Examining the Gender Pay Gap in the U.S. in 1979-2009: The Unconditional Quantile Regression Approach

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Abstract

Using the data from the Current Population Survey Outgoing Rotation Groups for 1979, 1989, 1999 and 2009 I show that the decline of the gender pay gap was not uniform across various quantiles of wage distribution and time periods. After substantial decline of the gender pay gap in 1979-1989, the slowdown of convergence was observed in 1989-2009, especially at higher quantiles of wage distribution. Decomposition of the gender wage differential on explained and unexplained parts shows that while decline in skill gap highly contributed to convergence of female and male wages, difference in returns to skills has changed slowly since 1989 and even increased at upper quantiles in 1999-2009. I interpret this fact as evidence of "glass ceiling effect". I use the newly developed recentered influence function projection method to decompose explained and unexplained gaps into the contribution of main individual characteristics. I find that "glass ceiling effect" may be associated with uneven returns to higher education, professional-managerial and sales-clerical occupations and working in private sector. In addition, unequal return to experience contributed to slow decline of the gender pay gap in the lower part of wage distribution.

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Introduction

Recent decades have witnessed a substantial decrease in gender pay inequality in the U.S. According to the U.S Census Bureau the ratio of women's to men's median annual earnings in 1979-2008 rose from 59.7% to 79.9%. This change becomes even more remarkable in light of expanding other wage differentials such as wage gaps between college and high school graduates or more- and less-experienced workers (Bound and Johnson 1992, Juhn et al. 1993). Most researchers agree that improvement in women's relative observed and unobserved skills as well as the decrease in discrimination should be considered as the main factors which led to the fall in gender wage differential (Fortin and Lemieux 1998, Blau and Kahn 1997, 2000, 2006). One of the most influential studies which explain the change in female labor market characteristics was performed by Goldin and Katz (2002). The authors suggest that the "pill revolution" enabled young women to postpone marriage and acquire more human capital since 1970's. As a consequence, women became less likely to be high school dropouts and more likely to have a college degree which eventually increased the proportion of females working in professional and managerial occupations previously mostly occupied by males. Thus, the "pill revolution" led to substantial occupational reallocation of women. Indeed, Blau and Kahn (2000) report that women became less concentrated in service and clerical jobs in the 1990's as opposed to managerial jobs where they constituted 45% of workforce. However, several other studies showed that females still differ from males in choosing the college major (Corcoran 1997, Black et al. 2008). For instance, Black et al., using matched procedure, found that from 44 to 73 percentage points of the gender wage differentials may be attributed to the highest degree and major.

The second important skill-related explanation of narrowing the gender pay gap considers the labor market experience. According to Mincer and Polachek (1974), the labor

market interruptions experienced by the majority of female workers due to child-bearing explain the substantial part of the gender pay gap. This basically means that potential labor market experience, computed as age minus education minus five years, usually overestimates the actual women's experience. Indeed, Blau and Kahn (1997) using the Michigan Panel Study of Income Dynamics which contains the information on worker's actual labor market experience find that changes in female actual labor market experience as opposed to changes in potential experience have played one of the most significant roles in narrowing the gender wage gap.

Finally, many studies suggest that female-male wage differential have decreased due to different trends in deunionization (Blau and Kahn 1997). It is a well known fact that union coverage of experienced women has declined less during the last three decades and especially in the 1980's (Fortin and Lemieux 1997). Moreover, DiNardo et al. (1996) show that deunionization accounted for 14% of the rise in male wage dispersion in the 1980's while for females this effect was only 3%. This fact suggests that the substantial number of men who were previously covered by union contracts lost their positions in wage distribution thereby reducing the gender wage gap.

In addition, Juhn et al (1993) suggest that not only observed labor market characteristics but also unobserved skills should be taken into account when investigating the wage differentials. While Neal and Johnson (1996) show that the gender pay gap generally is poorly explained by female-male differences in pre-market characteristics as opposed to black-white wage differential, there might be substantial cognitive differences across genders in career and work values. For instance, females are often considered to be more altruistic and less ambitious than males (Kuhn and Weinberger 2002, Gneezy et al. 2003). In addition, according to negotiating divide hypothesis (Babcock and Laschever 2003) women are less inclined to bargain over higher wages. In light of these hypotheses Fortin (2006) using the

data from single-cohort longitudinal surveys NLS72 and NELS88 finds that substantial part of the gender pay gap in 1970's could be attributed to the difference in work values across genders. Moreover, the author shows that this difference has shrunk considerably in the 1980's contributing to narrowing the gender wage differential.

The decline in gender labor market discrimination might have also contributed to the increase in female relative wages (Blau and Kahn 2000). Gender wage discrimination occurs when workers with equal productivity receive different wages. From the point of view of human capital theory, it happens when genders systematically differ in their returns to labor market characteristics. However, many researchers point out that a skill biased technological change started in the end of 1970's rose the demand for cognitive skills relative to craft skills and benefitted average woman relative to average man in the same way as it benefitted skilled relative to unskilled men (Welch 2000). Indeed, the relative returns to experience and education of women have considerably increased in the last three decades (Blau and Kahn 2006). This is consistent with results showed by Fortin and Lemieux (1998) according to whom, as the total distribution of wages remained almost unchanged in 1980's and 1990's, improvement of female positions in wage distribution implies crowding out males from the middle part of wage distribution. In addition, as returns to education and experience are clearly different at various quantiles of wage distribution, the effect of increase in relative skill prices must exhibit a considerable heterogeneity across the wage density. For instance, Juhn and Dave O'Neill (2005) show that gender differences in work experience are more important for workers with high school and lower education. Overall, recent studies suggest that the gender pay gap attributable to discrimination considerably decreased in last three decades. For instance, O'Neill (2003) using the NLSY data set for the year 2000 which enabled her to control for a reach set of personal, demographic, educational and occupational

characteristics including actual labor market experience found that the unexplained female-male differential was only 2.5%.

In general, as it is almost impossible to separate the discrimination effect from the unobserved skill gap when investigating the gender wage differential with nationally representative cross-sectional data such as the CPS. Therefore, most researchers report the gender pay gap estimates in terms of explained gap or the gap due to difference in skills and unexplained gap or the gap due to difference in wage structures. Moreover, it is implicitly assumed that a researcher controls for all necessary individual labor market characteristics, i.e. the model is fully specified. In this case both effects could be accurately estimated using a wage distribution decomposition technique. Furthermore, the letter effect is usually referred as the extent of gender wage discrimination or unexplained gender differentials in returns to labor market characteristics.

The common way to perform wage density decomposition is the Oaxaca-Blinder method due to Ronald Oaxaca (1973) and Alan S. Blinder (1973). This method implies decomposition of the observed mean gender wage gap into described above two effects. However, the extent of gender wage discrimination or the unexplained gender wage gap in economy often cannot be fully described with the mean unexplained wage gap providing that the gender wage differential is different in various parts of wage distribution. For instance, a "glass ceiling" effect represents a case when women at higher quantiles of wage distribution experience more wage discrimination than women at lower quantiles. Indeed, some studies (Cotter et al. 2001, Blau and Kahn 2006) find that there is evidence of a glass ceiling effect in the U. S. labor market. In addition, the gender differentials in unobserved skills might also produce effect similar to "glass ceiling". For example, Gneezy et al. (2003) and Niederle and Westerlund (2005) show that on average women are less successful in competitive environment than men which affects their comparative earnings at highly-paid jobs. Similarly,

Paserman (2007) comparing performance of female and male professional tennis players finds that the formers on average commit more unforced errors when playing critical points. He suggests that the gender differences in ability to work under pressure may result in the higher gender pay gap in the upper part of wage distribution.

It also should be pointed out that although, according to the U.S. Census Bureau, the convergence of women's and men's earnings was observed in every decade since 1970's, it was slower in 1990's and 2000's. For instance, Blau and Kahn (2006) suggest that less rapid decline in the gender pay gap in the 1990's may be attributable to a "glass ceiling effect" which affected women more severely as they moved up in the wage distribution. However, according to the authors, another possible explanation could be that women's commitment to labor market played much important role in the 1980's than in the subsequent decade thereby increasing women's hours of housework. Indeed, Aguiar and Hurst (2006) found that the gender gap in housework declined much rapidly in the 1980's than in the 1990's. It is also entirely possible that these effects were much different at various quantiles of wage distribution. For instance while "glass ceiling" might have played an important role for highly paid female workers, the work commitment effect may explain less rapid decline in the gender wage differential at lower quantiles of wage distribution.

Overall, above mentioned facts suggest that one has to use a wage density decomposition method which allows going beyond the mean of wage distribution and decompose the gender wage gap at different quantiles of wage density. At first glance, this need appeals to using the well known conditional quantile regressions (Koenker and Basset, 1978). However, the conditional quantile regression methods are not suitable for wage density decomposition purposes. Indeed, the construction of counterfactual wage density requires answering the question what would have happened had the distribution of individual characteristics changed while the wage structure remained the same. However, in the case of

conditional quantiles it is unclear whether an individual would remain in a particular quantile if his endowment vector changed. Thus, decomposition of wages at quantiles requires estimating the effect of explanatory variables on the unconditional quantiles of wages. In practice, the difference between unconditional and conditional quantile gap may be large as the latter captures only the within group dispersion while the former reflects both within and between group dispersion. One solution to this problem is proposed by Machado and Mata (2005). Their method implies construction of actual and counterfactual marginal densities of wages from the estimated conditional densities for various subpopulations. Overall, the method looks like the following:

1. Creating a random sample t_i – from a standard uniform distribution, $i = n$.
2. Estimating the conditional quantile regression of wages over a set of covariates for each sample quantile i.
3. Drawing a random sample of size i of covariates from the given distribution.
4. Estimating the marginal density of wages by assigning coefficients from conditional quantile regressions to covariates from the step 3.

By repeating this procedure one can draw an arbitrarily large sample of the marginal distribution of wages which conforms to the conditional distribution of wages given by a conditional quantile regression. In other words, the Machado-Mata approach implies integrating the conditional density of wages over the distribution of covariates. Moreover, a counterfactual distribution could be easily obtained by selecting the appropriate subsample from the random sample of covariates and assigning them to the coefficients estimated with quantile regression conditional on characteristics of some other subsample. Thus, using the method proposed by Machado and Mata one can estimate the contribution of each particular covariate to the wage structure effect. Nevertheless, this method has several important limitations. First of all, it does not allow computing a contribution of each factor to the

endowment effect which is important in policy-making. For instance, it is often essential to know whether the gender gap in education attainment or the difference in the return to education constitutes the gender earnings differential which attributable to education in the particular part of wage distribution. Secondly, the method is parametrical and implies that regression model fully specifies the particular quantile of wages. Since Machado-Mata decomposition requires running regression for a large number of quantiles, this assumption becomes very unappealing. Finally, the method is high computationally intensive which may be an important limitation considering a possibly large number of covariates in the model.

Due to described above limitations of quantile wage density decomposition methods, in this paper I use the newly developed RIF-projection decomposition method (Firpo et al. 2009) to investigate the dynamic of change in explained and unexplained parts of the gender wage gap attributable to education, experience, the union status and occupational choice at various quantiles of wage distribution in 1979-2009. The advantage of this method is threefold. Firstly, as was mentioned above, unconditional as opposed to conditional quantiles are usually of real interest in economic analysis. Secondly, this method allows decomposition of not only wage structure but also composition effects to portions attributable to each particular covariate. Finally, the approach proposed by Firpo et al. is relatively computationally easy especially comparing to Machado-Mata decomposition.

The rest of the paper is organized as follows. Chapter 1 describes the construction of the data set used in analysis. Chapter 2 provides theoretical framework for RIF-projection decomposition methodology. Results of decomposition are presented in Chapter 3. The paper ends with conclusion where I summarize the obtained results and outline the possible extensions. Finally, the sample summary statistics and the detailed results are presented with tables and graphs in Appendixes.

CHAPTER I: Data Overview

I use data from the Outgoing Rotation Group Supplements of the U.S. Current Population Survey (ORG CPS) for 1979, 1989, 1999 and 2009 years. The data set is publicly available and was obtained from the official web page of the National Bureau of Economic Research. In addition, as the information on the union status of workers was not collected in the May CPS supplements in 1979, I downloaded the publicly available data from the personal web page of Nicole Fortin for this particular year. The data set was used in the paper "Labor Market Institutions and the distribution of Wages, 1973-1992: A Semiparametric Approach" (DiNardo et al., 1996) and was constructed by matching answers concerning the union status from the 1979 Pension Supplement of the May 1979 CPS data set to the corresponding data on wages collected in the CPS ORG.

The particular reason for choosing the ORG data set is that it contains information on hourly wages of workers which is the more consistent measure of wages at a point in time (Lemieux, 2006). If the hourly wage is not reported I use the conventional technique and divide the average weekly earnings of an individual by usual weekly hours worked. The analysis is limited to wage and salary workers of age 16 to 65. In addition, to remove the outliers from the sample, only workers who report hourly wages from 1 to 100 U.S. dollars in real terms are kept in the sample. I use the GDP deflator for personal consumption expenditures to convert nominal wages to 1979 dollars.

Furthermore, several data manipulations were performed to create consistent year to year measures of variables applied to the analysis. Firstly, as the format of reported years of education was changed in the CPS ORG since 1992, it is impossible to obtain the consistent continuous variable reflecting the accurate measure of years of education from 1979 to 2009. Therefore, I do not use the years of education in the analysis but instead create five dummies for the level of education of an individual which correspond to high school dropouts, high

school graduates, college dropouts, college graduates and individuals with graduate education level. In addition, as actual labor market experience is not reported in the CPS, the construction of the variable reflecting years of potential experience (equal to age – education – five years) is also not possible due to the same reason. In this study I create dummies for nine experience groups which contain individuals with potential experience 0-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40 and over 40 years. These variables may be consistently constructed in the ORG data set for the period 1979-2009.

Secondly, to protect the anonymity of respondents, the hourly wages data were top-coded in the CPS ORG. For 1979 to 1988 the threshold was 999 dollars per week. For 1989 to 1998, the top code depended on hours worked and was selected so that earnings per hour times usual hours were not more than 1923.07 dollars per week. From 2004 the threshold was set to 2884 dollars per week. Topcoding is considered to lower mean and variance of wages relative to the true parameters. To deal with this problem, I take into account suggestion proposed by John Schmitt (2003) and estimate mean weekly wages above the top-code using pareto distribution with the 80^{th} percentile of the weekly earnings as the cut-off point for estimating parameters of the distribution.

Thirdly, I do not include overtime premiums, tips and commissions (OTC–adjustment) to the wage observations of workers paid by hour. While it clearly reduces the relative wages of hourly workers to those paid by week, adding these observations to hourly wages does not produce meaningful results for 1979-1988, gives only a limited effect for 1989-1993 and works much better since 1994 when the CPS ORG started to collect specific information concerning overtime premiums, tips, and commissions (Schmitt 2003).

Another commonly known problem is that wage data in the CPS are allocated for individuals who did not report their earnings. Furthermore, the ratio of individuals with allocated wages in the ORG CPS has been increasing over the last two decades exceeding

30% in the 2000s. In general, the CPS uses the careful matching procedure comparing the individual characteristics of workers who report their wages with those of nonrespondents and then allocating reported wages to nonrespondents with identical characteristics. However, as the union status is not used in the matching procedure, using allocated wages in this study may create a bias in estimation of the wage differentials based on these variables. Therefore, for the purpose of this paper all individuals with allocated earnings were excluded from the sample. For further discussion see Hirsch and Schumacher (2003).

Finally, following Fortin and Lemieux (1998) I do not exclude part time workers from the sample. However, for consistent estimation of wage densities I weight each observation by the reported usual weekly hours worked multiplied by the CPS earning weights and normalized to sum to one. This procedure puts more weights on workers who supply relatively more hours to labor market. According to Fortin and Lemieux, these weighted wage observations reflect the distribution of wages per hour worked as opposed to the distribution of wages per worker.

Summary statistics on variables used in this paper are presented in appendix A. The descriptive statistics reveal several trends in data that are different across genders. First of all, one can observe that union coverage has fallen sharply during the last three decades for men with the largest drop of approximately 40% in 1979-1989. In contrast, women have not experienced such a dramatic decline in union participation. While female union coverage decreased substantially in 1979-1989, union participation almost has not changed in subsequent decades. In general, although male workers were more likely to be union members in the 70's, the differences in gender trends in unionization led to the almost equal union coverage across genders in 90's and 2000's.

Secondly, although it is clear from the data that both genders have experienced similar trends in education attainment over the period, there are some differences concerning the

higher education. For instance, while women were less likely to have advanced education in 70's comparing to men, the proportions of males and females with graduate education in the CPS sample have become almost equal in the last twenty years. In addition, the proportion of female college graduates has become even larger relative to that of males in 1999-2009.

Thirdly, women have become more likely to hold professional and technical occupations over the last thirty years. Moreover, while the ratio of men who worked in these occupations has increased by 8% over the period, women have experienced almost 20% increase. In addition, it can be seen that the ratio of men holding sales and clerical occupations has been increasing over time while this picture has been different for women. However, most clerical positions were still occupied by females in the past two decades.

Finally, concerning the sectoral differences in employment across genders, one can see that most of them have not changed over the period. Moreover, when the patterns of industrial employment of men and women changed during the considered period, they remained more or less similar for both groups. For instance, it can be observed that both genders have become more likely to work in professional services and less likely to work in manufacturing over the last thirty years.

CHAPTER II: The Methodology

2.1 Estimating Counterfactual Distribution of Wages

At the first stage I use the wage density decomposition approach developed by DiNardo et al. (1996) to construct a counterfactual distribution of wages for each year. Following their methodology I regard distribution of wages as the integral of the density of wages conditional on a set of covariates over the distribution of individual attributes over the gender status. More precisely, wage densities of both groups may be represented as conditional distributions:

$$\int g^m(w)dw \equiv \int g^m(w|x,\varepsilon)z(x|M=1)dx, \quad (2.1)$$

$$\int g^f(w)dw \equiv \int g^f(w|x,\varepsilon)z(x|M=0)dx, \quad (2.2)$$

where w – a hourly wage; $z(x|M)$ – distribution of covariates conditional upon the gender status; $x \in X$ – a vector of observed individual characteristics; ε – unobserved individual components; M – a group indicator (1 – males, 0 – females).

