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Unionization and the Evolution of the Wage Distribution in Sweden: 1968 to 2000

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1. Introduction

The final third of the twentieth century represents an important episode in Swedish labor market history. Over that period, the pattern of unionization and the wage distribution co-evolved in interesting ways. From 1968-1983 the unionization rate increased sharply in Sweden, and unions gained more power to influence the wage distribution. These years were characterized by "solidarity wage bargaining," in which a pattern of centralized negotiations allowed unions to exert pressure to raise the relative wages of the least well paid. This was a period of strong wage compression. However, starting in 1983, the system of centralized bargaining started to fall apart. The fraction of workers covered by the Central Confederation of Blue-Collar Unions (LO), which had been the driving force behind solidarity wage bargaining, fell. The fraction of workers covered by the umbrella confederations representing white-collar workers (TCO and SACO) increased, as did the fraction of nonunion workers. From 1983-2000, the wage distribution in Sweden began to spread out again.

In this paper, we analyze changes in the Swedish wage distribution between 1968 and 2000. We investigate the extent to which changes in the wage distribution can be accounted for by
(i) changes in the pattern of unionization (LO versus TCO/SACO versus nonunion)
(ii) changes in the distribution of rewards associated with LO and TCO/SACO membership

(iii) changes in the distribution of other work force characteristics (education, etc.)
(iv) changes in the distribution of rewards to these other characteristics.

To address these questions, we use the Machado and Mata (2005) technique to simulate "counterfactual distributions." This technique allows us to "zero out" each of the above changes, so we can isolate the effect of each on the evolution of the wage distribution between two years. We carry out our analysis using data from the 1968, 1981 and 2000 waves of the Swedish Level of Living Survey (LNU).

We find that the evolution of the wage distribution between 1968 and 1981 was affected partly by changes in union status and other labor market characteristics such as gender, experience, and education. These account for some of the compression of the distribution – raising wages at the bottom and reducing wages at the top. The changes in returns to union status and other covariates is an even more important factor in explaining the compression at the bottom of the distribution. At the top of the distribution, the changes in covariates are a bit more important. After removing the trend and deflating wages, the change in the wage distribution between 1981 and 2000 is much less dramatic than in the earlier period. There was some compression at the bottom and a bit of spreading out at the very top. The changes at the extremes of the distribution are partly due to changes in union status and other covariates and partly due to returns to these characteristics. In the center of the distribution, changes in returns account for more than the total change, i.e., there is a reduction in relative wages in this part of the distribution between 1981 and 2000 and had the returns to the covariates remained the same there would have been an increase.

The outline of the rest of the paper is as follows. In the next section, we give some institutional background and explain why we expect to see a relationship between the pattern of unionization and the wage distribution. In Section 3, we describe the Swedish Level of Living Survey and present some first results. In Section 4, we report the results of quantile regressions of log wage on individual characteristics, including union membership. These quantile regressions are inputs to the Machado/Mata procedure – the collection of quantile regression coefficients represents the distribution of rewards to characteristics. Finally, in Section 5, we explain the Machado-Mata method and then use it to decompose changes in the wage distribution between 1968 and 1981 and between 1981 and 2000 into the four components discussed above.

2. The wage-setting institutions

We begin with some broad facts about unionization in Sweden. The union density rate in Sweden was very high by international standards during over the entire 1968-2000 period; indeed, available cross-national comparisons suggest that Sweden's union density rate was higher than in any other country during this period. The development of the Swedish union density rate over this period was more or less the mirror image of the development in the United States.

Table 1 goes here

At the same time, the union density rate did not increase uniformly in Sweden over this period. As can be seen in both Tables 1 and 2, this rate reached its peak sometime after 1980, declining thereafter.[1] Table 2 also shows a significant change in the pattern of union membership over time. In 1968, about 65% of union members were affiliated with LO. By 1981, although the fraction of the workforce affiliated with LO increased slightly, the rate of growth in TCO/SACO membership was considerably stronger, so LO members as a fraction of the unionized workforce fell to less than 60%. Finally, by 2000, LO membership had declined substantially, both as a fraction of the workforce and as a fraction of union membership (less than 50%).

Table 2 goes here

[1] Tables 1 and 2 show different Swedish unionization rates in 2000. The discrepancy is due to the fact that we do not include self-employed workers.

In short, although the union density rate was high over the entire 1968-2000 period in Sweden, it did not grow monotonically, and the mix of union membership (LO versus TCO/SACO) changed substantially over time. To understand why these changes potentially matter for the overall wage distribution, we now give some institutional detail about wage setting in different occupations and sectors.

<u>Blue-collar workers, private sector</u>

The solidarity wage policy is mainly associated with LO. During the 1966-1983 period, LO negotiated central frame agreements with the Swedish Employers Federation, SAF. These agreements covered around 800,000 LO-members in the private sector, or around 20 percent of the total labor force. They specified minimum contractual wage increases at the level of the individual worker. They were followed by negotiations at the industry and plant levels, which could result in additional wage increases and also concerned other aspects of work conditions. The central contracts had a number of characteristics that raised wages for workers in the bottom of the distribution:

i. A common flat rate of increase specified in *öre* (instead of relative wage increases) going to each worker.
ii. “Wage drift” guarantee amounts that compensated those workers who had not benefited from market wage drift since the previous wage agreement.
iii. Cost of living adjustments that were usually paid as a flat rate.
iv. Low wage adjustments amounts. These wage adjustments were earmarked for workers with hourly wages below a certain reference wage (*låglönegräns*) and were paid as a fraction of the difference between the worker’s actual wage and the reference wage.

These characteristics of the centrally negotiated contracts implied much larger wage increases for workers in the bottom of the distribution than for those further up in the distribution. In their detailed analysis of these contracts, Hibbs and Locking (1996, Figure 1) simulated the implications of the contracts using the actual wage structure. They found that the implied relative wage increases over the period 1972 to 1982 were about three times higher for workers in the bottom decile than for the median worker, who in turn could expect around a 50 percent higher wage increase than workers in the top decile.

Although the central agreements specified wage increases at the level of the individual worker, subsequent negotiations at the industry and plant levels allowed for other forces to affect actual wage increases. Substantial wage increases in addition to the centrally agreed ones were sometimes negotiated. It is these wage increases that became known as *wage drift*. It is likely that traditional market forces affected wage drift. The question then is how market forces acting through wage drift interacted with the equalizing effects of the centrally negotiated agreements.

The era of more decentralized wage bargaining and less emphasis on special low-wage settlements started in 1983 when the Swedish Metal Workers' Union (Metall) concluded a separate agreement with the Swedish Engineering Employers' Association (Verkstadsföreningen). At that time, *Metall* was a powerful union within LO, and Verkstadsföreningen a leading member association in SAF. The remaining parts of the SAF-LO area were covered by a central agreement.

