
Dilaka Lathapipat

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July 2008
Problem Statement

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- Wage dispersion has steadily increased at the top end
- This study seeks to understand the contributing factors (focus on education) to the observed changes in wage distribution
Stylised Facts

- Cross-Sectional datasets from Thai LFS from 1987-2006
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Cross-Sectional datasets from Thai LFS from 1987-2006

Composition of Highest Educational Qualification Attained for Thai Men

![Composition of Highest Educational Qualification Attained for Thai Men](image-url)
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- Proportion of those with less than upper secondary qualifications went down from 75.7% to 56.3% over two decades (drop of 19.4 percentage points)

Mostly absorbed by a 7.7 and a 7.3 percentage point increases in “Upper Secondary” and “College” categories respectively. “Post Secondary” group increases by 2.8 percentage points over the period. The largest increases in “Upper Secondary” and “Post Secondary” groups seen in 2001. Mainly due to the establishment of the SLF in 1996.
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Ratio of Average Real Wages to the Twenty-Year Average by Education Groups

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Wage Distribution in Thailand
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- Post-1996 the decline of the profiles of "Upper Secondary" and "Post Secondary" groups is even more rapid than the rise during the boom.
- By 2001, the average real wages for every group below "College" are below the 1987 levels.
- The bottom three groups now have their profiles below the reference rate (∼72% of each of 2001-2006 samples).
- The groups with university degrees have on average increased their advantage significantly over the rest.
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Comparison of Hourly Wages between Different Percentiles

- Wage inequality has steadily increased at the top half of the distribution
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Comparison of Hourly Wages between Different Percentiles

- Wage inequality has steadily increased at the top half of the distribution
- Opposite phenomenon has occurred at the bottom half

A closer look at different points in the wage distribution reveals a different story.
FFL Decomposition

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Set-up of the problem:

Focus on two time periods, \( T = 0, 1 \) and the distributional measure \( \nu \) (quantiles) whose change we will decompose. The wage structure function depends on observed and unobserved attributes \((X_i, \varepsilon_i)\) for \( T = 0, 1 \) and \( i = 1, \ldots, N \).

The observed wage for individual \( i \) is:

\[ Y_i = Y_{1i} T_i + Y_{0i} (1 - T_i) \]

We have a missing data problem since we only observe either \( Y_0 \) or \( Y_1 \) and not both for each individual.
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In the first stage of FFL decomposition the overall change in functional $\nu$ from date 0 to 1 is divided into "wage structure" and "composition" effects.
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- \( F_C(y) \) is the counterfactual distribution under wage structure function of year 0, but with \((X, \varepsilon)\) jointly distributed as in year 1.
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Identification of $F_C(y)$ which ensures that $\Delta^\nu_X$ only reflect changes in the distribution of $\mathbf{X}$ requires:
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Identification of $F_C(y)$ which ensures that $\Delta \nu_X$ only reflect changes in the distribution of $X$ requires:

- $(\varepsilon_0, \varepsilon_1)$ distributed independently of $T$ after conditioning on $X$
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Identification of $F_C(y)$ which ensures that $\Delta^\nu_X$ only reflect changes in the distribution of $X$ requires:

1. $(\epsilon_0, \epsilon_1)$ distributed independently of $T$ after conditioning on $X$
2. $0 < P(T = 1|x) < 1$ for all $x \in X$
Note that $F_T(y; T_x = T) = \int_X F_{T,Y|X}(y|x) dF_{X|T}(x|T_x = T)$
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The counterfactual distribution can thus be constructed as

\[
F_C(y) = \int_X F_{0,Y|X}(y|x) dF_{X|T}(x|T_X = 1)
= \int_X F_{0,Y|X}(y|x) \frac{dF_{X|T}(x|T_X = 1)}{dF_{X|T}(x|T_X = 0)} dF_{X|T}(x|T_X = 0)
= \int_X F_{0,Y|X}(y|x) \psi_x(x) dF_{X|T}(x|T_X = 0)
= F_0(y; T_X = 1)
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$$= \int_X F_{0,Y|X}(y|x) \psi_x(x) dF_{X|T}(x|T_X = 0)$$

$$= F_0(y; T_X = 1)$$

Applying Baye’s rule, the IPW is expressed as

$$\psi_x(x) = \frac{P(T = 1|x)P(T = 0)}{P(T = 0|x)P(T = 1)}$$

$$\quad = \left( \frac{-p(x)}{1-p(x)} \right) \left( \frac{1-p}{p} \right)$$
The 2nd stage further decomposes $\Delta_S^\nu$ and $\Delta_X^\nu$ into the contribution of each covariate.
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To study the effect on distributional statistic $\nu$ of changes in $X$, the Recentred Influence Function (RIF) Regression is used.
FFL Decomposition - 2nd Stage

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- To study the effect on distributional statistic $\nu$ of changes in $X$, the Recentred Influence Function (RIF) Regression is used.
- The influence function introduced by Hampel (1974) is defined as

$$IF_F(y; \nu) = \lim_{\epsilon \downarrow 0} \frac{\nu(F + \epsilon(\delta y - F)) - \nu(F)}{\epsilon}, \text{ for } \epsilon \in (0, 1)$$
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If $\nu$ is Gâteaux differentiable at $F$, a first order von Mises expansion for some distribution function $G$ close to $F$ is

$$\nu(G) = \nu(F) + \int a(y)d(G - F)(y) + r$$
Usual standardisation is to replace $a(y)$ with the influence function

