Wage Inequality Between Skilled and Unskilled Labor in Indonesian Manufacturing

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Abstrak

Mulai dari pertengahan tahun 1970-an sampai dengan pertengahan tahun 1990an terdapat kecenderungan menurunnya rasio upah antara tenaga kerja terampil dengan tenaga kerja tidak terampil di sektor manufaktur. Perkecualian dari kecenderungan ini terjadi selama paruh kedua tahun 1980-an ketika rasio upah pada waktu itu meningkat.

Kajian ini menemukan bahwa kecenderungan jangka panjang menurunnya rasio upah antara tenaga kerja terampil dengan tenaga kerja tidak terampil tersebut didorong oleh terus meningkatnya penawaran relatif tenaga kerja terampil, yang dihasilkan dari terus berlanjutnya perluasan sektor pendidikan. Sebaliknya peningkatan rasio upah antara tenaga kerja terampil dengan tenaga kerja tidak terampil selama paruh kedua tahun 1 980-an disebabkan oleh meningkatnya permintaan relatif terhadap tenaga kerja terampil secara besar dan cepat dalam periode tersebut. Peningkatan permintaan relatif terhadap tenaga kerja terampil ini timbul karena deregulasi perekonomian yang dilakukan pada saat itu menghasilkan perluasan secara cepat dari sektor-sektor modern dalam perekonomian Indonesia.

1. INTRODUCTION

Indonesia consistently maintained a relatively free labor market policy from the early 1970s to the early 1990s. Starting in the early 1990s, however, some more interventionist policy changes were introduced into the labor market. Among others, the most prominent one was the introduction of a regional minimum wage policy. Predictably, the effect of these new labor market policies is a reduction in the flexibility of Indonesian labor market.

The introduction of these labor market distortions was a result of various factors, both domestic and external. In retrospect, however, the most important one was probably increasing concerns among policy makers that somehow labor has been left behind in reaping the benefits of deregulation in the economy, which was introduced by the government starting in the mid 1980s. From the mid 1970s to the mid 1980s, Indonesia adopted an inward-looking import substitution development strategy. In the mid 1980s, as a result of pressures on balance of payments due to sharply falling oil prices, Indonesia changed direction by adopting an outward-looking export orientation development strategy.

Some studies have argued that the concerns that labor has been left behind in the distribution of deregulation benefits are unfounded (Agrawal, 1996; Manning, 1995). This conclusion is based on the findings that in general real wages have continuously increased over time. Hence, these studies refer to the improvements in absolute position of labor over time. However, as the debate on the effects of globalization on labor market in developed countries points out, changes in relative position of various groups of labor also play important policy considerations.

In particular, the debate in developed countries refers to how globalization affects the position of unskilled labor relative to skilled labor (Baldwin, 1994; Bound and Johnson, 1992; Burtless, 1995; Krugman and Lawrence, 1994; Wood, 1994). As it turns out, changes in the relative position of a group of labor to another bear policy implications because of their equity as well as efficiency consequences (Turrini, 1998).

In the context of developing countries, relatively little careful work has been done to assess the changes in relative position between skilled and unskilled labor (Diwan and Walton, 1997). Some preliminary studies

(Gonzalez and McKinley, 1997; Pissarides, 1997; Robbins, 1996a and 1996b; Tan and Batra, 1997; Wood, 1997), however, show mixed results on the labor market outcomes of globalization in developing countries. Wood (1997), for example, contrasts the convergence between skilled and unskilled labor real wages in the New Industrializing Countries (NICs) after they embraced a more open economic policy in the 1960s and 1970s with the opposing results experience by Latin American countries in the 1980s.

This study analyses the changes in relative wage of skilled to unskilled labor in Indonesia from 1977 to 1994. It concentrates on the manufacturing sector because this is the sector where the effects of development strategy shift from import-substitution to export-orientation in the mid 1980s were most significant. The results indicate that there was a secular decline in wage inequality between skilled and unskilled labor in Indonesia from the mid 1970s to the mid 1990s, except for a brief period in the second half of 1980s when wage inequality increased. The long term declining trend in wage inequality was driven by a steady increase in relative supply of skilled labor, but the brief increase in wage inequality during the second half of 1980s was caused by a large increase in relative demand for skilled labor.