In the following years, wage bargaining took place without central coordination between SAF and LO. The most common bargaining structure has been one of central agreements at the industry level without much co-ordination across the industries. Agreements at the industry level have been followed by agreements at the plant level. The scope for industry and firm specific factors to affect the wage structure has consequently increased. Although contracts often stipulated a guaranteed absolute wage increase for all workers, and hence higher relative wage increases in the lower end of the wage distribution, the special low-wage settlements that characterized the central frame agreements were no longer used.

<u>White-collar workers, private sector</u>

Unions for white-collar workers belong to either of two central organizations, namely, the Central Organization of Salaried Employees (TCO) or the Swedish Confederation of

Professional Associations (SACO). Unlike LO, these central organizations, with a few exceptions, have not participated in collective bargaining at the central level. For private-sector bargaining with SAF, a number of TCO and SACO unions formed a group called the Federation of Salaried Employees in Industry and Services (PTK). From the late 1960s until 1988, SAF and PTK were the main actors who negotiated the central frame agreements for white-collar workers in the private sector.

The agreements between SAF and PTK have not been scrutinized with the same detail as Hibbs and Locking (1996) did for the SAF-LO part of the labor market. There is no doubt that these agreements also had provisions that raised wages in the bottom of the distribution more than in the top, but these central agreements did not specify wage increases at the level of the individual worker in the way that the SAF-LO contracts did.[2] Our reading of the literature and informal interviews with industrial relations experts suggest that these contracts left more room for individual wage variation and more scope for wage drift. Thus, the contracts in this part of the labor market had somewhat weaker equalization effects than the SAF-LO contracts did. Finally, we note that the trend in wage-bargaining institutions since the 1980s is the same in this part of the labor market as the other, namely towards more decentralization.

<u>The public sector</u>

The public sector has three central employer organizations: one for the central government, one for municipalities, and one for the county councils. During the peak period of centralized wage bargaining, TCO and SACO (and two LO unions) had separate bargaining groups for this sector of the labor market. The central agreements in the public sector had very strong low-wage provisions. It is also likely that these agreements had a particularly strong impact on the final wage structure in the public sector. The reason is that wage drift is not regarded as a relatively important phenomenon in the public sector. In particular, piece rates and bonus pay, which are more difficult to regulate with central agreements, are used relatively infrequently in the public sector. We

[2] This is what makes it difficult to simulate the implications of the SAF-PTK agreements in the same way as Hibbs and Locking (1996) did for the SAF-LO agreements.

believe therefore that contracts in the public sector also had a strong equalizing effect and upward pressure on the very low wages was particularly strong. However, in common with the rest of the labor market, the trend towards decentralization has been very strong in the public sector since the late 1980s.

The nonunion sector

By tradition, agreements between a local union and a firm should also be valid for nonunion workers with jobs that are like those of the union workers. Nonetheless, it is interesting to note that the only Swedish study of union wage gaps (D'Agostino 1992) found significant union effects for blue-collar workers ranging from 12 to 24 percent over the period 1968 to 1981. Thus, despite the tradition of imposing union contracts on nonunion workers, there seems to be differential treatment of union and nonunion workers. We conjecture therefore that there is more room for individual and firm-specific factors to affect wages of nonunion workers. In addition, nonunion workers form a quite heterogeneous group with both temporary labor force participants, who do not have incentives to join a union, and managers, who may have more in common with owners than with other employees.

3. **Data**

We use the Level of Living Surveys conducted in 1968, 1981, and 2000 (see Erikson and Åberg , 1987). The LNU data are also available for 1974 and 1991, but, given our focus, it suffices to use only 1968, 1981, and 2000. The LNU dataset is the one most commonly used in previous studies of the Swedish wage structure. It is representative of the Swedish population (ages 15 to 75, except in 2000 when the lower age limit was 19). We only use data on workers 19-65 in order to be consistent across the years. Further, we eliminate the self employed since hourly wage information is not available for this group. The data set is a panel, but we do not use that property in this study.

The survey asks direct questions about key variables such as earnings, working hours, years of schooling and work experience, tenure with the present employer and union membership. In these data, the hourly wage is measured using information from a sequence of questions. A question is first asked about the mode of pay, whether it is by hour, by week, by month, by piece rate etc. Conditional on the answer to this question, the next question is about the pay per hour, the pay per week etc. Finally, information about normal working hours is used to compute hourly wages for those who are not paid by the hour.

The survey also asks about union membership. First, the sampled person is asked whether he or she is a union member. In case of an affirmative answer, the next question is to what union the person belongs.

Table 3 presents sample means by union status for each of the three years. Looking first at the log real wage (expressed in 1968 Swedish crowns), there is real wage growth across all categories, both from 1968 to 1981 and from 1981 to 2000. In terms of wage dispersion, the standard deviation of the log wage is lowest among LO members and highest among nonunion workers in all three years. This standard deviation falls across all worker categories between 1968 and 1981. This trend is least pronounced among LO workers. The pattern is different for 1981 to 2000. In this period, there was a continued decrease in inequality among LO members. This occurred despite the demise of solidarity wage bargaining over this period, perhaps reflecting an increased homogeneity among LO membership. Over the same period, wage inequality among TCO/SACO members was essentially unchanged, while among nonunion workers, there was a strong increase in the standard deviation of the log wage.

Table 3 goes here

In addition to union status, the variables that we use to explain the log wage are gender, years of education, years of work experience, years of tenure on the current job,[3] and sector (private versus public). The most notable trends in these variables over our sample period are the increase in the fraction of the workforce that is female and the growth in the relative importance of public sector employment between 1968 and 1981. These two developments are related as women are more likely than men to work in the public sector. Since public sector employees are more likely to be unionized than their private sector counterparts this also means that women are somewhat more likely to be union members than men are.

Figures 1-3 go here

The evolution of the wage distribution that is broadly summarized in Table 3 can be seen in more detail in Figures 1-3. The log wages that underlie these figures (and the other figures presented later) are real – all wages are expressed in 1968 SEK. Figure 1 shows estimated kernel densities for 1968, 1981 and 2000. The rightward shift in these kernels represents the real productivity growth realized over this period. The unionization effects that we are analyzing, however, have to do with the change in the shape of the log wage distribution rather the change in location. Accordingly, we detrend log wages in each year by subtracting the log of the average wage in that year.

Figure 2 shows the difference between the detrended 1981 and 1968 log wage distributions on a quantile-by-quantile basis. This figure can be understood as follows. Netting out the average growth in wages between 1968 and 1981, the workers toward the bottom of the 1981 log wage distribution were paid considerably more (about 25% more at the 5th percentile) than were the least well-paid workers in the 1968 log wage distribution. The workers toward the top of the 1981 log wage distribution were paid considerably less (about 10% less at the 95th percentile) than were the best-paid workers

[3] Tenure data are not yet available in the 2000 LNU, so for the moment we do our analysis without this variable.

in the 1968 log wage distribution. Another way to express this is to say that Figure 1 shows the difference between the estimated quantiles of the 1981 and 1968 log wage distributions. The fact that this difference is strongly downward sloping indicates substantial wage compression between 1968 and 1981. Further, we can see that the biggest gains in 1981 relative to 1968 were at the lowest quantiles; similarly, the biggest losses in 1981 relative to 1968 were at the highest quantiles.

