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Growth and Crisis Impacts on Formal Sector Wages in Indonesia

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1. Introduction

Since the mid-1980s, Indonesia initiated a variety of economic reforms and institutional deregulations (Agrawal, 1996). To large extent due to the policy measures adopted in 1986, Indonesia experienced an increased role of the formal sector (e.g. manufacturing and service sectors), and an absolute decline in employment in agriculture. At the same time there were increases in the supply of high school graduates and the labor force participation rate of women (Kawuryan, 1998). Growth in industrial sector employment ranged from five to seven percent per annum while the growth rate in real wages especially in manufacturing was close to 6 percent per annum, suggesting that Indonesian workers were benefiting from the growth of economy. The economic crisis that started in the middle of 1997 is believed to have caused a dramatic reversal of fortune. While the unemployment rate has gone up only slightly, from 4.7 percent in August 1997 to 5.5 percent in August 1998, formal sector real wages declined by around 34 percent over the same period.

In this paper we use repeated cross-sectional data from Indonesia for the years 1986 to 1998 to examine two inter-related questions. The first one is whether the large increases in real wages that took place during the years of rapid growth as well as the declines in real wages during the economic crisis that begun in 1997,

were distributed among workers equally or whether they were concentrated in particular groups of workers (males or females, younger or older workers). The second question is whether the large increases or decreases in wages rates were accompanied with higher or lower dispersion of wages or inequality within any given generation of workers.

Each of these issues is of considerable importance to policy. The extent to which workers of different age and gender share more or less equally the benefits of a growing economy speaks well of the ability of market and institutional reforms to have a significant impact on the earnings and welfare of individuals. In addition, in so far as the wages of workers of a specific age or gender are more adversely affected during the economic crisis allows us to identify the groups that are more vulnerable. Related arguments apply to the role of wage inequality. If the increase in mean or median wages for a given age and gender group is accompanied by an increase in inequality then it does not necessarily follow that the benefits of growth are distributed evenly among the members of the group. In fact it is possible that the increase (decline) in the mean wage may be driven by a large increase (decrease) in the wages of workers at the top of the distribution within the group while workers at the bottom of the wage distribution are earning less (more).

There is a large literature on the slow growth in mean wages and increased inequality during the 1980's and 1990's in the US and in other OECD economies (Gottschalk, 1997; Gottschalk and Joyce, 1988). Our paper contributes to this literature as the first study of wages and inequality within a developing economy that experienced rapid economic growth as well as sharp declines in output roughly during the same period. The distinguishing feature of our work is our attempt to trace out the experience of specific age cohorts (or generations of workers). Wages

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and labor supply exhibit a common pattern of the life-cycle of an individual while rapid economic growth typically makes younger generations better-off. We make an effort to disentangle this generational effect from the life-cycle components in wage profiles. That is particularly important in identifying the gainers and losers during positive and negative fluctuations around a positive trend in economic activities.

The paper is structured as follows. In section 2 we discuss the data source and the construction of synthetic cohorts in detail. In sections 3 and 4 we discuss the impact of the crisis on cohort specific wages and inequality, respectively, and in section 5 we conclude.

2. Data and Methodology

Our analysis is based on the 1986-89, 1992, 1994, 1996, 1997 and 1998 Labor Force Surveys (Sakernas) collected by the Central Agency of Statistics of Indonesia (BPS). The Sakernas survey is a nationally representative survey that covers approximately 35,000 households or 250,000 individuals per year from all 27 provinces of Indonesia. It contains information on individual earnings and hours of work on the primary job as well as data on individual characteristics such as age, education level, and gender[1].

The Sakernas survey is a cross-sectional survey repeated every year. Each year a new set of individuals is sampled from the population. Although it is not possible to construct a true panel data set, it is possible to construct a "synthetic-panel" by dividing the sample into groups that have a common characteristic, and

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[1] Collection of information on occupation began with the 1994 survey.

then tracking over time the changes in the average of the group rather than the specific individuals. One common way of defining a cohort is based on age or date of birth at the time of first available cross-sectional survey and then following the average of the variable of interest as the cohort ages. For example, since we are interested in the life-cycle path of wages, we can start with the wages of all 20 year-old individuals in 1986 and then use the 1987 survey to focus on the wages of all individuals who are 21 years old. Even though the set of individuals in 1987 is different than that in 1986, the implicit assumption is that the average wage of all the 21 year-old persons in 1987 is a good approximation of the wage that an average person who is 20 years old in 1986 would have earned in 1987. The reader is referred to Deaton (1997) who provides a very helpful discussion on synthetic cohorts as well as a more detailed presentation of the methods used to decompose cohort-specific earnings into cohort- or age- or year-specific effects.

