best capture completed fertility.[4] Since the fertility topical module is administered in the second year of SIPP participation, this ensures that our entire sample was either 40 or 41 (depending on the month of the year they were born) at the time they completed the fertility questionnaire. As our most recent survey year was in 2008, the 1965-68 birth cohort is thus the youngest cohort we study. We begin our analysis with the 1945 cohort.[5] We group our birth cohorts into three five year bins and one four year bin: 1945-1949, 1950-54, 1955-59, 1960-64, and 1965-68. We term these cohorts 1945, 1950, 1955, 1960 and 1965, respectively. Sample sizes for each cohort vary because of our sample restriction requiring the fertility topical module to have been completed after age 40. The 1945, 1950, 1955, 1960 and 1965 birth cohorts contain 21,800, 20,399, 15,697, 11,292, and 3,357 women respectively.[6]

The SIPP data offers us two datasets containing administrative records of social security earnings, one dataset that reports uncensored earnings, and one dataset which top-codes earnings to the earnings ceiling for earnings that are covered by Social Security in a given year.[7] We choose to use the top-coded version of the data, as earnings date back to 1951, easily allowing us to examine earnings for 1963, the year in which our oldest birth cohort turned 18. Employing the non-top-coded data, which begins in 1979, would entail eliminating all women born before 1961, thus cutting a majority of our cross-cohort observations. Fortunately (from a research perspective), in the synthetic data, we never observe more than 1% of women in our sample having top-coded earnings.

[4] Lifetime fertility information is collected during the fertility history topical module. Detailed information on how the fertility history variables are computed can be found in Reeder et al (2015).

[5] We choose this cutoff year because World War II provides a natural break point, and there is incomplete data on fertility for women who were older than 65 at the time of the survey.

[6] The sample sizes are not always integers due to the multiple imputation process, and are rounded to the nearest whole number.

[7] In recent years, roughly 94% of all workers had earnings below the Social Security maximum. Given that our sample focuses exclusively on female earnings, the proportion of our sample which is top-coded is quite small. See Table 4b at the following link for historical data on top-coding: https://www.ssa.gov/policy/docs/statcomps/supplement/2013/4b.pdf

Table 1 presents summary statistics on the key variables that we employ. We see cumulative income (up to age 43) monotonically decreasing with family size, along with years of labor market experience.[8] The summary statistics also suggest that education, measured at the time of the survey, is negatively correlated with family size. Unsurprisingly, women who have more children began having children at a younger age and have spent more of their lives married. Differences across other demographic variables suggest that these variables will be important to control for. We also observe that women who have had three or more children on average have had 3.66 children. We check the representativeness of the SIPP in this dimension by referring to the 1990 Census, which was the last year in which total fertility was included in the survey. When we consider the 1945-1949 birth cohorts in this data, the only birth cohorts in our sample who had reached age 40 by the time of the survey, we find a nearly identical average family size of 3.69 for women who had three or more children. Additionally, the shares of women having no children, one, two and more than two children are 15%, 16%, 36% and 33%, respectively. In our data, the respective shares across all cohorts were 17%, 16%, 35% and 31%.

We use a straightforward (Oaxaca, 1973) decomposition to analyze the various contributions to the family gap over time. When decomposing the gap between mothers and never-mothers, our control variables include cumulative experience, cumulative experience squared, education at time of survey categorical indicator variables[9], an indicator for Latina ethnicity, an indicator for a foreign born individual, cumulative years of marriage at age 43, and an indicator variable for women reporting their race as African-American. When we consider earnings gaps among mothers with different numbers of children, we

[8] Experience is defined as a year with non-zero social security earnings.

[9] We include three indicators for women's highest completed level of education: high school degree, some college and college graduate. Less than a high school degree is the omitted reference group. This approach, rather than the use of years of education, was necessitated on account of the SIPP data not reporting years of education.

also include a variable that measures the mother's age at the birth of the first child.