In general, the pay gap between two groups is analyzed by examining a particular functional of wage distribution (mean, quantile, etc.). Let φ be a functional of the conditional distribution $g(w|x)$. Then the φ-s raw wage gap is represented as:

$$\Delta^{\varphi} = \varphi(g^m) - \varphi(g^f) = \varphi^m - \varphi^f. \quad (2.3)$$

In addition, using the fact that x might be unevenly distributed across two groups, the raw pay gap is decomposed into composition and price effects:

$$\Delta^{\varphi} = (\varphi^m - \varphi^c) + (\varphi^c - \varphi^f) = \Delta^x + \Delta^s. \quad (2.4)$$

where the first term represents the composition effect and the second term represents the wage structure or the "unexplained effect". In formula (2.4) φ^c - is a wage functional of counterfactual distribution which may be referred as the distribution of wages that women could have earned had they be paid under male wage scheme. It should be mentioned that as was stressed in wage decomposition literature (Oaxaca and Ransom 1994) such counterfactual distribution is not unique. For instance, one may consider another decomposition of the raw gender pay gap using the density of wages which men would have earned if they had been paid under female wage structure as the counterfactual distribution. In other words, in the first case the counterfactual distribution is estimated using male wage scheme as a non-discriminatory wage structure while in the second case it is estimated using female wage scheme. In general, choosing a particular counterfactual density leads to different estimates of both composition and price effects. The most common way to deal with this problem in the existing literature is to estimate a counterfactual distribution based on male wage structure. However, some researchers argue that changes in women's wage structure may affect men's wage structure as well and propose to use a pooled wage structure as a non-discriminatory one (Datta Gupta et al. 2003, Fortin and Lemieux 1998). In this paper I follow the traditional approach and assume that:

1) male wage structure is not affected by the relative changes in wage position of females;
2) it could be used as a valid substitute for female wage structure. This means that unobserved individual characteristics which affect wages are distributed randomly across genders conditional on labor market characteristics:

$$\varepsilon \perp (M|X = x)\ \forall\ x \in X; \tag{2.5}$$

3) it is closer to the current non-discriminatory price of labor than female wage distribution.

Under these assumptions the counterfactual density of wages may be represented as follows:

$$g^c \equiv \int g^m(y|x,\varepsilon)z(x|M=0)dx. \quad (2.6)$$

It can be seen that the counterfactual distribution differs from male actual distribution only by the term $z(x|M=0)$. In general, using the Bayes' rule this term may be expressed in the following way:

$$z(x|M) \equiv \frac{P(M|x)z(x)}{p(M)}, M = 0,1, \quad (2.7)$$

where $P(M|x)$ - probability of being in group M conditional on x; $p(M)$ - unconditional probability of being in group M; $z(x)$ – unconditional distribution of individual characteristics. Combining the above expressions for both groups one can derive:

$$g^c \equiv \int g^m(y|x,\varepsilon)z(x|M=0)dx = \int \omega\, g^m(y|x,\varepsilon)z(x|M=1)dx, \quad (2.8)$$

where $\omega = \frac{1-p^m(x)}{p^m(x)}\frac{P_m}{P_f}$ - counterfactual weight based on the conditional probability; $p^m(x) = P(M=1|x)$ - the probability of being a male given the vector of observable characteristics x; P_m, P_f - proportions of males and females in a sample respectively. As long as the counterfactual distribution is constructed, the decomposition of raw gender pay gap into the composition and the wage structure effects is straightforward as under assumptions described above Δ^x- reflects only the difference in observable characteristics.

Furthermore, as the purpose of this study is to investigate the gender wage gap at the various quantiles of wage distribution, I need to construct the entire actual and counterfactual wage densities. For this purpose the kernel density estimator is used:

$$\hat{g}_h(w) = \sum_i \frac{\theta_i}{h} K\left(\frac{w - W_i}{h}\right), \tag{2.9}$$

where $\hat{f}_h(w)$ - estimated density of wages; θ_i – the sample weights; W_i - wage observation in a sample; $K(\cdot)$ – the specific kernel function; h – a particular bandwidth. The counterfactual wage density is constructed by multiplying the sample weights by the counterfactual weights ω_i based on the estimated propensity score:

$$\hat{g}_h^c(w) = \sum_i \frac{\theta_i \hat{\omega}_i}{h} K\left(\frac{w - W_i}{h}\right). \tag{2.10}$$

It should be pointed out that the crucial parameter for estimating the wage density is the bandwidth. Generally, the wider is the bandwidth the smoother is the estimated distribution and the higher is the estimation bias. In this study the default "rule of thumb" incorporated in the software package Stata is used for choosing the optimal bandwidth. In addition, I use the Gaussian kernel function for estimating densities of wages. The counterfactual weights are estimated using a probit model:

$$\Pr(M = 1|x) = \Pr\big(\varepsilon > -\beta' Z(x)\big) = 1 - \Theta\big(-\beta' Z(x)\big), \tag{2.11}$$

where $\Theta(\cdot)$ – a normal cumulative distribution function; *Z(x)* - a function of covariates.[1]

2.2 A RIF projection method

The basic idea behind the RIF-projection method is the construction of so called influence functions which account for contribution of each observation to a statistic of interest. For instance, consider a sample quantile *q(G)* of wage distribution *G(w)*. Then, the influence function calculated at this particular quantile looks as follows:

[1] *Z(x)* actually contains 8 experience dummies, 4 education dummies, dummies for a union status, marital status, race, part time job status as well as nineteen industry dummies and two occupation dummies.

$$IF(w,q,G) = \lim_{\epsilon \to 0} \frac{q(G_{\epsilon,\Delta_w}) - q(G)}{\epsilon} = \frac{\partial q(G_{\epsilon,\Delta_w})}{\partial \epsilon}, \quad (2.12)$$

where $G_{\epsilon,\Delta_w=}(1-\epsilon)G + \epsilon\Delta_w$ – is an infinitesimal perturbation of *G* by point mass at *w*. For example, the influence function for a particular quantile q_t is given by:

$$IF(w,q_t) = \frac{t - I(W \leq q_t)}{g_W(q_t)}, \quad (2.13)$$

where $g_w(q_t)$ – probability density function of wages evaluated at *t*-quantile; $I(\cdot)$ - indicator function which equals 1 if a particular observation is less or equal than the value of wage at *t*-quantile, and 0 - otherwise.

Then the recentered influence function or RIF-projection is obtained by adding the influence function to its quantile:

$$RIF(w,q,G) = q(G) + IF(w,q,G). \quad (2.14)$$

By definition, the expected value of a recentered influence function may be evaluated using the following expression:

$$E[RIF(W,q_t)|X=x] = \frac{1}{g_W(q_t)} Pr[W > q_t|X=x] + q_t + \frac{t-1}{g_W(q_t)}. \quad (2.15)$$

Let the counterfactual distribution of wages be obtained by replacing the distribution of covariates *Z(x)* with another distribution *Z'(x)* while keeping the conditional distribution of wages unchanged:

$$G'(w) = \int G(w|X=x)dZ'(x). \quad (2.16)$$

The central theorem in Firpo et al. (2009) states that the marginal effect of change in explanatory variables on the unconditional quantiles may be evaluated by averaging the conditional expected value of the recentered influence function with respect to the change in distribution of covariates.

$$\sigma_G(q) = \frac{\partial q(G_{W,t,G})}{\partial t}|_{t=0}$$

$$\int RIF(w,q)d(G'-G)(w)$$

$$= \int E[RIF(W,q)|X=x]d(Z'-Z)(x). \quad (2.17)$$

Thus, using this theorem one can derive the unconditional partial effects of the covariates:

1. Continuous covariate:

$$\alpha(q) = \int \frac{dE[RIF(W,q,G)|X=x]}{dx} dZ(x). \quad (2.18)$$

2. Dummy covariate:

$$\alpha_D(q) = E[RIF(W,q,G|X=1\,] - E[RIF(W,q,G|X=0\,]. \quad (2.19)$$

Practically, recentered influence functions may be estimated by replacing the unknown quantiles by their estimators while the density of wages may be replaced with a kernel density estimator:

$$\widehat{RIF}(W,\hat{q}_t) = \hat{q}_t + \frac{t - I(W \le \hat{q}_t)}{\hat{g}_W(\hat{q}_t)}, \quad (2.20)$$

$$\hat{q}_t = argmin_q \left\{ \sum_i (t - 1(W_i - q \le 0)(W_i - q) \right\}, \quad (2.21)$$

$$\hat{g}_W(\hat{q}_t) = \sum_i \frac{\theta_i}{h} K\left(\frac{W_i - \hat{q}_t}{h}\right). \quad (2.22)$$

Then, assuming that RIF depends linearly[2] on X I use the conventional OLS method for obtaining partial effects of covariates on the estimated RIF-functions.:

$$E[RIF(W_k,q_t)|X=x] = X\beta. \quad (2.23)$$

As long as true population RIF function is unobservable I use its sample counterpart $\widehat{RIF}(W,\hat{q}_t)$ in (2.23). Due to the fact that an indicator function in the RIF equation is a dummy variable reflecting the position of a particular wage observation regarding a given

[2] When it seems to be an obvious restriction to assume that RIF- functions are linear in X, the partial effects of covariates may be estimated using binary response models such as probit and logit.

quantile while all other terms are constants, running the OLS of RIF-functions on right hand side variables implies estimating a linear probability model for a given wage observation being above or below the chosen quantile. Thus, coefficients estimated with RIF regressions are the same as in the linear probability model except that they are multiplied by the term $\frac{1}{\hat{g}_W(\hat{q}_t)}$.

I estimate a standard Mincer equation with RIF-functions estimated at different deciles as left hand side variables. Right hand side variables are presented by four education dummies, eight experience dummies, union dummy as well as thirteen industry dummies, two occupation dummies, three region dummies, part time, marital status, race dummies and a dummy indicating whether an individual works in private or public sector. The reference groups for education, experience, and occupational dummies are represented by high school dropouts, workers with less than five years of experience, individuals working in durable manufacturing and workers holding operational and service occupations respectively. As it was widely stressed in related literature (Oaxaca 1973, Blinder 1973), including sectoral and occupational dummies in the model may underestimate the wage structure effect due to the fact that they may reflect the possible barriers that females face entering some sectors or occupations. I do not expect a severe bias in estimated results. First of all, sectoral and occupational dummies in this research are not detailed. Secondly, as many researchers suggest, industrial and occupational segregation has declined considerably in the last three decades (Blau and Kahn 2000).

The unconditional quantiles may be recovered from RIF-regressions by taking expectations from the both sides of (2.23):

$$q_t(W_k) = E(X_k)\beta_k, k = m, f, c, \quad (2.24)$$

where indexes *m*, *f* and *c* represent male, female and counterfactual wages respectively. Then, using the estimated coefficients, the unconditional quantiles of wages are expressed with:

$$\hat{q}_t(W_k) = \bar{X}_k \hat{\beta}_k \,. \tag{2.25}$$

Using equation (2.24) one can easily decompose the raw quantile gender pay gap to wage structure and composition effects attributable to a particular explanatory variable:

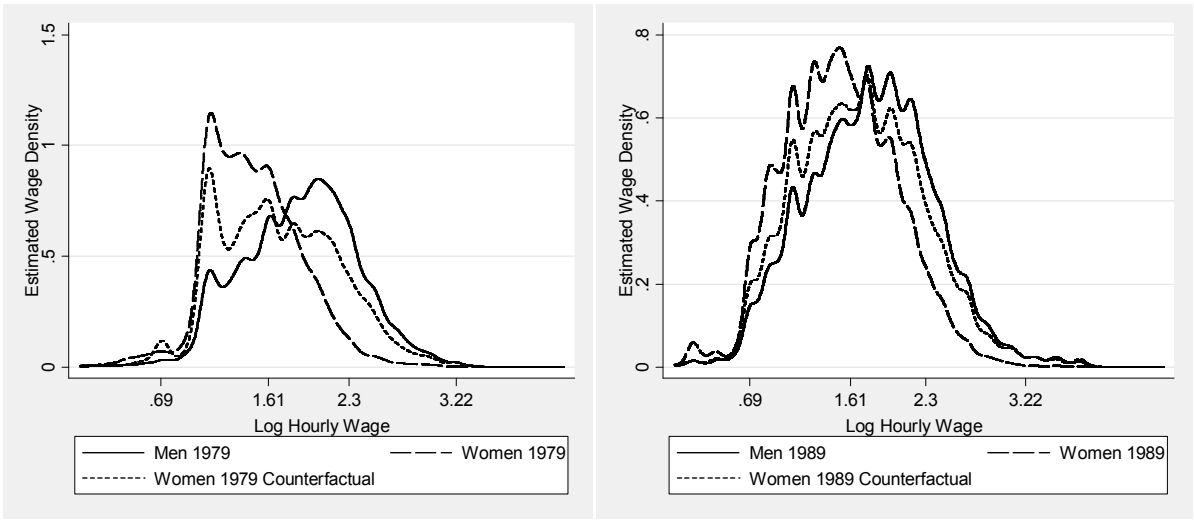
$$\begin{aligned} \hat{q}_t(W_m) - \hat{q}_t(W_f) &= \left(\hat{q}_t(W_m) - \hat{q}_t(W_c)\right) + \left(\hat{q}_t(W_c) - \hat{q}_t(W_f)\right) \\ &= \bar{X}_m\left(\hat{\beta}_m - \hat{\beta}_c\right) + \left(\bar{X}_m\hat{\beta}_c - \bar{X}_f\hat{\beta}_f\right), \end{aligned} \tag{2.26}$$

where the first term represents the endowment or explained effect and the second term represents the wage structure or unexplained effect.

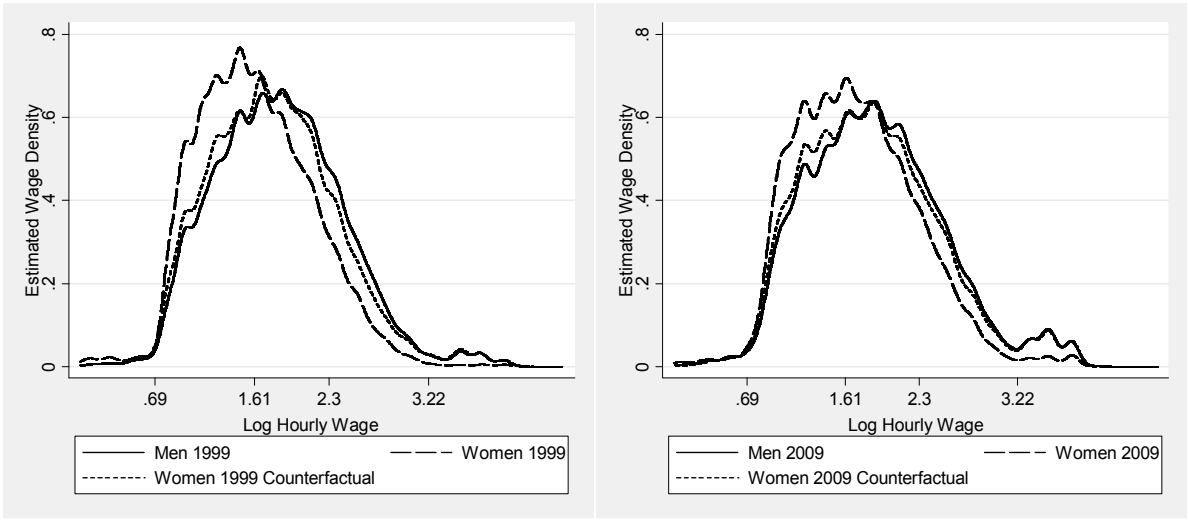
CHAPTER III: Results

3.1 Decomposition results for selected quantiles

The actual male and female wage densities as well as the counterfactual density of female wages estimated with kernel density estimator are presented in Figure 1:



a) 1979 **b) 1989**



c) 1999 **d) 2009**

Figure1: Wage Densities Estimated with Kernel Estimator, 1979-2009

Figure1.a shows the substantial raw gender pay gap in 1979. In addition, one can see that the female wage distribution is considerably skewed to the left while the opposite is true for male wage density. From the counterfactual density one can infer that the wage structure effect is very small at low quantiles but it is of considerable magnitude at higher quantiles of wage distribution. It is also evident that the difference in skills affects the gender pay gap at both tails of wage distribution in 1979 although this effect seems to be less than the wage structure effect at upper quantiles.

Examining the estimated wage densities for years 1989-2009 establishes several important facts. First of all, the raw gender pay gap decreased at all quantiles of wage distribution over the period. In addition, both densities became less skewed and more similar suggesting that women experienced considerable gain in earnings over the period while some males lost their positions in wage distribution. Secondly, the dispersion of wage distribution widened for both groups in each decade confirming that wage inequality has increased for both genders in 1979-2009. Thirdly, since 1989 the wage structure effect has played an important role in determining the gender pay gap not only at higher quantiles but also at lower quantiles of wage density. At the same time, it can be seen that the contribution of the endowment effect to the raw pay gap has decreased across wage distribution suggesting that female labor market characteristics became very similar to those of males. Finally, while the role of unexplained differences in the gender wage gap has increased over the period, the magnitude of this effect clearly became lower. Thus, even the rough examination of the gender pay differential with estimated kernel densities allows making an inference that both decrease in skill gap and change in the wage structure contributed to overall decrease in the gender wage gap over the last three decades.

Table1 presents results of estimated decomposition of the gender pay gap into wage structure and endowment effects using the equation (2.4). Not surprisingly, numerical results

confirm the conclusion made with examining the graphical representation of wage densities from Figure 1. Nevertheless, several interesting facts may be inferred from Table1.

