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EDUCATIONAL ATTAINMENT AND FAMILY GAPS IN WOMEN'S WAGES: EVIDENCE FROM FIVE INDUSTRIALIZED COUNTRIES

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Abstract:

This paper employs Luxembourg Income Study data for women in five industrialized countries to answer the following questions: Do family gaps in women's wage vary across levels of education? Does educational attainment help to "insure" a woman against child wage penalties?

Cross-national analysis of "family gaps" in women's wages provides clear evidence that wage penalties to motherhood vary significantly in magnitude across countries. Harkness and Waldfogel (1999) estimate these differentials between the wages of mothers and non-mothers for seven industrialized countries. They find that family gaps appear to be largest in Anglo-Saxon countries.

The character of our research is primarily exploratory, but some basic conclusions can be drawn from our results. In Canada and the United States, we find that a high educational attainment acts as a "shock absorber," almost eliminating the large negative effects of children on a woman's wages; results for Germany are similar. We find these results to be robust to the inclusion of part-time workers in the sample. We conclude that educational attainment does help to offset the family gaps faced by mothers in some countries.

I. Introduction

Within the growing literature on cross-national differentials in inequality (reviewed in Gottschalk and Smeeding, 1997), studies involving gender issues have played a major role. Although women have gained ground in the workforce throughout the industrialized world over the past few decades, studies of cross-national gender inequality in earnings agree that gender earnings gaps are still common. The *degree* to which men's earnings differ from those of women varies significantly across countries (Blau and Kahn, 1992, 1995, and 1996; Gornick, 1999). However, in *all* countries, the fact that women generally bear more of the responsibility for child-rearing can account for a portion, perhaps a large portion, of this differential between men's and women's earnings. If gender gaps arise in part because women face earnings penalties from having children, one should observe differentials between the earnings of mothers and non-mothers—a so-called "family gap."

The extent to which these wage penalties to motherhood can explain the observed gender gaps in wages was the initial motivation for the "family gap" research program. Waldfogel (1998) examines gender wage gaps, family gaps, and the effects of maternity leave on these wage differentials in the United States and Britain. A decomposition of the gender gaps in both countries suggests that nearly half (45% in the United States and 48% in Britain) of the gap between men and women at age 30 is due to parental status. In order to assess the direct effects of motherhood on wages, Waldfogel employs log-wage regressions on human capital characteristics and dummy variables for one child and two or more children. In the United States, the OLS results show a 7.4 percent penalty to having one child and an 8.3 percent wage penalty for having two or more children; in Britain, the wage penalties to motherhood are slightly larger. Waldfogel also analyzes the effects of maternity leave

coverage on women's current wages and finds that access to job-protected maternity leave has a substantial positive wage effect for mothers in both the United States and Britain.

Even and Macpherson (1997) approach wage penalties to motherhood from a different direction, examining the exit rates among American women in the labor force over the past 20 years, particularly as they relate to childbearing. They find a significant increase in labor force attachment of American mothers from 1976 through 1995 – the exit rate of women ages 21 to 40 with an infant declined 25.7 percentage points. Also, the differences in labor force participation according to parental status fell drastically over this time period. Even and Macpherson hypothesize that since the effects of children on exit rates has dropped for most married women, the penalties of children on the wages of married women should also have fallen. Indeed, their results support this conclusion. The results of their human capital regressions show a 3.1 percent penalty per child in the period from 1976 to 1979, compared to a 1.6 percent per-child penalty in 1992-95. Clearly, the results of Even and Macpherson (1997) and Waldfogel (1998) imply that certain policies protecting the labor force attachment of mothers may help to offset the negative effects of children on women's wages. This notion was, in part, the impetus for extending the family gap research program to examine wage penalties to motherhood cross-nationally.

Harkness and Waldfogel (1999) paved a new path for cross-national research by examining earnings gaps *among* women cross-nationally. Specifically, they study earnings and employment differentials between women with children and women without children—the so-called "family gap"—across seven OECD countries. Controlling for differences in human capital characteristics, they find pay penalties to having children to be largest in the United Kingdom, smaller in other Anglo-Saxon countries and Germany, and smallest in

Scandinavia. Furthermore, their results suggest that there is a correlation between the family gap and gender gap in pay across countries, so that those countries (e.g., the United Kingdom) with large family gaps also have large gender gaps in wages. Harkness and Waldfogel are unable, however, to draw definitive conclusions as to how we can explain so much variation in the size of family pay gaps across countries. They find no evidence to support differential selection into employment or differences in wage structure as explanations of cross-national differences in the family gap.

An article by Sullivan and Smeeding (1997) uses Luxembourg Income Study data to explore possible relationships between educational attainment and earnings inequality across eight industrialized countries. After comparing the extent of inequality in a country's earnings distribution to the percentage of its labor force with high educational attainment, they find no obvious relationship between the two. However, when they look instead at returns to education across nations, they find a strong positive correlation between a country's returns to education and the extent of its earnings inequality. Underlying results presented in this paper show a great deal of cross-country variation in both educational attainment and returns to education for full-year, full-time women. These results are, in some ways, the impetus for our research.