4 Results

We now present some initial findings on the lifetime family gap. Figure 1 informs us about the total earnings gap up to age 43, the oldest age for which we observe data on all birth cohorts in our sample. The figure suggests that the family gap has narrowed considerably between cohorts, dropping by roughly 30% from $220,000 to $158,000. While the gap is still substantial, it implies that, during their mid-forties, mothers in the youngest cohort faced a cumulative earnings gap with never-mothers of their generation that was over $60,000 less than the gap that mothers in the oldest cohort faced.[10] While a simple comparison is clearly not causal, the magnitude of this change is significant as it suggests that the implicit cost of having a child has dropped substantially between the cohorts that we study.

Figure 2 explores how the family gap between mothers and never-mothers varies by age. Understanding how the gap evolves over the lifecycle may help to illustrate how important the timing of birth and absences from the labor force are relative to the role of selection. The earnings gap is displayed in a different series for each of our five cohorts.[11] We see relatively small gaps between mothers and never-mothers of a given cohort at younger ages, suggesting that selection into motherhood plays a relatively small role on earnings. However, we see a widening gap between mothers and never-mothers as women pass through their mid-twenties. This gap continues to widen throughout the lifecycle, though

[10] We are able to reject a null-hypothesis of no change in the average gap with greater than 99% confidence.

[11] Our data was cleaned so that our main analysis preserved a consistent sample of women who were in the dataset up to age 43. When we analyze earnings or experience beyond age 43, we do see a small amount of attrition in our sample, ranging from 5.3% up to age 62 for never mothers in the oldest cohort, to only 0.5% to age 47 for the 1950 birth cohort.

the gap begins to grow at a decreasing rate after women enter their late 30's. By the time the oldest birth cohort reaches their early 60s, the family gap has grown to $350,000. Although we do not observe the younger cohorts at these ages, a simple projection based on the time periods that we do observe implies that by their early 60s, the gap for the 1950, 1955, 1960, and 1965 birth cohorts will be $324,000, $311,000, $287,000, and $282,000 respectively.[12]

Figure 3 plots the average cumulative experience gap for each cohort across the lifecycle. We focus specifically on experience because (as we will show below) it is by far the dominant factor in both the magnitude at a point in time and the change over time in the family gap. The cumulative experience gap has declined substantially across cohorts, dropping by nearly one and a half years from the oldest to the youngest cohort at the latest age for which we observe all cohorts. Of particular note is that while we examine five-year birth cohorts, the patterns seem to cluster more around decade of birth, with distinct differences between women born in the 40's, 50's, and 60's, but little divergence within each decade. Since the data for experience used in this study is binary (measuring whether an individual receive labor market earnings in a given year), rather than continuous (e.g. hours worked), it is likely that this graph understates the true experience gap between mothers and never-mothers. When we project experience gaps out to age 62, we find that the gap has narrowed from 3.7 years of experience for our oldest cohort to 2.9, 2.8, 2.3 and 2.1 years for our 1950, 1955, 1960 and 1965 cohorts, respectively.

Table 2 analyzes the sources of the cumulative family gap between never-mothers and mothers across birth cohorts. We use a standard Oaxaca decomposition to analyze the relative contributions of each factor. Variables included in the model are race, ethnicity, foreign born status, years of marriage and

[12] We obtain these projections by taking the average growth rate of the gap at a certain age across all previous cohorts for which we have actual data.

educational attainment indicator variables, experience and experience squared. The table displays the cumulative gap between mothers and never-mothers. In all decompositions, women with fewer children are the omitted reference group. In the framework of a Oaxaca decomposition, the explained gap in labor market outcomes between mothers and never-mothers results from a weighted sum of differences in the means of the included variables, where regression coefficients comprise the weights. The portion of the explained gap that is driven by the educational indicator variables may reflect either differential selection into motherhood or child induced educational interruptions. The explained gap that is attributable to the experience variables captures the long-run effects of experience differences between mothers and never-mothers. Each row in the table represents a cohort. The first column displays the total gap. The second column presents the residual unexplained gap, the third column gives the total explained gap, and the next four columns further break down the explained gap between the groups of explanatory variables. Standard errors are reported for estimates of the total gap, explained gap and unexplained gap.[13]

