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Persistence of Gender Occupational Segregation and the Gender Income Gap in Early 21st Century USA

Abstract

This study has found evidence that occupational segregation is still present, as some traditionally feminine occupations (primary school teaching and nursing) comprise significantly more women than men. Furthermore, this study has found evidence that the earnings gender gap persists even in these occupations that continue to be dominated by women.

**Wabash College
ECO 401: Senior Seminar
Dr. Joyce Burnette**

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Alex Goga '08

December 11, 2007

Introduction

The idea of equal opportunity, regardless of gender, race or creed has served as a foundational pillar for many American public policy undertakings. Nevertheless, despite the countless studies conducted in economics, psychology and sociology, as well as the several public policy initiatives such as Affirmative Action and Equal Employment Opportunity, no commonly accepted measure of definite success or clear progress has been achieved. Two indicators of gender inequality in the labor market, occupational segregation and income disparity are still present. While this disparity has improved somewhat over the course of the 20th century, it is still as present as it ever was, particularly in traditionally de facto gender-segregated occupations such as education, teaching and management.

This paper will use econometrics to analyze the current gender disparity situation in the American labor market, as represented by four relevant occupations primary school teaching, high school teaching, nursing and general management. The general outline consists of an overview of literature concerned with occupational segregation, a theoretical model for this study, empirical results and analysis and a conclusion that includes suggestions for further research.

Literature Review

My research led me to identify three major explanations for why women overwhelmingly choose some occupations over others: attitude towards competition, premeditated choice, and circumstantial choice.

The notion that women and men have a different attitude towards competition is researched using economics in the article “Do Women Shy Away From Competition? Do Men Compete Too Much” by Muriel Niederle and Lise Vesterlund and published in *The Quarterly Journal of Economics* in August 2007. The premise of their study was based on previous research in psychology suggesting that men are more competitive than women. The authors sought out to replicate real world attitude towards competition and showcase gender differences in an attempt to explain why women are underrepresented in many high-profile jobs. Their experiment was designed to “examine whether for a given performance level more women than men prefer to work under a non-competitive piece rate than under a competitive tournament compensation scheme. (Niederle & Vesterlund, p. 1067).

The study found that while as previously thought, gender differences in preferences and ability or simply discrimination are a major factor for this gender disparity across professions, an alternate explanation is men and women act differently when faced with competitive environments. The experiment design eliminated the explanatory power of discrimination or experience, as the time span of the experiment was short and did not involve long-term decisions (marriage, having children etc.). The study found evidence that women tend to avoid competition altogether if at all possible or, if forced to compete, exhibit lackadaisical performance. The underlying reason for this outcome is men are overconfident (twice more likely to choose a tournament), while women tend to avoid being in a competitive situation. There is a preference for competition that is much lower for women than for men. Consequently, a possible explanation for occupational segregation is different attitudes towards competition by

women (evasive) and men (aggressive) (Niederle & Vesterlund, pp. 1096-1100)

Another commonly encountered explanation for why women choose some occupations over others is the idea of personal choice to do something they perceive is making a difference. The article “Choosing to Teach: Reflections on Gender and Social Change” by Lisa Smulyan and published in *Teachers College Record* in March 2004 focuses on a select group of women at small liberal arts colleges who choose to become K-12 teachers (Smulyan, pp. 513-514).

The author gave serious consideration to previous literature that emphasized the predilection of women towards teaching young children as a natural extension to their traditional homemaker role. She also found ample anecdotic evidence in her interviews spanning over 10 years that especially the college women’s families expressed disapproval with their career choice. The arguments from parents varied from depicting a career in K12 education not worth the effort of an expensive liberal arts education to being worried that K12 education would not provide enough of a challenge to their daughters. However pertinent these arguments, the young women who chose to become K12 teachers despite parental disapproval argued that it is because of their exquisite education they are choosing to become teachers, because they see teaching as medium to bring about positive social change by educating tomorrow’s generations. This becomes a mark of professional success in itself, independently of more generally accepted signs of success such as being a manager, lawyer, doctor or investment banker. Smulyan therefore argues that many women make a conscious and premeditated choice to become teachers, because they want to make a difference in the world by educating the youth (Smulyan, p. 539)