Although these two articles (Harkness and Waldfogel, 1999, and Sullivan and Smeeding, 1997) seem unrelated, our study combines ideas from both papers to explore whether family gaps in wages vary according to women's levels of educational attainment. The character of our research is primarily exploratory, but some basic conclusions can be drawn from our results. First, a woman's educational attainment *does* appear to make a difference in the size of the wage penalty she faces. In Canada and the United States,

educational attainment acts as a sort of "shock absorber," insuring a woman against the earnings penalties of having children. In Germany, where we find family gaps in wages that are consistently larger than in Anglo-Saxon countries, a medium education decreases the size of those wage penalties, and a high educational attainment completely eliminates family wage gaps for women. The smallest wage penalties to having children are for mothers in the Netherlands, where family gaps are extremely small for all education levels. Sweden, where Harkness and Waldfogel (1999) find the smallest family gaps in pay, is the country for which we find the largest child penalties on wages. Here, we also find that a high education does not reduce the pay penalty to having children. Harkness and Waldfogel used data from the Swedish Level of Living Survey (LNU) instead of LIS data, however, which may account for some of the differences in our results.

Because part-time work is such an important option for mothers, we pose two questions when we include part-time workers in the sample population. First, do family gaps in wages increase in magnitude upon the inclusion of part-time workers in the sample, suggesting that there is an *extra* wage penalty incurred if a woman chooses part-time work? Our results refute this idea: When part-time workers are included in the sample, family gaps do not widen across all education levels in any of our five countries. Second, does the inclusion of part-time workers into the sample alter the patterns of family gaps across education levels that we observed for full-year, full-time working women? In the Netherlands (and in Canada, to some degree), family gaps increase in size only for low educated women. With this exception, it makes no substantial difference whether we analyze family gaps in wages for full-year, full-time workers or for all workers.

This paper will proceed in the following way. Section II provides a brief discussion of the Luxembourg Income Study data used in this paper and describes measurement issues we encountered when specifying the population of interest as well as technical decisions we made in developing our model. Section III explores family gaps in women's *wage rates* and whether they differ in magnitude across education levels. We compare the effects of educational attainment on family wage gaps across countries for full-year, full-time women and for all workers with positive earnings. Section IV concludes and offers suggestions for the future direction of the research program.

II. From Data to Measurement

This paper uses data from the Luxembourg Income Study (LIS) to compare the effects of educational attainment on the wage penalty to motherhood across five industrialized countries. The LIS database includes recent datasets from 26 different nations; we have limited our sample to five countries with features desirable for a study of family gaps and educational attainment. Within our sample, each of three welfare state regime types discussed by welfare state analysts is represented at least once. The United States and Canada are two large OECD countries with diverse populations and Anglo-Saxon political regimes. Germany and the Netherlands represent continental European OECD members. Lastly, welfare states of Nordic OECD countries are represented by Sweden. These five countries are appropriate for our study because they all offer recent (1994 to 1997) data with comparable measures of individuals' gross annual earnings,[1] educational attainment, and weeks and hours worked in the survey year. When we restrict the samples to the smallest numbers necessary in this paper

[1] Note that we have not top- or bottom-coded the earnings data employed in this paper. A vital adjustment to make when using income data, top and bottom codes are not generally necessary with earnings data.

(full-year, full-time women from age 24 to 44), the smallest (the Netherlands, 1994) contains 599 observations.

Examining the effects of children on the earnings returns to a woman's educational attainment requires us to address a set of measurement issues, such as how to define the population of interest, how to compare levels of educational attainment across countries, and how to address the mechanisms by which women adjust their labor force participation when they have children.

In specifying the age group in which we are interested, we follow Harkness and Waldfogel (1999) and limit our sample population for each country to those individuals ages 24 to 44. We choose these ages in order to exclude those still in full-time education as well as those women older than 44 who may report having no children under 18 now but are likely to have had children in the past. The lifetime earnings schedules of those older women have often been affected by childbearing, and thus, their present earnings would distort our comparison of the earnings of mothers and non-mothers. Like Harkness and Waldfogel, we also exclude workers identified as "self-employed" from the sample.

The effect of children on women's earnings is due to more than just a direct pay penalty; children also affect a woman's hours worked. Therefore, to separate the family gaps in returns to education from the employment effects of children, we need to consider family gaps in *wages*, not family gaps in earnings. We effect the separation in two ways. For full-year, full-time women, we follow Harkness and Waldfogel (1999) and regress the log of hourly wages, defined as grow annual earnings divided by the product of reported weeks worked in the year and reported hours worked per week. When we expand our sample to include women who do not work full-year, full-time, however, we employ a method different

from that of Harkness and Waldfogel. With this expanded sample, we get at family wage gaps by regressing the log of gross annual *earnings* on the logarithms of weeks worked and reported number of hours worked per week.

Our paper extends the work of Harkness and Waldfogel (1999) in one important way. Harkness and Waldfogel use education dummies that coincide exactly with each county's method of reporting educational attainment. While this method allows for the most specific assessment of a woman's educational attainment *within* her nation's system, it prevents any direct comparison of the returns to education of women in different countries. Therefore, we harmonize the education data of all five countries into a classification system of low, medium, and high attainment, following the coding initiated by Sullivan and Smeeding (1997). For Harkness and Waldfogel, who analyzed family gaps in wage rates, this was not necessarily as vital an adjustment. However, since our paper focuses directly on the effects of educational attainment on the family gap, it is essential to use a coding system that allows us to compare educational attainment across all five of our sample countries.