Our graphs and discussion will be focused on cohorts 15, 20, 25, 30, 35, 40, 45 and 50 years of age in 1986, the first year of the survey we were able to access. However, it should be kept in mind that the decompositions discussed below include every yearly cohort between 13 and 50 years of age in 1986. We also separate the analysis for male and female workers. Table A in the appendix contains the numbers of individuals in selected cohorts by gender and survey year. It should be pointed out that beginning in 1997, the BPS made some minor modifications to the questions used to classify one primary activity of individual during the week previous to the survey. Before 1997, individuals were asked to choose *one* from a list of four activities, (i.e. working, being in school, housekeeping and other activities) as their main activities last week. As of 1997, the question changed to whether a person during the last week performed *any* activity among the same four activities and an additional question asked individuals to identify the activity in

which he/she spent most time last week. Thus the revised version of the question now allows us to extract information on whether individuals performed more than one activity. For purposes of comparability with the previous years we have opted to classify as workers those individuals who declare work as the activity in which they spent most of their time.

Hourly wage is constructed by first transforming the information on monthly earnings collected in the survey into weekly earnings (by dividing by 30/7) and then by dividing by the number of hours worked per week also collected in the survey.[2] Beginning in 1996, the survey began distinguishing between monetary payments and value of non-monetary payments received in the place of employment. Given that the questions before 1996 did not make this distinction, we opted, for purposes of comparability across years, to leave out the value of payments in kind from the calculation of the wage rate.[3] To make nominal wages comparable across years we deflated nominal wages in each year by the province-specific Consumer Price Index (CPI) for the calendar year. Complete time series on the CPI are only available for 17 of the capital cities of the 27 provinces of Indonesia. Calculation of the CPI for the remaining 10 capital cities in the 10 provinces was initiated in 1989, and in 1996 the coverage expanded to 44 cities in the 27 provinces. For the provinces and years where the CPI is missing we used the value of the national CPI. Specifically, the "Economic Indicators" published monthly by BPS reports province-specific inflation rates based on the value of the province-specific CPI using April 1988 - March 1989 as base. The province-specific CPI by year is not reported. We recovered the value of the province specific CPI using the value of

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[2] We have also duplicated our analysis using the log of monthly salary earnings instead of the log of the hourly wage rate, and found no differences in our results.

[3] Note that the "unreported" earnings, especially of government workers, may be quite different from the earnings reported in the Sakernas survey. Unfortunately, there is very little we can do to remedy this shortcoming of the data.

the CPI in 1998 and the province-specific time-series data on inflation rates for the years 1985-1998. Before 1992, the collection of data was conducted evenly across different quarters of the calendar year. It is also important to point out that the regional deflators available in Indonesia are base explicitly on urban prices.

Since 1992 the Sakernas survey has been conducted during the month of August of each year. We deflated the nominal wages of 1998 using the value of the CPI over the whole calendar year rather than the value of the CPI during the time of the survey (August 1998). In August 1998, the inflation rate in Indonesia was at its peak but decreased substantially by December 1998.

The Indonesian labor market is characterized by relatively little government intervention and rigid seniority rules. Formal sector employs approximately 35 percent of total employment in 1998.

Figure 1 tracks the age profile of the rate of employment in the wage sector of selected synthetic cohorts of male and female workers separately (panels A and B) from 1986 to 1998. Beginning from the left, the first profile is the profile of workers who were 15 years old in 1986. Movements along that profile indicate how the rate of employment in the wage sector of this cohort of workers increases with age, i.e. the mean wage employment rate of 16 year olds in 1987, and so on continuously until the end of that wage-age profile indicating the wage employment rate of 27 year old workers in 1998. During the life cycle, employment in the wage sector seems to increase fast for both males and females reaching a peak at 45.6 percent and 18.3 percent at the ages of 31 and 23 for males and females respectively. After that point the wage sector employment rates for both males and females decrease rapidly with age.