The total gap in cumulative income between mothers and never-mothers dropped by nearly 30% ($220,000 to $158,000) over the twenty years between our oldest and youngest birth cohorts; this change is significant at the 1% level. The unexplained gap stayed more or less constant throughout our sample, though it became more variable and was not statistically significantly different from zero for the youngest cohort.[14] The explained gap declined significantly in

[13]Our analysis is restricted by a "privacy budget" that binds after a certain amount of information is extracted from the confidential data at Census. On account of this cost of extracting data, we did not extract most variable means at the cohort level nor did we extract estimates on individual variables. While the canned Oaxaca command reports standard errors on the explained portion attributable to each variable, many of the columns in the table are the summation of the explained portion attributed to more than one variable (for example experience and experience squared). Thus we did not extract this information and we do not have enough information to apply the delta method in order to calculate standard errors.

[14]It is important to note that the standard error of the estimate of the unexplained gap is nearly twice as large for the 1965 cohort as it is for the 1960 cohort; the sample size for the 1965 cohort is over 70% smaller. The unexplained gap is thus significant for all other cohorts

unison with the total cumulative income gap. In other words, we can attribute roughly the entire change in the family gap to observable factors. Based on the final four columns, nearly the entire drop in the explained family gap ($47,000 out of $51,000 between the youngest and oldest cohorts) can be attributed to changes in labor market experience rather than other factors such as education. Measured at age 43, the experience gap between mothers and never-mothers declined by about one and a half years in the labor force between the oldest and youngest birth cohorts in our sample.

Rather than comparing all mothers to women who never have children, Table 3 examines the marginal cost of increasing family size from no children to one child. Mothers of 1 child born in the 1945 birth cohort had a cumulative income deficit (through age 43) of $109,000 relative to women who never had children. This gap declined to $86,000 for those born 20 years later.[15] As before, differences in labor market experience are the dominant factor in explaining both the level and change over time in this income gap.

Table 4 looks at the margin between mothers of one child and mothers of two children, also adding age at first birth as an explanatory variable.[16] The gap in cumulative income between these two groups has dropped by more than 50% between the oldest and youngest birth cohorts ($78,000 to $37,000).[17] The narrowing experience gap between mothers of one and two children accounted for the majority of the change between cohorts ($24,000 of the $31,000 decline in the explained gap). The results on age at first birth are also informative, showing an

examined.

[15] Here again we have a smaller sample size for the 1965 cohort that is nearly 70% smaller than the 1960 cohort. While we cannot reject a null of no change in any of the gaps between the 1945 and 1965 cohorts, we are able to reject a null of no change in the total and explained gaps at the 10% level when we compare the 1945 cohort to the 1960 cohort.

[16] Changes in timing of birth may have also affected gaps between mothers and never-mothers, but there was no straightforward way in which this variable could be included in a standard decomposition as this variable is not defined among never mothers.

[17] Here, we are able to reject nulls at the 10% level of no change in the total and unexplained gap between the 1945 and 1965 cohorts and of no change in the explained gap between the 1945 and 1960 cohorts.

increase in the gap that is attributable to this variable. Our summary statistics show that mothers of one child typically give birth to their first (and only child) at a later age than do mothers of two children. Given a premium to delayed child birth, our results are consistent with both a widening gap in age at first birth for these two groups as well as an increased premium to delayed child birth. In the absence of these changes, the closing in the gap between these two groups would have been nearly 40% larger.

It goes without saying that the figures presented above should be interpreted as descriptive rather than causal; the novelty of this study lies in the richness of the data and the ability to make cross cohort comparisons not present elsewhere in the literature.