The next section discusses the data source used in this study. This is followed by a section which establishes the trend in wage inequality between skilled and unskilled labor in Indonesian manufacturing sector. The section after that tracks down the changes in relative returns to skill components, i.e. education and experience. Then, in the section following that, the roles of supply and demand factors in shaping the trend in wage inequality are analyzed. The final section provides the conclusion.

2. DATA

This study uses the data from the National Labor Force Survey (*Sakernas*), which was conducted by the Indonesian Central Agency of Statistics (*BPS*). Sakernas provides a cross-section database of individual workers across sectors and regions all over the country, containing data on their employment and wage conditions. This study utilizes the survey results from 1977, 1982, 1987, 1990, 1992, and 1994. However, it only focuses on a portion of the sampled workers, namely wage employees in the manufacturing sector.

3. TREND IN WAGE INEQUALITY

Wage inequality is often measured as ratios of wages among various groups of workers, where each group is thought of representing a certain skill level. Another type of measure, meanwhile, looks at wage variability within a group of workers as an indicator of wage inequality. In this type of indicator, higher variability of wages indicates higher wage inequality.

In this study, two indicators, one from each indicator type, are used to measure wage inequality. The first indicator is the ratio between the 90th and the 10th real wage percentiles, where the former representing skilled wages and the latter for unskilled wages. The second indicator used is the coefficient of variation of real wages, which is a measure of wage variability among workers. The changes in both indicators for selected years between 1977 and 1994 are presented in **Table 1**. In addition, this table also shows the ratios of the 90th to the 50th and the 50th to the 10th real wage percentiles, which are included to track down whether the changes in overall wage inequality are driven primarily by the changes in the upper or lower wage distribution.

Table 1
Real Wage Percentile Ratios and Coefficient of Variation in Indonesia Manufacturing, 1977-94

Wage Inequality Indicator	1977	1982	1987	1990	1992	1994
All workers:						
90: 10 Percentile Ratio	7.95	6.33	4.98	5.48	4.69	4.01
90: 50 Percentile Ratio	2.79	2.44	2.29	2.43	2.28	1.95
50: 10 Percentile Ratio	2.85	2.59	2.17	2.26	2.06	2.05
Coefficient of Variation	1.04	0.91	0.81	0.97	0.93	0.79
n	3,527	4,850	4,034	7,721	8,162	5,731
Male workers:						
90: 10 Percentile Ratio	5.77	4.94	4.77	4.79	4.45	3.54
90: 50 Percentile Ratio	2.33	2.19	2.32	2.35	2.25	1.96
50: 10 Percentile Ratio	2.47	2.26	2.06	2.04	1.98	1.80
Coefficient of Variation	0.92	0.86	0.78	0.92	0.90	0.78
n	2,359	3,441	2,898	5,205	5,164	3,478
Female workers:						
90: 10 Percentile Ratio	5.24	5.00	3.85	4.14	3.97	3.67
90: 50 Percentile Ratio	2.44	1.98	2.29	2.15	2.04	1.82
50: 10 Percentile Ratio	2.14	2.53	1.68	1.93	1.94	2.01
Coefficient of Variation	1.14	0.78	0.69	0.89	0.76	0.67
n	1,168	1,409	1,136	2,516	2,998	2,253

Source: Sakernas

The table shows that wage inequality between skilled and unskilled workers continued to decline from 1977 to 1987. Then, from 1987 to 1990, there was a reversal in the trend, but this reversal seemed to be short-lived because from 1990 to 1994 the declining trend continued again. This trend in wage inequality is consistently figured by both the ratio of the 90^{th} to the 10^{th} wage percentiles as well as the coefficient of variation of real wages. Furthermore, when workers are disaggregated by gender, this trend in wage inequality holds equally both for male as well as female workers.

These findings, therefore, strongly indicate that there was a secular decline in wage inequality from the mid 1970s to the mid 1990s, with a brief trend reversal in the second half of 1980s. Since there was a shift in Indonesian development strategy from inward-looking import-substitution to outward-looking export-orientation in the mid 1980s, it is logical to hypothesize that the tendency for wage inequality to increase in the second half of 1980s was the immediate effect of the introduction of a more open economic policy in this period.