Table 1: Decomposition Results at Selected Quantiles, 1979-2009

	10th	20th	30th	40th	50th	60th	70th	80th	90th	mean
1979										
Observed Raw Gender Gap	0.154	0.296	0.380	0.426	0.453	0.465	0.472	0.466	0.466	0.391
Explained Gap	0.126	0.236	0.241	0.245	0.241	0.201	0.157	0.126	0.102	0.178
Unexplained gap	0.028	0.060	0.139	0.181	0.212	0.264	0.315	0.340	0.364	0.213
1989										
Observed Raw Gender Gap	0.181	0.226	0.263	0.291	0.305	0.320	0.322	0.310	0.321	0.282
Explained Gap	0.074	0.105	0.118	0.124	0.115	0.116	0.099	0.082	0.062	0.093
Unexplained gap	0.107	0.121	0.145	0.167	0.190	0.204	0.223	0.228	0.259	0.189
1999										
Observed Raw Gender Gap	0.118	0.168	0.200	0.221	0.241	0.251	0.252	0.250	0.258	0.222
Explained Gap	0.042	0.051	0.053	0.054	0.061	0.060	0.061	0.062	0.049	0.050
Unexplained gap	0.076	0.117	0.147	0.167	0.180	0.191	0.191	0.188	0.209	0.172
2009										
Observed Raw Gender Gap	0.085	0.126	0.159	0.173	0.189	0.196	0.208	0.222	0.252	0.185
Explained Gap	0.025	0.039	0.051	0.047	0.045	0.048	0.043	0.038	0.033	0.036
Unexplained gap	0.060	0.087	0.108	0.126	0.144	0.148	0.165	0.184	0.219	0.149

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 1979-2009

Firstly, the highest overall fall in gender gap was observed in 1979-1989 with larger decrease in the middle of distribution and lower decrease at the tails. Interestingly, the 10th raw quantile gap actually increased in 1979-1989. It may be seen that this increase was almost totally absorbed by the rise in the unexplained gap. In addition, the unexplained wage gap in 1989 was higher for 20th and 30th quantiles. However, this tendency did not hold in subsequent decades confirming that there was a downward trend in both explained and unexplained wage gap over the period. It also can be inferred that the gender pay gap was decreasing much slower in 1989-2009 across wage distribution. Additionally, it is evident that changes in wage gap in last two decades were much less and more uniform across distribution averaging to 0.06 log points in 89-99 and 0.04 log points in 99-09 which confirms to results obtained by Blau and Kahn (2006) who report the slowdown of female-male convergence in earnings. This fact is explained by the relatively stable discrimination effect during the last two decades which decreased by 0.02-0.05 log points for the upper quantiles in 1989-1999 and by 0.02-0.04 log points for the low and middle quantiles in 1999-2009 but remained almost unchanged otherwise. Moreover, it may be observed that the raw gender pay gap remained stable for 8th and 9th deciles in 1999-2009. In addition, the part of gender wage differential attributable to wage structure effect even increased at the 9th decile. Overall, this suggests that the gender gap in unobserved skills and/or discrimination started to play much important role during the last decade across wage distribution especially at upper quantiles. In contrast to the unexplained gap, the explained gap decreased substantially in 1979-2009 reaching the level of 0.03-0.05 log points in 2009 which was relatively uniform across distribution.

3.2 RIF regression estimates at selected quantiles, 1979-2009

The RIF regression coefficients for 10^{th}, 50^{th} and 90^{th} quantiles are presented in Appendix B. The graphical representation of estimates is shown in Appendix C. The coefficients on dummy variables should be interpreted as the relative effect of a particular group to the effect of the base group. In general, the estimated RIF regressions reveal that returns to most factors were not homogeneous across wage distribution. Moreover, they show that patterns of gender differences in returns attributable to different labor market characteristics varied at different quantiles of wage density. It could be observed that private sector female workers experienced significant increase in returns comparable to public sector female workers above the 60^{th} quantile in 1989-1999 and across the whole wage distribution in 1999-2009. This increase was mush higher at upper quantiles of female wage distribution. Returns of private sector male workers have increased at higher quantiles but decreased below the 60^{th} quantile of wage distribution in the last two decades.

It also can be seen that the return to union membership looks like an inverse U-shaped curve for both groups, with higher effects in the middle of distribution and lower effects at the tails. While unionized males have lost their relative returns over the period at the low quantiles of wage distribution and gained in the middle, females experienced increase in the return to union status below the median of wage distribution and considerable decrease in the upper part which covered also the median in 2009. However, it is interesting that in contrast to men who had the negative return to union membership above the 85^{th} quantile in all decades women always had the positive return to union membership across the wage distribution.

The coefficients on experience dummies show that the relative return to experience considerably increased for both groups in the lower part of wage distribution in 1979-2009. However, the picture is different for upper quantiles. For instance, while female workers with

15 through 35 years of experience have witnessed the slight increase in the return to experience also in the upper part of wage distribution over the period, returns of female workers with 5 through 15 and more than 35 years of experience declined above the median of wage distribution since 1979. Similarly, males with 5 through 10 and more than 20 years of experience faced small increase in returns at upper quantiles in 1979-1989 but this pattern changed in 1989-2009 when their relative returns drop even slightly below the 1979 level. Finally, returns of males with 10 through 20 years of experience also declined above the median of wage distribution over the period.

Considering estimates on education dummies one may infer that patterns of increase in return to education have been different across education groups. Indeed, one should expect that high school education and some college education should have larger impact at lower quantiles of wage distribution while college education and advanced education should affect upper quantiles more. Really, the close examination of RIF regressions reveals that there has been the large increase in return to schooling across high school graduates and college dropouts relative to high school dropouts during the last three decades in the lower part of wage distribution. The rise was especially high in 1989-2009. This is true for both genders although the increase for females was greater at the first three deciles of wage distribution. As for increase in return to college education, it was higher below the median of wage distribution for both genders in the last two decades. In addition, while the return to college degree was relatively uniform across female and male wage distributions in 1989, it has become downward sloped for males in subsequent decades. Concerning the return to graduate education, it has stably increased over the period and showed a predictable pattern with the monotonically increased quantile effect across wage distribution for both gender groups.

Finally, it is evident that patterns of increase in returns to professional, managerial and technical occupations were different for both genders over the last thirty years. While there

was large increase in returns at the 40th-80th quantiles and the subtle increase in the lower tail of male wage distribution, women faced the relatively uniform 15-20% rise at first six deciles of wage density and decrease in returns at the 8th and 9th deciles. As for sales and clerical workers, the picture was similar except that increase in returns for male workers was also large in the lower part of wage distribution although it was much smaller than increase for female workers.

Overall, examining RIF regressions for both genders in 1979-2009 one can establish several important facts which help to understand the patterns of narrowing the gender wage gap. First of all, female return to education has increased significantly at all quantiles in every decade starting from 1979 as opposed to males who experienced less increase in return to education during these years except for advanced education at higher quantiles. Secondly, females faced the higher rise in return to experience over the period in the low part and in the middle of wage distribution and the lower drop in the return to experience in the higher part of wage distribution. Thirdly, women started to earn significantly more in private sector across wage distribution in the last two decades. Furthermore, female workers have earned higher returns to professional-managerial occupations in the lower and middle parts of wage distribution since the end of 1970's. Finally, the relative return to the union status in the lower part of wage distribution has increased for women while unionized men lost their returns at the first two deciles.

3.3 Decomposition with RIF estimates.

Using the results obtained from RIF regressions I further decompose endowment and discrimination effects to effects attributable to each particular factor. The results are presented in Appendix D. The graphical representation of decomposition is shown in Appendix E. As in

the case of RIF estimates, effects attributable to dummy variables should be interpreted as the relative contribution of this specific variable to the reference group.

It can be observed that while there was the substantial gender pay gap attributable to gender differences in labor market characteristics in 1979 and to some extent in 1989, it has become insignificant for most variables since 1990's. However, it should be pointed out that remained endowment effects were not uniform across wage distribution. For instance, men had slightly higher earnings at low quantiles due to higher experience while there were no significant differences in earnings attributable to experience in the upper part of distribution. Nevertheless, it should be stressed that potential experience used in this study most likely overstates actual labor market experience of women and therefore understates the possible endowment effect of experience. Thus, the effect of gap in years of experience might be actually larger, especially for the lower part of wage distribution. Furthermore, it may be observed that the endowment effect of education slightly decreased in the lower part of wage distribution and increased above the median in the last two decades. This pattern is more evident for highly educated workers. Finally, the endowment effect attributable to professional-managerial and sales-clerical occupations relative to that of operational and service occupations has fallen over the period by 2-5 log points at lower quantiles and increased by approximately the same amount in the upper part of wage distribution.

As for the wage structure decomposition, one may infer that there also were considerable differences in change of the gender wage gap across different quantiles of wage distribution. For instance, the gender pay gap attributable to working in private sector has decreased substantially by 2009 above the median of wage distribution while it remained almost unchanged at lower quantiles. The difference in return to union status has shown a stable declining pattern across the distribution with larger decrease in the middle part. It is also evident that the gap due to gender difference in return to experience has increased over

time at lower quantiles while it has fallen in the upper part of wage distribution. Additionally, there was considerable drop in the wage gap due to increasingly higher return to education of women across the whole wage distribution in last three decades except the lower quantiles for workers with high school education and higher quantiles for workers with advanced education. Furthermore, it is clear that the gender wage gap attributable to difference in returns to managerial and technical occupations has decreased significantly in 1979-2009 below the 70^{th} quantile of wage distribution. In contrast, the rise in male earnings observed in sales and clerical occupations within the last two decades contributed to the increase in the wage gap above the median of wage distribution.

Overall, the decomposition results suggest that while endowment effects have played the relatively uniform role in equalizing the earnings of men and women at various quantiles of wage distribution, discrimination effects have been different for various labor market characteristics at different quantiles. Furthermore, it may be observed that return to working in the private sector, unionization, experience and education highly contributed to decrease in the unexplained wage gap above the median of wage distribution in the last thirty years. In addition, women holding professional or managerial occupation had fewer chances to be discriminated below the 75^{th} quantile of wage distribution than those working in operational occupations. In contrast, experience may be attributed to increase in the gender wage gap at the lower deciles.

In addition, obtained results suggest that the slowdown of female-male earnings convergence in the last two decades comparable to that observed in the 1980's varied with respect to labor market characteristics and quantiles of wage distribution. For instance the gender pay gap attributable to difference in returns to working in private sector slightly increased above the median of wage distribution in the 1990's after substantial drop in the 1980's. This tendency, however, did not hold in the 2000's when the gap declined even

slightly below the 1980 level. Concerning the union status, the slowdown of convergence is observed at the last two deciles of wage density in 1990's but not in other parts of wage distribution. It also can be seen that the gender wage gap attributable to return to experience continued to decline approximately at the same rate in the upper part of wage distribution for all experience groups in 1990's but almost did not changed in the subsequent decade. The patterns of declining the gender pay gap attributable to education were also different for different quantiles of wage density. First of all, the gap attributable to return to high school education and some college education at the upper part of wage distribution has not changed since 1980's when it experienced a considerable drop. Secondly, the gap due to returns to college and advanced education declined in 1979-1999 at upper quantiles but not at lower quantiles. However, in the 2000's the gap remained almost unchanged in the upper part of wage distribution but fell substantially in the lower part. Finally, while the gap due to different returns at professional-managerial and sales-clerical occupations declined substantially in the lower part of wage distribution in the 1980's, it slowed down its decrease in subsequent decades

Overall, the results show that nowadays among the most important characteristics which contribute to existence of the discriminatory gender wage gap at higher quantiles of wage distribution are working in private sector, having college or advanced education, and holding professional or clerical occupations. In contrast, the gap in return to experience may be considered as the most significant factor contributing to the unexplained wage gap at lower quantiles.

Conclusion

Summary of results

In this study I show that decline in the gender pay gap in the U.S. in 1979-2009 was far from homogeneous at different points of wage distribution and different decades. While the gender wage differential fell sharply in the middle and higher parts of wage density in 1979-1989, it changed much slowly in the lower part of wage distribution. However, the different picture was observed in 1989-2009 when the gender wage differential declined at much slower pace across wage distribution, especially at upper quantiles.

Decomposition of the gender wage gap to explained and unexplained components suggests that large decline in gender skill gap over the period was responsible for the major part of decrease in gender wage differential across wage distribution. In contrast, decrease in the unexplained wage gap was much slower in the last two decades, especially at upper quantiles. This fact can be considered as evidence of the "glass ceiling effect".

Estimating the contribution of each covariate to explained and unexplained gaps using the RIF-projection technique shows that wage differentials attributable to difference in skills have declined constantly over the period across wage distribution and have not played an important role in explaining the gender pay gap since 1989. In addition, it is evident that the contribution of all estimated factors except managerial-professional and sales-clerical occupations to the unexplained wage gap has decreased over the period in the upper part of wage distribution, while difference in return to experience may be referred as the most important factor which determines the existence of the gender pay gap in the lower part of wage distribution.

Furthermore, this study shows that decline in the gender pay gap in 1990's was slower in the various parts of wage distribution due to different reasons. While higher returns to

working in private sector, being a union member, and holding a professional-technical or sales-clerical occupation contributed to slowdown at upper quantiles, gender differences in returns to high school and some college degrees caused the slowdown at lower quantiles. In addition, there is the evidence that unequal educational attainment and gender difference in years of experience may be attributed to the slower decline of the gender pay gap at lower quantiles in 1989-2009.

Finally, the obtained results suggest that existence of the gender pay gap attributable to wage structure effect in the nowadays U.S. labor market is mainly determined by the difference in returns to college and advanced education, working in private sector, and holding professional or clerical occupation in the upper part of wage distribution and the uneven return to experience in the lower part.

Possible extensions

I consider two possible extensions of conducted research. First of all, one possible explanation of decline in the gender pay gap over time is a selection bias (Blau and Kahn 2006). Indeed, a researcher has data only on wage observations of workers in the sample. Furthermore, the patterns of selection of male and female workers into the labor force could have changed over time. Indeed, the female labor force participation rate has stably increased in the last three decades while the opposite was true for males. For instance, according to Bureau of Labor Statistics, the labor force participation rate of women rose from 50.9% to 61.9% in 1979-2009, while it declined for men from 77.8% to 73.7% during the same period. Therefore, assuming that earnings of females entered labor force during these years were located in the upper part of wage distribution and men crowded out from the labor force during these years were mostly low paid workers, the selectivity bias in estimated gender pay gap would be substantial. One solution to this problem was proposed by Heckman (1976).

However, the so called Heckman correction is very sensitive to identification, which implies that the selection model has to be adequately specified usually in case by case basis. Nevertheless, Lee (2005) proposed a procedure which allows bounding the obtained estimates from below and from above by trimming the sample. The trimming is based on two assumptions: 1 the difference in labor force participation comes entirely from the bottom of wage distribution; 2 the difference in labor force participation comes entirely from the top of wage distribution. Such trimming procedure will bound the possible role of selection when estimating the changes in the gender wage differential. Moreover, it can be applied to either dummy or continuous covariates assuming division of a sample into an adequate number of cells by education, experience, race, the union status, etc. Thus, the possible applying a bounding procedure to RIF decomposition technology would be a possible extension of this research.

In addition, as was mentioned in Methodology section, estimation of counterfactual density may be performed using wage structure of pooled sample instead of male wage structure. The former method has one advantage: it allows counterfactual wage structure to be affected by changes in women relative wages. However, it also assumes that the overall wage structure is applicable to both genders which may not be true. In general, while choosing a particular method is still a subject of debate in the literature, the results of decomposition are susceptible to the chosen reference wage structure (Fortin and Lemieux 1998). Thus, it might be useful to compare results of decomposition with RIF functions estimated with both methods to shed more light on this problem.

Appendix

Appendix A: Labor Market Characteristics by Gender, 1979-2009 (Sample Means)

Table A: Sample Means, 1979-2009

	Males				Females			
	1979	**1989**	**1999**	**2009**	**1979**	**1989**	**1999**	**2009**
Private	0.826	0.845	0.854	0.846	0.779	0.801	0.798	0.785
Union	0.318	0.197	0.158	0.136	0.172	0.126	0.120	0.122
Experience <5	0.188	0.159	0.139	0.136	0.225	0.175	0.153	0.119
Experience 5-10	0.172	0.146	0.123	0.118	0.154	0.138	0.116	0.110
Experience 10-15	0.144	0.158	0.134	0.116	0.127	0.148	0.118	0.107
Experience 15-20	0.105	0.142	0.135	0.117	0.095	0.135	0.129	0.102
Experience 20-25	0.086	0.111	0.138	0.114	0.090	0.118	0.141	0.111
Experience 25-30	0.077	0.087	0.125	0.119	0.081	0.088	0.127	0.126
Experience 30-35	0.072	0.071	0.089	0.114	0.076	0.070	0.094	0.121
Experience 35-40	0.070	0.056	0.056	0.092	0.073	0.054	0.059	0.094
Experience >40	0.086	0.070	0.061	0.091	0.079	0.073	0.063	0.094
High School Dropouts	0.246	0.172	0.128	0.095	0.198	0.133	0.097	0.067
High School	0.381	0.352	0.318	0.299	0.462	0.387	0.316	0.264
Some College	0.178	0.234	0.271	0.278	0.184	0.265	0.312	0.323
College	0.109	0.155	0.187	0.211	0.101	0.151	0.190	0.226
Advanced	0.086	0.087	0.095	0.116	0.055	0.065	0.086	0.119
Nonwhite	0.098	0.173	0.223	0.261	0.131	0.185	0.225	0.258
Married	0.702	0.637	0.618	0.607	0.573	0.561	0.552	0.553
Part time	0.069	0.031	0.020	0.055	0.222	0.049	0.028	0.060

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1979-2009

Table A: Sample Means, 1979-2009 (continued)

	Males				Females			
	1979	**1989**	**1999**	**2009**	**1979**	**1989**	**1999**	**2009**
Occupation:								
Professional, Technical and Managerial	0.264	0.275	0.315	0.343	0.223	0.294	0.372	0.421
Sales and Clerical	0.116	0.161	0.162	0.168	0.426	0.415	0.368	0.327
Operational and services	0.620	0.564	0.523	0.489	0.351	0.291	0.260	0.252
Industry:								
Agriculture, Forestry and Fisheries	0.027	0.022	0.022	0.014	0.009	0.008	0.008	0.004
Mining	0.019	0.011	0.010	0.012	0.003	0.002	0.001	0.002
Construction	0.098	0.093	0.094	0.094	0.010	0.011	0.011	0.012
Manufacturing (durable goods)	0.198	0.162	0.139	0.104	0.092	0.066	0.056	0.035
Manufacturing (nondurable goods)	0.105	0.094	0.074	0.054	0.088	0.073	0.051	0.030
Transportation and Communication	0.097	0.102	0.097	0.100	0.040	0.045	0.045	0.042
Wholesale Trade	0.048	0.053	0.052	0.038	0.024	0.024	0.025	0.016
Retail Trade	0.130	0.146	0.156	0.170	0.188	0.189	0.180	0.179
Finance, Insurance and Real Estate	0.036	0.046	0.046	0.056	0.080	0.089	0.082	0.084
Business and Repair Services	0.035	0.059	0.071	0.060	0.043	0.058	0.055	0.035
Personal Services	0.012	0.017	0.016	0.006	0.034	0.034	0.032	0.014
Entertainment and Recreation	0.010	0.012	0.019	0.021	0.010	0.010	0.018	0.020
Professional Services	0.111	0.123	0.147	0.210	0.324	0.339	0.386	0.473
Public Administration	0.075	0.060	0.056	0.061	0.054	0.051	0.050	0.056

