Does Having Children Make Cents?

An Economic Analysis of the Gender Wage Gap in Nevada

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Abstract

In this paper, I examine three hypotheses regarding the gender wage-gap in Nevada: children, differing returns to human capital, and occupational choice. Women have made progress in human capital equality with men, yet there remains an unexplained gap. I first present my model, methods, and predictions for each variable. I describe some salient summary statistics which illuminate some of why there remains a pay gap before moving on to a Tobit model and OLS model. I compare joint significance results to individual significance results to determine which factors matter most in determining wages. I perform a Blinder-Oaxaca decomposition and uncover how much of the gap in this sample is due to traits differences and how much is unexplained (and thus "discrimination"). A total wage gap of 31% is found. The children hypothesis does not find evidence in this analysis, but human capital and occupational choices are found to be important in explaining the wage gap in Nevada. The implications of these results are discussed, and suggestions for further research into the differences in labor market choices and differing returns to education are offered.

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(i) Introduction

The persistence of the gender wage gap in Nevada, the United States, and the world, remains unexplained. This paper focuses on testing the hypothesis offered by Waldfogel (1998) and several labor economists worldwide, which is that children and the family structure are behind the remaining wage gap, in Nevada. Waldfogel argues that a lack of support in the US for mothers is the cause of the wage gap. I will refer to Waldfogel's explanation as the "children hypothesis" in this paper. The skills convergence discussed by Goldin (2014) brought the gap from 60% to 76% (Blau & Kahn, 2000), but it does not tell the entire story. Previous researchers have used countless avenues to explain the gap. One hypothesis is that there are different returns to education between men and women; in the UK, women seemingly had the upper-hand (Blundell et al., 1999). In another analysis, men received greater returns to education than did women (Evertsson et al., 2009). I will term the latter the "differing returns to education hypothesis" in this paper. Job preference may differ between genders; Goldin's hypothesis explains the wage gap in terms of a preference for flexibility, which would impel women to seek part-time work in fields which are more flexible at a higher rate than do men (2014). In this paper, I term the idea that women have difference preferences for the kinds of work they are willing to do the "occupation hypothesis." Notably, that explanation may strongly relate to children; after all, the possibility of having children and the social expectations of handling childcare could well impose extra costs on women which men do not face. That difference in costs, which generally involves the time-commitment of children and the potential loss of career advancement, could be why women make different occupational choices when compared to men, if indeed they do. The explanations which I test in this paper are the children hypothesis, the differing returns to education hypothesis, and the occupation preference hypothesis.

I first provide the pair of models with which I attempt to analyze the wage gap in Nevada. I use the Nevada subset of the American Community Survey (ACS) from 2014, a sample which describes 13,263 workers. I proceed to perform several regressions and analyze the results with respect to the hypotheses in question. I compare means and OLS regression coefficients of female and male subsets of the data set, examine joint significance for each category of variable in the model, and perform a Blinder-Oaxaca decomposition by the female variable.

(ii) Model

The OLS wage model I will use can be specified thus:

$$\text{Ln(wagp)} = \text{f(Human Capital, Traits, Children, Occupation)} + \varepsilon$$

The Tobit model is similar:

$$\text{wagp}^* = \text{f(Human Capital, Traits, Children, Occupation)} + \varepsilon$$

Wagp* is the uncensored variable which Tobit estimates. Human capital contains variables like age (instrument for experience) and level of education. Traits are facts about a worker which do not benefit or harm one's capacity to be productive. Children contains the variables for having children and their interactions with the female variable. Occupation contains all variables which specify the industry of which the worker is a part. The letter ε represents the error term with the usual assumptions. The definitions of some selected variables are listed in Table 1. Due to the scope of this model, not all variables will be specifically listed in this table.