Figure 3 shows the difference between the 2000 and 1981 log wage distributions. Between the 5^{th} and the 95^{th} percentiles, this difference shows a slight but steady increase; that is, there was a weak increase in dispersion across most of the distribution. At the very lowest quantiles, the difference between the 2 distributions (net of average log wage growth between the two years) is strongly positive (but the difference is not statistically significant); at the very highest quantiles, the difference is again strongly positive. That is, there was some compression between 1981 and 2000 at the very bottom of the distribution coupled with some pulling apart at the very top of the distribution.

4. Quantile regression results

Figures 2 and 3 show differences between unconditional log wage distributions. The next step therefore is to look at conditional log wage distributions. To do this, we estimate a series of quantile regressions. We assume linearity, i.e., that the q^{th} quantile of the log wage distribution in year t conditional on characteristics is linear in those variables:

$$Quant_q(Y_t / X_t = x) = x\beta_t(q)$$

Given the linearity assumption, the quantile regression coefficients $\{\beta_t(q): 0 < q < 1\}$ completely characterize the distribution of log wages in year t conditional on characteristics X.

We first present the summary results of a series of simple quantile regressions in which we condition only on an LO and a TCO/SACO dummy. Table 4 presents the quantile regression results at the 10^{th}, 50^{th} , and 90^{th} percentiles for 1968, 1981 and 2000. For comparison, the OLS results are also presented for each of the three years. We emphasize that, of course, the LO and TCO/SACO indicators, are arguably endogenous. This means that the coefficient estimates presented in Table 4 should be interpreted as the returns "associated with" union status. The coefficient estimates on the LO and TCO/SACO dummies cannot be interpreted purely as the causal effect of union membership on the log wage. These estimates presumably also reflect the fact that LO and TCO/SACO members differ from each other and from nonunion workers in terms of relevant observables and unobservables. However, from the point of view of the Machado-Mata analysis to be presented in the next section, endogeneity is not an issue. The estimated quantile regression coefficients characterize the distribution of the log wage conditional on the explanatory variables in each of the three years, and they do so irrespective of whether the estimates reflect the "true" casual effect of these variables.

Table 4 goes here

The pattern shown in Table 4 is straightforward. There are positive returns to LO membership in the bottom half of the distribution, but there is a penalty associated with LO membership in the highest percentiles. In general, the returns to LO membership fall over time. There are positive returns to TCO/SACO membership (except at the 90th percentile in 2000), especially in the lower percentiles, but these returns have fallen over time.

Table 5 goes here

Of course, some of the "returns" to union status reflect the fact that LO members, TCO/SACO members and nonunion workers do not have the same characteristics. To control for this as best we can, we use the variables presented in Table 3 as explanatory variables, i.e., union status, a gender dummy, years of education, years of work experience, years of work experience squared (divided by 100), years of tenure, and a sector dummy.[4] The results of these quantile regressions are presented in Table 5. First,

[4] For the moment, we do not include tenure, while we wait for this variable to be added to the 2000 LNU.

holding all else constant, the premium associated with LO or TCO/SACO membership is still primarily positive, although these premia are lower than the "raw" returns presented in Table 4. Second, the pattern of coefficient estimates for the explanatory variables is standard. There is a significant premium for males, which especially after 1968, increases as we move up the distribution. This is the "glass ceiling" pattern discussed in Albrecht, et al. (2003). The returns to years of work experience are positive (but small) and concave; similarly, the returns to education are positive, as expected. Finally, and perhaps unexpectedly, the coefficient on the dummy for private sector employment moves from negative across the distribution in 1968 to strongly positive in 2000.

5. Machado-Mata Analysis

Figure 2 shows the difference between the detrended 1981 and 1968 log wage distributions on a quantile-by-quantile basis. Similarly, Figure 3 shows the log wage gap between 2000 and 1981. In this section, we use Machado and Mata (2005) to address questions such as "What would the log wage gap between 1981 and 1968 have been if the returns to observables had not changed during that period?" That is, to what extent can we account for the observed gap between the 1981 and 1968 distributions by the change in the distribution of observables, and to what extent is the gap due to a change in the distribution of returns to those observables between those two years?

The Machado-Mata method can be understood most easily by considering the following artificial problem. Consider a random variable Y with distribution function F(y). Let the corresponding explanatory variables X have distribution function G(x). Suppose we have a sample on (Y,X). Write

$$F(y) = \int F(y/x)dG(x)$$

Using the assumption that the conditional quantiles of Y given X = x are linear in x (equation 1), the conditional distribution of Y given X = x is completely described by the collection of quantile regression coefficients, i.e., the $\{\beta(q): 0 < q < 1\}$. One can then simulate a draw from F(y) by (i) drawing a value of q at random from [0,1] and estimating $\beta(q)$, (ii) drawing a value of x at random from the empirical distribution of X, and (iii) multiplying the two to generate a simulated value y. Repeating this process many times simulates draws from F(y).

The simulation problem just described is artificial in the sense that there is no need to simulate F(y) – we already had a sample from that distribution. The same reasoning, however, can be used to simulate "counterfactual" distributions. Suppose we are interested in the distribution of log wages that we would expect to observe if workers had the year t distribution of X's but the year s distribution of returns. Call this counterfactual random variable $Y_{t,s}$. The distribution function of this random variable is

$$F_{t,s}(y) = \int F_s(y/x)dG_t(x)$$

Draws from $F_{t,s}(y)$ can be simulated by (i) drawing a value of q at random from [0,1] and estimating $\beta_s(q)$, (ii) drawing a value of x at random from the year t sample distribution of observables, and (iii) multiplying the two to generate a simulated value of y. Again, repeating this process many times simulates draws from $F_{t,s}(y)$. Similarly, the Machado-Mata procedure can be used to simulate draws from $F_{s,t}(y)$, the distribution of log wages that we would expect to observe if workers had the year s distribution of X's and the year t distribution of returns.

We apply this technique to the gap between the distributions of detrended real log wages in 1981 versus 1968, i.e., to analyze the pattern of change exhibited in Figure 2. We start by presenting a counterfactual gap. Figure 4 shows the difference between the observed 1981 distribution and a counterfactual distribution that we construct by simulating the distribution of wages that we would expect to have observed with workers distributed across LO, TCO/SACO, and nonunion according to the 1981 fractions but receiving 1968 payoffs to union status. The bands around the gap shown in Figure 4 are 95% confidence intervals. The standard errors used to construct these confidence bands are based on the asymptotics presented in Theorem 2 in Albrecht, van Vuuren and Vroman (2008).

The counterfactual distribution underlying the gap shown in Figure 4 is constructed assuming that the only variables that determine log wages are the union status dummies. We construct another counterfactual gap by also taking into account the effect the other observables (gender, years of work experience, etc.) have on log wages. Figure 5 shows the difference between the observed 1981 distribution and the distribution we would expect to have observed if workers had the 1981 distribution of observables, including but not limited to union status, but received the 1968 distribution of returns to those observables.