4. RELATIVE RETURNS TO SKILL COMPONENTS

Changes in wage inequality between skilled and unskilled labor may reflect the changes in relative returns to the components of skill. These components of skill, however, are divided into observable as well as unobservable components. The most important unobservable skill component is an individual worker's innate ability. Meanwhile, two most important observable skill components are educational attainment and work experience. Innate ability, however, affects educational attainment in addition to other factors such as family's social-economic background. Hence, this study concentrates on the two observable skill components.

To separate the changes in returns to education and experience, a variation of Mincer's equation (Mincer, 1974) is employed here. The basic form of Mincer's equation regress wages on education, experience, and other individual characteristics. Since the database only provides samples' highest educational attainment categories, the education variable in this study is represented by dummy education variables. The experience variable, meanwhile, is proxied by samples' age minus the normal age to achieve their respective highest educational attainment. Retaining the usual Mincer equation's assumption of diminishing return

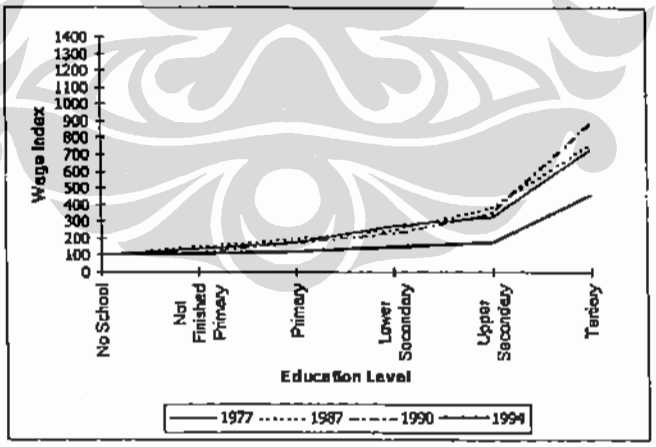
to experience, the square of experience variable is also entered into the equation. Control variables included in the equation are regional, rural, and gender dummy variables.

The regressions are run only for the years 1977, 1987, 1990, and 1994, because each of these years represents either the end point or the change point in the wage inequality trend. The regression results for all workers are presented in **Table A1** in the **Appendix**. Furthermore, the regressions are also run for male only and female only workers, with the results presented in **Table A2** and **Table A3** respectively.

5. RELATIVE RETURNS TO EDUCATION

To construct the relative returns to education, the regression results in **Table A1** are used to construct the real wage level for each education category, controlled by experience and other control variables. To make the results comparable among different years, the real wage of the 'no school' category in each year is normalized to 100. The resulting relative returns to education are presented in **Figure 1**. The same construct is then repeated for male only and female only workers, with the results presented in **Figures 2** and **Figures 3** respectively. To make comparison easier, all the three figures are drawn on the same scale. In these figures, a flatter graphic indicates lower wage inequality.

Figure 1
Changes in Realative Returns to Education in Indonesia Manufacturing for All Workers, 1977-94



For all workers, **Figure 1** shows that there was little change in relative returns to education between 1977 and 1990. There was, however, a significant increase in relative return to tertiary education in 1990, which probably reflects the increase in wage inequality in this period. In the second half of 1990s, on the other hand, the returns to education become more equal across education level. The relatively flat graphics for 1994 is obviously correlated with the declining trend in wage inequality between 1990 and 1994. Therefore, while the trend in relative returns to education between 1977 and 1987 is not consistent with the trend in wage inequality, the trend between 1987 and 1994 reflects the trend in wage inequality.

Comparing **Figures 2** and **Figures 3,** for every year analyzed, the graphics for female workers are always flatter than the graphics for male workers. This means that the relative returns to education for male workers are always more unequal compared to female workers. In addition, there was a difference between male and female workers in the changes in relative returns to education from 1977 to 1987. While there was a tendency for returns to education for male workers to become slightly more unequal during this period, the opposite trend occurred for female workers. This means that the changes in relative returns to education for female workers are consistent with the trends in wage inequality for the whole period between 1977 and 1994.

