The Family Gap: The Penalty of Motherhood on Women's Wages

SUSAN E. LONG

Abstract

Motherhood results in a wage penalty to women. I use data from the 1997-2012 National Longitudinal Survey of Youth to investigate two primary factors accounting for this so-called family gap. In least squares and fixed-effects regression models I find that part-time work and number of children have significant negative impacts ranging from about 2% to 5% on the wages of mothers, which results primarily through reduced human capital accumulation in labor market experience. Women at higher education levels are responding to the penalty by choosing to delay and even forgo motherhood. A review of similar research literature suggests that maternity leave policies could diminish the gender and family gaps to create more equitable labor market outcomes for mothers.

I.   Introduction

The gender gap in wages between men and women is a prominent topic on academic and public stages. Over the last fifty years women have made significant progress in narrowing that gap; in part due to legislated equality measures, but moreover due to gains in human capital accumulation in education and experience. However, while the gender gap diminishes, the "family gap" in wages between mothers and non-mothers grows larger (Waldfogel 1998). The family gap, aptly coined the motherhood penalty, is a wage penalty associated with motherhood. It is a woman's lifelong financial cost of raising children. As a component of the gender gap, the family gap perpetuates inequality through women's labor market disadvantage to men and has long term implications engendered in increased poverty rates, lowered lifetime earnings and pension benefits, and diminished bargaining power in both the domestic and professional arenas. Its examination and decomposition are necessary to identify key variables which contribute to the wage disparity, thus moving closer to determining more appropriate and equitable family policies that will result in wage equality for women in the United States.

I add to the literature in the United States by examining a more current and unexplored data set which focuses on the primary reproductive years correspondent to the early career years for women. Hence, this analysis provides unique insight to the motherhood penalty at a critical time in a woman's life for advancement of family and career outcomes. This paper follows the prominent empirical literature by examining the importance of part time employment and number of children as potential explanations of mothers' current lower incomes.

My results show that part-time work reduces a woman's hourly wage by about 4%, making it a significant contributing factor to the motherhood penalty. Having one child reduces a woman's hourly wage by about 2% and two or more children reduce her hourly wage by about 5.6%. These results occur in a fixed effects model which controls for person-specific effects, thus removing any rationale for unobserved heterogeneity arguments.

In the following section, I review the academic literature to ascertain the most significant variables contributing to the motherhood penalty. In section three, I explain the model including expectations based on theoretical underpinnings and limitations in variable construction. Section four provides a brief explanation of the data and its descriptive statistics, followed by a discussion of the empirical results which includes their characteristics and interpretation. In section five I include a brief conclusion to summarize my findings and suggest opportunities for future research.

II.   Literature Review

Many hypotheses have been offered as explanations for the family gap. Early research (Hill 1979) and expectations based on human capital theory (Becker 1985) predict that to the extent women spend less time in the labor market due to bearing children, the effects of children on women's pay can be fully accounted for by diminished labor market experience. Subsequent research in the United States (Korenman and Neumark 1992; Waldfogel 1997; Budig and England 2001), Canada (Phipps, Burton, and Lethbridge 2001), and Great Britain (Joshi, Paci, and Waldfogel 1999) attributes a substantial portion of the motherhood penalty to lessened labor market experience but finds it is not the full explanation. Following labor market experience, marriage (Korenman and Neumark 1992; Waldfogel 1997, 1998; Budig and England 2001) and education (Waldfogel 1997, 1998; Joshi, Paci, and Waldfogel 1999) appear as the most significant variables which increase a woman's wage, while part-time work status (Waldfogel 1997; Joshi, Paci, and Waldfogel 1999; Budig and England 2001) and number of children (Waldfogel 1997, 1998; Joshi, Paci, and Waldfogel 1999; Budig and England 2001;) most significantly decrease her wage.

From there, the research largely becomes an examination of endogeneity issues and whether the variables and the characteristics which make a woman more likely to select into motherhood result from unobserved heterogeneity. The findings are divergent.

Korenman and Neumark (1992) compare an OLS model, short first difference model, and instrumental variable model on data from the 1982 wave of the National Longitudinal Survey of Youth to examine each of the previously listed variables, with the exception of part-time status, as well as family background and measures of attitudes and expectations, and find no evidence that experience, marital status, or number of children are correlated with wage.