Table 1: Variables, definitions, and expected signs

Variables	Definition	Expected Signs
Dependent Variable		
wagp	Wages in last 12 months	n/a
Independent Variables		
Human capital		
age	Age of worker	+
age^2	Age of worker, squared	-
school	Years of schooling of worker	+
assoc	1 if worker has an associate's, 0 if not	+
colgrad	1 if worker has a bachelor's, 0 if not	+
masters	1 if worker has a master's, 0 if not	+
phd	1 if worker has a PhD, 0 if not	+
Traits		
black	1 if worker's is Black, 0 if not	-
asian	1 if worker is Asian, 0 if not	-
hispanic	1 if worker is Hispanic, 0 if not	-
othernw	1 if worker is another nonwhite race, 0 if not	-
married	1 if worker is married, 0 if not	+
female	1 if worker is a woman, 0 if not	-
fmarr	interaction of female and married	-
parttime	1 if worker worked <35 hours usually	-
hours	Mean number of hours worker worked per work	+
Children		
children05	1 if worker only has children 0-5 years old, 0 if not	-
children617	1 if worker only has children 6-17 years old, 0 if not	-
children017	1 if worker has children 0-17	-
femch5	interaction of female and children05	-
femch617	interaction of female and children617	-
femch017	interaction of female and children017	-
Occupation		
hls	1 if health support services worker, 0 if not	-
ext	1 if extractive industry worker, 0 if not	+

This model includes 46 independent variables and 1 dependent variable. I have divided these variables into groups which reflect their role in the model.

Human capital variables should all have positive coefficients, except for the quadratic age variable (which is negative to capture diminishing returns). Age is an instrument for experience since age and experience are highly correlated. The education variables, which include whether someone has a college degree and how many total years of schooling the worker has received, capture the human capital of the worker. The degree variables will capture the sheepskin effect, the additional wage premium of completing a degree on top of spending years in school (Yaeger & Page, 1996). The base group for the degree dummy variables is the population which has not graduated high school.

Traits variables vary widely in their impact and are included to account for factors which are assumed to be important but which do not constitute the focus of this paper.

The female variable ought to take a negative coefficient. Goldin's work, among numerous others, points to a persistent wage gap which will be partially captured by this dummy variable (2014). The interaction of "marriage" and "female" should be negative; women, when married, are frequently expected to settle down and raise children. That allows men to work more (they are less encumbered by childcare) and thus benefit more from marriage. Both genders should benefit from marriage in general (Cohen and Haberfeld believe the marriage wage premium comes from an unspecified third variable which is not gender-specific) but this aspect could dampen that benefit for women (1991).

The part-time and hours variables control for the possibility that men and women work different amounts. Goldin's hypothesis that women prefer flexibility will be examined with these variables; if part-time work (which is more flexible) is more common for women and simultaneously less rewarding (on top of working fewer hours in general), then that could explain part of the wage gap (2014). I expect that working more hours will bring higher yearly wages simply because each hour worked represents an hourly wage (*de facto* in salaried positions, yet still applicable). In turn, part-time work can be expected to have a wage penalty because part-time workers are legally entitled to fewer benefits than full-time workers. Furthermore, the flexibility of part-time work lowers the opportunity cost of working for the worker, so the worker does not need as much direct monetary compensation to justify spending his or her time at the job.

The children dummy variables could have positive or negative coefficients in a model and it would not speak to the pay gap per se. If they are positive for a model containing only men and negative for a model containing only women, that would provide evidence that having children contributes to the pay gap. The children hypothesis would also be evidenced if the interactions between each of these variables and the female variable are significant and have negative coefficients. The base group for the children variables is a person who currently has no children aged 17 or under whatsoever.

By controlling for occupation, I can further isolate the effects of gender discrimination; in this model, the effect of working in a higher-paying field will be included, which means that the resultant gap will not be explainable strictly by the fact that there are fewer women in one field or another. I use industry as the instrument for occupation, since the precise occupation of each individual in the survey is not available. This part of the model will provide ample material to analyze how much of the gender pay gap is due to differences in occupation and how much is due to differences *within* that occupation. As for signs, I expect occupations like those in extractive industries, business, finance, law, and government to have a wage premium. The first four listed are well-known for their high wages; there is a lot of money to be had in oil and minerals, business, on Wall Street, in the courthouse, and in bureaucracy. Other occupations, like health support services and non-profit work, are often less valued in the market. Nurses and medical technicians are generally paid well below any physician or physician's assistant, and non-profit work by its very nature does not lend itself to hefty wages.

(iv) Empirical Results

Coefficients for the variables from both OLS and Tobit models are listed alongside each other in Table 2. Due to the size of the model, not all variables will be included in the table. Each asterisk indicates a level of confidence: one means 90% confidence, two mean 95% confidence, and three mean 99% confidence.

I have applied the natural log to the wage variable so that it will be smooth and continuous. All coefficients are reported to 3 decimal places. To determine the percent effects of each variable on wage in the semi-log OLS regression, I will enter each coefficient from the table into the formula:

$$\%\Delta wagp/\%\Delta x_i = 100(e^{\beta_i} - 1)$$

where β_i is the coefficient on the ith variable and x_i is the ith variable.