Figure 2
Changes in Realative Returns to Education in Indonesia Manufacturing for Male Workers, 1977-94

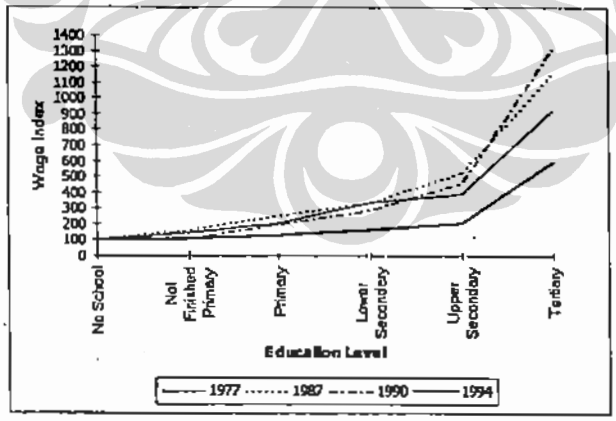
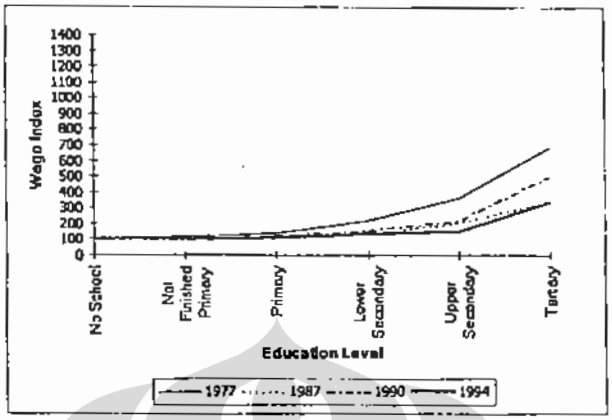


Figure 3
Changes in Realative Returns to Education in Indonesia
Manufacturing for Female Workers, 1977-94



6. RELATIVE RETURNS TO EXPERIENCE

To construct the relative returns to experience, the same method as for education is employed. The regression coefficients for experience variables from **Table A1** are used to construct the real wage level for each year of experience, in this case limited from 0 to 40 years, controlling for education and other control variables. Again to make the relative returns to experience is comparable among years, the real wage level for 0 year of experience is normalized to 100. The results for all workers are presented in **Figure 4**. The same construct is also repeated for male only and female only workers, with results presented in **Figure 5** and **Figure 6** respectively. Also for comparison purposes, all the three figures are drawn on the same scale.

Figure 4 shows that the relative returns to experience for all workers continued to increase between 1997 and 1990. In the first half of 1990s, however, there was a large drop in relative returns to experience, so that the graphic for 1994 is much flatter than for 1977. Therefore, similar with relative returns to education, the trend in relative returns to experience between 1977 and 1987 is not consistent with the trend in wage inequality, but the trend between 1987 and 1994 is.

The comparison between male and female workers, as shown by **Figures 5** and **Figures 6**, again indicate that relative returns to experience for male workers are much more unequal than for female workers. Also

similar to relative returns to education, there was a difference in the tendencies of relative returns to experience between male and female workers during the 1977-87 period. While the returns to experience for male workers become more unequal during this period, they become more equal for female workers. Hence, again similar to relative returns to education, the relative returns to experience for female workers are consistent with the trends in wage inequality for the whole period between 1977 and 1994.

Figure 4
Changes in Realative Returns to Experience in Indonesia Manufacturing for All Workers, 1977-94

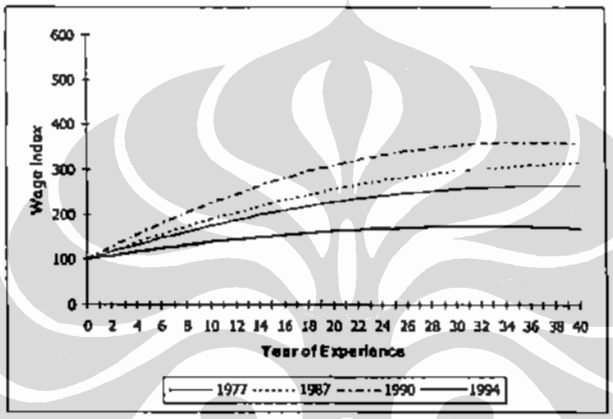


Figure 5
Changes in Realative Returns to Experience in Indonesia Manufacturing for Male Workers, 1977-94