In Figure 6, we show three gaps – (i) the observed (raw) gap between the 1981 and 1968 distributions, (ii) the gap between the 1981 distribution and the counterfactual distribution underlying Figure 4, and (iii) the gap between the 1981 distribution and the counterfactual distribution underlying Figure 5. To keep Figure 6 readable, we suppress the confidence bands around the three gaps.

Figure 6 can be understood as follows. Consider the difference between the raw gap and the gap based on the counterfactual that controls only for union status. We can express the raw gap at the q^{th} quantile as

$$Quant_q(Y_{81}) - Quant_q(Y_{68}) = Quant_q(Y_{81}) - Quant_q(Y_{81,68}) + Quant_q(Y_{81,68}) - Quant_q(Y_{68})$$

where $Y_{81,68}$ is the counterfactual random variable simulated using the 1981 union status fractions but the 1968 returns to those variables. The raw gap at the q^{th} quantile can be written as the sum of two components. The first term, $Quant_q(Y_{81})$- $Quant_q(Y_{81,68})$, isolates the part of the raw gap that is due to the change in the distribution of returns to union status between 1968 and 1981. The second term, $Quant_q(Y_{81,68})$- $Quant_q(Y_{68})$ isolates the component due to the change in the union status fractions between 1968 and 1981. The difference between the raw gap (circles) and the first counterfactual gap (diamonds) is then the part of the raw gap that is attributable to the change in the union status fractions between 1968 and 1981. At the very bottom of the distribution (below the 5^{th} percentile), the change in the union mix accounts for a substantial fraction of the gap. From the 5^{th} percentile to the median, the raw gap is positive and this is partly accounted for by the change in the union mix. The rest of the gap is due to the change in the returns to union status. Note that, for the gap below the median, when we account for all the covariates, the story is essentially the same, i.e., part of the gap is due to changes in the distribution of returns and part due to the change in the distribution of covariates. Above the median the raw gap is negative and increasingly so as one goes up the distribution. This is exacerbated when we control for union status and even more so when we control for the other covariates. This indicates that when we take into account changes in union status and especially other covariates such as gender and education, the gap increases. This means that the change in the returns to the covariates accounts for more than the total negative gap. Had the distribution of returns remained the same in 1981 as in 1968, there would have been a positive gap. For example, had the returns to education remained at the 1968 level, the change in education would have raised wages in the top half of the distribution between the two years.

Figures 7, 8, and 9 give the corresponding results for the change in the log wage distribution between 1981 and 2000. Since the two counterfactual gaps as well as the raw gap are given in Figure 9, we will focus on this graph. The raw gap is slightly negative across the distribution except at the two extremes where it is positive. This indicates that after taking out the average wage change the distribution was compressed at the bottom, but more spread out at the top in 2000 relative to 1981. Controlling for the change in union status between 1981 and 2000 makes essentially no difference. When we control for the other covariates, the gap becomes significantly more negative over most of the distribution. This indicates that the change in returns to the covariates account for more than the total negative gap, i.e., had the returns remained the same in this part of the distribution, the change in covariates would have led to a positive change between 1981 and 2000.

To summarize, the evolution of the wage distribution between 1968 and 1981 was affected partly by changes in union status and other labor market characteristics such as gender, experience, and education. These account for some of the compression of the distribution – raising wages at the bottom and reducing wages at the top. The changes in returns to union status and other covariates is an even more important factor in explaining the compression at the bottom of the distribution. At the top of the distribution, the changes in covariates are a bit more important. After removing the trend and deflating wages, the change in the wage distribution between 1981 and 2000 is much less dramatic than in the earlier period. There was some compression at the bottom and a bit of spreading out at the very top. The changes at the extremes of the distribution are partly due to changes in union status and other covariates and partly due to returns to these characteristics. In the center of the distribution, changes in returns account for more than the total change, i.e., there is a reduction in relative wages in this part of the distribution between 1981 and 2000 and had the returns to the covariates remained the same there would have been an increase.

5. Conclusions

(To be added later)

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Table 1: Union density rates in selected countries 1970-2000

	1970	*1980*	*1990*	*2000*
Sweden	68	80	83	78
Denmark	60	76	71	75
Finland	51	70	72	78
Norway	51	57	56	53
Canada	31	36	36	31
United Kingdom	45	50	39	29
United States	23	22	16	13

Sources: OECD(1994) for 1970, 1980 and 1990. Kjellberg (2002) for 2000.

Table 2: Unionization Rates in Sweden (from LNU)

	1968	1981	2000
LO	.460	.494	.401
TCO/SACO	.249	.353	.417
Nonunion	.288	.153	.186

Table 3: Sample means (standard deviations in parentheses) by union status.

	1968 (N=2907)			**1981 (N=3296)**			**2000 (N=2985)**		
	LO	TCO/ SACO	Nonunion	LO	TCO/ SACO	Nonunion	LO	TCO/ SACO	Nonunion
Percent of sample	0.460	0.249	0.288	0.494	0.353	0.153	0.401	0.417	0.186
Ln real wage (1968 SEK)	2.265 (0.259)	2.587 (0.408)	2.167 (0.592)	2.448 (0.246)	2.630 (0.296)	2.427 (0.415)	2.647 (0.194)	2.861 (0.297)	2.811 (0.442)
Percent Male	0.729	0.584	0.451	0.574	0.499	0.414	0.572	0.435	0.543
Years of work exp.	22.9 (13.6)	19.0 (12.7)	16.0 (13.4)	19.7 (13.3)	18.5 (11.7)	14.5 (11.8)	20.3 (12.8)	20.9 (11.6)	15.8 (12.3)
Years of school	7.50 (1.65)	10.94 (3.55)	8.88 (2.74)	9.09 (2.37)	12.6 (3.50)	10.60 (3.50)	11.1 (2.31)	14.0 (3.19)	13.2 (3.01)
Years of tenure	9.82 (10.5)	10.1 (9.91)	5.58 (7.93)	9.02 (8.69)	10.7 (9.03)	5.30 (6.56)			
Private sector	0.761	0.488	0.755	0.577	0.456	0.660	0.589	0.482	0.847

Table 4: Quantile Regressions – 2000 (n=2980, SE in Parentheses)

	10th	**50th**	**90th**	**OLS**
LO	.053 (.017)	-.069 (.015)	-.480 (.030)	-.163 (.015)
TCO/SACO	.162 (.017)	.105 (.015)	-.129 (.030)	.050 (.015)
Constant	2.371 (.014)	2.710 (.013)	3.375 (.025)	2.811 (.013)

Table 4: Quantile Regressions – 1981 (n=3296, SE in Parentheses)

	10th	**50th**	**90th**	**OLS**
LO	.118 (.030)	.061 (.037)	-.288 (.039)	.021 (.015)
TCO/SACO	.223 (.031)	.198 (.039)	.033 (.041)	.203 (.016)
Constant	2.089 (.026)	2.376 (.033)	3.005 (.034)	2.427 (.013)

Table 4: Quantile Regressions – 1968 (n=2893, SE in Parentheses)