Waldfogel (1997) finds evidence to the contrary using pooled cross-sectional models, difference models, and fixed effects models on data from the 1968-1988 Longitudinal Survey of Women which includes each of the significant variables previously listed as well as variables for motivation and commitment to paid work. She finds that children have a negative impact on wages even after controlling for unobserved heterogeneity, and the longer the difference the greater the penalty, suggesting that the research presented by Korenman and Neumark (1992) was biased by too short a time frame.

Budig and England (2001) propose five alternatives to the aforementioned variables to provide evidence of a motherhood penalty; interrupted full time job experience, trading wages for mother friendly jobs, reduced productivity, employer discrimination, and spurious correlation. Using data from the 1982-1993 Longitudinal Survey of Youth in a fixed effects model, they find that some of the unobserved human capital difference between mothers and non-mothers is exogenous to both motherhood and measured human capital and affects each. They find no evidence to support the theory that women expend less energy at work by storing it for use at home, and only weak support for the theory that women choose more mother friendly jobs, the most significant of which are part time jobs.

Phipps, Burton, and Lethbridge (2001) begin their research with the same significant variables, but they utilize unique characteristics of their 1995 Canada General Social Survey to distinguish between and measure the impact of time spent out of the labor market for child related reasons from other reason; to measure the effects of returning to the same job after child-related reasons from other time off reasons; and examine the effects of unpaid work on paid work productivity. They find that the total number of unpaid work hours at home is negatively associated with current incomes. They also find that women who have always had full time employment and return to the same job after child related interruption have higher current incomes than their counterparts who do not return to the same job. This result is in accord with Waldfogel (1998) who finds that women returning to the same job actually received a wage premium. Perhaps even more interesting is the authors' finding that time out of the

workplace for childbearing actually results in human capital deterioration equal to forty three percent of what is gained in a year if employment were continuous.

The final continuity amongst almost all of the literature, excluding Korenman and Neumark (1992), is a portion of the motherhood penalty which remains after all theory based explanation has been exhausted. The researchers suggest the possibility of discrimination based either on taste or expectations but report that data are not yet available to explore this theory.

III. Model

The regression model uses the natural log of hourly wage as the dependent variable, which is consistent with empirical models in the literature (Korenman and Neumark 1992; Waldfogel 1997; Joshi, Paci, and Waldfogel 1999; Budig and England 2001). The independent variables consist of the following; an indicator variable equal to one if the respondent was ever married, if the highest level of education was a high school degree, if the highest level of education was a college diploma, if there was one child living in the household, if there were two plus children living in the household, if the current employment status was considered part-time (<35 hours a week), and a years of experience variable constructed from the summation of total weeks of experience for the current year plus each of the previous years. A disturbance term is included:

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where $i = (1,...,N)$ indexes individuals and $t = (0,...,16)$. One important note regarding the *OneChild* and *TwoPlusChildren* variables is that they are biological children currently living in the household. The literature which I reviewed did not limit children by biology or current residency status. However, I confined my regression to this more parsimonious variation. Upon consideration, it is likely that children have the most impact on a mother's time and energy when living in her household, so this limitation should not significantly bias the results. A second note of importance is that the log of hourly wage and *YearsExperience* variables are limited to the respondent's primary job in any given year. Considering that any additional hours or wages from a second, third, fourth, etc. job would likely be from part time work which has a negatively biased correlation with wages, the overall bias from this exclusion should be minimal and is perhaps even more precise than if additional jobs were included.