In the Tobit model, the original coefficient is interpreted as the effect of a unit change in the independent variable in question on an uncensored dependent variable:

$$\Delta wagp^* = \beta_i \Delta \mathbf{x}_i$$

where β_i is the coefficient on the ith variable, x_i is the ith variable and wagp* is the uncensored dependent variable.

The letter 'F' in parentheses in the table indicates an interaction with the female variable.

Table 2: Regressions

Variable	OLS	Tobit
Observations	12599	13263
Female	-.0110	-3400.3193***
Part-time	-.4884***	-10748.0166***
Bachelor's degree	.2213***	13089.6458***
School (in years)	-.0062	66.0467
Married	.2363***	9848.7835***

(F) Married	-.1687***	-9640.7212***
Children (<6 yrs)	.0292	3322.7386
Children (6-17)	-.0210	833.3112
Children (0-17)	-.0350	-2287.0454
(F) Children (<6 yrs)	.0305	-1193.3124
(F) Children (6-17)	.0038	-2381.9865
(F) Children (0-17)	.0864	2972.4078
Extractive Industry	.5563***	22839.1421***
Health Support Services	-.1098***	-6444.4663***
*****p<.01, **p<.05, *p<.10**		

It is immediately notable that none of the children variables' coefficients are significant in either model. The coefficients also vary in sign, both in each model and between each model. The interaction variables are also insignificant. This result indicates that whatever effects children have on wages (if indeed they have any effects), they are captured elsewhere. While this does not dismiss the possibility that children make up part of the wage gap, the lack of any direct effects of children on wages whatsoever in this sample does call the children hypothesis into question.

Both occupational variables in Table 2 are statistically significant and substantial in effect in both models. Working in an extractive industry job, such as mining, bears a premium of 74.42% in the OLS model, while working in health support services has a wage penalty of 11.60%.

The part-time variable has a negative and significant coefficient in both the OLS model and Tobit model. In the OLS model, the wage penalty for working part-time is -62.97%. This result lends some support to Goldin's hypothesis (2014). If part-time work is heavily penalized on top of the effects of hours of work, and women work part-time more often, then that would explain part of the wage gap. Every degree variable is positive and significant at 99% confidence except for the variable for years in school, which is not significant. This result points to the idea that education is not just human capital investment, but a "sheepskin" which *signals* to employers one's level of human capital (Jaeger & Page, 1998). That in turn opens the possibility that employers could misread the signal based on gender. A woman with a bachelor's degree may have her signal underestimated by the employer and thus receive less of a premium for that degree. Table 3 includes selected variable means and coefficients from two OLS models. One regression had only female workers (denoted by a sub- or superscript 'F') and one had only male workers (denoted by a sub- or superscript 'M').

Table 3: Female and Male Coefficients and Means

Variable	β^F	□$_F$	β^M	□$_M$
Bachelor's degree	.1500***	.2043	.2949***	.2073
PhD	.3938***	.0364	.2890***	.0402
Part-time	-.3764***	.1655	-.5838***	.1235
Extractive Industry	.6797	.0002	.5706***	.0038
Health Support Services	-.1422**	.0168	-.0790	.0032
*****p<.01, **p<.05, *p<.10**				

Men and women have almost the same incidence of bachelor's degrees, 20.73% and 20.43% respectively, but the coefficients are starkly different. Men receive almost double the wage premium that women do, even controlling for type of degree via the occupation variables. Men receive a larger wage premium for every education level between bachelor's and PhD. At the PhD level, women receive a higher wage premium. One possibility is that achieving a PhD sends a strong signal to employers (and said employers are often universities for PhD graduates) which is less likely to be muddied by implicit discriminatory views of women, so the wage premiums they would have received for earlier degrees are instead captured in the PhD premium. Men and women get PhDs at almost the same rate in the sample. This result provides evidence for the idea that the wage gap results from differing returns to education between men and women (Evertsson et al., 2009).

Men receive a larger wage penalty for part-time work than do women, though women work part-time at a higher rate compared to men. This result further demonstrates Goldin's hypothesis; plainly women work part-time (i.e., flexible hours) more often in this sample, and there is a penalty for part-time work. Men receive a statistically significant wage premium from working in extractive industries while women do not (possibly due in part to the small number of women recorded in that occupation, which is .02% of women sampled). Men also work in extractive industries at a rate more than 10 times that of women. Occupation in this case seems to be a major driver of the wage gap; men work in a highly lucrative field at a higher rate, and they receive a higher premium for doing so as well. Women work more frequently in health support services than do men, and they receive a statistically significant wage penalty for it. Men do not have a significant wage penalty, perhaps due to sample size (only .02% of men worked in that occupation). Therefore, occupational differences make up a meaningful part of the wage gap in Nevada.