The life-cycle paths of younger cohorts lie above those of older cohorts suggesting that much of the growth in employment in the wage sector in Indonesia over these years has taken place by hiring from the pools of younger workers. Moreover, these generational differences in the wage employment rates of females are only apparent for the three younger cohorts. Thus females of younger generations are more likely to be working in the wage sector compared to older females. In other words, a 25 year old female in 1986 is less likely to be employed in the wage sector compared to a 25 year old female in 1996. Clearly, the growth in female employment in the wage sector seems to have taken place without workers of the same generation shifting from other sectors of employment to the wage sector. The generational effects seem to diminish with the age of female cohort.

For males, the generational effects in the wage employment rate profiles are also significantly and present even for older cohorts. The profile of a younger generation of males lies above the profile of the generation of male workers five or ten years older even if we compare the wage employment rate of 50 year old males in 1986 with that in 1996. Some of the early evidence (Feridhanusetyawan (1999); and Papanek and Handoko (1999)) suggests that in the labor market, at least, the impact of the 1997 and 1998 crisis has been reflected much more on wages than on employment. The wage employment rates in Figure 1 suggest that male cohorts experienced a decline in their employment opportunities in the wage sector. In contrast to males the wage employment rate of older females (cohorts 35 and 40 in 1986) seem to have increased considerably. This suggests the possibility that as a result of the crisis firms are may be shedding more male workers who are typically employed under more permanent arrangements and substituting their services with the older females probably employed with more flexible working arrangements.

3. Analysis of Cohort-Specific Median Wages

Figure 2 tracks the age profile of median real wages of selected synthetic cohorts of male and female workers separately from 1986 to 1998. We use median wages instead of mean wages in order to minimize the influence of extreme values in our results. The numbers behind these figures are presented in Table B in the appendix. Beginning from the left, the first wage-age profile is the profile of workers who were 15 years old in 1986. Movements along that wage-age profile indicate how the median wages of this cohort of workers increased with age, i.e. the mean wage of 16 year olds in 1987, and so on continuously until the end of that wage-age profile indicating the wage of 27 year old workers in 1998.

There are substantial differences in the wage profiles of different cohorts for both male and female employees. The wage profiles of younger cohorts lie above the wage profiles of older cohorts. Thus as a result of the rapid economic growth that took place during the decade prior to 1997, individuals born more recently earn higher wages at each age than did those of older generations. Second, from Figure 2 one can easily infer that there is a pronounced curvature in the life-cycle path of wages earned by a typical individual in Indonesia. Wage rates start low at young ages and increase faster with age at the early stages of the working career than they do in the later stages, particularly for males. From 1986 to 1996 all cohorts of male workers experienced a steady increase in their real wages with age. Moreover, the real wage increases for the youngest cohort of female workers tended to be faster than the real wage increases of older cohort workers. Between 1997 and 1998, the slope of the age profile of real wages of younger cohort workers (cohorts 15-30) turned to negative. Clearly the financial crisis that hit Indonesia since 1997 was an aggregate shock that resulted in a large decline in the real wages

of all age cohorts. Thus, it appears that the crisis had the same negative effect on the wages of males and females in each age cohort.

Next, we use the methods of Deaton and Paxson (1994) we decompose cohort-specific wages into three factors: cohort (or generation) effects, age (or life-cycle) effects, and year effects. One problem with such decomposition is that these three effects are not separately identifiable because of the linear dependence among age, year and cohort effects. In short the differences in the wages between two individuals observed in the same year could be due to age effects or cohort effects and there is no way of disentangling them. To circumvent this problem we make the identifying assumption that year effects average to zero and are orthogonal to linear trends. This is equivalent to assuming that all linear trends in the data can be interpreted as a combination of age and cohort effects.

The graphs in Figure 3 respectively show the age, cohort, and life-cycle effects on real wages for males and females. These decompositions are obtained by first estimating separate regressions of the logarithm of mean wages of males and females on a constant term and sets of dummy variables for cohort (37 dummy variables), age of cohort (49 dummy variables) and survey year (7 dummy variables) and then performing the normalization discussed in detail in Deaton (1997).[4] Panel A in Figure 3 indicates that the effects of cohort on real wages are declining with age. It also appears that there is steady growth in wages from cohort to cohort. The cohort effects on the real wages of older males also seem to be higher than the cohort effects on the real wages of older females. Though this difference is diminishing down to zero for cohorts younger than 25 years of age in 1986.