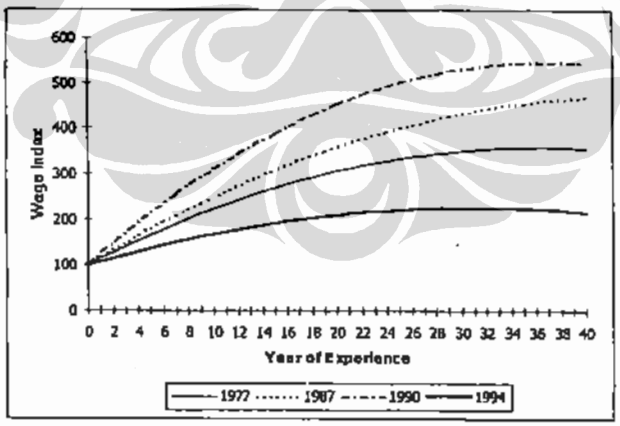
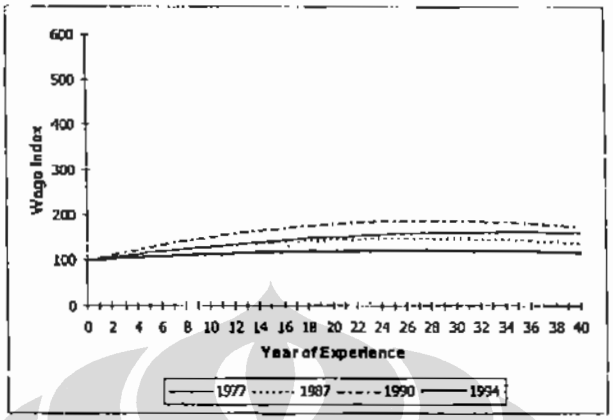


Figure 6
Changes in Realative Returns to Experience in Indonesia Manufacturing for Female Workers, 1977-94



7. SUPPLY AND DEMAND FACTORS

Changes in wage inequality between skilled and unskilled labor can arise because of changes in relative supply of skilled to unskilled labor, changes in relative demand for skilled to unskilled labor, or a combination of both. However, because defining skilled and unskilled labor is not straightforward, defining changes in relative supply of as well as relative demand for skilled to unskilled labor is not a straightforward exercise either.

In this analysis, for simplicity, relative supply of skilled to unskilled labor is defined as the ratio of the number of labor force with upper secondary education or higher to the number of labor force with lower than upper secondary educational attainment. Hence, in this definition, only level of education which separates between skilled and unskilled labor.

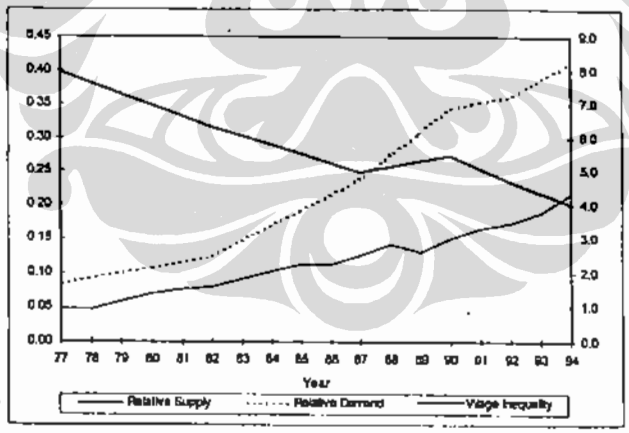
Relative labor demand, meanwhile, is defined as the ratio of the number of workers with upper secondary education or higher employed to the number of workers with lower than upper secondary educational attainment employed in the manufacturing sector. Hence, relative demand is assumed to be the same as relative employment of skilled to unskilled labor. This assumption is based on the fact that manufacturing

employment is small relative to total employment, which implies that labor supply in the manufacturing sector is elastic, so that employment is determined by the demand side. The share of manufacturing employment almost doubled from 7 percent in 1971 to 13 percent in 1995, but it is still a small proportion from the total employment.