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1979-2009

Appendix B: Selected Results of RIF Regressions

Table B1: Results of RIF regressions, 1979

	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	0.005	0.150	0.160	0.031	0.066	0.049
	(0.021)	(0.016)	(0.022)	(0.007)	(0.012)	(0.020)
Union	0.191	0.284	-0.014	0.045	0.236	0.158
	(0.010)	(0.009)	(0.012)	(0.004)	(0.010)	(0.019)
Experience 5-10	0.335	0.165	0.024	0.028	0.162	0.128
	(0.022)	(0.014)	(0.013)	(0.007)	(0.012)	(0.018)
Experience 10-15	0.363	0.317	0.188	0.034	0.199	0.216
	(0.023)	(0.016)	(0.018)	(0.009)	(0.014)	(0.022)
Experience 15-20	0.374	0.396	0.288	0.045	0.196	0.197
	(0.028)	(0.019)	(0.024)	(0.012)	(0.018)	(0.027)
Experience 20-25	0.391	0.436	0.327	0.062	0.217	0.244
	(0.037)	(0.024)	(0.030)	(0.017)	(0.023)	(0.034)
Experience 25-30	0.385	0.491	0.421	0.082	0.225	0.220
	(0.050)	(0.031)	(0.040)	(0.024)	(0.029)	(0.042)
Experience 30-35	0.418	0.503	0.472	0.101	0.242	0.250
	(0.066)	(0.040)	(0.051)	(0.032)	(0.038)	(0.055)
Experience 35-40	0.457	0.576	0.395	0.120	0.241	0.298
	(0.085)	(0.050)	(0.063)	(0.043)	(0.049)	(0.071)
Experience >40	0.486	0.529	0.351	0.151	0.269	0.256
	(0.112)	(0.070)	(0.088)	(0.057)	(0.067)	(0.099)
High School	0.259	0.165	0.100	0.035	0.111	0.050
	(0.016)	(0.010)	(0.010)	(0.008)	(0.010)	(0.011)
Some College	0.328	0.261	0.174	0.036	0.194	0.147
	(0.019)	(0.013)	(0.015)	(0.009)	(0.012)	(0.017)
College	0.403	0.407	0.449	0.034	0.271	0.312
	(0.021)	(0.016)	(0.025)	(0.011)	(0.016)	(0.029)
Advanced	0.357	0.494	0.630	0.034	0.307	0.720
	(0.024)	(0.019)	(0.033)	(0.011)	(0.018)	(0.044)
Nonwhite	-0.150	-0.113	-0.057	0.005	-0.019	0.029
	(0.021)	(0.013)	(0.014)	(0.007)	(0.010)	(0.017)
Married	0.199	0.097	0.008	0.019	-0.008	-0.031
	(0.014)	(0.010)	(0.012)	(0.004)	(0.008)	(0.013)
Part time	-0.728	-0.032	0.099	-0.054	-0.110	0.012
	(0.034)	(0.013)	(0.015)	(0.007)	(0.009)	(0.012)

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1979
Robust Standard errors in parentheses

Table B1: Results of RIF regressions, 1979 (continued)

	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Occupation:						
Professional, Technical and Managerial	0.148	0.253	0.314	0.099	0.384	0.412
	(0.014)	(0.012)	(0.018)	(0.008)	(0.012)	(0.022)
Sales and Clerical	0.053	0.045	0.046	0.110	0.142	0.044
	(0.018)	(0.013)	(0.016)	(0.007)	(0.009)	(0.011)
Industry:						
Agriculture, Forestry and Fisheries	-0.865	-0.285	-0.087	-0.161	-0.099	-0.106
	(0.056)	(0.020)	(0.022)	(0.035)	(0.037)	(0.034)
Mining	0.071	0.307	0.069	-0.031	0.279	0.424
	(0.026)	(0.028)	(0.042)	(0.010)	(0.066)	(0.153)
Construction	0.124	0.115	0.234	-0.052	0.121	0.187
	(0.019)	(0.017)	(0.025)	(0.014)	(0.041)	(0.070)
Manufacturing (durable goods)	0.028	0.080	-0.040	0.005	0.174	0.069
	(0.015)	(0.015)	(0.018)	(0.006)	(0.018)	(0.024)
Transportation and Communication	-0.020	0.166	0.034	-0.045	0.187	0.322
	(0.018)	(0.017)	(0.023)	(0.008)	(0.022)	(0.044)
Wholesale Trade	-0.024	0.012	-0.039	-0.040	0.067	0.007
	(0.024)	(0.021)	(0.027)	(0.009)	(0.027)	(0.038)
Retail Trade	-0.375	-0.202	-0.129	-0.165	-0.216	-0.087
	(0.024)	(0.016)	(0.018)	(0.010)	(0.015)	(0.019)
Finance, Insurance and Real Estate	-0.108	0.015	0.119	-0.070	0.055	0.019
	(0.029)	(0.024)	(0.040)	(0.008)	(0.019)	(0.028)
Business and Repair Services	-0.166	-0.110	-0.016	-0.229	-0.113	-0.047
	(0.037)	(0.022)	(0.028)	(0.018)	(0.020)	(0.026)
Personal Services	-0.419	-0.243	-0.197	-0.124	-0.164	-0.087
	(0.069)	(0.036)	(0.033)	(0.018)	(0.022)	(0.025)
Entertainment and Recreation	-0.506	-0.192	-0.047	-0.090	-0.126	-0.065
	(0.073)	(0.036)	(0.049)	(0.027)	(0.038)	(0.053)
Professional Services	-0.214	-0.199	-0.210	-0.046	-0.018	-0.092
	(0.026)	(0.019)	(0.028)	(0.007)	(0.016)	(0.021)
Public Administration	-0.082	0.173	0.101	-0.042	0.200	0.277
	(0.027)	(0.025)	(0.034)	(0.010)	(0.023)	(0.042)

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1979
Robust standard errors in parentheses

Table B2: Results of RIF regressions, 1989

	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	0.035	0.057	0.146	0.040	0.064	0.076
	(0.009)	(0.008)	(0.012)	(0.007)	(0.007)	(0.010)
Union	0.138	0.310	-0.065	0.141	0.251	0.079
	(0.005)	(0.006)	(0.007)	(0.005)	(0.006)	(0.010)
Experience 5-10	0.485	0.167	0.018	0.268	0.199	0.086
	(0.012)	(0.007)	(0.007)	(0.009)	(0.007)	(0.008)
Experience 10-15	0.563	0.307	0.116	0.300	0.278	0.172
	(0.012)	(0.008)	(0.009)	(0.010)	(0.007)	(0.009)
Experience 15-20	0.592	0.407	0.205	0.338	0.295	0.200
	(0.014)	(0.009)	(0.012)	(0.011)	(0.008)	(0.010)
Experience 20-25	0.639	0.501	0.318	0.384	0.323	0.227
	(0.017)	(0.011)	(0.016)	(0.015)	(0.010)	(0.012)
Experience 25-30	0.702	0.544	0.362	0.427	0.354	0.232
	(0.023)	(0.014)	(0.021)	(0.019)	(0.013)	(0.015)
Experience 30-35	0.774	0.607	0.384	0.484	0.398	0.241
	(0.030)	(0.018)	(0.026)	(0.025)	(0.017)	(0.018)
Experience 35-40	0.855	0.625	0.381	0.546	0.420	0.262
	(0.038)	(0.023)	(0.033)	(0.033)	(0.021)	(0.023)
Experience >40	0.899	0.590	0.288	0.557	0.416	0.219
	(0.051)	(0.033)	(0.046)	(0.045)	(0.030)	(0.031)
High School	0.272	0.120	0.002	0.225	0.098	-0.011
	(0.009)	(0.006)	(0.005)	(0.010)	(0.006)	(0.004)
Some College	0.301	0.234	0.112	0.255	0.207	0.084
	(0.010)	(0.006)	(0.007)	(0.011)	(0.006)	(0.006)
College	0.374	0.435	0.397	0.315	0.377	0.318
	(0.011)	(0.008)	(0.012)	(0.011)	(0.008)	(0.011)
Advanced	0.338	0.521	0.809	0.281	0.424	0.787
	(0.012)	(0.010)	(0.019)	(0.012)	(0.009)	(0.020)
Nonwhite	-0.071	-0.125	-0.057	0.006	-0.032	-0.016
	(0.008)	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
Married	0.105	0.099	0.043	0.044	-0.014	-0.024
	(0.006)	(0.005)	(0.006)	(0.005)	(0.004)	(0.006)
Part time	-0.466	-0.140	-0.005	-0.284	-0.143	-0.025
	(0.022)	(0.009)	(0.009)	(0.015)	(0.007)	(0.007)

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1989
Robust standard errors in parentheses

Table B2: Results of RIF regressions, 1989 (continued)

	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Occupation:						
Professional, Technical and Managerial	0.135	0.350	0.364	0.302	0.478	0.308
	(0.007)	(0.007)	(0.010)	(0.008)	(0.006)	(0.009)
Sales and Clerical	0.106	0.107	0.076	0.271	0.184	-0.007
	(0.009)	(0.006)	(0.008)	(0.007)	(0.005)	(0.005)
Industry:						
Agriculture, Forestry and Fisheries	-0.626	-0.240	-0.073	-0.230	-0.194	-0.099
	(0.029)	(0.012)	(0.012)	(0.035)	(0.020)	(0.017)
Mining	0.062	0.198	0.133	-0.044	0.290	0.306
	(0.015)	(0.020)	(0.033)	(0.032)	(0.038)	(0.078)
Construction	0.138	0.105	0.043	-0.055	0.035	0.009
	(0.009)	(0.010)	(0.012)	(0.020)	(0.022)	(0.025)
Manufacturing (durable goods)	0.036	0.065	0.010	0.097	0.134	0.024
	(0.008)	(0.008)	(0.012)	(0.010)	(0.011)	(0.012)
Transportation and Communication	-0.008	0.122	0.031	-0.057	0.182	0.170
	(0.009)	(0.010)	(0.013)	(0.011)	(0.012)	(0.018)
Wholesale Trade	-0.038	-0.031	-0.014	-0.037	-0.002	0.053
	(0.012)	(0.012)	(0.016)	(0.014)	(0.016)	(0.019)
Retail Trade	-0.483	-0.180	-0.074	-0.486	-0.256	-0.041
	(0.012)	(0.009)	(0.011)	(0.012)	(0.008)	(0.009)
Finance, Insurance and Real Estate	-0.054	0.009	0.128	-0.049	0.043	0.059
	(0.011)	(0.012)	(0.022)	(0.010)	(0.011)	(0.013)
Business and Repair Services	-0.178	-0.086	-0.032	-0.177	-0.083	0.017
	(0.014)	(0.011)	(0.015)	(0.014)	(0.011)	(0.013)
Personal Services	-0.404	-0.275	-0.103	-0.285	-0.217	-0.075
	(0.029)	(0.015)	(0.018)	(0.019)	(0.012)	(0.011)
Entertainment and Recreation	-0.348	-0.236	-0.112	-0.337	-0.214	-0.016
	(0.033)	(0.019)	(0.024)	(0.031)	(0.019)	(0.025)
Professional Services	-0.175	-0.210	-0.220	-0.109	-0.056	-0.061
	(0.011)	(0.010)	(0.016)	(0.010)	(0.009)	(0.010)
Public Administration	-0.026	0.080	0.071	-0.038	0.174	0.116
	(0.012)	(0.014)	(0.021)	(0.012)	(0.013)	(0.019)

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1989
Robust standard errors in parentheses

Table B3: Results of RIF regressions, 1999

	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	0.043	0.113	0.239	0.074	0.057	0.132
	(0.011)	(0.011)	(0.016)	(0.008)	(0.008)	(0.014)
Union	0.159	0.363	-0.041	0.132	0.248	0.095
	(0.007)	(0.009)	(0.010)	(0.006)	(0.008)	(0.015)
Experience 5-10	0.543	0.133	-0.042	0.276	0.162	0.029
	(0.017)	(0.010)	(0.011)	(0.011)	(0.009)	(0.012)
Experience 10-15	0.605	0.270	0.063	0.292	0.258	0.145
	(0.017)	(0.010)	(0.012)	(0.012)	(0.010)	(0.014)
Experience 15-20	0.664	0.360	0.156	0.332	0.300	0.208
	(0.019)	(0.011)	(0.015)	(0.013)	(0.010)	(0.015)
Experience 20-25	0.733	0.432	0.197	0.361	0.313	0.207
	(0.023)	(0.013)	(0.017)	(0.016)	(0.012)	(0.016)
Experience 25-30	0.782	0.456	0.213	0.388	0.344	0.233
	(0.029)	(0.016)	(0.020)	(0.020)	(0.015)	(0.020)
Experience 30-35	0.851	0.479	0.251	0.432	0.388	0.216
	(0.038)	(0.021)	(0.026)	(0.026)	(0.019)	(0.024)
Experience 35-40	0.956	0.502	0.229	0.478	0.393	0.181
	(0.048)	(0.027)	(0.033)	(0.034)	(0.024)	(0.030)
Experience >40	1.009	0.400	0.173	0.501	0.312	0.113
	(0.066)	(0.038)	(0.047)	(0.047)	(0.034)	(0.042)
High School	0.502	0.137	-0.020	0.345	0.095	-0.040
	(0.016)	(0.008)	(0.006)	(0.014)	(0.007)	(0.005)
Some College	0.555	0.272	0.028	0.392	0.222	0.041
	(0.016)	(0.009)	(0.007)	(0.014)	(0.008)	(0.007)
College	0.627	0.522	0.399	0.466	0.460	0.398
	(0.017)	(0.011)	(0.015)	(0.014)	(0.010)	(0.014)
Advanced	0.604	0.635	1.009	0.452	0.580	0.998
	(0.018)	(0.013)	(0.026)	(0.015)	(0.011)	(0.026)
Nonwhite	-0.085	-0.150	-0.065	-0.026	-0.052	-0.004
	(0.010)	(0.007)	(0.008)	(0.007)	(0.006)	(0.009)
Married	0.110	0.136	0.086	0.029	-0.008	-0.009
	(0.008)	(0.007)	(0.008)	(0.005)	(0.005)	(0.008)
Part time	-0.347	-0.156	-0.007	-0.216	-0.171	-0.027
	(0.035)	(0.016)	(0.017)	(0.021)	(0.012)	(0.014)

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1999
Robust standard errors in parentheses

Table B3: Results of RIF regressions, 1999 (continued)

	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Occupation:						
Professional, Technical and Managerial	0.159 (0.009)	0.426 (0.009)	0.361 (0.012)	0.264 (0.008)	0.531 (0.008)	0.289 (0.010)
Sales and Clerical	0.114 (0.012)	0.143 (0.009)	0.083 (0.009)	0.219 (0.009)	0.175 (0.007)	-0.008 (0.006)
Industry:						
Agriculture, Forestry and Fisheries	-0.450 (0.038)	-0.216 (0.017)	-0.045 (0.019)	-0.125 (0.035)	-0.190 (0.027)	-0.159 (0.030)
Mining	0.112 (0.021)	0.244 (0.030)	0.033 (0.038)	0.067 (0.029)	0.256 (0.068)	0.518 (0.166)
Construction	0.172 (0.014)	0.120 (0.014)	0.011 (0.016)	0.057 (0.020)	0.063 (0.029)	-0.085 (0.035)
Manufacturing (durable goods)	0.068 (0.012)	0.048 (0.013)	0.025 (0.017)	0.126 (0.014)	0.127 (0.016)	0.001 (0.021)
Transportation and Communication	0.015 (0.013)	0.115 (0.014)	0.041 (0.019)	0.027 (0.014)	0.213 (0.017)	0.085 (0.026)
Wholesale Trade	-0.019 (0.017)	-0.008 (0.016)	0.019 (0.022)	-0.004 (0.017)	0.039 (0.021)	0.020 (0.029)
Retail Trade	-0.493 (0.017)	-0.184 (0.012)	-0.038 (0.015)	-0.346 (0.014)	-0.242 (0.012)	-0.070 (0.017)
Finance, Insurance and Real Estate	-0.030 (0.016)	0.077 (0.016)	0.185 (0.030)	0.010 (0.013)	0.075 (0.015)	0.040 (0.022)
Business and Repair Services	-0.074 (0.017)	-0.048 (0.014)	0.087 (0.021)	-0.057 (0.016)	-0.055 (0.015)	0.052 (0.023)
Personal Services	-0.329 (0.041)	-0.282 (0.023)	-0.123 (0.022)	-0.198 (0.023)	-0.171 (0.017)	-0.107 (0.019)
Entertainment and Recreation	-0.360 (0.035)	-0.187 (0.021)	-0.042 (0.027)	-0.238 (0.027)	-0.199 (0.021)	-0.091 (0.028)
Professional Services	-0.151 (0.015)	-0.171 (0.013)	-0.187 (0.021)	-0.060 (0.012)	-0.087 (0.012)	-0.127 (0.018)
Public Administration	-0.015 (0.017)	0.146 (0.019)	0.133 (0.029)	0.048 (0.015)	0.168 (0.018)	0.150 (0.030)

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 1999
Robust standard errors in parentheses

Table B4: Results of RIF regressions, 2009

	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	0.030	0.098	0.338	0.057	0.116	0.267
	(0.010)	(0.011)	(0.019)	(0.007)	(0.009)	(0.014)
Union	0.114	0.330	-0.101	0.093	0.200	0.016
	(0.007)	(0.009)	(0.013)	(0.006)	(0.009)	(0.016)
Experience 5-10	0.492	0.122	-0.028	0.287	0.175	0.057
	(0.017)	(0.010)	(0.013)	(0.012)	(0.010)	(0.013)
Experience 10-15	0.553	0.261	0.099	0.319	0.269	0.192
	(0.017)	(0.011)	(0.016)	(0.012)	(0.010)	(0.015)
Experience 15-20	0.583	0.351	0.212	0.346	0.315	0.254
	(0.018)	(0.012)	(0.019)	(0.013)	(0.011)	(0.017)
Experience 20-25	0.630	0.419	0.306	0.374	0.352	0.262
	(0.020)	(0.014)	(0.023)	(0.015)	(0.012)	(0.018)
Experience 25-30	0.662	0.472	0.332	0.403	0.385	0.286
	(0.024)	(0.016)	(0.026)	(0.018)	(0.014)	(0.019)
Experience 30-35	0.720	0.502	0.302	0.440	0.424	0.294
	(0.030)	(0.020)	(0.032)	(0.022)	(0.017)	(0.023)
Experience 35-40	0.750	0.490	0.246	0.462	0.451	0.259
	(0.037)	(0.025)	(0.039)	(0.028)	(0.022)	(0.027)
Experience >40	0.774	0.452	0.227	0.494	0.447	0.199
	(0.050)	(0.035)	(0.055)	(0.038)	(0.031)	(0.039)
High School	0.390	0.154	-0.021	0.357	0.082	-0.033
	(0.017)	(0.009)	(0.008)	(0.016)	(0.008)	(0.007)
Some College	0.460	0.291	0.035	0.414	0.232	0.028
	(0.017)	(0.009)	(0.009)	(0.016)	(0.008)	(0.008)
College	0.532	0.534	0.411	0.483	0.484	0.342
	(0.017)	(0.011)	(0.017)	(0.016)	(0.010)	(0.013)
Advanced	0.500	0.656	1.130	0.472	0.660	0.943
	(0.018)	(0.013)	(0.029)	(0.017)	(0.011)	(0.023)
Nonwhite	-0.069	-0.153	-0.093	-0.009	-0.059	-0.020
	(0.008)	(0.006)	(0.010)	(0.006)	(0.006)	(0.009)
Married	0.107	0.146	0.078	0.036	0.014	-0.009
	(0.007)	(0.007)	(0.010)	(0.005)	(0.006)	(0.009)
Part time	-0.304	-0.172	-0.013	-0.207	-0.168	-0.053
	(0.020)	(0.011)	(0.013)	(0.015)	(0.009)	(0.010)