III. The Effects of Education on Family Wage Gaps

A. Introduction

Numerous explorations of family gaps in the United States, Britain, and other OECD countries (see Waldfogel, 199; Joshi, Paci, and Waldfogel, 1998; Taniguchi, 1999; Taniguchi, 1999) have yielded convincing results that suggest that family gaps *do* exist across many countries. The focus of the research program, however, no longer lies in verifying the

existence of family gaps but in their analysis. The principal question we ask is whether these family gaps in earnings are not just earnings reductions, but penalties or bonuses to a woman's returns to education. In other words, the extent to which a mother's earnings are penalized may depend on her level of educational attainment.[2]

We develop human capital regressions for women age 24-44, excluding those workers classified as "self-employed," and employ the log of gross annual earnings as our dependent variable. On the right hand side of our human capital regressions are age and its square, a dummy variable for marital status, dummies for levels of educational attainment, dummies for number of children (1, 2, 3, and 4+, with zero children as the control group), and interactive dummy variables for number of children by level of education. The estimated coefficients on these interactive variables will comprise the majority of our discussion.

We isolate family gaps in wages in two ways, first by limiting our sample to full-year, full-time workers using a regression model similar to that of Harkness and Waldfogel (1999), and then by expanding the sample and including weeks and hours worked as regressors in the earnings equations.

B. Family Gaps for Full-year Full-time Workers Only

Table 1 shows the estimated family gaps in *wages* when we observe full-year, full-time women (defined as working 50 or more weeks per year, 30 or more hours per week),

[2] We verify the importance of educational attainment in determining the magnitude of family gaps with simple human capital earnings regressions; results are exhibited in Appendix A. These regressions include age and its square, a dummy variable for marital status, dummies for levels of educational attainment, dummies for number of children (1, 2, 3, and 4+, with zero children as the control group), and interactive dummy variables for number of children by level of education. Chow tests on these interactive variables prove that family gaps are almost always significantly different in magnitude for women of different education levels. Thus, there is clear evidence that the issue of educational attainment and its effect on family gaps is worth exploration.

excluding the self-employed from the sample.[3] This model, comparable to one used by Harkness and Waldfogel (1999), employs the log of hourly wages (defined as gross annual earnings divided by the product of weeks worked per year and hours worked per week) as the dependent variable. The model does not initially include interactive variables for number of children by education level. These results isolate the effects of children on the *wages* of full-year, full-time women.

Our measures of family pay gaps are fairly consistent with the results of Harkness and Waldfogel (1999); Table 2 shows both sets of results for comparison. Canadian women with one child face a 7.2 percentage point wage penalty according to our results; Harkness and Waldfogel estimated a penalty of 5.8 percentage points. In the United States, our estimated family gaps in pay are consistently five to six percentage points larger than the Harkness and Waldfogel estimates. The difference in these estimates may be due to the fact that we employ 1997 U.S. data as opposed to 1994 data used by Harkness and Waldfogel, or that Harkness and Waldfogel top-coded and bottom-coded the U.S. data.

Whereas Harkness and Waldfogel estimated German family gaps to be slightly smaller than those in Canada and the United States, our results suggest that German women face much larger family gaps in pay than women in Anglo-Saxon countries. It is likely that the difference in our estimates for Germany occurs because we do not include a dummy variable for living in East Germany versus West Germany in these initial regressions. Upon the inclusion of an East-West dummy, we find a wage penalty for living in the East of more than 20 percent and smaller family gaps in Germany. Failing to control for this East-West

[3] If self-employment were a mechanism by which women adjusted to having children without forgoing all earnings, we might expect to see family gaps shrink in size upon the inclusion of self-employed workers into the sample. However, when we included self-employed workers, we saw little change in the magnitude of family gaps.

differential in the wages of German women is likely to have biased our estimates of child wage effects in Germany downward. Therefore, we include an East-West dummy variable for Germany in all subsequent regressions.

The other continental European country in our sample, the Netherlands, was not included in the Harkness and Waldfogel study. In this country, we find that family pay gaps for full-year, full-time women are extremely small.

Finally, in our only Scandinavian country, Sweden, where Harkness and Waldfogel found family gaps to be smallest, we find 40 to 50 percentage point penalties on the wages of full-year, full-time mothers. The colossal difference in our estimates for Sweden may be a result of using LIS data rather than the Swedish Level of Living Survey (LNU) data used by Harkness and Waldfogel.

Two differences should be noted between the model used by Harkness and Waldfogel and our own log-wage regressions. First, we define our sample of full-time workers somewhat differently than do Harkness and Waldfogel: We include in the sample women who work 50 or more weeks per year and 30 or more hours per week (full-year, full-time workers), while Harkness and Waldfogel consider women who report having a job during the survey week and working 30 or more hours during the week. More importantly, we do not include the additional controls used by Harkness and Waldfogel for ethnicity, region, and urban/rural residence, which may account for some differences between our estimates and theirs. While Harkness and Waldfogel control for as many individual characteristics as possible in each country, their regressions are not defined identically for all countries. To ensure cross-national comparability of our results, we choose instead to employ only those control variables for which we have very similar measures in each sample country (the only exception

being the East-West dummy in Germany). Despite these differences, with the exceptions of Sweden and perhaps Germany, our estimates of family gaps across countries are consistent with those found in previous research.