In contrast to this idea of free choice by women to become teachers and thus choosing occupations which from the outside could seem like taking it easy or simply wasting potential, comes the notion of choices being forced by circumstances. The article “Explaining Women’s Employment Patterns: ‘Orientations to Work’ Revisited” by Rosemary Crompton and Fiona Harris, published in the March 1998 edition of *The British Journal of Sociology* offers an insightful analysis of circumstantial choice. The labor market in the paper is that of the United Kingdom, particularly women in banking and medicine, but the findings can be generalized to the US or the world as well. The article comes in reply to literature claiming that gender occupational segregation is a result of varying individual choices by women (Crompton & Harris, p. 118).

The authors of this sociology paper find that given the intensely stressful nature of having a fulfilling family life and a career at the same time, many women indeed choose certain occupations, but not because they desire to make a difference like we saw before with K-12 teaching, but rather by necessity. The women that the authors are talking about are forced to find a way to effectively balance their personal and family life with professional and career life. Crompton & Harris argue that these circumstances, which change throughout a woman’s life, influence their occupational choice. The authors conclude that women are a major cause for gender occupational segregation due to choices influenced by circumstance, eventually causing temporary occupations to become lifelong tenures (Crompton & Harris, pp. 131-133).

Armed with these three possible explanations for occupational segregation and wage disparity, we will analyze the current situation in the United States labor market for traditionally female and traditionally male occupations.

Theoretical Section

The dependent variable of the study is LNWAGE. The regressions will be based on the following independent variables: FEMALE (dummy proxy variable for Sex), AGE, EDUCATION, CHILDREN (dummy for presence of children), MARRIED (dummy for married with spouse present), MARRIED*FEMALE (dummy for the case of married women) and four dummy variables for regions: NORTHEAST (base case), MIDWEST, WEST and SOUTH.

The regressions are based on the following models:

Model 1

$$\text{LNWAGE} = \alpha \text{FEMALE} + \varepsilon_0$$

This basic model has only one independent variable and assumes that the log Wage is determined primarily by gender.

Model 2

$$\text{LNWAGE} = \alpha \text{FEMALE} + \beta_1 \text{AGE} + \beta_2 \text{EDUCATION} + \beta_3 \text{MARRIED} + \beta_4 \text{CHILDREN} + \beta_5 \text{MARRIED*FEMALE} + \beta_6 \text{MIDWEST} + \beta_7 \text{WEST} + \beta_8 \text{SOUTH} + \varepsilon_0$$

This model adds all the explanatory variables. EDUCATION and AGE are continuous variables and all others are dummy variables (0 – false/no and 1 – true/yes).

Empirical Results and Analysis

The data for this study was collected and assembled from the *September 2007 Current Population Survey (CPS)*. Only observations with non-missing values (in universe) for the selected variables were included in the data sets. The aggregated data set contains only people with ages between 18 and 62 (from adult to retirement age) as they are the only ones eligible to be in any of the four occupations. Choosing a minimum and maximum age also allows for comparing across occupations. The following table details the CPS variables used for the aggregate data set with the conditions or ranges stipulated.

CPS Variables

Name	CPS Label	Conditions / Range
PTERNWA	Earnings-weekly earnings, amount-recode	0 to max
PRTAGE	Demographics-age top coded at 90 years old	18 to 62
PESEX	Demographics-sex	1 (M) and 2 (F)
PRNMCHLD	Demographics-number of own children	0 to max
PEEDUCA	Demographics-highest level of school completed	All codes
GEREG	Geography-region	1 (NE), 2 (MW), 3 (W), 4 (S)
PEMARITL	Demographics-marital status	All codes
PTIO1OCD	Indus.&Occ.-(main job)occupation code	Only codes: 0010, 0020, 0040, 0050, 0060, 0100, 0110, 0120, 0130, 0140, 0150, 0160, 0200, 2300, 2310, 2320, 3500, 3600,

The variables were renamed and converted or recoded in order to fit the purpose of this study. EDUCATION was recoded as in order to measure the total number of years spent in school and thus be an adequate explanatory variable (see table).