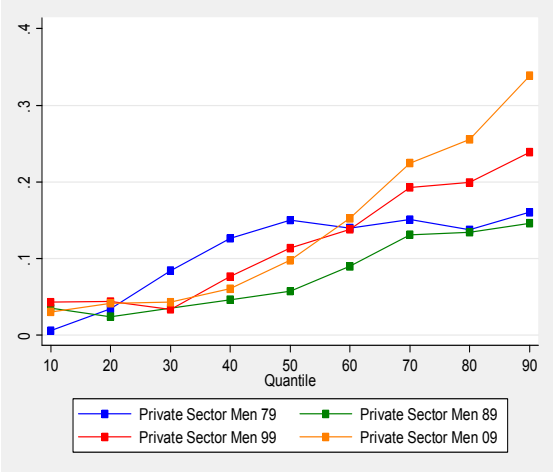
Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 2009
Robust standard errors in parentheses

Table B4: Results of RIF regressions, 2009 (continued)

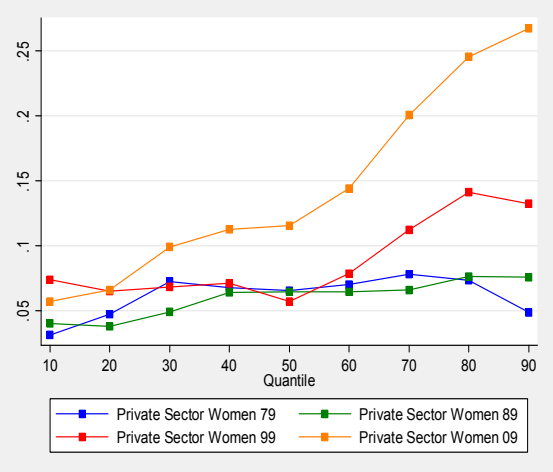
	Males			Females		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Occupation:						
Professional, Technical and Managerial	0.153	0.423	0.378	0.221	0.489	0.300
Managerial	(0.008)	(0.009)	(0.015)	(0.008)	(0.008)	(0.010)
Sales and Clerical	0.099	0.099	0.060	0.192	0.174	-0.016
	(0.011)	(0.009)	(0.011)	(0.009)	(0.007)	(0.007)
Industry:						
Agriculture, Forestry and Fisheries	-0.485	-0.263	-0.101	-0.215	-0.226	-0.183
	(0.043)	(0.022)	(0.027)	(0.057)	(0.037)	(0.042)
Mining	0.105	0.409	0.083	0.034	0.348	0.012
	(0.018)	(0.029)	(0.049)	(0.030)	(0.062)	(0.104)
Construction	0.148	0.156	0.024	-0.031	0.130	-0.079
	(0.014)	(0.015)	(0.022)	(0.022)	(0.030)	(0.043)
Manufacturing (durable goods)	0.049	0.064	0.020	0.053	0.064	0.008
	(0.012)	(0.015)	(0.024)	(0.017)	(0.020)	(0.032)
Transportation and Communication	-0.024	0.117	0.064	-0.033	0.110	0.036
	(0.014)	(0.015)	(0.024)	(0.017)	(0.020)	(0.031)
Wholesale Trade	-0.029	0.006	0.032	-0.035	0.018	-0.001
	(0.017)	(0.019)	(0.032)	(0.021)	(0.027)	(0.041)
Retail Trade	-0.461	-0.209	-0.050	-0.396	-0.284	-0.120
	(0.016)	(0.014)	(0.021)	(0.017)	(0.015)	(0.023)
Finance, Insurance and Real Estate	-0.050	0.043	0.219	-0.034	0.016	0.005
	(0.015)	(0.017)	(0.036)	(0.016)	(0.017)	(0.029)
Business and Repair Services	-0.134	-0.103	-0.053	-0.094	-0.150	-0.112
	(0.019)	(0.016)	(0.023)	(0.021)	(0.019)	(0.028)
Personal Services	-0.373	-0.164	-0.069	-0.311	-0.145	-0.103
	(0.062)	(0.035)	(0.044)	(0.036)	(0.025)	(0.030)
Entertainment and Recreation	-0.316	-0.192	-0.057	-0.237	-0.176	-0.166
	(0.032)	(0.022)	(0.032)	(0.028)	(0.023)	(0.030)
Professional Services	-0.126	-0.135	-0.118	-0.071	-0.096	-0.151
	(0.013)	(0.014)	(0.026)	(0.015)	(0.015)	(0.024)
Public Administration	-0.001	0.196	0.294	0.015	0.203	0.237
	(0.016)	(0.020)	(0.035)	(0.017)	(0.020)	(0.034)

Source: The U.S. Current Population Survey Outgoing Rotation Groups Supplements, 2009
Robust standard errors in parentheses

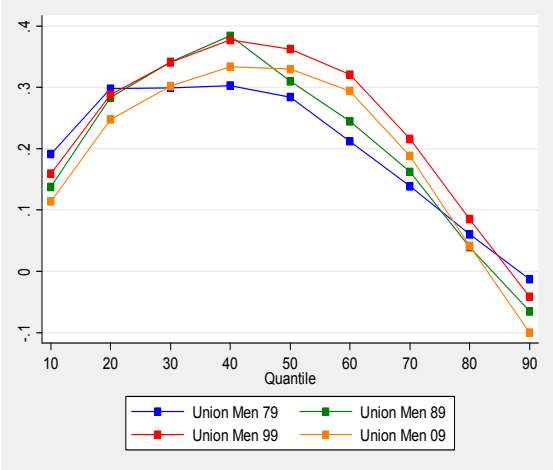
Appendix C: Graphical Representation of the Rif Estimates on Selected Variables