Although verifying the existence of similar family pay gaps in our data is important, repeating the work of Harkness and Waldfogel is not our goal. We turn to Table 3 to discuss not the direct effects of children on wages, but their effects on returns to education. Still regressing log hourly wages for full-year, full-time workers, we now consider an interesting question: Are family gaps in hourly wages the same for women of all education levels? Our regression results are shown in Table 3, which now shows parameter estimates on the interactive variables between number of children and education level. The coefficients on these interactive variables are the principal focus of our study, for they illustrate the effect of educational attainment on the magnitude of the family gap. Chow tests on these regressions indicate that educational attainment affects the size of family gaps for full-year, full-time women in the United States, Canada, Germany, and Sweden.

From the results presented in Table 3, we examine the effects of educational attainment on family gaps in women's wages more closely in Table 4. Here, the child penalties for the low education category are simply the parameter estimates on children 1 through 4 from the regression, since low education is the omitted education category. For the medium and high education categories, the family gaps are equal to the sum of the child penalty for low educated women and the penalty/reward for women with a medium or high education. In short, these results can be viewed as the percentage effects on wages of having a certain number of children, depending on one's education level.

We find that, at least in some countries, a woman's education level does affect the size of the wage penalty she faces for having children. In the Anglo-Saxon countries, high educational attainment acts as a sort of "shock absorber," insuring women against family gaps. More specifically, in Canada and the United States, family gaps in returns to a low education range from zero to 18.1 percentage points, while women with high educational attainment face no wage penalty at all to having children (In fact, highly educated women with three or more children receive a slight increase in their wages).

On the other hand, women with a medium education actually encounter larger family gaps than do their less educated peers. One possible explanation for this somewhat surprising result is unobserved heterogeneity within the low education categories of the Anglo-Saxon countries. Of low educated mothers, those with the highest earnings potential are the most likely to sort into full-time employment; those mothers with lower earnings potential would have a comparative advantage in providing childcare. Therefore, when we limit our sample to only full-year, full-time workers, the mothers remaining in the low education category are likely to be those low educated mothers with the highest wages. This selectivity phenomenon would bias our estimates of family gaps in this education category toward zero; thus, it may explain the results we find in Canada and the United States.

In Germany, the penalties to having children are even larger than in the Anglo-Saxon countries for low educated women, ranging from a 15.4 percentage point penalty to having one child to a 35.0 percentage point penalty for having three or more children. Unlike the Anglo-Saxon countries, a medium education reduces the child wage penalty dramatically. Again, a high educational attainment completely offsets any wage penalty to motherhood.

In the Netherlands we find the smallest family wage gaps (statistically not different from zero), and educational attainment effects no change on the size of those wage differentials.

Sweden is again our outlying country. Here the penalties are smallest for women with low education, although these family gaps still range from 11 to 78 percentage points. For the medium and highly educated, the family gaps range in magnitude from around 40 percentage points to 61 points. Although educational attainment has significant effects on these family gaps, we observe no consistent pattern in the ability of education to protect Swedish full-time mothers from wage penalties.

C. Family Gaps for All Workers

Because our sample of only full-year, full-time workers is so highly selected, we now approach the problem of variable weeks and hours worked in another way. In order to address part-time or part-year work, which is an important labor market option for mothers in many countries, we include *all* women age 24 – 44 and regress earnings on measures of labor supply, like weeks worked full-time, weeks worked part-time, and reported number of hours worked per week. The larger sample of working women comes at a cost: Reports of hours worked are not as comparable across countries as one might wish, and the assumption that full-time workers and part-time workers are described by a common model is suspect.

One of the goals of these regressions is to explore the labor force participation effects of children by assessing family wage gaps in different sample populations; thus, we first examine some background statistics. Table 5 illustrates the distributions of mothers and non-mothers into different labor force categories, and we can draw some conclusions as to the

effects of children on employment status across countries simply by assessing these frequencies. In both Anglo-Saxon countries, for instance, nearly 40 percent of mothers work full-year full-time, while only 16 percent of German mothers and 10 percent of Dutch mothers work full-time. In these continental European countries, the number of mothers who do not work is even more noteworthy: In Germany, 40 percent of mothers have zero earnings, and 45 percent of mothers in the Netherlands do not work. A probably explanation for these numbers is that continental European welfare states are not organized in a way that encourages working mothers. Finally, in Sweden, where family policies encourage working mothers, 85 percent of all mothers work at least part-time. Clearly, these distributions coincide with characteristics of the welfare states to which each country belongs.

We now turn to our regression results to assess the changes in magnitude of family gaps across countries when we include women who do not work full-year full-time. Table 6 presents these regression results. We use these results to create Table 7, which is constructed in the same fashion as Table 4. Thus, Table 7 illustrates family gaps in earnings by education level and number of children for all women with positive earnings who work more than zero weeks in the survey year. When we include part-year and part-time workers in the sample, we observe family gaps qualitatively similar to those we found for full-year, full-time women. In Canada and the United States, low educated women still face a consistent penalty to motherhood, the minimum penalty being a 7.4 percentage point reduction in wages. Anglo-Saxon women with a medium education face even larger wage penalties to having children, possibly due to unobserved heterogeneity in the low education category, as discussed above, or the influence of binding wage floors on the family gap estimates for low educated women.

A high education again acts as an "insurance policy" against family gaps, reducing a mother's wage penalty drastically.