Using these definitions, **Figure 7** shows the trends in relative supply, relative demand, as well as wage inequality between skilled and unskilled labor. The trend in wage inequality is represented by the ratio of the 90th to the 10th wage percentiles from **Table 1**. Meanwhile, the data source for the calculations of relative supply of skilled to unskilled labor is various issues of the Indonesian Statistical Yearbook published by *BPS*.

Figure 7 shows that both the relative supply and relative demand of skilled to unskilled workers continued to increase during the whole period under study, except for a brief period of 1988-89 when the relative supply slightly declined. The figure shows that the relative demand has always been higher than the relative supply, which implies that the manufacturing sector is more skilled labor intensive compared to the rest of the economy.

Figure 7
Realative Supply and Demand (left axis) and Wage Inequality (right axis) between Skilled and Unskilled Labour, 1977-94



Theoretically, changes in wage inequality should be negatively correlated with changes in relative supply and positively correlated with changes in relative demand. Since the trends in both relative supply and relative demand are increasing while the trend in wage inequality is decreasing, there is a strong indication that the overall trend in wage inequality is much more affected by the trend in relative supply than by the trend in relative demand.

For the period of 1977-87, where wage inequality continued to decrease, both relative supply and demand of skilled to unskilled labor during this period were increasing. This means that the declining trend in wage inequality during this period was driven by the increasing trend in relative supply, completely offsetting the effect of increasing relative demand. The increase in relative demand, however, is consistent with the increase in relative returns to education and experience illustrated in **Figures 1** and **Figure 4.**

During the period of 1987-90, the trend in wage inequality was increasing. Although there was a brief decline in relative supply between 1988 and 1989, the overall trend of relative supply during this period was increasing. Meanwhile, as indicated by **Figure 7**, the relative demand during this period has sharply accelerated. Therefore, the increasing wage inequality in this period is more likely to be driven by the surge in demand for skilled workers, which offset the weak increase in relative supply.

The second half of 1980s is the period where the newly liberalized Indonesian economy expanded rapidly, in which the lack of skilled workers available to support such an expansion was significantly felt by manufacturing and modern services industries. In fact, this has created a situation where "*hijacking*" of skilled workers from one firm to another became a common occurrence. Consequently, wages of skilled workers shot up, which is consistent with the found increase in wage inequality during this period. This is similar to the case of developed countries during the 1980s, where wage inequality has increased due to the changes in relative demand favoring more skilled workers (Johnson, 1997).

Between 1990 and 1994, the trend in wage inequality was decreasing again. Meanwhile, both the relative supply and relative demand

continued to increase, but the increase in relative demand was not as fast as in the previous period. This means that the trend in wage inequality is consistent again with the relative supply, suggesting that the effect of increasing relative supply again offset the effect of increasing relative demand.

The strong effect of relative supply on reducing wage inequality between skilled and unskilled labor in Indonesia from the mid 1970s to the mid 1990s is similar to the case of South Korea during the relatively same period. Kim and Topel (1995) find that although South Korean manufacturing rapid expansion seemed to suggest a strong demand side effect for reducing wage inequality between skilled and unskilled labor, it was the supply side effect through education expansion which has driven the reduction in wage inequality in this country.

8. CONCLUSION

The results of this study indicate that there was a secular decline in wage inequality between skilled and unskilled labor in the Indonesian manufacturing sector from the mid 1970s to the mid 1990s, with the exception for a brief period during the second half of 1980s when wage inequality increased. The long term declining trend in wage inequality is consistent and driven primarily by a steady increase in the relative supply of skilled labor in the Indonesian economy, which was resulted from a continuing expansion of the education sector.

The brief increase in wage inequality in the second half of 1980s, meanwhile, was driven by a large and fast increase in the relative demand for skilled labor during this period. In the mid 1980s, Indonesia liberalized its economy, resulting in a quick expansion in its modern sectors. The lack in skilled workers available to support such an expansion in such a short period of time resulted in a high increase in their wages relative to unskilled wages. Hence the increase in wage inequality between skilled and unskilled labor.