	10th	**50th**	**90th**	**OLS**
LO	.349 (.021)	.128 (.015)	-.311 (.024)	.098 (.018)
TCO/SACO	.465 (.024)	.441 (.017)	.242 (.028)	.425 (.021)
Constant	1.609 (.016)	1.128 (.011)	2.885 (.019)	2.167 (.014)

Table 5: Quantile Regressions – 2000 (n=2943, SE in Parentheses)

	10^{th}	**50^{th}**	**90^{th}**	**OLS**
LO	.027 (.016)	-.061 (.012)	-.240 (.026)	-.110 (.014)
TCO/SACO	.120 (.015)	.044 (.012)	-.083 (.030)	.015 (.014)
Male	.098 (.011)	.150 (.008)	.181 (.020)	.160 (.010)
Experience	.013 (.002)	.018 (.001)	.022 (.003)	.020 (.001)
Exp^2/100	-.018 (.003)	-.024 (.003)	-.027 (.006)	-.028 (.003)
Yrs of School	.017 (.002)	.033 (.002)	.053 (.004)	.036 (.002)
Private	.040 (.012)	.095 (.009)	.131 (.022)	.102 (.011)
Constant	1.981 (.038)	1.978 (.027)	2.080 (.070)	1.961 (.032)

Table 5: Quantile Regressions – 1981 (n=3287, SE in Parentheses)

	10^{th}	**50^{th}**	**90^{th}**	**OLS**
LO	.096 (.017)	.006 (.011)	-.134 (.027)	.006 (.014)
TCO/SACO	.193 (.018)	.075 (.011)	-.084 (.030)	.086 (.015)
Male	.133 (.012)	.129 (.008)	.197 (.019)	.149 (.010)
Experience	.013 (.002)	.018 (.001)	.025 (.003)	.021 (.001)
Exp^2/100	-.020 (.003)	-.028 (.002)	-.034 (.005)	-.031 (.003)
Yrs of School	.015 (.002)	.029 (.001)	.048 (.004)	.032 (.002)
Private	-.027 (.012)	-.009 (.008)	.058 (.019)	.020 (.010)
Constant	1.803 (.038)	1.887 (.022)	1.963 (.063)	1.817 (.028)

Table 5: Quantile Regressions – 1968 (n=2800, SE in Parentheses)

	10^{th}	50^{th}	90^{th}	OLS
LO	.157 (.018)	-.027 (.015)	-.151 (.025)	-.007 (.016)
TCO/SACO	.326 (.022)	.144 (.017)	.021 (.029)	.168 (.018)
Male	.268 (.017)	.264 (.013)	.295 (.021)	.292 (.014)
Experience	.028 (.002)	.027 (.002)	.030 (.003)	.032 (.002)
Exp^2/100	-.046 (.004)	-.044 (.003)	-.047 (.005)	-.052 (.004)
Yrs of School	.042 (.003)	.054 (.002)	.075 (.005)	.061 (.003)
Private	-.075 (.018)	-.039 (.013)	-.048 (.022)	-.048 (.014)
Constant	1.075 (.041)	1.418 (.032)	1.618 (.057)	1.280 (.034)

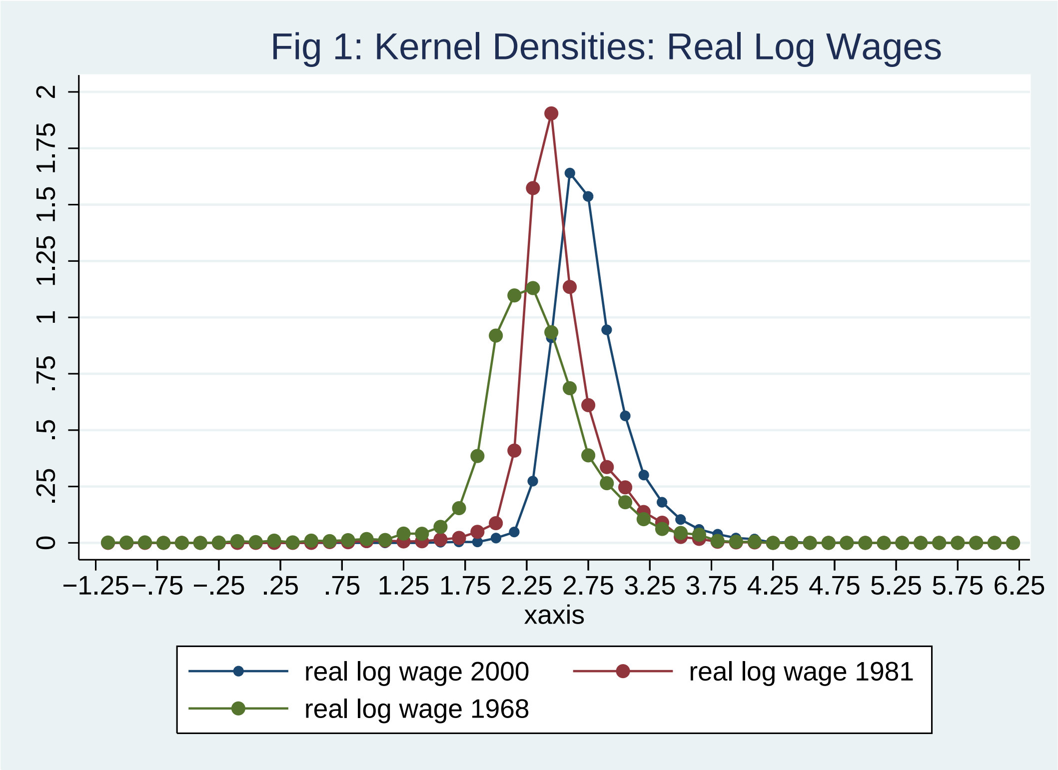
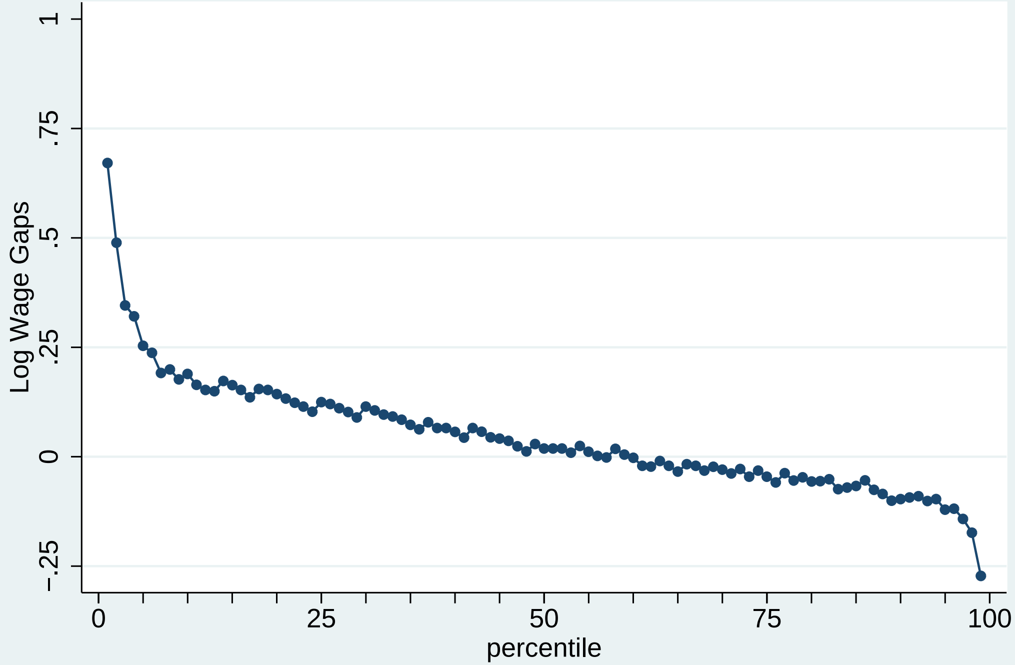