Because previous research has shown a higher effect of marriage on the earnings of women than on men (Waldfoegel), the variable MARRIED*FEMALE was added.

EDUCATION Recoding Table

EDUCATION = years of schooling = PEEDUCA – 26, recoded as follows:

PEEDUCA	EDUCATION	Equivalent
31	0	Less than 1 st grade
32	3	1 st – 4 th grade
33	6	5 th or 6 th grade
34	8	7 th or 8 th grade
35	9	9 th grade
36	10	10 th grade
37	11	11 th grade
38	12	12 th grade, no diploma
39	12	High school grad or equivalent
40	13	Some college, no degree
41	14	Associate's degree – occupational or vocational
42	14	Associate's degree – academic
43	16	Bachelor's degree
44	17	Master's degree
45	19	Professional school
46	20	Doctorate

The dependent variable LNWAGE was calculated as the log of the CPS weekly earnings PTERNWA, in order to properly normalize the distribution of the values and allow for a calculation of the wage gap. The independent dummy variable MARRIED=1, if the person is married with a spouse present, and MARRIED=0 otherwise (not married, widowed, divorced etc.). We are only interested in the presence or absence of children, not the total number of children, therefore PRNMCHLD was used to generate the dummy variable CHILDREN=1, if there are any children present, and CHILDREN=0 otherwise. Similarly, each of the region variables (NORTHEAST, MIDWEST, WEST, SOUTH) are =1, if the person lives in that region, and =0 otherwise. The following table offers a summary of all the variables used in this study.

Final Variables

Name	Description
LNWAGE	Dependent variable, calculated as $\ln(\text{PTERNWA})$
FEMALE	Dummy variable: 1 – female, 0 – male
AGE	18 to 62 years
EDUCATION	Years of schooling (see recoding table above)
MARRIED	Dummy variable: 0 – no/other, 1 – yes (Spouse Present)
CHILDREN	Dummy variable calculated from PRNMCHLD: 0 – none, 1 – one or more children
MARRIED*FEMALE	Composite dummy variable: 0 – unmarried woman, 1 – married woman
NORTHEAST	
MIDWEST	Dummy variables for regions: 0 – not in region, 1 – in region
WEST	(NORTHEAST used as base case for regression.)
SOUTH	

The aggregated data set was broken down by CPS occupational code (PTIO1OCD) into data sets or cohorts, corresponding to the following occupations:

- I. Pre-school, kindergarten teachers and elementary, middle school teachers
(PTIO1OCD = 2300 or 2310)
- II. High school teachers
(PTIO1OCD = 2320)
- III. Nursing (practitioner, vocational nurses and psychiatric, home care nurses)
(PTIO1OCD = 3500 or 3600)
- IV. Management (all managers)
(PTIO1OCD = 0010, 0020, 0040, 0050, 0060, 0100, 0110, 0120, 0130, 0140, 0150, 0160, 0200)

Given the fact that teaching and nursing are occupations traditionally dominated by women, we expect to find more women than men in occupations I, II and III and more men than women in occupation IV. This selection of specific occupation will serve as a way to analyze the current situation in the labor market and analyze the income gender gap that still persists today. The regression using both models (M1 and M2) have been run on each individual data set (I, II, III, IV) and summary statistics, including for the aggregate data set, are provided below.