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[4] The regression results are available upon request form the authors.

Panel B in Figure 3 contains the estimated age effects on the wage rate of male and female. Again, these effects are found to be very similar for males and females. For females less than 25 years of age, the life-cycle age path of wages is slightly lower than for males, though this difference seems to disappear after 25 years of age. In addition, the age paths of male and female wage seem to exhibit a slight curvature in the latter half of the working cycle.

Panel C in Figure 3 shows the net effects of the year dummy variables (macroeconomic shocks) on real wages, after controlling for cohort and age of workers. For the reasons outlined above, by construction, these effects sum up to zero. As in the other two panels, the macroeconomic shocks had a similar effect on the wages of working male and female workers. During booming years, for example in 1992, real wages were above trend. On the other hand, during the economic crisis, as shown between 1997 and 1998, real wages fell below trend.

4. Cohort-Specific Wage Inequality

The previous section showed that the economic crisis has substantially reduced the real wages of workers uniformly across all cohorts. In this section, we analyze the effects of economic crisis on wage inequality as measured by the variance of real wage within gender-specific cohorts. Cohort-specific earnings data from other countries suggest that earnings inequality typically increase with age (Deaton and Paxson, 1994). A similar relationship is also predicted by standard models of education and earnings in which different people have different amount of education (Dooley and Gottschalk, 1984). Even within a homogeneous education group, wage inequality could increase if different individuals experience different rates of return to their human capital.

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Our preferred measure of inequality is the difference between the 90th percentile and the 10th percentile (P90-P10) of the distribution of the logarithm of real wages. The measure of inequality in real wages for selected cohorts of male and female workers are shown in Figure 4 (based on the numbers in Table C in the appendix). In each of these figures the horizontal axis denotes the year of observation as well as the age of the individual given that each graph follows a single cohort. The vertical axis the difference P90-P10 in the logarithm of the real wages and each graph is drawn in the same scale for all cohorts in order to highlight the differences across cohorts. A vertical line in 1996 is drawn to facilitate the discussion on the impact of the crisis

on the inequality of real wages during the crisis years of 1997 and 1998.

A comparison of the plots in Figure 4 reveals the following: a) the inequality in female wages in each age cohort (denoted by the small triangle symbol in each panel) is much higher than the inequality of wages in the respective male cohort; b) the age path of the inequality of wages of the two younger females cohorts (cohorts 15 and 20) is steeper than that for the respective male cohorts; and c) although higher than that for males, the age path of the inequality of female wages is parallel, if not identical, to the age path of inequality of male wages for the middle aged cohorts (cohorts 25 through 45).

The higher level of inequality of female wages at each year (or age) is probably related to the fact that female workers enter into and exit from the labor market more frequently than male workers. This causes the within cohort inequality of worker characteristics for females to be higher than for male, which is then reflected in wage inequality. We have also examined whether the increase in inequality in female wages is due to a decline in the bottom or an increase in wages at the top of the distribution. We found that the increase in female wage inequality over age was

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primarily due to a decline in female wages in the bottom of the wage distribution.

Interestingly, inequality in wage payments within most of the male cohorts seems to have decreased between 1986 and 1988 or 1989. The same pattern is observed for female workers during the same years except the cohort of females 25 of age in 1986.

The economic crisis that begun in 1997 and intensified in 1998 seems to have had a rather mixed effect on inequality within male and female cohorts. For younger male (cohorts 15-30 in Figure 4) it appears that there was a general increase in the inequality of wages. For selected cohorts it appears there was an increase in inequality in 1997 that was then followed by a slight decrease in inequality (e.g. see cohorts 20, 25, 40, and 45 in Figure 4). But for some male cohorts inequality in 1998 continued increasing. This did not happen for any of the female cohorts where inequality in 1998 either decreased or stayed constant. A notable exception is the cohort of 35 year old females.

In Figure 5 we decompose the inequality of wages along the same lines for the median wages. The generational or cohort effects on wage variances are shown in panel A. Cohort effects on wage inequality of male and female workers exhibit the same general trend until the cohort of 40 year-olds. In general younger cohorts exhibit higher variance in wages. For older cohorts, the cohort effects for female workers are lower than for male workers.