Table 4 shows the results of a Blinder-Oaxaca decomposition by the female dummy variable. This analysis will allow me to measure the magnitude of discrimination and break it down into its causes.

Table 4: Decomposition of average male-female wage gap

Blinder-Oaxaca Decomposition	Ln wage gap	Percent difference (rounded)
Total gap	.2725631	31.33%
Due to skills and traits	.1872565	20.59%
Due to discrimination	.0993064	10.44%

The Nevada gender pay gap in 2014 was such that for each dollar a man earned, a woman earned about 69 cents. The gap due to traits was 20.59%, which means that two-thirds of the magnitude of the wage gap is due to differences in factors such as education and occupation. 10.44%, or a third of the wage gap, however, results from what is termed discrimination (Cotton, 1988). That is, the 10.44% comes from differing treatment of those characteristics between men and women, such as the education differential (see Table 3).

(v) Conclusion

There is evidence to support the findings of Evertsson et al. (2009) that there are different returns to education between men and women. In Nevada, men do in fact gain more from education, even though women are on average better educated. The gap in wage premiums is substantial up to the doctorate level, where it reverses direction to favor women. The differing returns to education hypothesis does bear out in Nevada. Goldin's part-time explanation (2014) appears in this data set as well; more women are part-timers, and part-time work carries a hefty penalty. The hypothesis which is not evidenced by this analysis is that of children. In Nevada, children do not appear to represent a wage penalty for women or men. The effects of children and family-building could be captured, as suggested by Goldin, in occupational traits such as part-time work (2014). Further, the occupations themselves see different participation between genders. Extractive industries pay well, for instance, and men work more in those industries. Women work in health supportive services at a higher rate than men, but that field has a wage penalty. This fact, along with differing returns to education, explains much of the gender wage gap.

Based on these findings, children do not appear to be decisive in explaining the wage gap in Nevada in the way offered by Waldfogel (1998). If the wage gap were due to children via the lack of economic support for mothers, one would expect those variables (particularly the interactions with the female variable) to have at least some impact on wages directly. Instead, the route through which children seem to have their impact, if they have any at all, is the one suggested by Goldin (2014). Occupational choices and differing returns to education are decidedly more powerful for explaining why there persists such a wide gender wage gap in the Nevada labor market. As for why men and women make different occupation choices (if indeed they are truly choices) and face differing returns to education, that is a matter for future research. This analysis could be built upon by examining such factors as choice of degree to further isolate the effects of occupation. It is not yet clear why women face differing returns to education, nor why the fields which women choose are often paid less than those chosen by men. Further analysis could also examine the causal links between children and the factors which have been shown by much compelling research to cause the gender wage gap.

References

Blau, F. and Kahn, L. "Gender differences in Pay" *Journal of Economics Perspectives.* Vol. 14 (4), Fall 2000: 75-99.

Cotton, J. "On the Decomposition of Wage Differentials" *The Review of Economics and Statistics.* Vol. 69, 1988: 236-243.

Claudia Goldin. "A Grand Gender Convergence: Its Last Chapter." The *American Economic Review*. Vol. 104 (04), 2014: 1091-1119.

Evertsson, Marie, Paula England, Irma Mooi-Reci, Joan Hermsen, Jeanne de Bruijn, David Cotter, Institutet för social forskning (SOFI), Stockholms universitet, and Samhällsvetenskapliga fakulteten. "Is gender inequality greater at lower or higher educational levels? common patterns in the netherlands, sweden, and the united states" Social Politics 16 (2), 2009: 210-41.

Jaeger D. and Page, M. "Degrees Matter: New Evidence on Sheepskin Effects in the Returns to Education" *The Review of Economics and Statistics.* Vol. 78, 1996: 733-740.

Richard Blundell, Dearden,L., Meghir C., and Barbara Siamesis, "Human Capital Investment: The Returns from Education and Training to the Individual, the Firm and the Economy" *Fiscal Studies. Vol. 20,* 1999: 1–23

Waldfogel, Jane. 1998. "Understanding the "Family Gap" in Pay for Women with Children." *Journal of Economic Perspectives*, 12(1): 137-156.