In Germany, including part-year, part-time workers in the sample reduces the size of family wage gaps for low educated women by several percentage points. As with the sample of full-year, full-time women, a medium education appears to reduce these wage penalties, and a high educational attainment reduces or completely eliminates any wage penalty to motherhood. In the Netherlands, the inclusion of part-year and part-time workers into the sample results in statistically significant family gaps for low educated women only; mothers with a medium or high education again face no significant family gaps.

Finally, the estimated family gaps for Swedish mothers are surprisingly large (wage penalties ranging from 25 percentage points to 60 percentage points) relative to those observed in other countries. Again, we find no obvious patterns across education levels. Having compared our estimates with Harkness and Waldfogel's estimates of family gaps in Sweden, we treat these results as suspect.

Comparing the results in Table 7 to those for full-time workers also allows us to observe cross-national variation in wage penalties to part-time work through a model different than those used in previous research (see, for instance, Gornick and Bardesi, 2000). If family gaps are larger when we include part-time and part-year workers in the sample, we might conclude that mothers who choose to work part-time pay an extra wage penalty. Of the other hand, if family gaps are not clearly changed by the inclusion of part-time workers, we may reason that part-time work is not an important or available solution for mothers in that country or that there is no extra penalty to working part-time instead of full-time.

Comparisons of Tables 7 and 4 show that Canada and the Netherlands are the only countries in which family gaps increase in size upon the inclusion of part-year and part-time workers into the sample. More importantly, in these two countries, family gaps are larger only for mothers with a low education, which suggests that the wage penalty for part-time work by medium and highly educated mothers is not notable in these countries. On the other hand, it is possible that these larger family gaps for low educated women can be explained by unobserved heterogeneity in our low education category. More specifically, those low educated working mothers with the highest earnings potential ("the best of the worst") are likely to sort into full-time work, while those with lower earnings potential would more likely sort into part-time work. This sorting effect may explain why when we include part-time workers in the sample, family gaps in the Netherlands and Canada only increase for *low* educated women. In contrast to the Canada and the Netherlands, Germany, the United States and Sweden show no consistent difference in the magnitude of family gaps when we include part-time workers. We can therefore conclude that there is very little wage penalty to working part-time rather than full-time in those countries, regardless of education level.

IV. Concluding Remarks

This paper has combined key ideas from a previous paper by Harkness and Waldfogel (1999) on family gaps in pay and a Sullivan and Smeeding (1997) paper on cross-national educational attainment affects the size of family gaps in wages across countries. It extends

the research program by offering further insight into the effects of children on the wages of mothers in different welfare state regimes.

In the Anglo-Saxon countries, for which Harkness and Waldfogel (1999) find relatively large family gaps, we find that a high level of educational attainment greatly reduces the wage penalty to motherhood. Thus, in nations like Canada and the United States, where mothers are encouraged to work but childcare is not subsidized, education is very important in determining women's wages. Not only do women receive much higher direct returns to education in Anglo-Saxon countries (see, for example, Sullivan and Smeeding, 1997a), but educational attainment also provides women an *extra* reward by reducing or even eliminating the wage penalties they would otherwise pay for having children.

In continental Europe, we find differing results for Germany and the Netherlands. Specifically, family gaps for low educated women are even larger for German mothers than for Anglo-Saxon mothers, but a high education *completely eliminates* any wage penalty to motherhood. On the other hand, wage penalties for mothers in the Netherlands are extremely small, and educational attainment appears to make no difference in the size of those family gaps.

Our results differ with respect to previous research in that we find the largest family gaps in wages in Sweden, where Harkness and Waldfogel (1999) found little or no child wage penalties. Until we have conclusive evidence that our large estimated family gaps in Sweden are not just due to underlying anomalies within the LIS Sweden data set, the results are somewhat suspect. The interpretation or our results is that, in Scandinavian countries, where childcare is highly subsidized and 85 percent of mothers work, it is possible that mothers are choosing lower-wage jobs with desirable traits, creating large family gaps in wages.

The fact that our model is not structural and does not correct for selectivity bias in women's employment decisions is a weakness of this paper. Clearly, simultaneity problems arise repeatedly in the analysis of women's earnings and wages. For instance, there are simultaneous decisions made in the determination of women's work effort and wages, between a wife's earnings and her husband's earnings, and between market income and transfer payments. The many factors that are at play in the determination of a woman's wages may be distorting our estimates and interpretations of family gaps.

Also, the econometric model used in the entire "family gap" research program is an odd one in that it treats the birth of a child as an exogenous event, similar in many ways to some unexpected catastrophe. Generally, enough planning and decision-making goes into having a child so that it is inconsistent to treat the number of children in a family as completely exogenous. However, a model that treats the number of children as a choice made by the household rather than an exogenously determined household characteristic will not be easy to implement empirically with income survey data.

Another possible extension of the "family pay gap" research would be an exploration of "family *income* gaps" across countries. In countries where women's earnings are penalized for having children, do the earnings of husbands increase to offset lost income in married couple families? Do transfer payments, especially those directly related to children, help to offset family gaps in some countries? This sort of extension, which seeks to understand the effects of children on the mother *and* on the household, would serve to link two of the major strands of cross-national research: the study of labor market outcomes (especially for women) and the study of child welfare (especially child poverty).