Fig 1: Kernel Densities: Real Log Wages
0
.25
.5
.75
1
1.25
1.5
1.75
2
−1.25
−.75
−.25
.25
.75
1.25
1.75
2.25
2.75
3.25
3.75
4.25
4.75
5.25
5.75
6.25
xaxis
real log wage 2000
real log wage 1981
real log wage 1968

Fig 2: Real Log Wage Gaps: 1981 vs 1968



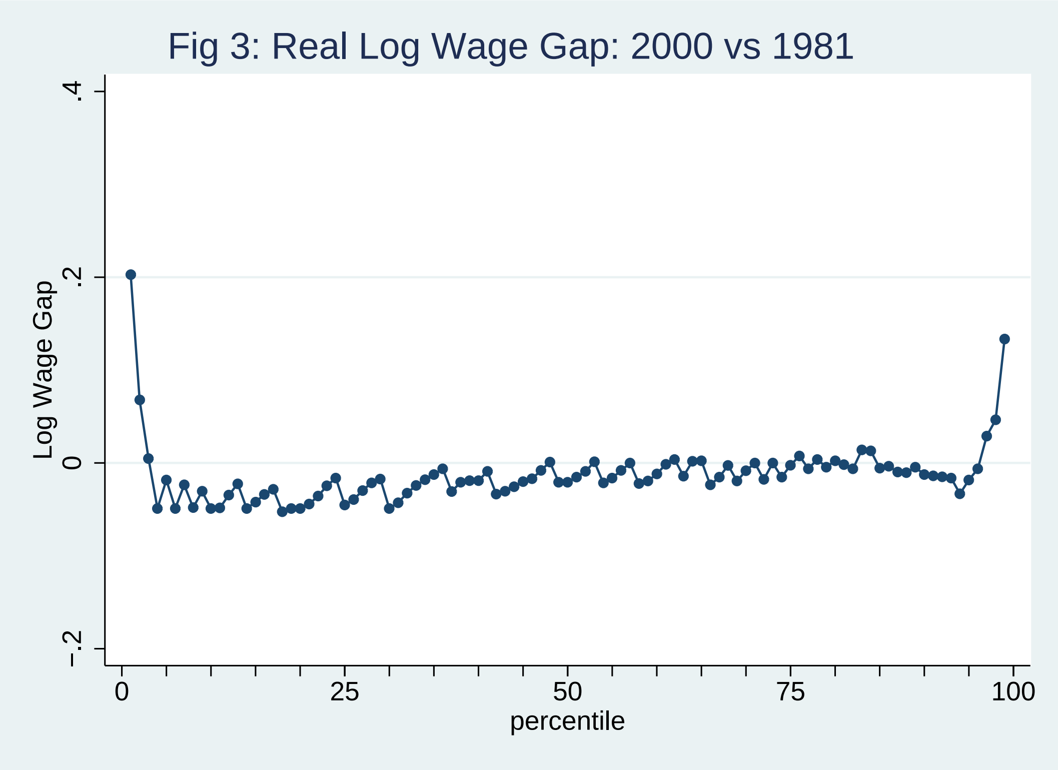
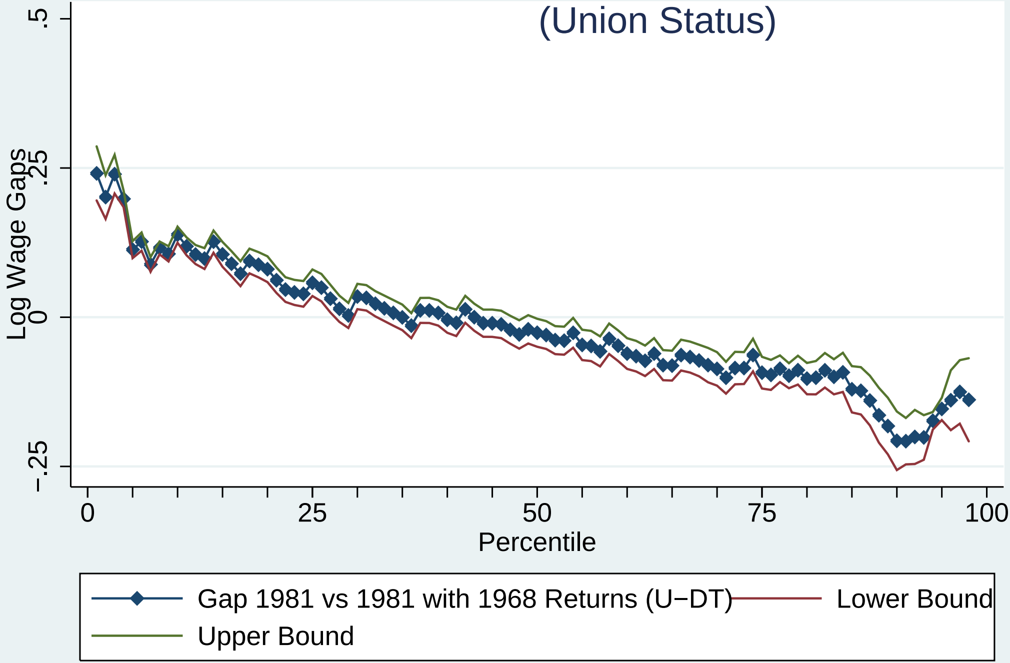


Fig 3: Real Log Wage Gap: 2000 vs 1981
Log Wage Gap
-.2
0
.2
.4
0
25
50
75
100
percentile

Fig 4: Real Log Wage Gap: 1981 vs 1981 with 1968 Returns (Union Status)