5 Discussion

Overall, the above evidence points to the gap in labor market experience as the main driver of the gap between never-mothers and mothers in families of all sizes, consistent with the prior literature (Korenman and Neumark, 1992). Moreover, we find that experience is also the key factor which explains the change in the family gap over time. This is consistent with the finding in Lundberg and Rose (2000) the differences in experience explain nearly all of the family gap. When comparing our oldest and youngest cohorts, we find a decline in the motherhood gap of approximately $62,000, $47,000 of which is attributed to experience in our decomposition. Experience gaps can have both direct effects in the short run (direct earnings loss during absences from the labor market) as well as additional indirect effects in the long run (lower earnings on account of less accumulated experience after returning to the labor market). Our results provide evidence regarding which effect is larger in our data: we also observe a decline in the experience gap at age 43 of 1.4 years (from 3.2 to

1.8) between these two cohorts. The average annual earnings of mothers in the youngest cohort were approximately $25,000. Thus, we can attribute $35,000, or nearly three quarters, of the effect of experience directly to earnings lost during absences from the labor market.

While other factors, such as educational attainment, are certainly important predictors of the family gap, the magnitude is only a fourth that of the loss of experience. Some of this increase in labor force participation of mothers may be attributable to increasing returns to experience (Olivetti, 2006). Accordingly, the most effective way to reduce the family gap, and by extension a good way to reduce the gender gap in earned income, is to implement labor market policies which are aimed at reducing the "cost" of working while also raising children as well as decreasing firms' ability to discriminate against female workers on account of childbearing. These policies may include direct payments from the government to the individual such as a child-care tax credit or policies which mandate or incentivize employers to offer family-friendly workplace programs such as paid maternity leave, flexible work schedules, job sharing, or telecommuting, among others. Anti-discrimination policies, such as the 1978 Pregnancy Discrimination Act, have also been found to increase labor force participation (Mukhopadhyay, 2012).

In addition to the many direct mechanisms we have discussed which contribute to the family gap (and by extension the gender pay gap), many other channels exist which we are unable to measure in the current study (and thus likely show up in the unexplained portion of the decomposition) but are still in line with our recommendation of family-friendly policies. For instance, Webber (2016) finds that 60% of the labor market penalty due to mobility constraints is due to marital (20%) and fertility (40%) status.

It is useful to provide some context to our main estimates before we conclude.

First, it is important to note that the gap in lifetime earnings between mothers and non-mothers has decreased overtime. At the same time, it is also important to recognize that the persisting gap still represents several years of earnings and is attributable to direct lost earnings from labor market absences as well as from indirect effects from lost experience during labor market absences. A decomposition of pre-childbearing gaps suggests that selection alone may not explain the entire remaining gap.

A comparison in changes in our estimates of the *implicit costs* of motherhood are also contextualized with a comparison to estimates in changes of the *explicit costs* of motherhood. As mentioned earlier, USDA estimates of the explicit costs of raising a child have risen substantially since this figure was first computed in 1960. The annual average increase in the real cost of a child has been around 0.4%. Interpolating between 1960 and the most recent estimate, and extrapolating back to 1945, we estimate that the explicit cost of raising a child increased by around $16,000 between our oldest and youngest cohorts. This is smaller than our point estimates of the increase in the implicit costs of raising a child, though these are not estimated precisely enough to reject a null hypothesis of no overall change in the cost of raising a child. This provides evidence that decreases in fertility are driven by a decreased taste for childrearing, rather than by increased costs. However, this does not suggest that it is not important in explore enacting policies that will decrease the cost of raising children. Indeed, if policy makers wish to increase fertility in the developed world at the same time that tastes and preferences are leading couples to have fewer children, it is necessary for policy makers to lower the cost of raising a child.

6 Conclusion

In this paper we provide arguably the most comprehensive evidence of how the family gap (and the factors which influence it) has evolved over time in the U.S. The figures presented above provide a detailed picture of the implicit costs of having a child. An understanding of which factors drive the family gap, and how these have changed over time, is important for both researchers (the family gap is a large contributor to the gender pay gap) and policymakers (knowing what factors are important allows for better targeting of labor market policies).