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Table 1: Parameter estimates from Log Hourly Wage Regressions
Full-year, Full-time Women age 24 - 44, not self-employed

	Canada	United States	Germany	Netherlands	Sweden
Age	0.091 ***	0.105 ***	0.108 ***	0.119 ***	0.051
Age^2	-0.001 ***	-0.001 ***	-0.001 ***	-0.002 ***	0.000
Medium Education	0.265 ***	0.348 ***	0.048	0.085 ***	0.037
High Education	0.575 ***	0.712 ***	0.172 ***	0.220 ***	0.183 ***
1 Kid	-0.072 ***	-0.086 ***	-0.177 ***	-0.006	-0.404 ***
2 Kids	-0.062 ***	-0.121 ***	-0.246 ***	-0.035	-0.412 ***
3+ Kids	-0.158 ***	-0.187 ***	-0.135	-0.029	-0.563 ***
Married	0.002	0.093 ***	0.019	0.064 **	-0.076 **
N	6639	8782	828	645	1862
R^2	0.131	0.186	0.079	0.188	0.133

*** Significant at α = .10**
**** Significant at α = .05**
***** Significant at α = .01**

Table 2: Comparison of Estimated Effects of Marriage and Children on Women's Wages to those of Harkness and Waldfogel (1999)

Full-year, Full-time Women age 24 - 44

	CN 94 (Todd)	CN 94 (Harkness and Waldfogel)
1 Kid	-0.072 ***	-0.058 **
2 Kids	-0.062 ***	-0.065 **
3+ Kids	-0.158 ***	-0.203 **
Married	0.002	-0.004
N	6639	7885
R^2	0.131	0.144

	US 97 (Todd)	US 94 (Harkness and Waldfogel)
1 Kid	-0.086 ***	-0.025 **
2 Kids	-0.121 ***	-0.048 **
3+ Kids	-0.187 ***	-0.102 **
Married	0.093 ***	0.075 **
N	8782	11588
R^2	0.186	0.2678

	GE 94 (Todd)	GE 94 (Harkness and Waldfogel)
1 Kid	-0.177 ***	-0.032
2 Kids	-0.246 ***	-0.08 *
3+ Kids	-0.135	-0.134 **
Married	0.019	0.002
N	828	1107
R^2	0.079	0.1674

	SW 95 (Todd)	SW 91 (Harkness and Waldfogel)
1 Kid	-0.404 ***	-0.031
2 Kids	-0.412 ***	-0.056 **
3+ Kids	-0.563 ***	-0.102 **
Married	-0.076 **	0.037 **
N	1862	685
R^2	0.133	0.1996

*** Significant at α = .10**
**** Significant at α = .05**
***** Significant at α = .01**

Table 3: Parameter estimates from Log Hourly Wage Regressions
Full-year, Full-time Women age 24 - 44, not self-employed

	Canada	United States	Germany	Netherlands	Sweden
Age	0.095 ***	0.097 ***	0.102 ***	0.113 ***	0.055
Age^2	-0.001 ***	-0.001 ***	-0.001 ***	-0.001 ***	0.000
Medium Education	0.288 ***	0.379 ***	0.070 *	0.066 **	0.150
High Education	0.548 ***	0.677 ***	0.113 *	0.189 ***	0.265 ***
1 Kid	-0.122 **	-0.057 ***	-0.154 **	-0.054	-0.111
2 Kids	0.001	-0.093 ***	-0.269 ***	-0.087	-0.249 **
3 Kids	-0.132 *	-0.181 ***	-0.349 *	-0.165	-0.778 ***
1KID*MEDIUM	0.045	-0.054 *	0.083	0.024	-0.307 **
2KIDS*MEDIUM	-0.104 **	-0.052 *	0.143	0.039	-0.229 *
3KIDS*MEDIUM	-0.085	-0.022	0.338 **	0.128	0.208
1KID*HIGH	0.084	0.045	0.172	0.094	-0.359 **
2KIDS*HIGH	0.039	0.086	0.442 ***	0.086	-0.114
3KIDS*HIGH	0.150 *	0.284 ***	0.888 **	0.147	0.343 *
Married	0.007	0.092 ***	0.040	0.074 ***	-0.070 *
East-German	--------	--------	-0.286 ***	--------	--------
N	6639	9264	828	599	1862
R^2	0.134	0.191	0.177	0.250	0.139

*** Significant at a = .10**
**** Significant at a = .05**
*****Significant at a = .01**

RESULTS OF CHOW TESTS FOR INTERACTIVE VARIABLES:

		(medium=high)	(low=medium)	(low=high)
CANADA	F-value:	8.067 ***	2.265 **	2.202 **
GERMANY	F-value:	3.096 **	1.663	3.865 ***
NETHERLANDS	F-value:	0.127	0.440	0.800
SWEDEN	F-value:	1.401	4.293 ***	5.437 ***
UNITED STATES	F-value:	6.597 ***	3.413 **	10.107 ***

Table 4: Family Gaps in Wages, by Education Level and Number of Children
Full-year, Full-time Women age 24 - 44, not self-employed

Canada 94 (N=6639)

	Low	Medium	High
1 Kid	-0.122	-0.077	-0.038
2 Kids	0.001	-0.103	0.040
3+ Kids	-0.132	-0.217	0.018

United States 97 (N=9264)

	Low	Medium	High
1 Kid	-0.057	-0.111	-0.012
2 Kids	-0.093	-0.145	-0.006
3+ Kids	-0.181	-0.203	0.103

Germany 94 (N=828)