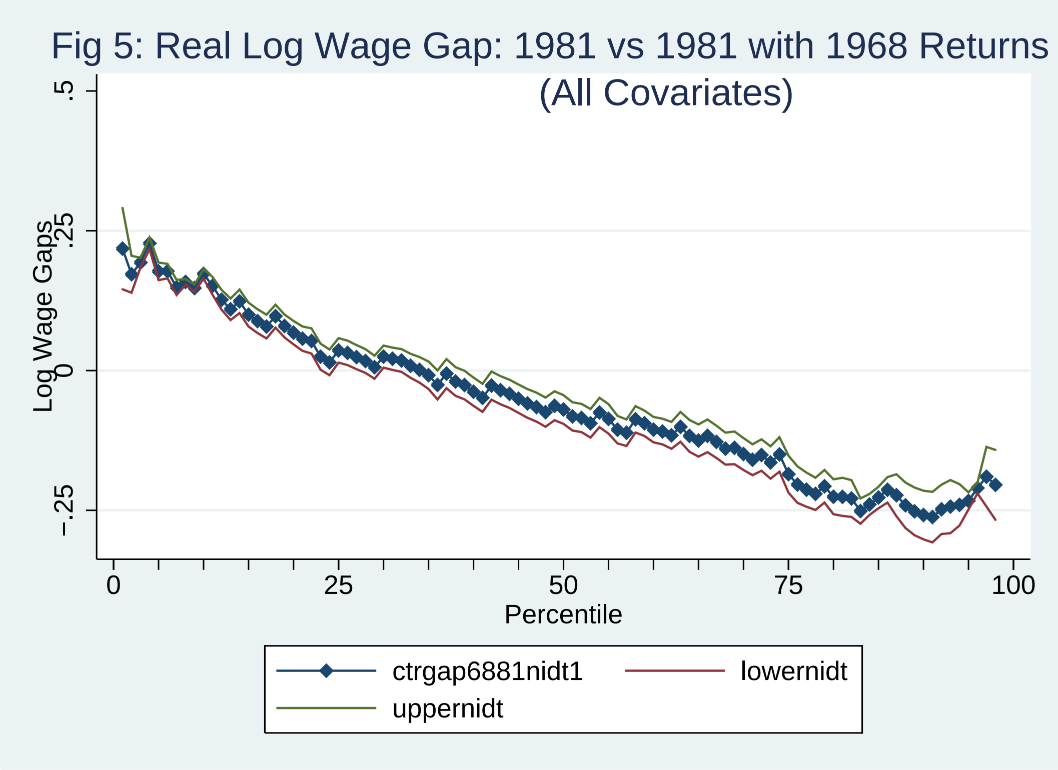


Fig 5: Real Log Wage Gap: 1981 vs 1981 with 1968 Returns
(All Covariates)
Log Wage Gaps
.5
.25
0
-.25
0
25
50
75
100
Percentile
ctrgap6881nidt1
lowernidt
uppernidt

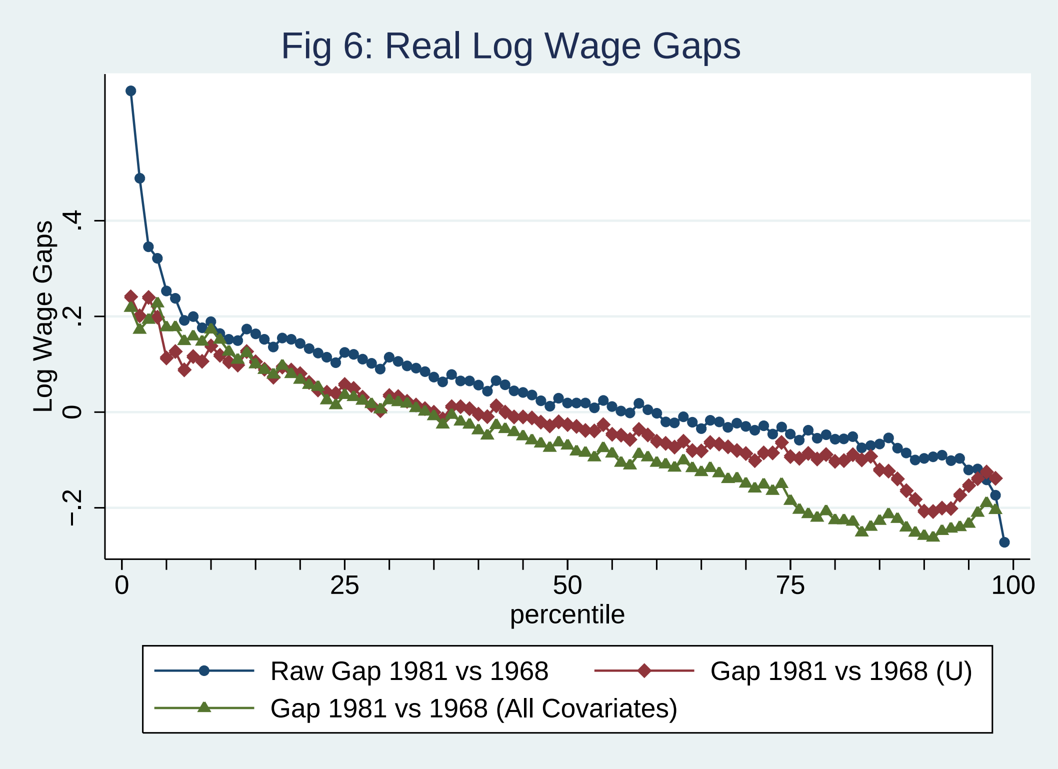


Fig 6: Real Log Wage Gaps
Log Wage Gaps
-.2
0
.2
.4
0
25
50
75
100
percentile
Raw Gap 1981 vs 1968
Gap 1981 vs 1968 (U)
Gap 1981 vs 1968 (All Covariates)