We utilize a unique panel dataset which links a traditional labor market survey, the Survey of Income and Program Participation (SIPP) to over 50 years of administrative earnings records. This allows us to follow individuals for decades before and after they appeared in the SIPP, and enables us to trace out lifecycle earnings paths for multiple birth cohorts.

Comparing cumulative earnings for all birth cohorts up to age 43 (the oldest age at which we have data from all cohorts) in the lifecycle, we find that the indirect costs of having children have dropped along several different margins. Comparing mothers and never-mothers, we find a gap of $220,000 for our earliest cohort, born between 1945 and 1949, compared to less than $160,000 for the cohorts born twenty years later. While we only observe the labor market earnings of our oldest cohort in their 60's, the family gap grows to approximately $350,000 as this cohort nears retirement. If we project lifecycle returns of our most recent cohort out to this point, we would expect the family gap to have declined to around $282,000 for our youngest cohort. Additionally, an analysis of cumulative earnings gaps to age 43 between mothers of one child and mothers of two children reveals a decline in the gap from around $78,000 for the oldest cohorts to around $37,000 for the youngest cohorts, though these gaps are less precisely estimated than the gaps between all mothers and never-mothers.

We then decompose the sources of the family gap to explore the relative contribution of various factors, including years of marriage, educational attainment, years of labor market experience and some demographic control variables. For each cohort, these variables always explain nearly three quarters of the gap. In addition, over 80% of the change in this gap between the oldest and youngest cohorts can be explained by variables in our model, with changes in labor force participation by far the best explanation for the declining gap.

Whether we look at the family gap within a cohort, or the change in the gap across cohorts, labor market experience is the dominant factor. From a policy perspective, the results clearly point to family-friendly labor market policies as the most effective way to reduce the family gap.

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Figure 1: Income until age 43