	Low	Medium	High
1 Kid	-0.154	-0.071	0.018
2 Kids	-0.269	-0.126	0.173
3+ Kids	-0.349	-0.011	0.539

Netherlands 94 (N = 599)

	Low	Medium	High
1 Kid	-0.054	-0.030	0.040
2 Kids	-0.087	-0.048	-0.001
3+ Kids	-0.165	-0.036	-0.017

Sweden 95 (N=1862)

	Low	Medium	High
1 Kid	-0.111	-0.418	-0.470
2 Kids	-0.249	-0.478	-0.363
3+ Kids	-0.778	-0.570	-0.435

Table 5: Percentages of Mothers and Non-mothers by Labor Force Status
Women age 24 - 44, not self-employed

CANADA 1994	Mothers	Non-Mothers
Full-year, Full-time Women	37.7	56.8
Women with Earnings > 0, not Full-year, Full-time	34.4	30.5
Women with Earnings = 0	27.9	12.7
Total Percentage	100.0	100.0

UNITED STATES 1997	Mothers	Non-mothers
Full-year, Full-time Women	39.4	59.0
Women with Earnings > 0, not Full-year, Full-time	35.5	27.9
Women with Earnings = 0	25.1	13.1
Total Percentage	100.0	100.0

GERMANY 1994	Mothers	Non-mothers
Full-year, Full-time Women	16.1	56.2
Women with Earnings > 0, not Full-year, Full-time	44.2	31.8
Women with Earnings = 0	39.7	12.0
Total Percentage	100.0	100.0

NETHERLANDS	Mothers	Non-mothers
Full-year, Full-time Women	10.2	60.4
Women with Earnings > 0, not Full-year, Full-time	44.7	24.0
Women with Earnings = 0	45.1	15.6
Total Percentage	100.0	100.0

SWEDEN 1995	Mothers	Non-mothers
Full-year, Full-time Women	34.5	45.1
Women with Earnings > 0, not Full-year, Full-time	50.7	43.6
Women with Earnings = 0	14.8	11.3
Total Percentage	100.0	100.0

Table 6: Parameter Estimates for Log Earnings Regressions
Women age 24-44 with Positive Earnings, not self-employed

	Canada	United States	Germany	Netherlands	Sweden
Age	0.125 ***	0.105 ***	0.094 ***	0.042	0.063 **
Age^2	-0.002 ***	-0.001 ***	-0.001 ***	-0.001	-0.001
Medium Education	0.272 ***	0.292 ***	0.145 ***	0.063	0.101
High Education	0.521 ***	0.587 ***	0.270 ***	0.204 ***	0.202 ***
1KID	-0.136 ***	-0.057 ***	-0.057	-0.132 **	-0.252 ***
2KIDS	-0.074 *	-0.098 ***	-0.194 **	-0.218 ***	-0.272 ***
3KIDS	-0.121 *	-0.098 ***	-0.239 **	-0.321 ***	-0.532 ***
4KIDS	-0.387 ***	-0.230 ***	-0.609 *	0.156	-0.598 ***
1KID*MED	0.070	-0.050	0.010	0.184 **	-0.144
2KIDS*MED	-0.043	-0.042	-0.032	0.139 **	-0.125
3KIDS*MED	-0.126 *	-0.114 ***	0.251 *	0.455 ***	0.013
4KIDS*MED	0.154	-0.036	-0.029	-0.446	0.133
1KID*HIGH	0.147 **	0.098	0.090	0.232 **	-0.145
2KIDS*HIGH	0.052	0.062 *	0.135	0.305 ***	-0.059
3KIDS*HIGH	0.139	0.006	0.825 ***	0.277 *	0.073
4KIDS*HIGH	0.419 ***	0.153 *	1.200 ***	0.326	0.336
MARRIED	-0.007	0.106 ***	-0.057 *	0.046	-0.072 ***
Log Total Hours	0.854 ***	1.042 ***	0.942 ***	0.988 ***	0.386 ***
East-German	-------	-------	-0.182 ***	-------	-------
N	10250	16066	1485	1289	3089
R^2	0.496	0.663	0.637	0.738	0.263

*** Significant at a = .10**
**** Significant at a = .05**
***** Significant at a = .01**

Table 7: Family Gaps in Earnings, by Education Level and Number of Children
Women age 24 - 44, with positive earnings, not self-employed

Canada 94 (N=10250)

	Low	Medium	High
1 Kid	-0.136	-0.066	0.011
2 Kids	-0.074	-0.117	-0.022
3 Kids	-0.121	-0.247	0.180
4+ Kids	-0.387	-0.233	0.032

United States 97 (N=16066)

	Low	Medium	High
1 Kid	-0.052	-0.104	-0.010
2 Kids	-0.095	-0.133	-0.023
3 Kids	-0.093	-0.204	-0.082
4+ Kids	-0.232	-0.261	-0.047

Germany 94 (N=1485)

	Low	Medium	High
1 Kid	-0.057	-0.047	0.033
2 Kids	-0.194	-0.227	-0.059
3 Kids	-0.239	0.012	0.586
4+ Kids	-0.609	-0.638	0.590

Netherlands 94 (N=1289)

	Low	Medium	High
1 Kid	-0.132	0.053	0.100
2 Kids	-0.218	-0.078	0.087
3 Kids	-0.321	0.134	-0.043
4+ Kids	0.156	-0.290	0.482

Sweden 95 (N=3089)