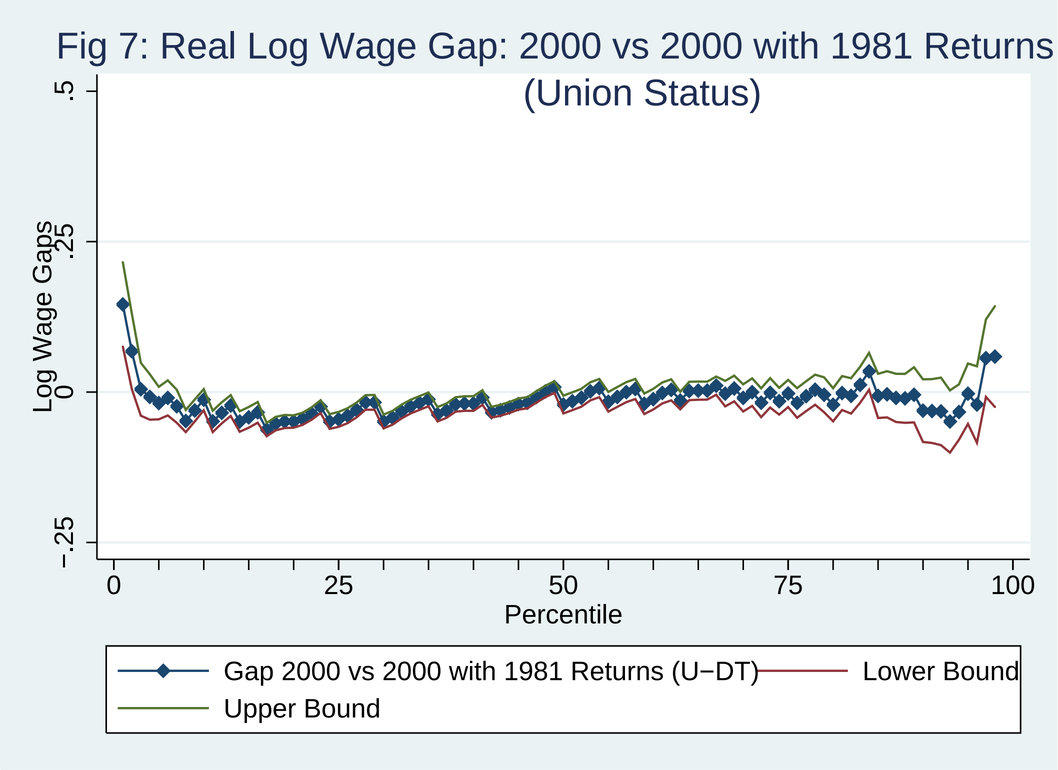


Fig 7: Real Log Wage Gap: 2000 vs 2000 with 1981 Returns
(Union Status)
Log Wage Gaps
.5
.25
0
−.25
0
25
50
75
100
Percentile
Gap 2000 vs 2000 with 1981 Returns (U−DT)
Lower Bound
Upper Bound

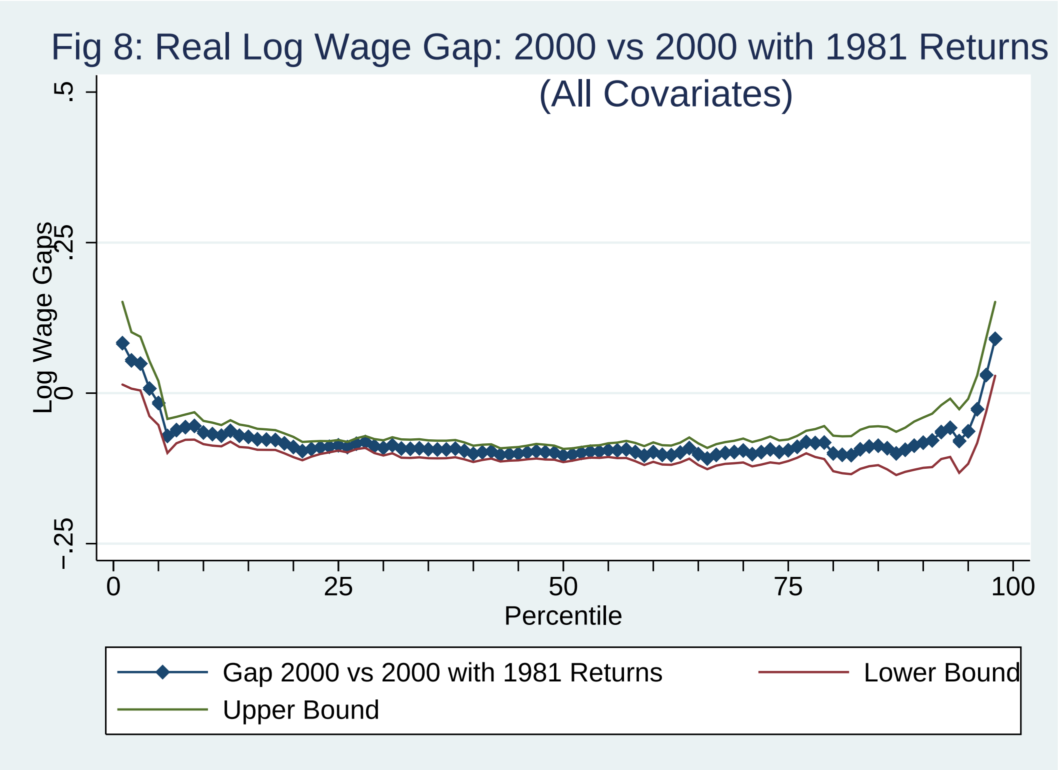


Fig 8: Real Log Wage Gap: 2000 vs 2000 with 1981 Returns
(All Covariates)
Log Wage Gaps
-.25
0
.25
.5
0
25
50
75
100
Percentile
Gap 2000 vs 2000 with 1981 Returns
Lower Bound
Upper Bound

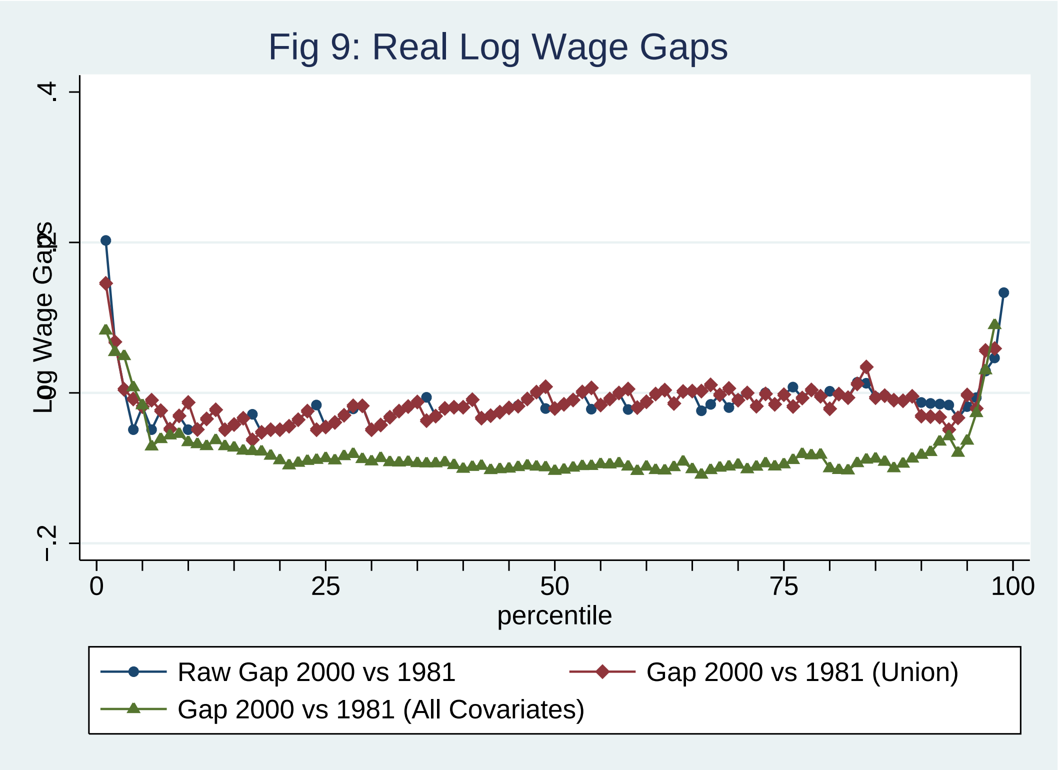


Fig 9: Real Log Wage Gaps
Log Wage Gaps
.4
.2
0
-.2
0
25
50
75
100
percentile
Raw Gap 2000 vs 1981
Gap 2000 vs 1981 (Union)
Gap 2000 vs 1981 (All Covariates)