Regression Summary Statistics

	Aggregate		I K, E, M School		II High School		III Nursing		IV Management	
N	2156		412		120		281		685	
%F : %M	57% : 63%		86% : 14%		50% : 50%		90% : 10%		35% : 65%	
Avg. LNWAGE F – M differential	6.595 – 7.028 = -0.433		6.555 – 6.852 = -0.297		6.684 – 6.780 = -0.096		6.017 – 6.028 = -0.011		6.969 – 7.161 = -0.192	
	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
p (95% CI)	0.000	0.000	0.001	0.000	0.416	0.254	0.937	0.000	0.001	0.000
Adj. R ²	0.079	0.298	0.023	0.182	0.006	0.209	0.000	0.062	0.138	0.078
RMSE	0.731	0.640	0.630	0.584	0.643	0.636	0.732	0.707	0.737	0.713

The summary results show that the occupations chosen for this study confirm our expectations. There are overwhelmingly more women than men in primary teaching and nursing (I and III). Occupation II (high school teachers), is not dominated by women as we expected. The sample of high school teachers features an equal number of men and women. However, the data for high school teachers is not statistically significant, most likely due to a relatively small sample size (N=120). The results for high school teachers should not be generalized. Nonetheless, the overall trend for all four cohorts showcases the persistence of gender-based occupational segregation and earnings gap.

Previous findings (see literature review) are confirmed as women dominate two traditionally feminine occupations (teaching and nursing), while men dominate management, a traditionally masculine occupation. Furthermore, even in occupations where there are more women than men (I and III) or a roughly equal number (II), the wage differential still favors men to the detriment of women. Surprisingly, primary teaching has the highest wage differential. A possible explanation for this is that there

are many women teachers at the primary level, but the management, which controls employment decisions (i.e. the principal), is comprised mainly of men. If the overrepresentation of women in a given occupation were to blame, then we would expect to find nursing, which has even more women (90% versus 86% in primary teaching), to show a similar highly negative wage differential. However, this is not the case, as the wage differential for nursing (-0.011) is the lowest encountered in this study, suggesting closer wage equality between men and women in this occupation. Keep in mind that the very large number of women in the nursing occupation (over 90%) might not allow the differential to be generalized, as it represents the difference in the average LNWAGE for all women and for all men, in that occupation. Next, we will look at the results of the regressions.

The table shows a breakdown of the effects each independent variable has on LNWAGE across occupations. The explanatory variables chosen for the study yielded mixed regression results. Several values were not statistically significant, especially in the nursing cohort. The regressions using Model 1 find FEMALE to be as high as -0.297 (in primary education), meaning that being a woman in this occupation leads to a 29.7% decrease in average wage. In the management cohort, being a woman leads to a 19.2% decrease in average wage. By contrast, also using Model 1, FEMALE is a lot less influential in the case of high school teachers and nursing, where being a woman leads to a 9.6% decrease and 1.2% decrease, respectively, in average wage. However, the values encountered using Model 1 for high school teachers and nursing are not statistically significant at the 95% confidence interval level and should not be generalized to the entire population the sample represents.

Regression Results

Dependent Variable Coefficients

	I K, E, M School		II High School		III Nursing		IV Management	
	M1	M2	M1	M2	M1	M2	M1	M2
FEMALE	-0.297 (0.004)	-0.256 (0.004)	-0.096* (0.011)	-0.127* (0.010)	-0.012* (0.009)	0.043* (0.009)	-0.192 (0.002)	-0.145 (0.002)
AGE		0.005* (0.001)		0.008* (0.000)		0.002* (0.000)		0.114 (0.000)
EDUCATION		0.152 (0.001)		0.106* (0.007)		0.090 (0.001)		0.079 (0.000)
MARRIED		-0.082* (0.004)		0.086* (0.015)		0.298 (0.007)		-0.019 (0.003)
CHILDREN		-0.023* (0.006)		0.036* (0.027)		0.059* (0.256)		0.113* (0.006)
MARRIED *FEMALE		0.104* (0.007)		0.011* (0.030)		-0.116* (0.008)		0.059* (0.006)
MIDWEST		-0.361 (0.004)		-0.218* (0.015)		0.002* (0.007)		-0.020* (0.003)
WEST		-0.166* (0.004)		-0.364 (0.016)		-0.069* (0.008)		0.131* (0.001)
SOUTH		-0.150* (0.004)		-0.167* (0.015)		0.008* (0.007)		0.040* (0.003)

All results rounded to three decimal points.