The age effects on the variance of wages of both male and female workers are shown in panel B of Figure 5. For both male and female workers, the higher the age the higher the age effects on the variance of wages. Thus the aging of the population in Indonesia has an automatic tendency to increase inequality. As the population growth rate decreases, the relative structure of the population changes

with more elderly persons being relatively more heavily represented thus increasing inequality. Moreover, the increase in inequality with age is faster for females than males.

The impact of the macroeconomic shocks on the variance of wages is shown in panel C. Panel C, in contrast to the impact of the macroeconomic shocks on mean male and female wages, shows that there is a difference of how macroeconomic shocks affected the variance of male and female wages. Macroeconomic shocks before the crisis seem to have raised the variance of female wages above trend more so than for men. In contrast, after the onset of the crisis, the variance of female wages falls below trend more than for men. Thus macroeconomic shocks seem to impact inequality of wages within female workers more so in comparison to male workers.

5. Conclusions

Indonesian workers in the formal sector of Indonesia experienced a substantial increase in their wages during the period of economic growth. Our analysis reveals that it is the younger cohorts of male and female workers that have reaped the benefits of the growing employment and wages in the formal sector. The growing wage sector has been absorbing many of the young entrants into the labor market but more male workers than female workers. Also, younger female cohorts seem to be earning higher wages than older female cohorts. Thus younger male cohorts seem to have gained more in terms of employment while younger female cohorts seem to have gained more in term of wages rather than employment.

Even though wages of younger cohorts have been growing rapidly their increase has been accompanied by a rise in the inequality of earnings. The increases in inequality are also higher for females of younger cohorts than male cohorts.

The benefits of growth were shared among workers of different gender.

At times of crises, rigidities in labor markets typically prevent real wages from falling sufficiently to absorb large decreases in the demand for labor. In the case of Indonesia it appears that labor markets are relatively flexible since the response in real wages to the crisis prevented the unemployment rate from increasing much more significantly.

Our findings also confirm that the economic crisis in Indonesia has led to a substantial decline in real wages. The declines in real wages have been relatively evenly distributed among workers across different cohorts or generations and among males and females of the same cohort. The impact of the crisis on the inequality of wages within cohorts seems to have been quite mixed. For younger male cohorts within cohort inequality seems to have increased slightly or remained unchanged at the level of inequality before the crisis. But for most female cohorts inequality seems to have decreased. We have also uncovered some evidence that suggests that females wages exhibit higher variance than male wages in response to macroeconomic shocks.
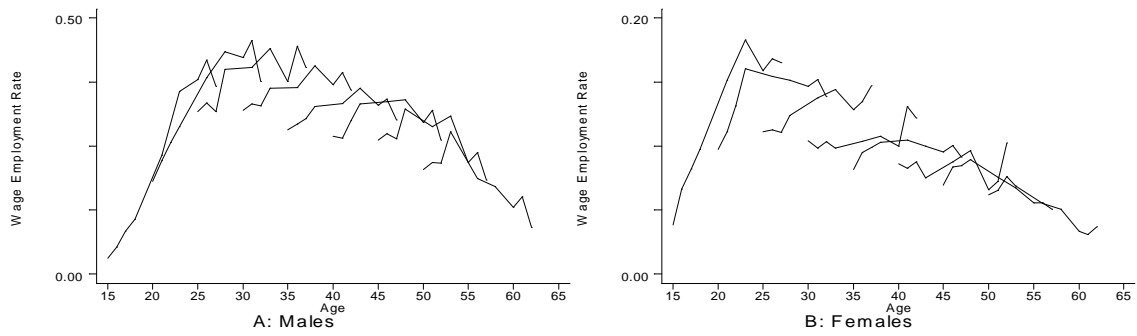
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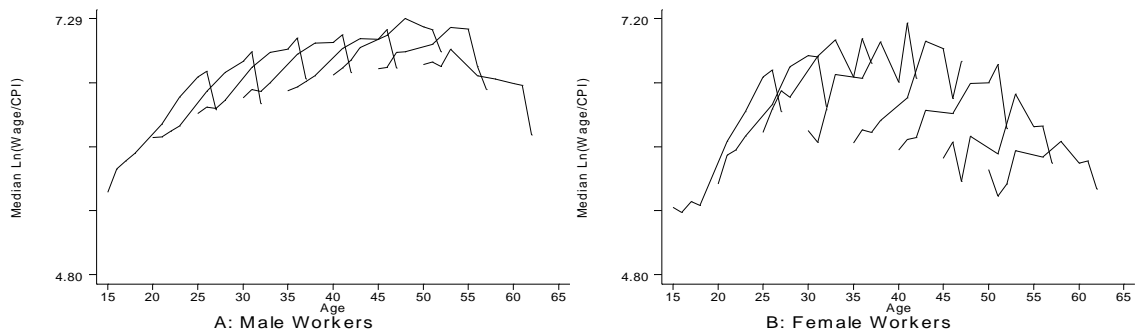
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Wage Employment Rates
Figure 1