I expect a positive sign for the *EverMarried* variable since much of the literature indicates that a wage premium exists for married women (Korenman and Neumark 1992; Waldfogel 1997, 1998; Budig and England 2001), which carries forward regardless of a current marital status of widowed or divorced (Waldfogel 1997). This expectation is consistent with a selection model that states success in the labor market is correlated with success in the marriage market. Yet, it is inconsistent with human capital theory (Becker 1985), and it is only moderately consistent with a household production model which states that people are more productive when married because two people can live more efficiently than one. Based on the predictions of human capital theory (Becker 1985) which state that high school and college educations greatly raise a person's income, *HSDiploma* and *CollegeDegree* are also expected to have positive signs. The *OneChild* and *TwoPlusChildren* variables are expected to have negative signs based on theories presented in the empirical literature (Waldfogel 1997, 1998; Joshi, Paci, and Waldfogel 1999; Budig and England 2001; Phipps, Burton, and Lethbridge 2001). *PartTime* is expected to have a negative sign based on the empirical literature (Waldfogel 1997, 1998; Joshi, Paci, and Waldfogel 1999; Budig and England 2001). *YearsExperience* is expected to have a positive sign based on human capital theory (Becker 1985), which predicts that experience has positive returns because it involves on the job training which makes employees more productive. This expectation is also consistent with the empirical literature (Hill 1979; Korenman and Neumark 1992; Waldfogel 1997, 1998; Joshi, Paci, and Waldfogel 1999; Budig and England 2001; Phipps, Burton, and Lethbridge 2001).

IV. Data

The panel data are from the 1997-2012 National Longitudinal Survey of Youth (NLSY97, http://www.bls.gov/nls/nlsy97.htm) which contains detailed family status and employment histories for a nationally representative sample of women. In its earliest survey round respondents ages range from 13 to 17 and in its most recent round ages range from 28 to 32. From the original sample size of 4,385 women, oversampled for blacks and Hispanics; deletions for attrition, missing data, and hourly compensation outliers above $200.00 reduce the sample size to 1,135 women for a total of 17,501 observations. The log wage variable is limited to 12,489 observations after accounting for zeros.

Table 1 provides the descriptive statistics for the dependent and independent variables. On average, in any given year, 20.4% of the sample was ever married, 50.3% achieved a high school diploma, 16.2% achieved a college degree, 16.6% had one child living in the household, 16.3% had two or more children living in the household, 63.1% worked part time, and years of experience were 3.76.

Table 1. *Descriptive Statistics*

Variable	Observations	Mean	Standard Deviation	Min	Max
Logwage	12,849	6.863961	0.6076022	0	9.903487
EverMarried	17,501	0.2043312	0.4032236	0	1
HSDiploma	17,501	0.5032855	0.5000035	0	1
CollegeDegree	17,501	0.1618765	0.368348	0	1
OneChild	17,501	0.1658762	0.3719801	0	1
TwoPlusChildren	17,501	0.1629621	0.3693417	0	1
PartTime	17,501	0.6308782	0.4825808	0	1
YearsExperience	17,501	3.761532	3.472512	0	15.03846

Table 2 provides the correlation matrix of the independent variables. None of the simple correlation coefficients is large enough in absolute value to cause concern that multicollinearity is a significant problem amongst the chosen variables.

Table 2. *Correlation Matrix*

	EVER MARRIED	PART TIME	HS DIPLOMA	COLLEGE DEGREE	ONE CHILD	TWOPLUS CHILDREN	YEARS EXPERIENCE
EVER MARRIED	1.000000	-0.180901	0.094453	0.185875	0.150800	0.302448	0.382351
PARTTIME	-0.180901	1.000000	-0.108647	-0.290372	-0.103914	-0.059396	-0.46619
HSDIPLOMA	0.094453	-0.108647	1.000000	-0.442376	0.110900	0.149958	0.191308
COLLEGE DEGREE	0.185875	-0.290372	-0.442376	1.000000	0.007954	-0.070846	0.457858
ONECHILD	0.150800	-0.103914	0.110900	0.007954	1.000000	-0.196765	0.150315

TWOPLUS CHILDREN	0.302448	-0.059396	0.149958	-0.070846	-0.196765	1.000000	0.179212
YEARS EX-PERIENCE	0.382351	-0.46619	0.191308	0.457858	0.150315	0.179212	1.000000

V.   Empirical Results

The results of the OLS regression on the panel data set are presented in Table 3. On average, having one child results in a 1.26% decrease in wage and two plus children result in a 2.86% decrease in wage, holding all else constant. Having ever married results in a 4.81% increase in wage on average; current part time employment a 6.44% decrease in wage on average; a high school diploma a 15.68% increase and a college degree a 48.72% increase on wage on average; and every one year increase in experience results in a 6.08% increase in wage on average, holding all else constant.