Standard Error - SE reported in parentheses.

Non-starred values have $p < 0.05$ (95% CI) or better.

* Starred values are not statistically significant, i.e. $p\text{-value} > 0.05$.

When using Model 2, we see a decrease in the influence of FEMALE across all occupations, with the exception of the nursing cohort, where we find the only positive coefficient 0.043. This coefficient translates to being a woman in nursing leading to a 4.3% increase in average wage. Also it is worth mentioning that using Model 2, being a

woman high school teacher leads to a 12.7% decrease (as opposed to a 9.6% decrease using Model 1) in average wage. This means that despite the roughly equal number of women and men employed as high school teachers, there is still a significant earnings penalty for women that is heightened when using the explanatory variables as controls, rather than diminished, as it would be expected.

The explanatory variables have varying coefficients and several of them (marked with an asterisk) are not statistically significant with a 95% confidence interval. It is worth noting that the variables with the largest impact as measured by the regression coefficient estimates are EDUCATION and MARRIED. EDUCATION has an impact on the average wage, which varies from a 7.9% increase in the management cohort to a 15% increase in the primary education cohort. MARRIED has the broadest impact range. Its effect varies from an 8.2% decrease in the primary education cohort average wage to a relatively large 29.8% increase in the nursing cohort average wage. CHILDREN have a relatively small impact that varies from a 2.3% decrease in average wage in the case of the primary education cohort to a 11.3% increase in the care of the male dominate management cohort. All the dummy variables for region, with the exception of MIDWEST for primary teachers and WEST for high school teachers, do not have a statistically significant impact on the average wage in any of the four occupations. The data shows evidence that being a primary teacher in the Midwest incurs a 36.1% decrease in average wage. Similarly, being a high school teacher in the West incurs a 36.4% decrease in average wage. The following table shows only statistically significant findings using Model 2, converted to percentage effects on average wage for easy reference.

Model 2 Regression Results
Dependent Variable Percentage Effect on LNWAGE
(statistically insignificant values were omitted)

	I K, E, M School	II High School	III Nursing	IV Management
FEMALE	-25.6%			14.5%
AGE				11.4%
EDUCATION	15.2%		9%	7.9%
MARRIED			29.8%	-1.9%
CHILDREN				
M*FEMALE				
MIDWEST	-36.1%			
WEST		-36.4%		
SOUTH				

The management occupation cohort is dominated by men (65% versus 35%) and exhibits a statistically significant 20% average wage differential between men and women. This was expected given previous research on the matter. What is more interesting is the fact that being a woman in management incurs a 14.5% increase in average wage. This is probably indicative of not only equal employment opportunity corporate policies, but also the perception of employers that women that get into management are more responsive to economic incentives (higher pay) than women in the other three occupations considered. Furthermore, AGE and EDUCATION have a positive effect on the average wage (11.4% and 7.9% respectively) and act as a proxy measure of experience, which is more prized by employers in management than in the other occupations.

Given the fact that previous research (Waldfogel) has found differences in the effect of marital status on women versus men, usually to the disadvantage of women, we took special attention towards controlling for this by creating the MARRIED*FEMALE composite variable. The table below focuses on the difference between MARRIED, the effect of married on the average wage of the entire cohort, and MARRIED*FEMALE, the effect of being married on the average wage of women in the cohort.

MARRIED vs. MARRIED*FEMALE Differential

	I K, E, M School	II High School	III Nursing	IV Management
MARRIED	-8%	9%	30%	-2%
M*FEMALE	10%	1%	-12%	6%
D	19%	8%	41%	8%

Values rounded to nearest integer percentage point.

As we expected, the composite variable MARRIED*FEMALE shows there is a significant difference on the average wage impact of marital status between women and men. In the case of primary education, being married leads to an 8% decrease in average wage, yet for married women, this translates into a 10% increase in average wage. Also, the nursing cohort shows a very significantly higher impact of marital status for women. The average wage for a married female nurse is decreased by 12%, while the average male or female nurse gets a 30% higher average wage for being married. Given the fact that there are 90% women in our sample, this can be generalized to pen that married male nurses get a significant average wage increase, while married female nurses get a significant average wage decrease.