Age Profiles of Median ln(Wages) for Selected Cohorts
Figure 2

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A: COHORT EFFEC   B: AGE EFFECTS

C: BUSINESS CYCLE EFFECTS
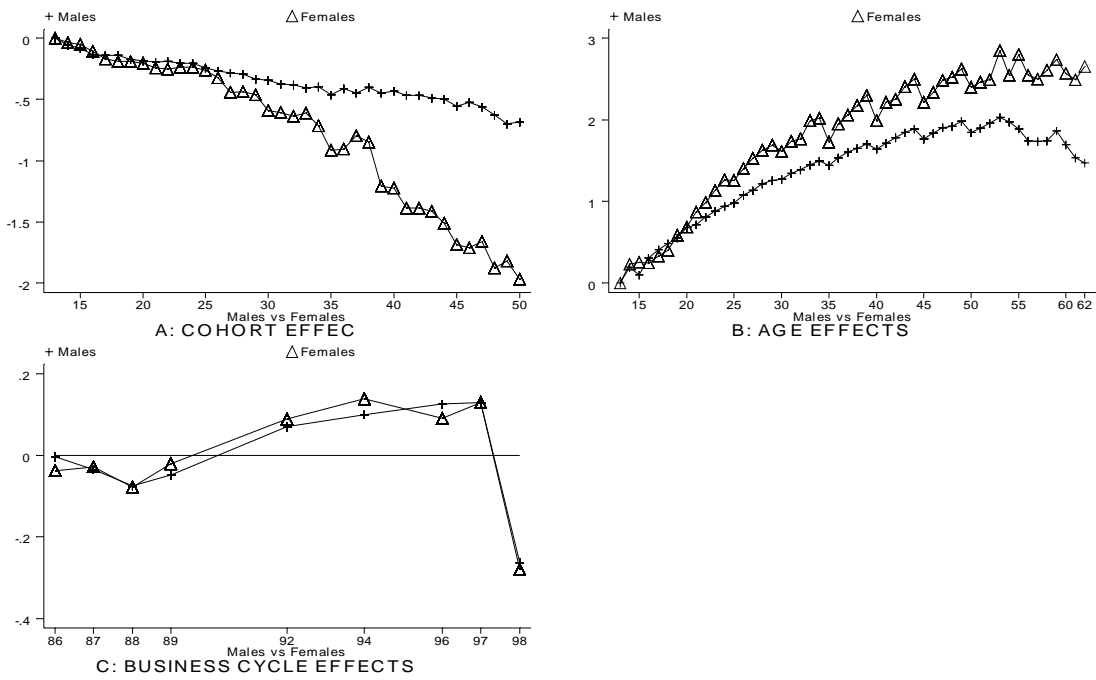
Decomposition of Median ln(Wages)