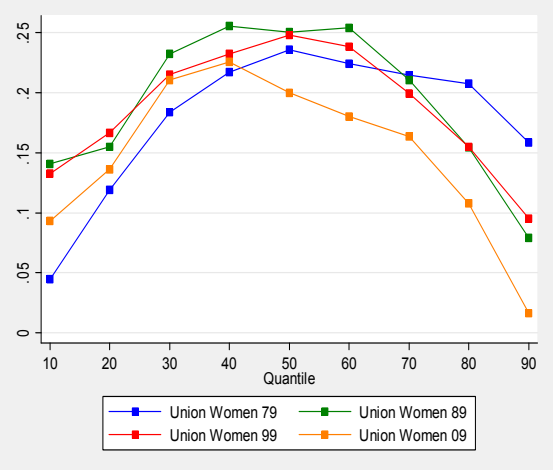
1) Private Sector Men



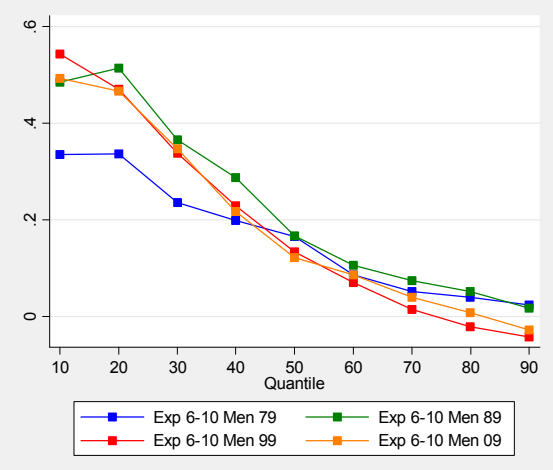
2) Private Sector Women



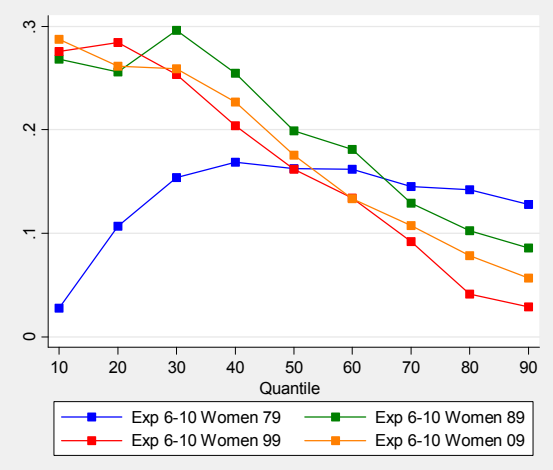
3) Union Men



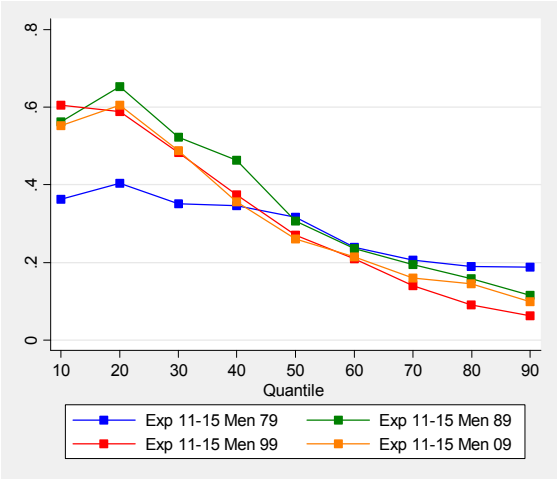
4) Union Women



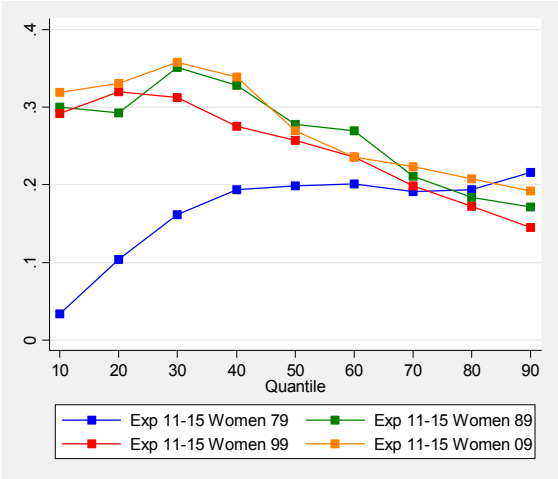
5) Experience 6-10 Men



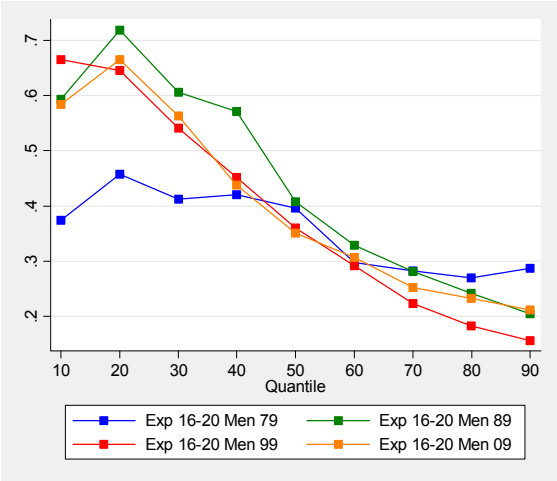
6) Experience 6-10 Women



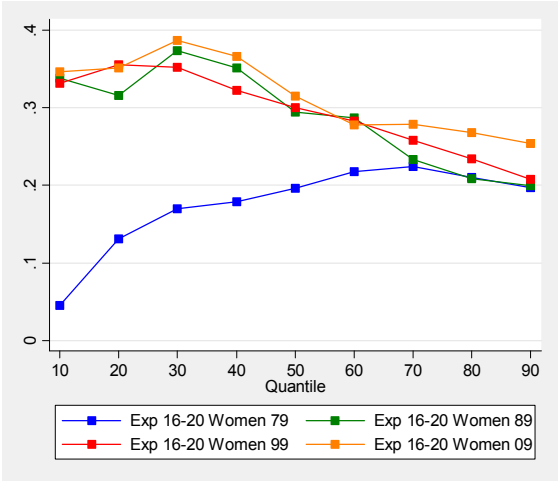
7) Experience 11-15 Men



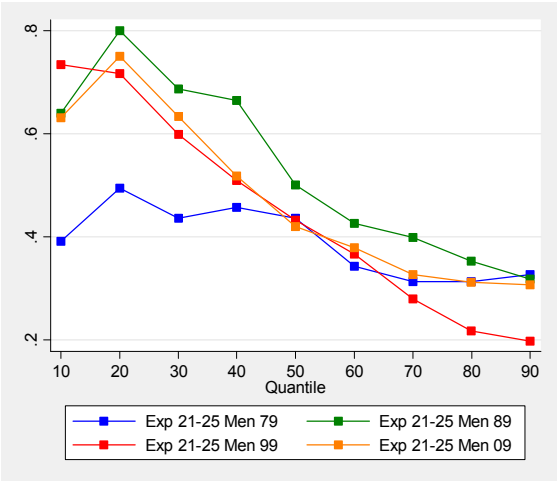
8) Experience 11-15 Women



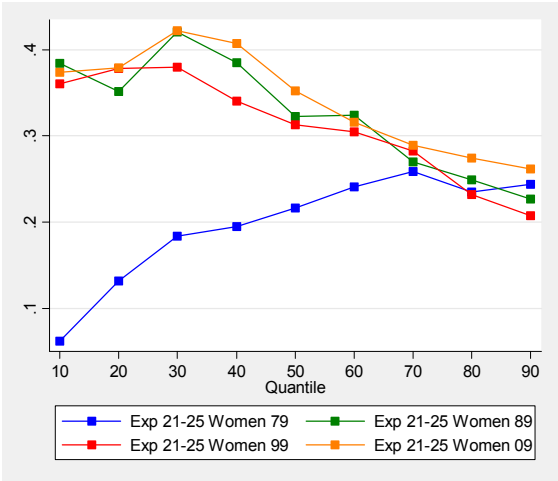
9) Experience 16-20 Men



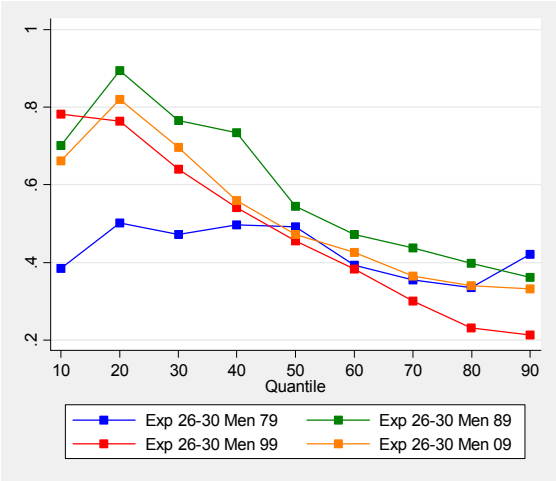
10) Experience 16-20 Women



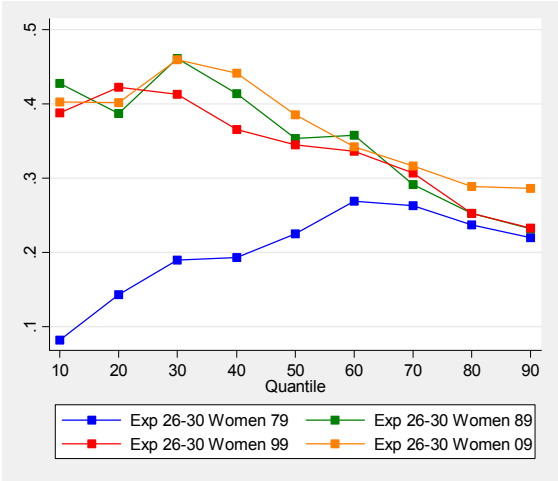
11) Experience 21-25 Men



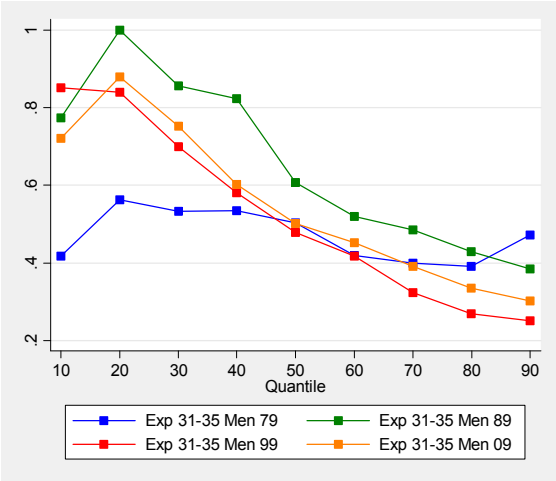
12) Experience 21-25 Women



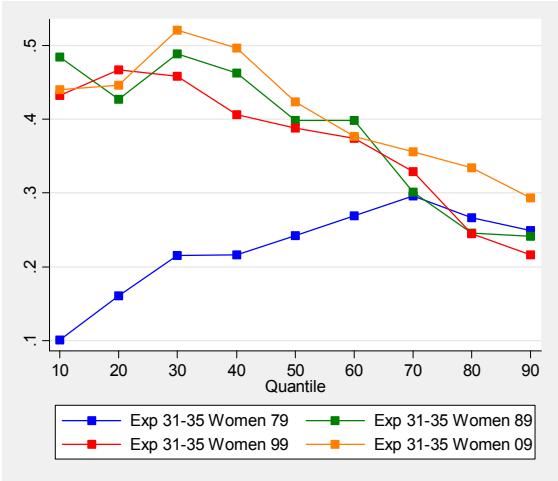
13) Experience 26-30 Men



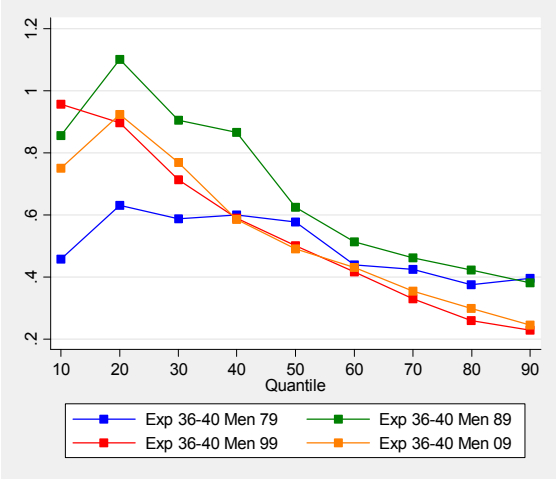
14) Experience 26-30 Women



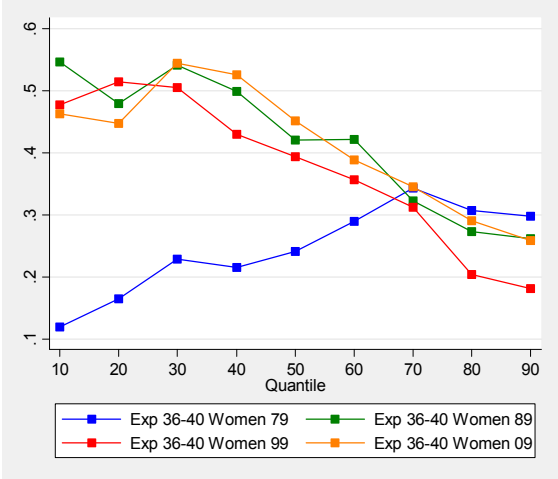
15) Experience 31-35 Men



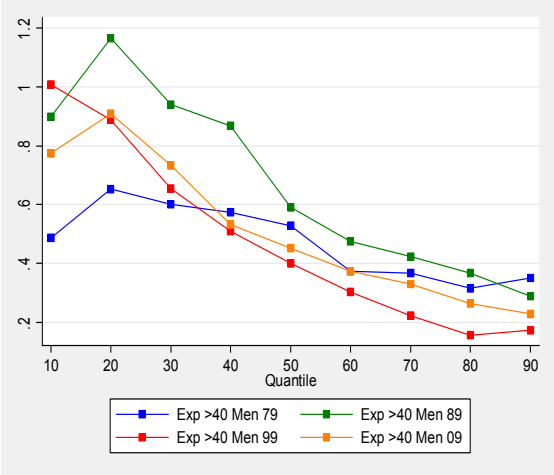
16) Experience 31-35 Women



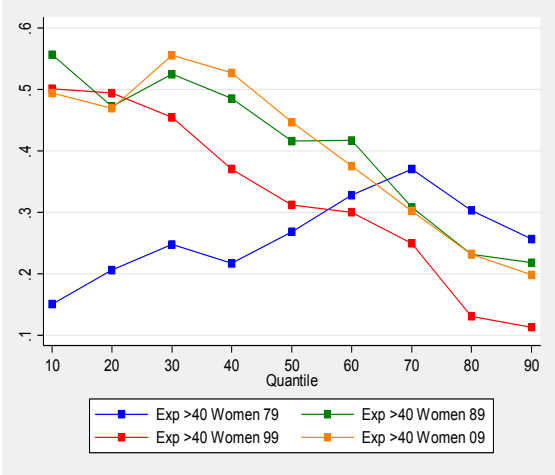
17) Experience 36-40 Men



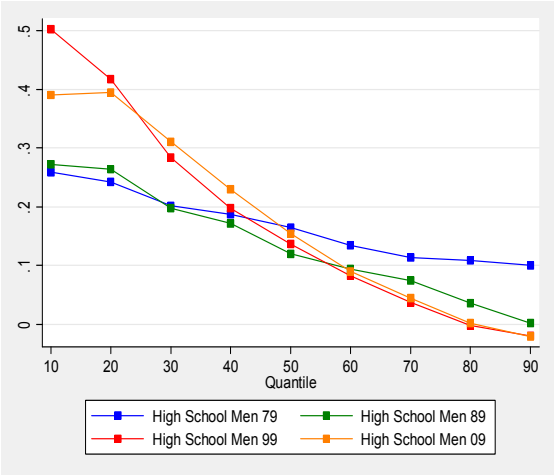
18) Experience 36-40 Women



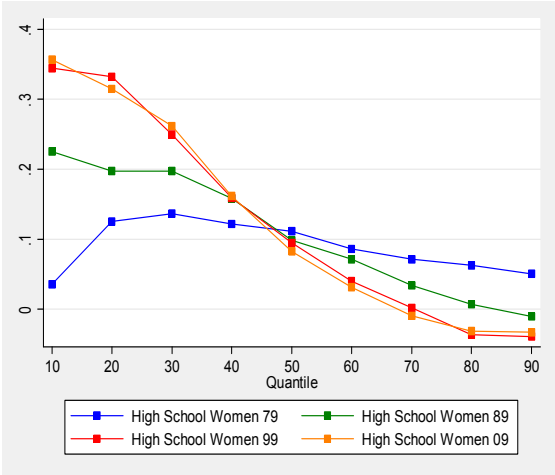
19) Experience >40 Men



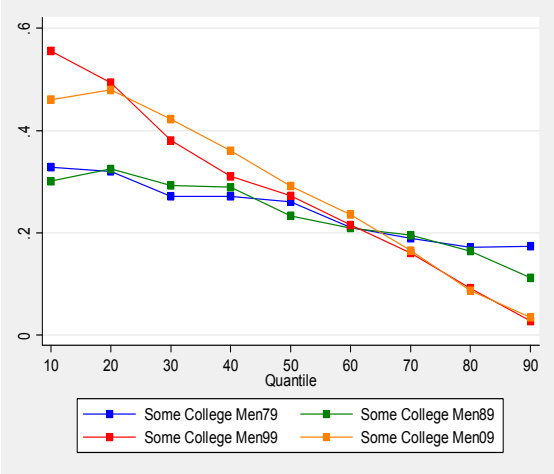
20) Experience >40 Women



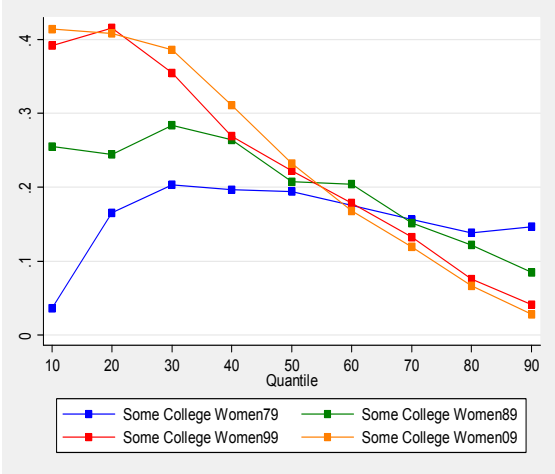
21) High School Men



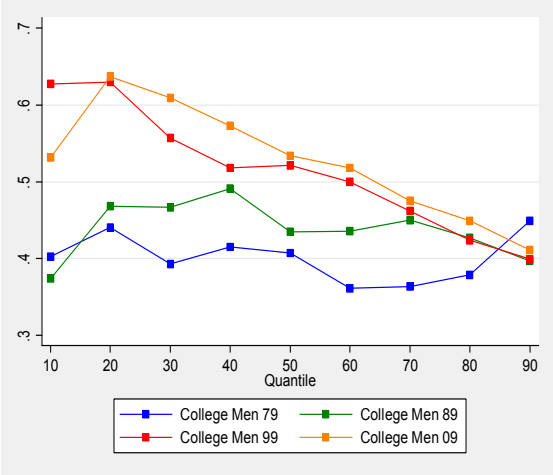
22) High School Women



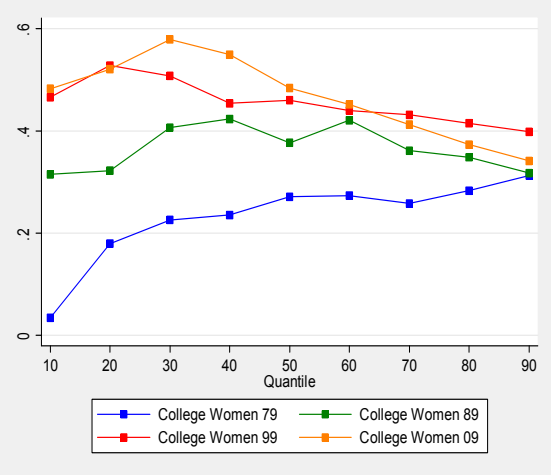
13) Some College Men



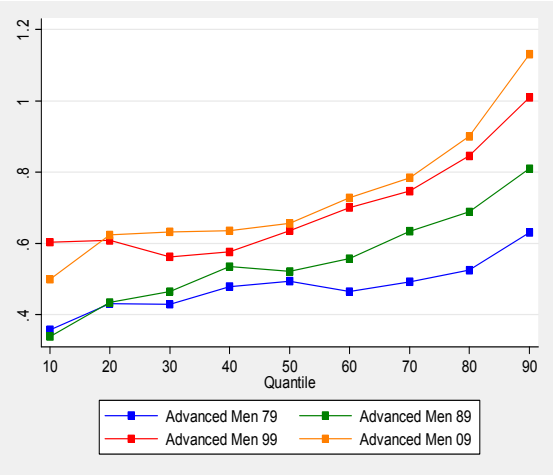
24) Some College Women



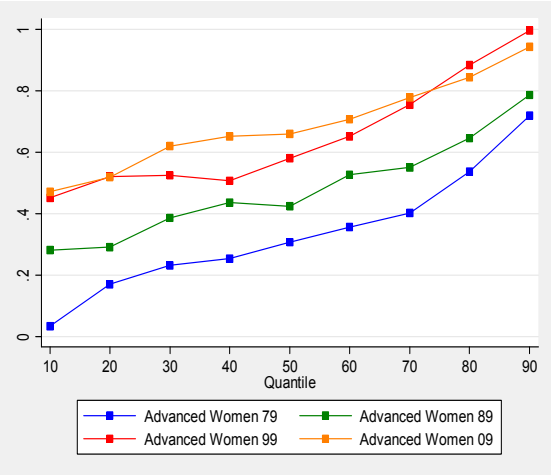
25) College Men



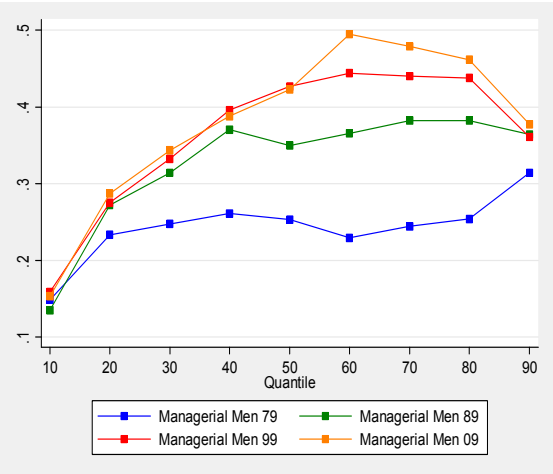
26) College Women



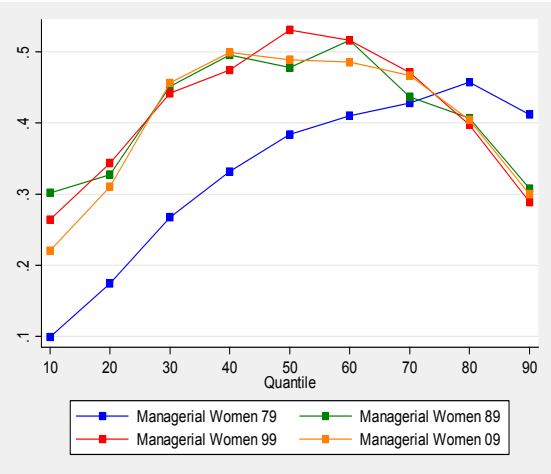
27) Advanced Men



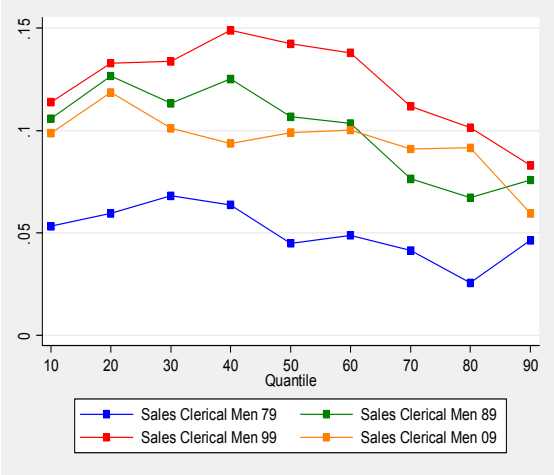
28) Advanced Women



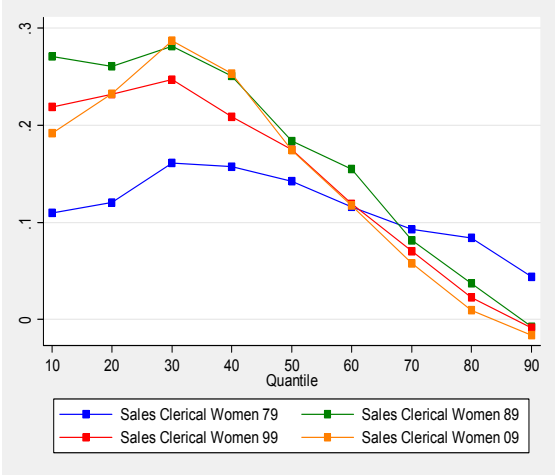
29) Professional, Technical and Managerial Men



30) Professional, Technical and Managerial Women



31) Sales and Clerical Men



32) Sales and Clerical Women

Appendix D: Decomposition of the Gender Pay Gap to Specific Variables at Selected Quantiles

Table D1: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 1979

1979	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	0.0106	0.0419	-0.0394	-0.0305	0.0311	0.1337
Union	0.0485	-0.0060	-0.0115	0.0046	0.0557	-0.0200
Experience 6-10	0.0481	-0.0125	-0.0057	0.0053	0.0159	-0.0097
Experience 11-15	0.0440	-0.0060	-0.0131	0.0038	0.0263	0.0126
Experience 16-20	0.0335	-0.0024	-0.0132	0.0017	0.0255	0.0248
Experience 21-25	0.0295	-0.0012	-0.0124	-0.0016	0.0190	0.0184
Experience 26-30	0.0262	0.0002	-0.0105	-0.0031	0.0196	0.0253
Experience 31-35	0.0268	-0.0023	-0.0110	-0.0044	0.0201	0.0260
Experience 36-40	0.0289	-0.0009	-0.0103	-0.0055	0.0239	0.0165
Experience >40	0.0379	-0.0049	-0.0084	-0.0081	0.0291	0.0182
High School	0.0746	-0.0148	-0.0192	0.0077	0.0263	0.0340
Some College	0.0444	-0.0032	-0.0142	0.0073	0.0139	0.0180
College	0.0337	0.0000	-0.0170	0.0068	0.0171	0.0346
Advanced	0.0239	0.0037	-0.0196	0.0048	0.0217	0.0340
Nonwhite	-0.0115	0.0024	0.0008	-0.0038	-0.0111	-0.0102
Married	0.1127	-0.0360	-0.0133	0.0164	0.1085	0.0368
Part time	-0.0366	0.0108	-0.0032	-0.0018	0.0113	0.0073

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 1979

Table D1: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 1979 (continued)

1979	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Industry:						
Agriculture, Forestry and Fisheries	-0.0152	0.0056	0.0009	-0.0064	-0.0123	-0.0022
Mining	0.0012	0.0011	-0.0016	0.0003	0.0040	0.0018
Construction	0.0094	0.0015	-0.0150	0.0032	0.0085	0.0359
Manufacturing (durable goods)	0.0039	0.0019	-0.0009	0.0011	-0.0022	-0.0133
Transportation and Communication	-0.0007	0.0059	-0.0048	0.0006	0.0027	-0.0049
Wholesale Trade	-0.0012	0.0026	-0.0018	0.0010	-0.0036	-0.0003
Retail Trade	-0.0388	0.0112	0.0059	0.0211	0.0033	-0.0062
Finance, Insurance and Real Estate	-0.0031	0.0020	-0.0016	0.0048	-0.0059	0.0043
Business and Repair Services	-0.0045	0.0027	0.0003	0.0085	-0.0017	0.0012
Personal Services	-0.0039	0.0011	0.0008	0.0032	0.0016	-0.0002
Entertainment and Recreation	-0.0037	0.0013	0.0002	-0.0007	-0.0020	-0.0001
Professional Services	-0.0175	0.0048	0.0080	0.0085	-0.0210	-0.0014
Public Administration	-0.0037	0.0064	-0.0033	-0.0003	-0.0043	-0.0042
Occupation:						
Professional, Technical and Managerial	0.0324	-0.0001	-0.0277	-0.0153	-0.0186	0.0188
Sales and Clerical	0.0051	-0.0026	0.0012	-0.0457	-0.0528	-0.0147

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 1979

Table D2: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 1989

1989	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	-0.0012	0.0101	-0.0178	-0.0018	-0.0131	0.0806
Union	0.0040	-0.0091	-0.0025	0.0054	0.0386	-0.0203
Experience 6-10	0.0004	-0.0110	-0.0023	0.0333	0.0080	-0.0070
Experience 11-15	0.0032	-0.0164	-0.0070	0.0412	0.0238	-0.0001
Experience 16-20	0.0036	-0.0149	-0.0093	0.0349	0.0329	0.0114
Experience 21-25	0.0030	-0.0110	-0.0113	0.0224	0.0283	0.0197
Experience 26-30	0.0026	-0.0103	-0.0094	0.0207	0.0263	0.0204
Experience 31-35	0.0023	-0.0096	-0.0089	0.0185	0.0246	0.0191
Experience 36-40	0.0015	-0.0086	-0.0070	0.0168	0.0208	0.0141
Experience >40	0.0007	-0.0122	-0.0087	0.0218	0.0233	0.0130
High School	0.0001	-0.0108	-0.0068	0.0086	0.0150	0.0116
Some College	0.0016	-0.0074	-0.0104	0.0012	0.0073	0.0142
College	0.0028	-0.0048	-0.0199	0.0077	0.0153	0.0335
Advanced	0.0014	0.0005	-0.0152	0.0098	0.0174	0.0346
Nonwhite	-0.0033	0.0027	0.0028	-0.0101	-0.0184	-0.0096
Married	0.0028	-0.0169	-0.0035	0.0389	0.0880	0.0447
Part time	0.0008	0.0017	0.0006	-0.0016	0.0009	0.0005