9. REFERENCES

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APPENDIX

Table A1
Real Wage Regression Results for All Workers, 1977-94

	1977	1987	1990	1994
Constant	132.56	159.30	158.88	358.17
	(18.79)	(32.57)	(29.65)	(30.90)
Education dummy variables: Not finished primary	46.78	78.03	22.91*	30.68*
	(12.16)	(26.12)	(25.56)	(26.29)
Primary	1 00.91	160.86	122.93	88.80
	(12.85)	(25.90)	(24.42)	(25.88)
Lower secondary	231.81	245.04	215.99	182.39
	(15.16)	(27.79)	(25.83)	(27.36)
Upper secondary	300.70	456.11	394.40	283.16
	(18.05)	(28.06)	(26.10)	(27.84)
Tertiary	840.49	1,056.82	1,262.13	1,282.61
	(33.16)	(39.78)	(36.28)	(44.41)
Experience variables: Experience	11.42	16.20	23.12	16.16
	(1.08)	(1.51)	(1.32)	(1.28)
Experience squared	-0.15	-0.19	-0.32	-0.25
	(0.02)	(0.03)	(0.03)	(0.03)
Region dummy variables	Yes	Yes	Yes	Yes
Rural dummy variable	Yes	Yes	Yes	Yes
Female dummy variable	Yes	Yes	Yes	Yes
R^2	0.405	0.418	0.353	0.293
n	3,449	3,993	7,624	5,666

Note:
- numbers in parentheses are standard errors
- all coefficients are significant at 5 percent level, except those with * sign

Table A2
Real Wage Rearession Results for Male Workers, 1977-94

	1977	1987	1990	1994
Constant	101.93	112.07	113.48	288.51
	(26.64)	(44.87)	(42.96)	(46.25)
Education dummy variables: Not finished primary	42.72	73.35*	9.35*	20.66*
	(20.13)	(38.06)	(39.74)	(40.62)
Primary	105.28	170.69	113.12	86.76
	(20.47)	(37.33)	(37.71)	(39.84)
Lower secondary	241.56	262.17	213.39	183.42
	(22.47)	(39.21)	(38.98)	(41.68)
Upper secondary	299.63	482.39	412.15	306.71
	(25.38)	(39.36)	(39.20)	(41.91)
Tertiary	853.78	1,169.14	1,366.36	1,434.45
	(42.59)	(53.47)	(51.44)	(63.29)
Experience variables: Experience	14.53	18.84	27.44	23.22
	(1.55)	(1.98)	(1.81)	(1.89)
Experience squared	-0.20	-0.21	-0.37	-0.37
	(0.03)	(0.04)	(0.04)	(0.04)
Region dummy variables	Yes	Yes	Yes	Yes
Rural dummy variable	Yes	Yes	Yes	Yes
R^2	0.580	0.395	0.325	0.268
n	2,311	2,867	5,136	3,432

Note:
- numbers in parentheses are standard errors
- all coefficients are significant at 5 percent level, except those with * sign

Table A3
Real Wage Regression Results for Female Workers, 1977-94

	1977	1987	1990	1994
Constant	136.27	253.69	218.47	369.48
	(16.63)	(30.94)	(28.54)	(30.93)
Education dummy variables: Not finished primary	20.67	-1.19*	-7.48 *	16.51*
	(10.45)	(25.38)	(24.22)	(26.99)
Primary	50.48	40.54*	58.81	46.08*
	(11.74)	(25.87)	(23.87)	(27.01)
Lower secondary	159.06	92.18	131.86	131.49
	(16.59)	(28.77)	(26.31)	(28.81)
Upper secondary	354.81	273.84	263.24	193.08
	(22.85)	(29.33)	(26.52)	(29.98)
Tertiary	801.03	619.98	877.98	880.74
	(49.84)	(42.91)	(40.38)	(52.30)
Experience variables: Experience	4.87	9.22	13.61	5.89
	(1.08)	(1.60)	(1.49)	(1.39)
Experience squared	-0.07	-0.17	-0.24	-0.11
	(0.02)	(0.04)	(0.04)	(0 03)
Region dummy variables	Yes	Yes	Yes	Yes
Rural dummy variable	Yes	Yes	Yes	Yes
R^2	0.448	0.424	0.345	0.271
n	1,138	1,126	2,488	2,234

Note:
- numbers in parentheses are standard errors
- all coefficients are significant at 5 percent level, except those with * sign ■