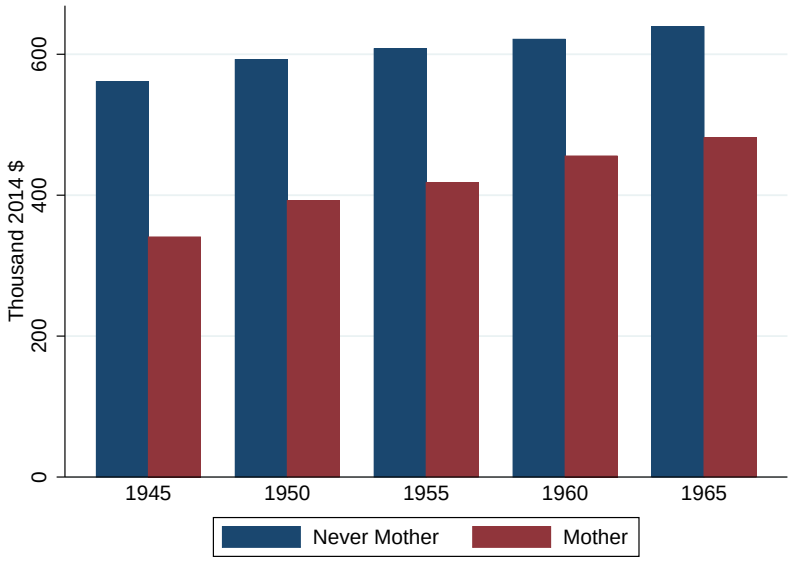

Figure 2: Running Income Gaps

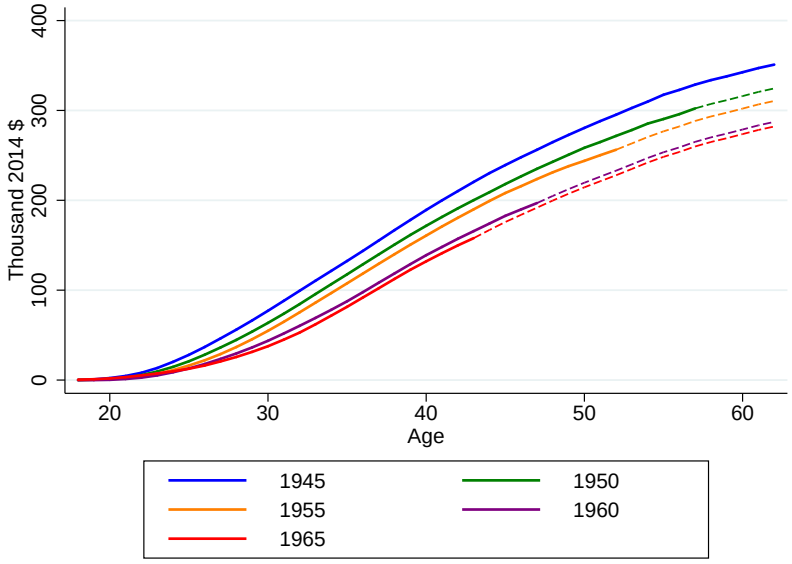

Figure 3: Running Experience Gaps

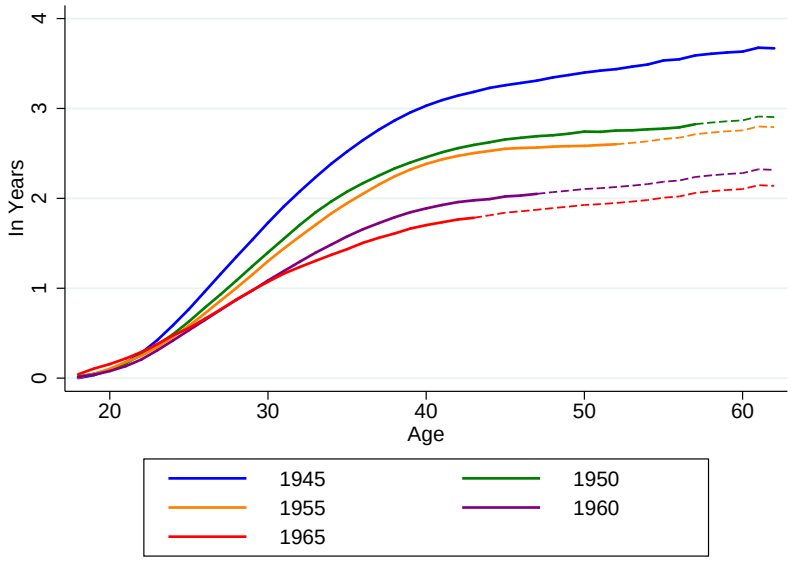

Table 1: Summary Statistics

	No Child	One Child	Two Children	Three or More Children
Cummulative Income	594.51	498.08	430.24	304.77
	(421.33)	(378.54)	(351.52)	(301.09)
Years Labor Market Exp	19.85	19.02	17.94	15.37
	(7.00)	(7.02)	(7.00)	(7.45)
Educ HSD	0.05	0.07	0.07	0.17
	(0.23)	(0.25)	(0.25)	(0.38)
Educ HSG	0.25	0.31	0.32	0.34
	(0.43)	(0.46)	(0.47)	(0.47)
Educ SC	0.33	0.36	0.35	0.32
	(0.47)	(0.48)	(0.48)	(0.47)
Educ CG	0.37	0.26	0.25	0.17
	(0.48)	(0.44)	(0.44)	(0.38)
Age at First Birth		26.62	24.06	21.48
		(6.33)	(5.18)	(4.44)
Years Married	8.91	14.53	17.53	17.90
	(8.84)	(7.98)	(7.03)	(7.35)
Race White	0.83	0.79	0.83	0.77
	(0.37)	(0.41)	(0.38)	(0.42)
Race Black	0.11	0.14	0.11	0.16
	(0.32)	(0.35)	(0.31)	(0.36)
Race Other	0.05	0.07	0.06	0.07
	(0.23)	(0.25)	(0.24)	(0.25)
Hispanic	0.05	0.06	0.07	0.14
	(0.22)	(0.24)	(0.25)	(0.34)
Foreign Born	0.09	0.11	0.11	0.15
	(0.28)	(0.32)	(0.31)	(0.36)
Number Children	0.00	1.00	2.00	3.66
	(0.00)	(0.00)	(0.00)	(1.10)
Observations	12,408	11,762	25,525	22,798