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 1989

Table D2: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 1989 (continued)

1989	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Industry:						
Agriculture, Forestry and Fisheries	0.0003	0.0021	0.0001	-0.0126	-0.0060	-0.0010
Mining	0.0004	-0.0004	-0.0001	0.0004	0.0020	0.0009
Construction	0.0020	-0.0029	-0.0054	0.0115	0.0124	0.0094
Manufacturing (durable goods)	0.0015	-0.0030	-0.0009	-0.0021	0.0047	0.0009
Transportation and Communication	0.0026	0.0014	-0.0019	-0.0009	0.0029	-0.0026
Wholesale Trade	0.0008	-0.0004	-0.0011	-0.0019	-0.0012	-0.0009
Retail Trade	0.0002	0.0072	0.0014	0.0214	0.0152	-0.0044
Finance, Insurance and Real Estate	0.0013	0.0000	-0.0013	0.0006	-0.0034	0.0020
Business and Repair Services	-0.0001	0.0011	-0.0002	0.0000	-0.0013	-0.0027
Personal Services	-0.0002	0.0009	0.0006	0.0031	0.0018	0.0002
Entertainment and Recreation	0.0001	0.0005	0.0001	-0.0007	-0.0011	-0.0012
Professional Services	0.0003	0.0004	0.0053	0.0153	-0.0074	-0.0115
Public Administration	0.0006	-0.0007	-0.0007	-0.0002	-0.0034	-0.0010
Occupation:						
Professional, Technical and Managerial	0.0033	-0.0024	-0.0268	-0.0550	-0.0420	0.0364
Sales and Clerical	-0.0012	-0.0018	-0.0021	-0.0943	-0.0573	0.0174

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 1989

Table D3: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 1999

1999	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	0.0055	0.0171	-0.0358	-0.0280	0.0343	0.1341
Union	0.0028	-0.0016	-0.0009	0.0065	0.0292	-0.0171
Experience 6-10	0.0039	-0.0048	0.0007	0.0306	0.0024	-0.0093
Experience 11-15	0.0049	-0.0057	-0.0037	0.0414	0.0113	-0.0050
Experience 16-20	0.0059	-0.0056	-0.0064	0.0412	0.0156	0.0007
Experience 21-25	0.0070	-0.0037	-0.0088	0.0433	0.0191	0.0067
Experience 26-30	0.0066	-0.0039	-0.0079	0.0413	0.0168	0.0047
Experience 31-35	0.0050	-0.0032	-0.0077	0.0299	0.0092	0.0097
Experience 36-40	0.0036	-0.0018	-0.0046	0.0221	0.0070	0.0069
Experience >40	0.0038	-0.0023	-0.0038	0.0268	0.0074	0.0073
High School	0.0090	-0.0105	-0.0005	0.0417	0.0242	0.0067
Some College	0.0090	-0.0064	-0.0049	0.0192	0.0109	-0.0004
College	0.0079	-0.0016	-0.0226	0.0214	0.0121	0.0220
Advanced	0.0037	0.0015	-0.0172	0.0150	0.0092	0.0277
Nonwhite	-0.0010	0.0028	0.0024	-0.0122	-0.0244	-0.0159
Married	0.0064	-0.0014	-0.0142	0.0456	0.0900	0.0722
Part time	-0.0005	0.0002	0.0004	-0.0004	0.0015	0.0002

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 1999

Table D3: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 1999 (continued)

1999	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Industry:						
Agriculture, Forestry and Fisheries	-0.0007	0.0004	0.0007	-0.0083	-0.0036	-0.0004
Mining	0.0001	0.0001	0.0001	0.0009	0.0020	-0.0004
Construction	0.0014	-0.0002	-0.0023	0.0141	0.0107	0.0043
Manufacturing (durable goods)	0.0006	-0.0014	0.0005	0.0017	0.0009	0.0029
Transportation and Communication	0.0003	0.0009	-0.0000	-0.0000	0.0007	0.0002
Wholesale Trade	-0.0001	0.0003	-0.0002	-0.0009	-0.0017	0.0007
Retail Trade	-0.0066	0.0027	0.0051	-0.0081	0.0122	0.0015
Finance, Insurance and Real Estate	-0.0003	0.0005	-0.0008	-0.0019	-0.0031	0.0060
Business and Repair Services	-0.0004	0.0012	-0.0001	-0.0018	-0.0016	0.0034
Personal Services	-0.0007	0.0005	0.0009	0.0017	0.0005	0.0006
Entertainment and Recreation	-0.0009	0.0003	0.0007	-0.0019	-0.0004	0.0001
Professional Services	-0.0026	0.0009	0.0102	0.0036	0.0076	0.0115
Public Administration	0.0001	0.0012	-0.0022	-0.0033	-0.0013	0.0022
Occupation:						
Professional, Technical and Managerial	0.0057	0.0046	-0.0400	-0.0540	-0.0680	0.0459
Sales and Clerical	0.0010	-0.0001	-0.0060	-0.0630	-0.0411	0.0225

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 1999

Table D4: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 2009

2009	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Private	0.0049	0.0106	-0.0285	-0.0242	-0.0187	0.1050
Union	0.0017	-0.0016	0.0006	0.0024	0.0220	-0.0163
Experience 6-10	0.0048	-0.0038	-0.0005	0.0219	-0.0010	-0.0090
Experience 11-15	0.0052	-0.0037	-0.0020	0.0249	0.0052	-0.0070
Experience 16-20	0.0054	-0.0040	-0.0039	0.0276	0.0130	0.0028
Experience 21-25	0.0054	-0.0048	-0.0051	0.0248	0.0134	0.0109
Experience 26-30	0.0056	-0.0043	-0.0065	0.0228	0.0121	0.0100
Experience 31-35	0.0055	-0.0051	-0.0053	0.0232	0.0110	0.0042
Experience 36-40	0.0044	-0.0036	-0.0035	0.0216	0.0066	0.0020
Experience >40	0.0039	-0.0030	-0.0037	0.0200	0.0021	0.0058
High School	0.0077	-0.0083	-0.0010	0.0150	0.0327	0.0034
Some College	0.0093	-0.0092	-0.0014	-0.0149	0.0153	0.0021
College	0.0086	-0.0061	-0.0134	-0.0057	0.0094	0.0229
Advanced	0.0045	-0.0012	-0.0135	-0.0030	-0.0015	0.0318
Nonwhite	-0.0024	0.0024	0.0002	-0.0134	-0.0271	-0.0194
Married	0.0051	-0.0059	-0.0094	0.0398	0.0870	0.0616
Part time	-0.0011	0.0014	0.0004	-0.0033	-0.0009	0.0021

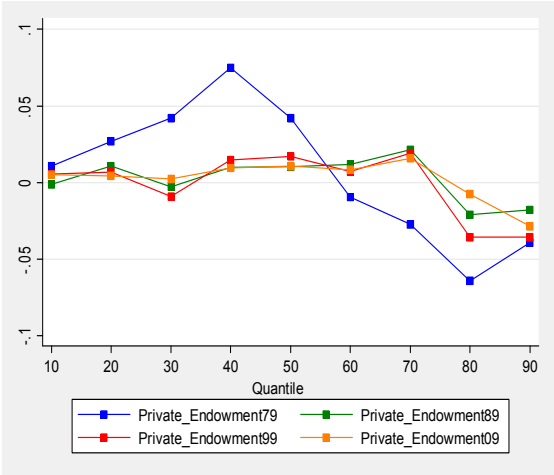
Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 2009

Table D4: Decomposition of the Gender Wage Gap to Specific Variables at Selected Quantiles, 2009 (continued)

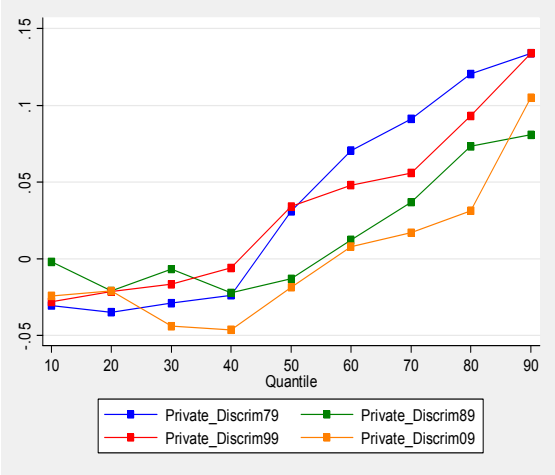
2009	The Endowment Effect due to Different Characteristics			The Discrimination Effect due to Different Returns		
	10th	**50th**	**90th**	**10th**	**50th**	**90th**
Industry:						
Agriculture, Forestry and Fisheries	-0.0005	0.0007	0.0001	-0.0057	-0.0036	-0.0009
Mining	0.0002	-0.0004	-0.0004	0.0010	0.0047	0.0014
Construction	0.0011	-0.0011	-0.0008	0.0132	0.0143	0.0040
Manufacturing (durable goods)	0.0005	-0.0003	-0.0019	0.0027	0.0047	0.0038
Transportation and Communication	0.0003	0.0004	-0.0007	-0.0013	0.0066	0.0055
Wholesale Trade	-0.0001	0.0002	-0.0003	-0.0004	-0.0003	0.0015
Retail Trade	-0.0055	0.0061	0.0004	-0.0018	0.0092	0.0126
Finance, Insurance and Real Estate	-0.0001	0.0008	-0.0004	0.0001	0.0003	0.0123
Business and Repair Services	-0.0006	0.0013	0.0006	-0.0042	-0.0023	0.0001
Personal Services	-0.0001	0.0001	0.0001	0.0023	0.0009	0.0009
Entertainment and Recreation	-0.0005	0.0008	0.0002	-0.0015	-0.0013	0.0019
Professional Services	-0.0019	0.0032	0.0034	0.0090	0.0138	0.0431
Public Administration	0.0004	0.0006	-0.0032	-0.0013	-0.0000	0.0079
Occupation:						
Professional, Technical and Managerial	0.0049	-0.0004	-0.0237	-0.0453	-0.0604	0.0270
Sales and Clerical	0.0006	0.0012	-0.0011	-0.0468	-0.0416	0.0164

Source: The U.S. Current Population Survey Outgoing Rotation Group Supplements, 2009

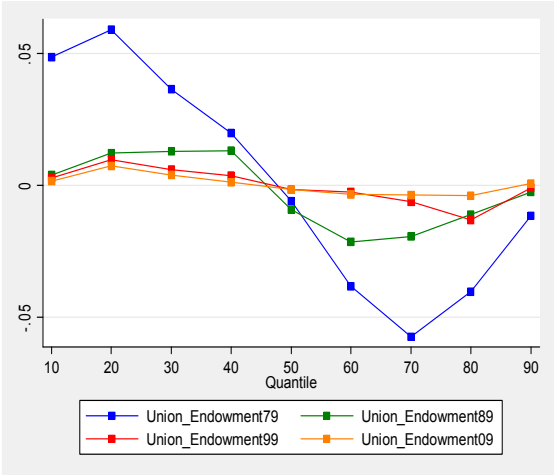
Appendix E: Graphical Representation of RIF decomposition at Selected Variables