Figure 3

Male vs. Female Workers
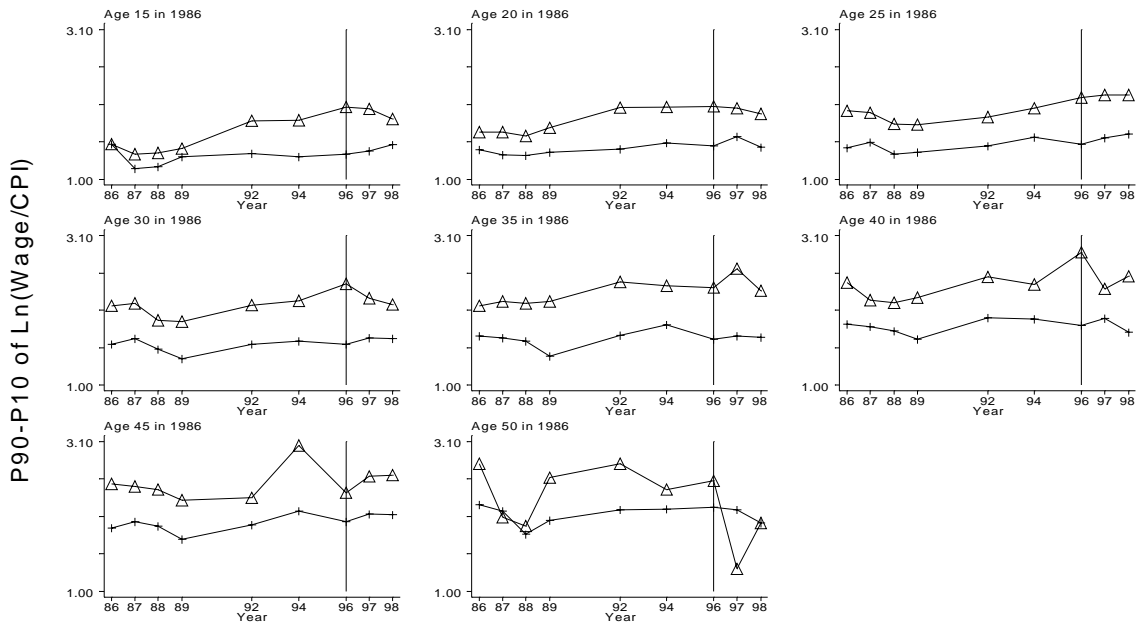
ge Profiles of Inequality in ln(Wages) by Selected Cohorts

Figure 4
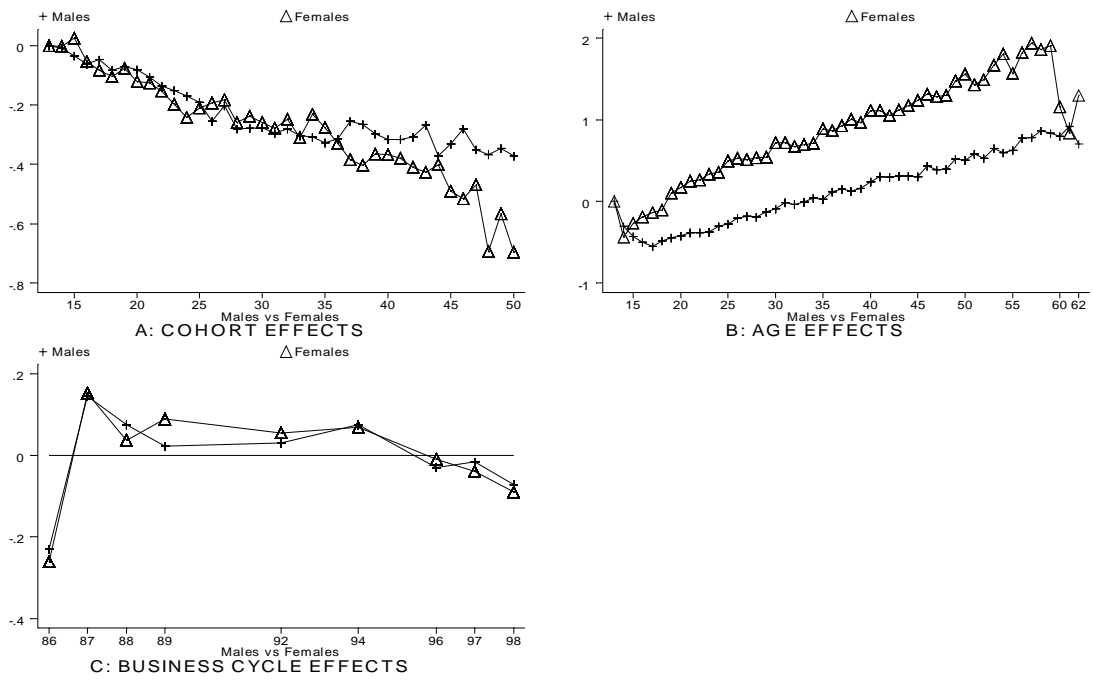
Decomposition of Inequality in ln(Wages)