This significant difference between the effect of marital status in-between men and women appears as evidence to discriminatory practices. In our study, the regression results on the nursing cohort are eloquent. Women dominate the nursing occupation (90% female, 10% male in our sample), yet being a married female nurse leads to a 12% decrease in average wage. This suggests that employers have higher wages for the much fewer married male nurses because they consider men are far less likely to quit for family reasons, but could quit for economic reasons. Married female nurses are more likely to quit for family reasons (i.e. childbearing) than their male counterparts and as such their average wage is lower if they are married. These findings are consistent with other studies (Waldfogel and others), which found the effects of marriage to be advantageous to men and disadvantageous to women. Employees pay equally qualified married women less than married men, because economic incentives have a perceived higher effect on men than on women. It appears that employers in nursing still consider women more likely to quit their jobs simply because they want to spend more time with their newborns, and that no reasonable economic incentive (i.e. higher wage) would act as a deterrent

Conclusion and Suggestions for Further Research

This study has found evidence that occupational segregation is still present, as some traditionally feminine occupations (primary school teaching and nursing) comprise more women than men. Furthermore, this study has found evidence that the earnings gender gap persists even in these occupations that continue to be dominated by

women. Even in occupations that are overwhelmingly female such as primary school education and nursing, the few men that make it in these occupations earn on average more than their female counterparts. The largest average wage difference between men and women is found in primary school teaching, an occupation traditionally held by women, but also overwhelmingly with a male management (e.g. the school principal). Age and education (proxies for experience) have a more significant impact on the average wage in management than having children, being married or being a married woman.

There are several possible explanations for the continuing occupational segregation leading to the overrepresentations of women in primary school education and nursing. Firstly, as the literature review has shown, women tend to be more passionate about teaching as means to “make a difference” or effect social change. Furthermore, the natural inclination of women to pursue less competitive occupations, without immediate feedback or a clear winner, would make them more likely to chose teaching or nursing over management. Secondly, a less “scientific” theory that women are better communicators than men also supports their choice of occupations which makes use of this comparative advantage over men: teaching and education. Thirdly, while the primary education of children can come about as a natural extension of the traditional role of women in the household, one should not overlook the attitude of parents towards those who teach their children. It is likely, however difficult to measure, that parents prefer leaving their young children (pre-school to middle school) in the care of a female teacher, rather than a male teacher. This brings about the question of what

further research should be conducted to obtain more insight into the issues of gender occupational segregation and gender earnings gap.

Audit studies, in my opinion, are best suited to determine the pertinence power of the previously mentioned possible explanations, as well as develop other hypothesis that could offer a deeper understanding of the matter. An audit study in education should try to measure how difficult is it for a man to obtain a similar teaching position as a woman. In addition, an assessment of parents' attitude towards male teachers in kindergarten, elementary and middle school education could also provide valuable information. Similarly, in nursing, an audit study methodology could be used to evaluate the likelihood for a well-qualified male to obtain a nursing position. Moreover, an assessment of patient attitudes towards the gender of nurses, considering the possibility of customer (i.e. patient) discrimination against male nurses would also be useful. Even more so, an assessment of young men considering a career in healthcare and how they view nursing as a viable choice for occupation might highlight a preferential discrimination on the part of men for other healthcare-related occupations other than nurse (i.e. pharmacist, surgeon, paramedic).

The issue of equal employment opportunity correlated with gender occupational segregation and gender income gap are far from reaching any reasonable consensus in economics, psychology or public policy. Perhaps the major obstacle lies in the territorial nature of each behavioral science. Consensus on these issues of policy towards equality might only be reached once they are no longer treated as simply economic or political issues, but rather as study matter for emergent interdepartmental sciences such as behavioral economics.

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