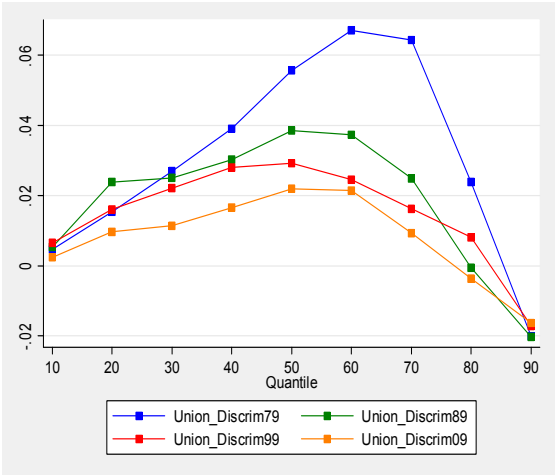
1) Endowment Private Sector



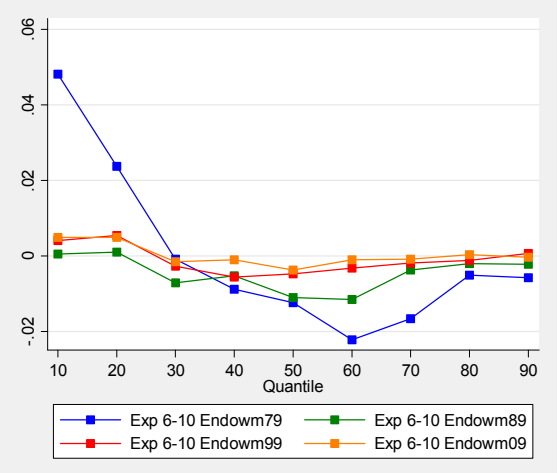
2) Wage Structure Private Sector



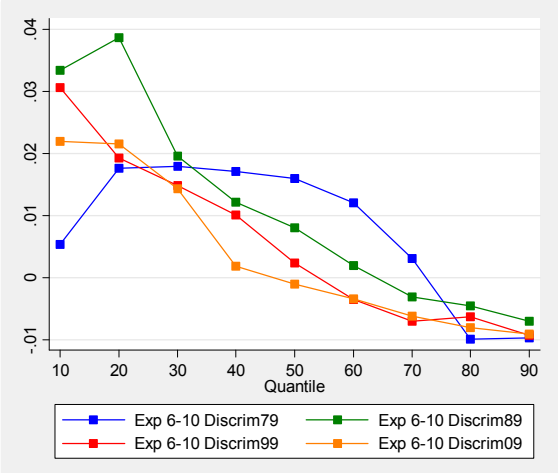
3) Endowment Union



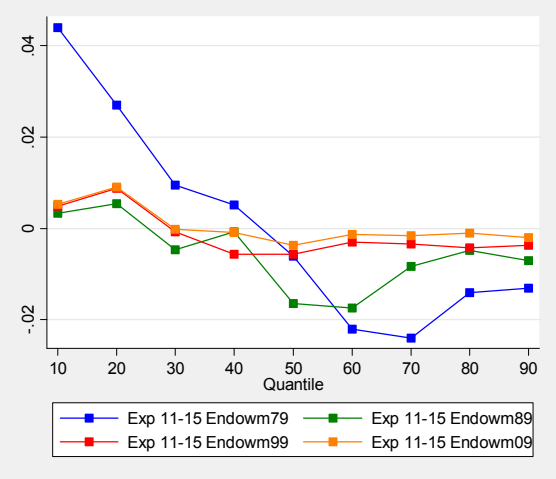
4) Wage Structure Union



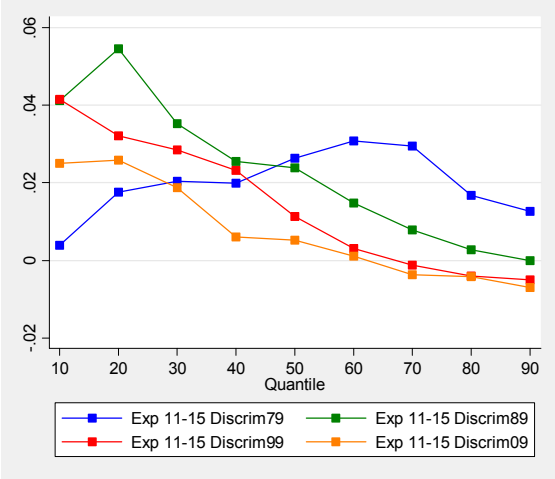
5) Endowment Experience 6-10



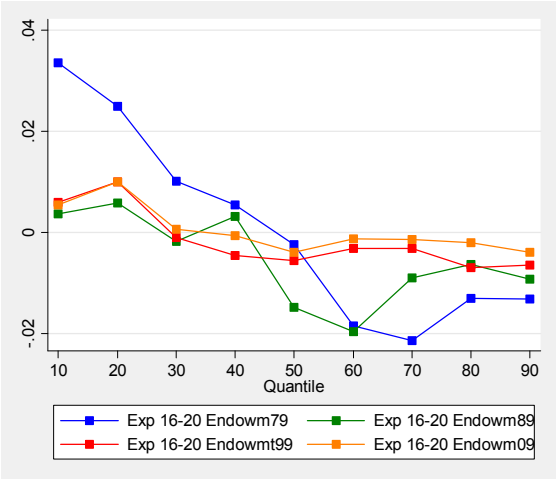
6) Wage Structure Experience 6-10



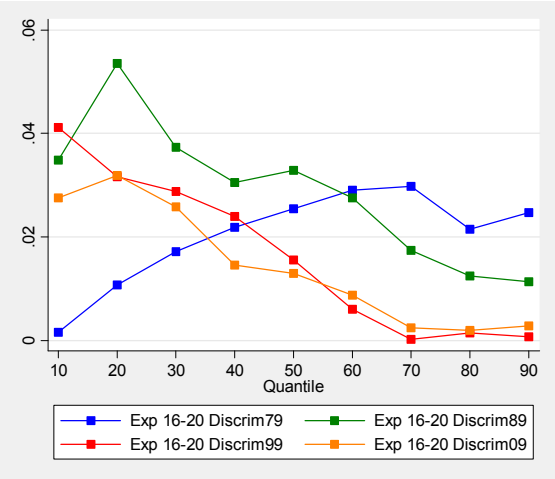
7) Endowment Experience 11-15



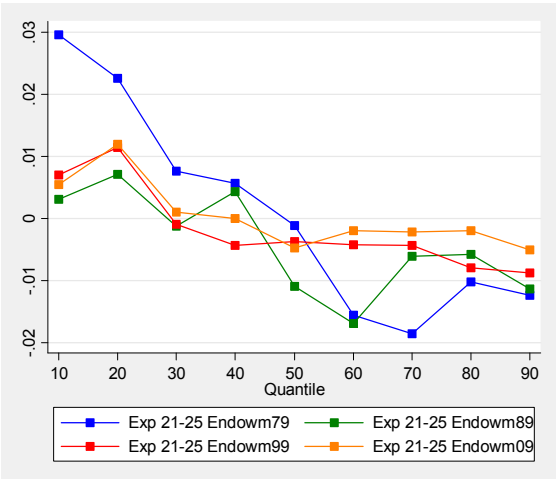
8) Wage Structure Experience 11-15



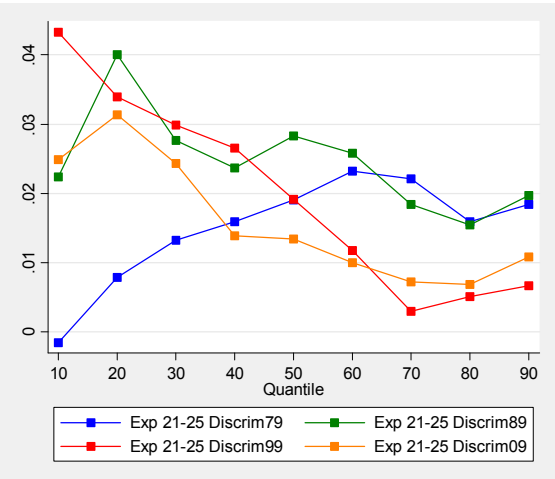
9) Endowment Experience 16-20



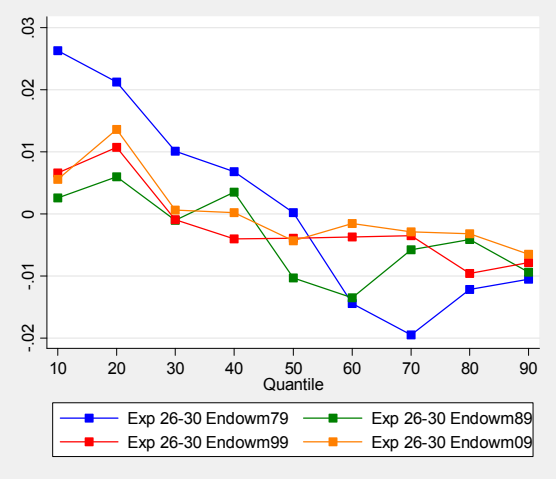
10) Wage Structure Experience 16-20



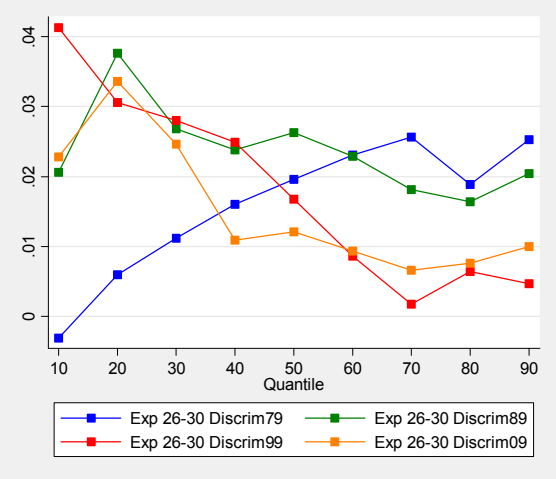
11) Endowment Experience 21-25



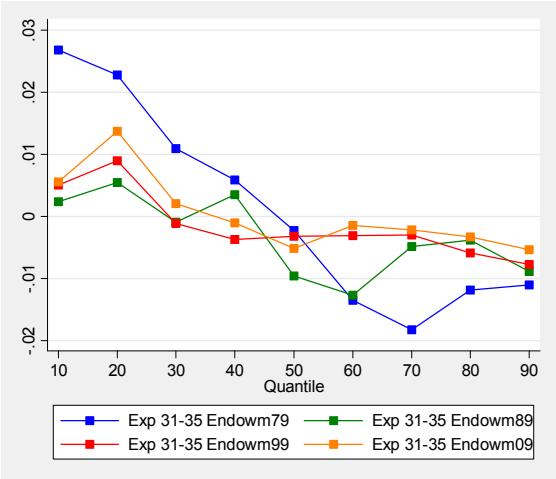
12) Wage Structure Experience 21-25



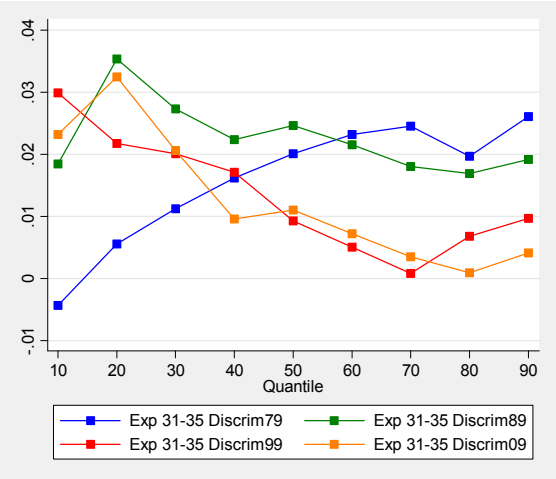
13) Endowment Experience 26-30



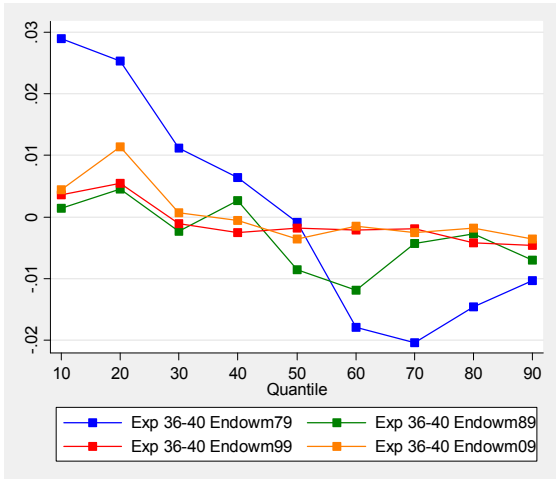
14) Wage Structure Experience 26-30



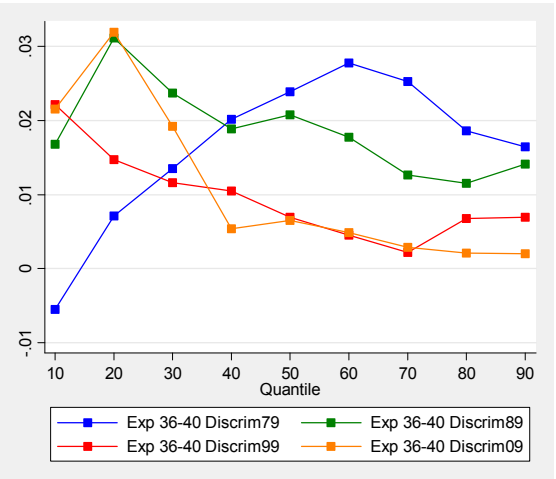
15) Endowment Experience 31-35



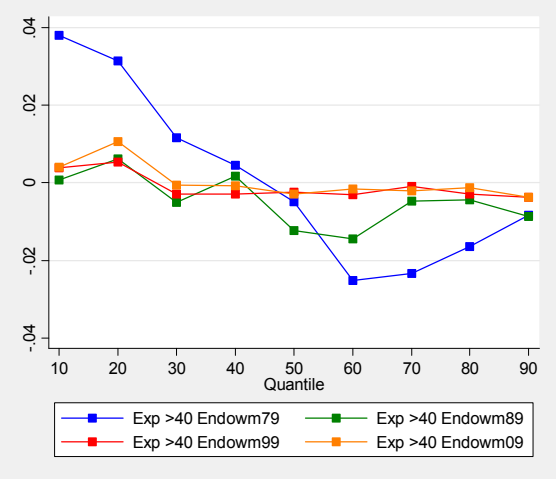
16) Wage Structure Experience 31-35



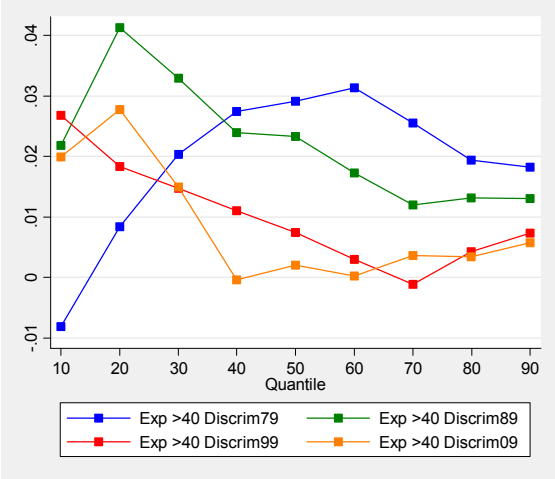
17) Endowment Experience 36-40



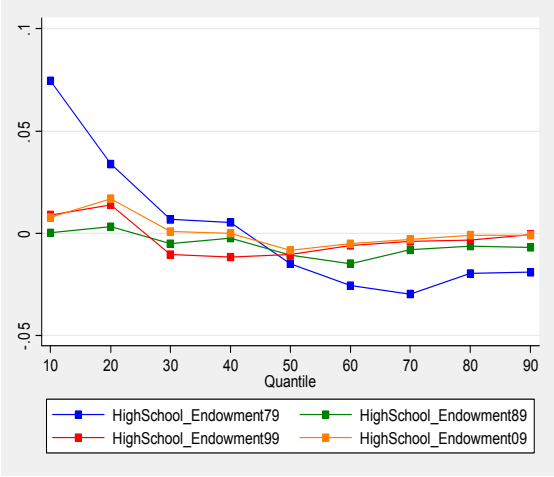
18) Wage Structure Experience 36-40



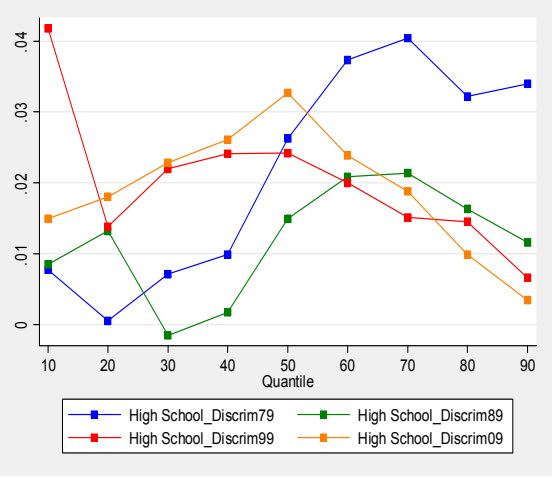
19) Endowment Experience >40



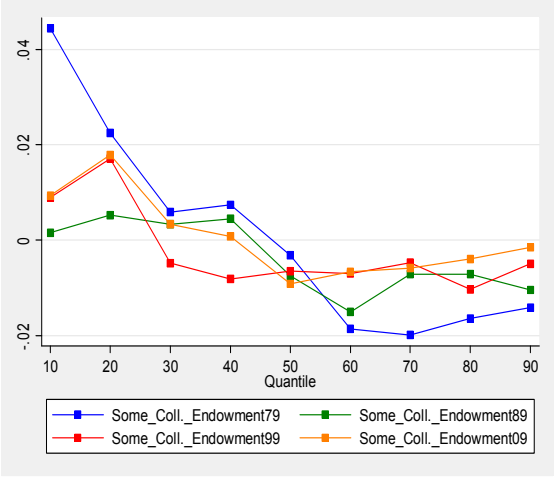
20) Wage Structure Experience >40



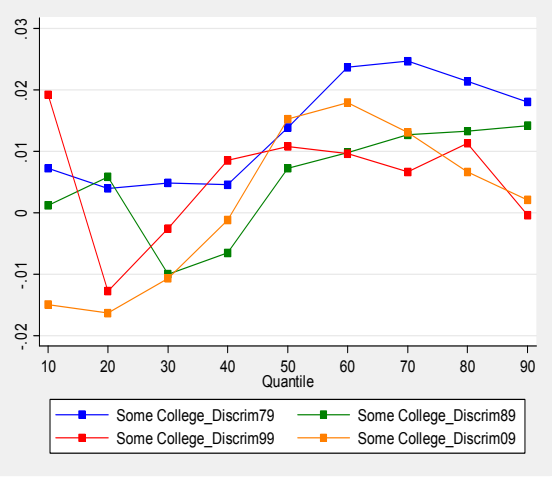
21) Endowment High School



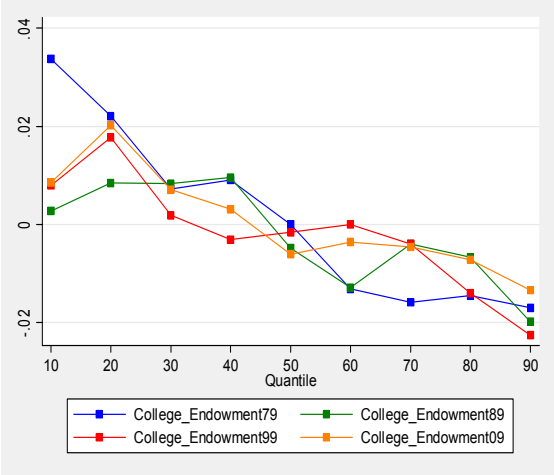
22) Wage Structure High School



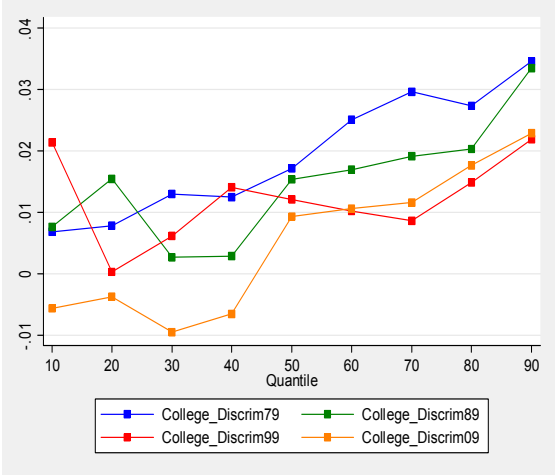
23) Endowment Some College



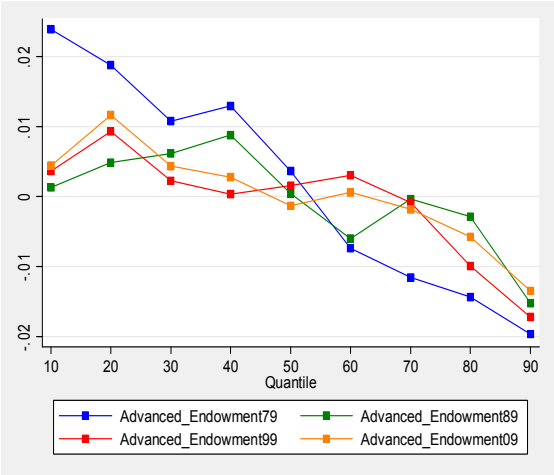
24) Wage Structure Some College



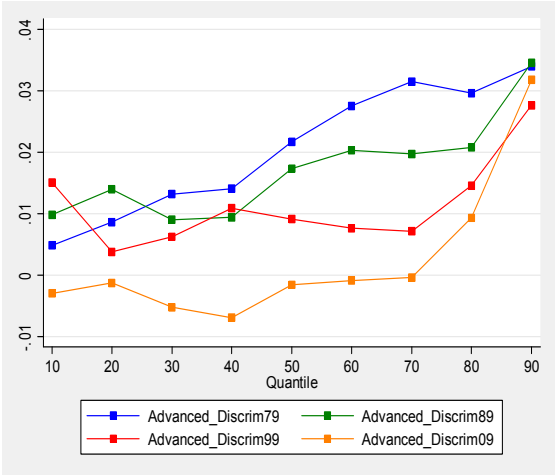
25) Endowment College



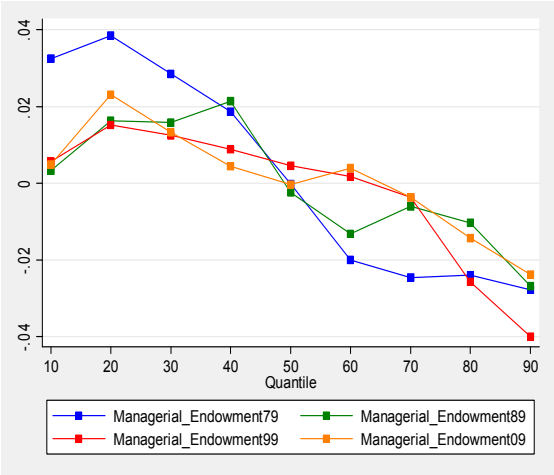
26) Wage Structure College



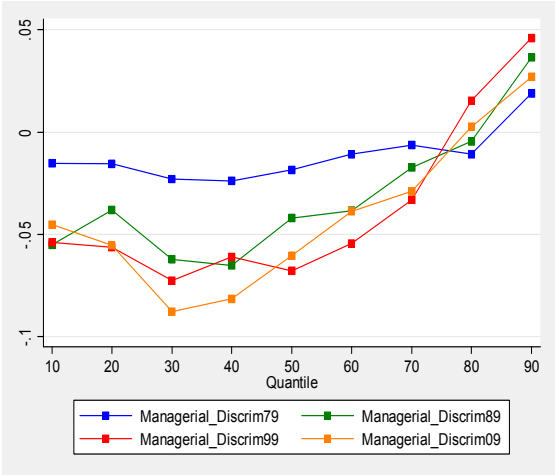
27) Endowment Advanced



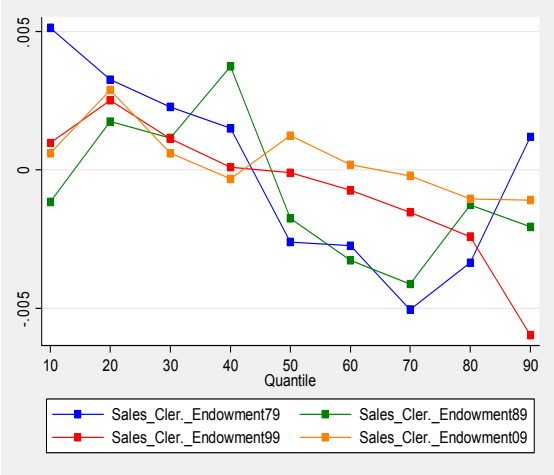
28) Wage Structure advanced



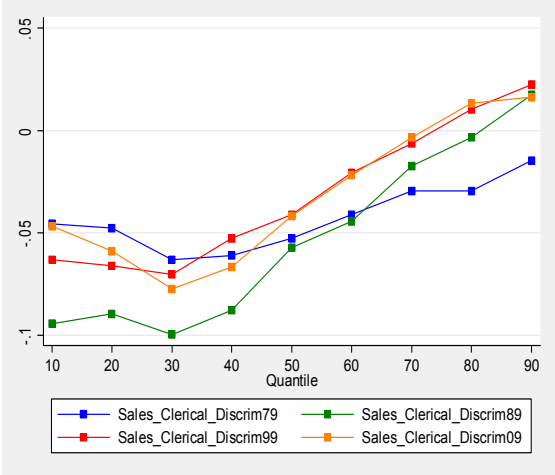
29) Endowment Professional, Technical and Managerial



30) Wage Structure Professional, Technical and Managerial



31) Endowment Sales and Clerical



32) Wage Structure Sales and Clerical

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