	Low	Medium	High
1 Kid	-0.252	-0.396	-0.397
2 Kids	-0.272	-0.397	-0.331
3 Kids	-0.532	-0.519	-0.464
4+ Kids	-0.598	-0.465	-0.262

Appendix A: Parameter estimates from Log Earnings Regressions
Women age 24 - 44 with positive earnings, not self-employed

	Canada	United States	Germany	Netherlands	Sweden
Age	0.213 ***	0.169 ***	0.188 ***	0.167 ***	0.216 ***
Age^2	-0.003 ***	-0.002 ***	-0.003 ***	-0.002 ***	-0.003 ***
Medium Education	0.541 ***	0.312 ***	0.228 ***	0.137 *	0.388 ***
High Education	0.825 ***	0.704 ***	0.078	0.310 ***	0.446 ***
1 Kid	-0.299 ***	-0.192 ***	-0.359 ***	-0.838 ***	-0.247 ***
2 Kids	-0.189 ***	-0.411 ***	-0.745 ***	-1.146 ***	-0.217 **
3 Kids	-0.254 ***	-0.443 ***	-1.014 ***	-1.090 ***	-0.624 *
4+ Kids	-0.630 ***	-0.774 ***	-2.165 ***	-0.904	-1.242 ***
1KID*MEDIUM	0.066	-0.024	-0.168	0.252 *	-0.246 ***
2KIDS*MEDIUM	-0.214 ***	0.053	-0.172	0.262 **	-0.369 *
3KIDS*MEDIUM	-0.333 ***	-0.093 *	0.211	0.144	-0.150 ***
4KIDS*MEDIUM	-0.036	-0.038	-0.089	-0.342	0.286
1KID*HIGH	0.129	0.052	0.380 **	0.621 ***	-0.145
2KIDS*HIGH	0.014	0.055	0.475 **	0.553 ***	-0.121
3KIDS*HIGH	0.014	-0.158 **	0.195	0.326	0.173
4KIDS*HIGH	0.030	-0.059	2.527 ***	-0.810	0.333
Married	0.017	0.026	-0.051	0.083	0.042
N	12002	16066	1856	1477	4080
R^2	0.097	0.139	0.145	0.208	0.093

*** Significant at a = .10**
**** Significant at a = .05**
*****Significant at a = .01**

RESULTS OF CHOW TESTS FOR INTERACTIVE VARIABLES:

		(medium=high)	(low=medium)	(low=high)
CANADA	F-value:	5.131 ***	2.980 **	2.534 **
GERMANY	F-value:	4.612 ***	3.809 ***	9.976 ***
THE NETHERLANDS	F-value:	2.818 ***	12.434 ***	16.615 ***
SWEDEN	F-value:	2.372 **	4.088 ***	3.845 ***
UNITED STATES	F-value:	1.491	12.448 ***	10.750 ***

Appendix B: Percentages of Working Age Mothers and Non-mothers, by Education Level and Labor Force Status

CANADA -- Women age 24 - 44, not self-employed		**Low Education**	**Medium Education**	**High Education**	
Full-year, Full-time Women	with children	6.33	36.73	21.95	
	no children	3.61	31.39	12.74	100%
Women with earnings > 0; not Full-year, Full-time	with children	10.06	46.59	8.31	
	no children	4.66	21.15	9.23	100%
Women with earnings = 0	with children	25.76	46.26	6.33	
	no children	9.23	10.15	2.27	100%

GERMANY -- Women age 24 - 44, not self-employed		**Low Education**	**Medium Education**	**High Education**	
Full-year, Full-time Women	with children	5.80	23.92	5.03	
	no children	8.70	50.38	9.47	100%
Women with earnings > 0; not Full-year, Full-time	with children	13.31	51.20	7.59	
	no children	6.53	15.87	5.49	100%
Women with earnings = 0	with children	27.26	52.58	7.21	
	no children	3.17	9.03	0.75	100%

NETHERLANDS -- Women age 24 - 44, not self-employed		**Low Education**	**Medium Education**	**High Education**	
Full-year, Full-time Women	with children	3.78	7.94	6.72	
	no children	17.58	39.91	24.07	100%
Women with earnings > 0; not Full-year, Full-time	with children	23.79	34.49	14.90	
	no children	8.15	13.48	5.20	100%
Women with earnings = 0	with children	43.44	33.07	7.23	
	no children	8.25	5.07	2.94	100%

SWEDEN -- Women age 24 - 44, not self-employed		**Low Education**	**Medium Education**	**High Education**	
Full-year, Full-time Women	with children	6.95	33.11	21.14	
	no children	3.40	22.57	12.83	100%
Women with earnings > 0; not Full-year, Full-time	with children	12.15	42.90	15.74	
	no children	3.58	15.45	10.20	100%
Women with earnings = 0	with children	23.12	37.82	11.89	
	no children	9.42	12.33	5.42	100%

UNITED STATES -- Women age 24 - 44, not self-employed		**Low Education**	**Medium Education**	**High Education**	
Full-year, Full-time Women	with children	24.91	19.20	13.52	
	no children	12.01	12.06	18.31	100%
Women with earnings > 0; not Full-year, Full-time	with children	34.10	22.09	16.07	
	no children	8.35	8.74	10.65	100%
Women with earnings = 0	with children	47.33	19.35	13.07	
	no children	11.93	5.35	2.96	100%