Table 3. *OLS Model - Panel Least Squares*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.415909***	0.01264	507.5775	0
EVERMARRIED	0.048105***	0.011963	4.021095	0.0001
PARTTIME	-0.064392***	0.009571	-6.727637	0
HSDIPLOMA	0.156838***	0.012103	12.95868	0
COLLEGEDEGREE	0.487235***	0.016877	28.86912	0
ONECHILD	-0.012565*	0.012206	-1.029419	0.3033
TWOPLUSCHILDREN	-0.028558**	0.013434	-2.125841	0.0335
YEARSEXPERIENCE	0.060838***	0.001729	35.18856	0
R-squared	0.319775	Mean dependent var		6.863961
Adjusted R-squared	0.319404	S.D. dependent var		0.607602
S.E. of regression	0.501261	Akaike info criterion		1.457244
Sum squared resid	3226.465	Schwarz criterion		1.461889
Log likelihood	-9354.061	Hannan-Quinn criter.		1.458797
F-statistic	862.3667	Durbin-Watson stat		1.08499
Prob(F-statistic)	0			

*p<10%   **p<5%   ***p<1%

Each of the signs of the estimate coefficients corresponds to theory based expectations and all but *OneChild* are significant at the 5% level when compared to a t-critical value of 1.645. Based on the adjusted R-squared value, 31.94% of the variation in ln *Wage* can be accounted for by the independent variables, adjusted for degrees of freedom. The F-statistic of 862.37 is larger than the unconstrained F-critical value of 2.01 at a 5% level of significance, so I conclude that at least one of the coefficients is not zero. Using the Durbin-Watson test for serial correlation I find that $d = 1.08$ is less than $= 1.53$ at the 5% level of significance, which means that serial correlation exists in the equation. Based on the nature and size of the data, heteroscedasticity is also expected. The serial correlation and heteroscedasticity will not cause

bias in the coefficient estimates but will cause over inflated t-scores and an increased likelihood that the null hypothesis is rejected when it is in fact true, a Type I Error. However, based on theory, each of the included variables is relevant and should remain in the equation. Heteroscedasticity will be corrected by utilizing White standard errors. This new model will provide the most relevant results for statistical inference and hypothesis testing.

Table 4. *Fixed Effects Model - Panel Least Squares - Fixed by cross section and period- White cross section standard errors*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.63959***	0.02118	313.4773	0
EVERMARRIED	0.028157**	0.014965	1.881499	0.0599
PARTTIME	-0.040467***	0.011783	-3.434291	0.0006
HSDIPLOMA	0.025218***	0.010358	2.43462	0.0149
COLLEGEDEGREE	0.294665***	0.025654	11.48608	0
ONECHILD	-0.020095*	0.013085	-1.535755	0.1246
TWOPLUSCHILDREN	-0.056177***	0.019561	-2.871835	0.0041
YEARSEXPERIENCE	0.037402***	0.003919	9.544665	0
R-squared	0.52663	Mean dependent var		6.863961
Adjusted R-squared	0.478847	S.D. dependent var		0.607602
S.E. of regression	0.438634	Akaike info criterion		1.276967
Sum squared resid	2245.301	Schwarz criterion		1.961576
Log likelihood	-7024.875	Hannan-Quinn criter.		1.505845
F-statistic	11.02125	Durbin-Watson stat		1.541627
Prob(F-statistic)	0			

*p<10%   **p<5%   ***p<1%

Table 4 presents the results of a fixed effects regression. All of the signs are consistent with the expectations set forth by theory. Each of the explanatory variables is still significant at the 5% level except for *OneChild* which is significant at the 10% level when compared to a t-critical value of 1.645. Based on the adjusted R-squared, 47.88% of the variation in ln *Wage* can be accounted for by the explanatory variables, adjusted for degrees of freedom, which is significantly improved from the OLS model adjusted R-squared of 31.94%. The F-statistic has dropped significantly but is still larger than the unconstrained F-critical value of 2.01 at a 5% level of significance, so I still conclude that at least one of our variables is not zero. The Durbin-Watson statistic has increased to 1.54which is between = 1.53 and = 1.83 at the 5% level of significance, thus the test for serial correlation is now inconclusive. Using White standard errors resulted in t-scores for each of the variables that have dropped significantly, except for *TwoPlusChildren* which has risen slightly. Given the large sample size and corresponding number of observations, White standard errors should be a sufficient remedy for heteroscedasticity.