Table 2: Results from Oaxaca decomposition between Never-Mothers and Mothers

Cohort	Delta Y	Delta U	Delta E	Exp	Educ	Years Mar	Demographics
1945	220.43	34.30	186.13	152.07	26.83	8.13	-0.90
	(9.31)	(6.48)	(8.97)				
1950	200.15	35.98	164.17	131.26	30.78	3.50	-1.37
	(11.96)	(7.78)	(10.84)				
1955	189.95	31.93	158.02	123.62	31.85	5.03	-2.48
	(12.65)	(8.91)	(12.93)				
1960	165.67	42.66	123.01	95.38	34.30	-4.54	-2.13
	(13.02)	(10.53)	(13.57)				
1965	157.88	22.65	135.23	105.47	26.16	13.38	-9.77
	(22.22)	(20.27)	(23.38)				

Delta Y represents the total gap in earnings between never-mothers and mothers, Delta E presents the part of the gap that can be explained by the observable factors in our model, Delta U is the part of the gap that cannot be explained by any of these factors. The remaining columns break down the contribution to the explained gap into years of labor market experience (experience and experience squared), years of marriage, education categories, and demographic indicators (race, ethnicity and foreign born).

Table 3: Decomp: Gap between Never-Mothers (base group) and Mothers of 1

Cohort	Delta Y	Delta U	Delta E	Exp	Educ	Years Mar	Demographics
1945	108.88	33.96	74.92	54.88	14.89	5.64	-0.49
	(12.32)	(6.69)	(10.43)				
1950	93.14	28.01	65.13	41.58	21.30	2.50	-0.25
	(10.88)	(7.11)	(9.45)				
1955	102.46	23.51	78.95	52.78	22.92	3.45	-0.20
	(12.69)	(9.16)	(10.84)				
1960	74.40	25.88	48.51	28.18	25.29	-3.07	-1.88
	(14.01)	(11.09)	(12.00)				
1965	86.31	36.72	49.59	35.57	13.54	8.93	-8.45
	(27.79)	(20.55)	(23.47)				

Delta Y represents the total gap in earnings between never-mothers and mothers, Delta E presents the part of the gap that can be explained by the observable factors in our model, Delta U is the part of the gap that cannot be explained by any of these factors. The remaining columns break down the contribution to the explained gap into years of labor market experience (experience and experience squared), years of marriage, education categories, and demographic indicators (race, ethnicity and foreign born).

Table 4: Decomp: Gap between Mothers of 1 (base group) and Mothers of 2

Cohort	Delta Y	Delta U	Delta E	Exp	Educ	Years Mar	Demographics	AFB
1945	77.75	6.87	70.88	62.80	1.95	0.91	0.41	4.81
	(7.58)	(4.80)	(6.50)					
1950	76.92	12.35	64.57	54.96	1.92	-0.14	0.70	7.12
	(9.98)	(5.75)	(8.06)					
1955	47.46	4.51	42.96	34.21	2.09	-1.34	-0.32	8.33
	(11.80)	(6.66)	(10.85)					
1960	55.43	16.69	38.74	37.82	-1.84	-7.14	0.67	9.22
	(12.70)	(8.52)	(11.20)					
1965	36.77	-22.80	59.56	38.82	2.50	-1.58	-0.66	20.49
	(22.53)	(16.36)	(18.59)					

Delta Y represents the total gap in earnings between never-mothers and mothers, Delta E presents the part of the gap that can be explained by the observable factors in our model, Delta U is the part of the gap that cannot be explained by any of these factors. The remaining columns break down the contribution to the explained gap into years of labor market experience (experience and experience squared), years of marriage, education categories, demographic indicators (race, ethnicity and foreign born) and age at first birth.