Figure 5

	Cohort: Age in 1986							
Year	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
	Male							
1986	114	597	1,103	1,045	903	639	639	375
1987	188	509	759	676	555	364	403	255
1988	298	604	717	752	533	468	348	282
1989	490	719	909	773	703	535	506	354
1992	696	1,008	1050	886	652	508	389	225
1994	869	963	738	817	546	419	287	134
1996	1,152	1262	1173	970	684	430	256	145
1997	872	822	879	622	470	307	227	97
1998	626	632	539	512	262	242	102	55
	Female							
1986	140	381	447	370	242	222	161	124
1987	222	300	302	186	181	112	117	74
1988	276	354	298	237	175	142	113	94
1989	402	465	370	221	218	125	146	83
1992	505	490	348	256	174	137	99	60
1994	503	401	270	216	138	123	59	42
1996	576	506	389	250	180	102	60	43
1997	399	286	285	188	130	71	48	21
1998	302	254	189	169	79	90	25	21

Appendix Table A
Sample Sizes of Selected Cohorts by Survey Year, 1986-98

Appendix Table B							
Median Ln Real Wage of Selected Cohort by Year							
Cohort: Age in 1986							
Year	15	20	25	30	35	40	45	50
Male							
1986	5.61	6.14	6.37	6.52	6.59	6.75	6.81	6.85
1987	5.83	6.14	6.43	6.60	6.63	6.81	6.82	6.87
1988	5.91	6.20	6.42	6.59	6.68	6.89	6.96	6.83
1989	5.98	6.25	6.50	6.67	6.74	7.01	6.97	7.00
1992	6.27	6.58	6.82	6.95	7.00	7.13	7.05	6.74
1994	6.53	6.77	6.96	7.06	7.10	7.29	7.21	6.71
1996	6.72	6.88	7.00	7.07	7.10	7.21	7.19	6.67
1997	6.78	6.97	7.11	7.13	7.19	7.19	6.83	6.64
1998	6.41	6.47	6.71	6.77	6.81	6.97	6.61	6.16
Female							
1986	5.43	5.65	6.13	6.15	6.03	5.97	5.89	5.78
1987	5.39	5.92	6.35	6.04	6.16	6.07	6.05	5.54
1988	5.49	5.97	6.53	6.35	6.14	6.09	5.67	5.65
1989	5.45	6.10	6.46	6.68	6.25	6.34	6.10	5.96
1992	6.05	6.39	6.85	6.64	6.46	6.31	5.94	5.91
1994	6.33	6.75	7.00	6.98	6.99	6.59	6.50	6.05
1996	6.65	6.85	6.65	6.60	6.92	6.60	6.19	5.84
1997	6.72	6.84	7.01	7.16	6.45	6.77	6.19	5.87
1998	6.33	6.38	6.78	6.64	6.80	6.17	5.84	5.60

	Appendix Table C							
	Q90-Q10 of Ln Real Wage of Selected Cohort by Year							
	Cohort: Age in 1986							
Year	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
	Male							
1986	1.49	1.42	1.43	1.57	1.69	1.85	1.88	2.22
1987	1.15	1.34	1.52	1.65	1.66	1.82	1.98	2.12
1988	1.18	1.33	1.35	1.50	1.62	1.76	1.92	1.80
1989	1.31	1.38	1.37	1.37	1.41	1.64	1.73	1.99
1992	1.36	1.42	1.46	1.58	1.70	1.94	1.93	2.14
1994	1.31	1.51	1.59	1.62	1.85	1.92	2.12	2.15
1996	1.35	1.46	1.49	1.57	1.64	1.84	1.97	2.18
1997	1.40	1.60	1.58	1.66	1.69	1.94	2.08	2.15
1998	1.48	1.45	1.64	1.65	1.67	1.75	2.08	1.96
	Female							
1986	1.49	1.66	1.96	2.11	2.12	2.44	2.50	2.78
1987	1.35	1.66	1.93	2.14	2.18	2.19	2.47	2.04
1988	1.37	1.61	1.77	1.91	2.15	2.15	2.43	1.92
1989	1.43	1.72	1.76	1.90	2.17	2.23	2.27	2.60
1992	1.81	2.00	1.87	2.12	2.45	2.52	2.31	2.79
1994	1.83	2.01	1.99	2.18	2.39	2.41	3.04	2.42
1996	2.01	2.02	2.14	2.42	2.37	2.86	2.38	2.55
1997	1.98	1.99	2.18	2.22	2.63	2.35	2.61	1.32
1998	1.84	1.92	2.18	2.13	2.33	2.52	2.62	1.95