Having ever married results in a 2.8157% increase in wage, a 2% drop from the OLS model, thus marriage offers a premium to women just as it does men. A high school diploma

results in a 2.5218% increase in wage and a college degree a 29.4665% increase in wage. These changes are dramatic when compared to the OLS model. *HSDiploma* is reduced by about 13% while *CollegeDegree* is reduced by about 19%. Regardless of the reductions, investments in higher education clearly have a significant effect on a woman's wages. This is one of the largest contributing factors to the diminishing gender gap. For every one year increase in work experience a woman receives 3.74% more in wage, a roughly 2.3% reduction from the OLS model. This factor has also had a significant effect on the diminishing gender gap. Women are spending more time in the labor force and reaping the long term benefits of returns to experience. However, current part time status reduces wage by 4.05%, which is roughly 2% lower than the OLS model. This is a very important variable because mothers, particularly married mothers with spouses of a higher education level than themselves, often select into part time employment (Joshi, Paci, and Waldfogel 1999) which has long term negative implications to their wages. Having one child reduces the wage by 2.01% while two or more children negatively impacts wage by 5.62%. Both of these coefficients are within one percentage point of the OLS model. These are important findings which coincide with the majority of the literature; by and large children reduce a woman's wages.

VI.   Conclusion

This paper set out to identify the key variables which contribute to the motherhood penalty and family gap. I used empirical literature to form a theoretical basis for selecting seven key variables; four positive and three negative influencing factors. Positive influencers included having ever been married, a high school diploma or college degree, and total years of experience. Negative influencers included current part time work status, having one child, or having two or more children. After completing a fixed effects regression to correct for any endogeneity issues the evidence suggests that a college degree and increasing years of experience have the most significant positive impact on a woman's wages, while part time work status and two or more children have the most negative impact on a woman's wages. These results are important because they lead us to some important questions. For instance, why do part time work and number of children reduce a woman's wages and what are the long term implications for women in theory and practice?

One of the most interesting implications is that women are having fewer children, in part due to the wage penalty they incur over their lifetime. Because of the higher earning power of childless women, there is a trend that career minded and highly educated women are postponing and even forgoing motherhood (Joshi, Paci, and Waldfogel 1999). This makes sense when we consider that the wage penalty rises with education level (Waldfogel 1997) and that childless, educated women are more likely to work full time (Joshi, Paci, and Waldfogel 1999). Full time work experience is important to both current wages and generating positive years of experience because part time work generally offers lower wages and fewer returns in the form of experience, seniority, or opportunities for advancement. (Waldfogel 1997; Budig and England 2001).

In an attempt to find solutions to the motherhood penalty, Waldfogel (1998) researched family policies like maternity leave and no cost child care. She found that family policies raise women's wages because they raise a woman's retention over childbirth and increase her work experience and job tenure which allows her to maintain good job matches. She found that 67% of women with maternity leave options returned to the same employer after their most recent childbirth, while only 47% of those who lacked coverage managed the same. Maternity leave policies raised retention in Britain by 16%, the United States by 23%, and Japan by 76%. The guarantee of keeping the same job also encourages women to return more quickly to work. Research in Canada suggests that women who return to the same job take an average of 1.93 years out of the work force while those who return to different jobs take an average of 5.75 years (Phipps, Burton, and Lethbridge 2001). This has a significant impact on work experience and wages. Waldfogel (1998) finds that women who returned to the same employer within one year of their most recent birth had 11 to 12 percent higher wages than those who did not return

quickly. This finding is consistent with human capital theory as well as institutional theories that see the returns to experience as a result of organizational policies and inertia that reward experience for reasons other than links to productivity (Budig and England 2001). Waldfogel (1998) estimates that family leave policies could close the family gap by 40% and the gender gap by 7%.

Further research is warranted for several aspects of the motherhood penalty. Thus far no data have been available for researchers to analyze the problem of discrimination towards mothers. Data are also unavailable to investigate the wage benefits of publicly offsetting child care costs. Comparisons between countries who do implement family policies versus those who do not have thus far been difficult because of large gaps in comparable data, but would be valuable in understanding and legislating policy reforms that will help women bridge the family and gender gaps.

VII.   References

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