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- For \( G = \delta_y \), FFL call this first order approx the RIF:

\[
RIF_F(y; \nu) = \nu(F) + \int IF_F(y; \nu) d\delta_y(y) = \nu(F) + IF_F(y; \nu)
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The $RIF_F(y; \nu)$ integrates up to the functional of interest $\nu(F)$:

$$
\int RIF_F(y; \nu) dF(y) = \nu(F)
$$

$$
E_X[E[RIF_F(y; \nu)|x]] = E_X[m^\nu(x)] = \nu(F)
$$

by LIE, and $m^\nu(x)$ denotes the RIF regression model.
FFL Decomposition - 2nd Stage

- Consider linear structural model (directly comparable to Oaxaca-Blinder):

\[
E[m_T(x) | T_x = T] = E[x' | T_x = T] \beta^T_T = \nu(F_T), \text{ for } T = 0, 1
\]

\[
E[m_C(x) | T_x = 1] = E[x' | T_x = 1] \beta^C_C = \nu(F_C)
\]

where

\[
\beta^T_T = (E[xx' | T_x = T])^{-1} E[x \cdot RIF_{FT}(y_T; \nu_T) | T_x = T], \text{ for } T = 0, 1
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\[
\beta^C_C = (E[xx' | T_x = 1])^{-1} E[x \cdot RIF_{FC}(y_0; \nu_C) | T_x = 1]
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\[ \beta_T^\nu = \left( E[xx'|T_x = T]\right)^{-1} E[x.RIF_{F_T}(y_T; \nu_T)|T_x = T], \text{ for } T = 0, 1 \]
\[ \beta_C^\nu = \left( E[xx'|T_x = 1]\right)^{-1} E[x.RIF_{F_C}(y_0; \nu_C)|T_x = 1] \]

We have the generalised Oaxaca-Blinder decomposition:

\[ \Delta_O^\nu = \Delta_S^\nu + \Delta_X^\nu = (\nu(F_1) - \nu(F_C)) + (\nu(F_C) - \nu(F_0)) \]
\[ = E[x'|T = 1](\beta_1^\nu - \beta_C^\nu) + (E[x'|T = 1]\beta_C^\nu - E[x'|T = 0]\beta_0^\nu) \]
Looking at the means of the distribution

Wage Structure Effects with Attributes distributed as in 2006
Results

- Looking at the means of the distribution

Wage Structure Effects with Attributes distributed as in 2006

- Steady fall in the average returns to education
Composition Effects with 2006 Prices of Attributes

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Results

Composition Effects with 2006 Prices of Attributes

- Upward shift in the average rate of schooling accumulation coincides with the declining returns
Results

- Time line for analysis is divided into three interesting intervals:
  - The economic boom period of 1988-1996
  - The economic crisis from 1996-2000
  - Recent developments running from 2001-2006

Estimate RIF (Unconditional Quantile) regressions for 19 log wage quantiles from 5th to 95th for each year.

The covariates used are:
- 15 education dummies
- Potential experience and its square
- Marital status
- 9 occupation and 15 industry dummies
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Selected RIF Regression Coefficients

- Lower-Primary
- Upper-Vocational
- Post-Secondary Vocat
- Bachelor Academic

Average years of schooling increased from 7.9 to 8.3 years.

Rapid rise in average real wage largely driven by wage structure effects.

More positively sloped coefficient curves for higher education levels.

Significantly steeper curves in 1996 indicates greater inequality-enhancing characteristics of higher education.

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**Economic Boom (1988-1996)**

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FFL Decomposition Results for 1988-1996

- Observed increase in real wages largely driven by favourable changes in the wage structure

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Observed increase in real wages largely driven by favourable changes in the wage structure

Composition effect plays a minor role
Observed increase in real wages largely driven by favourable changes in the wage structure
- Composition effect plays a minor role
- Wage structure effect reduces inequality in the lower half of the distribution
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We break down the effects further into the contribution of each generic group of covariates
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- Increase in returns to education for those above the 40th quantile exceed those at the other end
- Biggest gainers are "Upper Vocational", "Post Secondary" and those with university degrees
- Combined effect of education is clearly inequality-enhancing during the boom period
Changes in the wage ratios between selected quantiles can also be analysed.
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- Combined effect of education is to increase the 50:10 and 90:10 ratios by more than 16% over the boom period
Average years of schooling went from 8.3 to 9 years
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The Crisis (1996-2000)

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- Composition effect completely offset by the wage structure effect
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- Composition effect completely offset by the wage structure effect
- Combined effect reduces wage dispersion throughout
- Workers with secondary and post secondary qualifications suffered significant declines in their wages
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Those with university degrees suffered to a lesser extent.
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The 5th and 95th quantiles aside, the combined effect of education again enhances top-end inequality while reduces that at the bottom-end
The combined effect of education is relatively small over this period
Recent Developments (2001-2006)

Average real wage increased from 58.7 to 61.5 Baht, but the increase is not evenly shared. Workers between the 55th and 70th quantiles experienced a reduction in wages. The U-shaped pattern is driven by combined wage structure effects. Wage structure changes depress wages in the upper half of the distribution, while composition effects play an offsetting role.
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The majority of these either hold post-secondary vocational or university qualifications.

Returns to education for the rest of workers generally declined or stagnated.
Education emerged as a major factor contributing to the observed increase in top-end wage inequality over this period.
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It also plays a role in compressing wage dispersion in the lower end of the distribution.
Summary of Effects of Education

The Effects of Education on Wage Inequality for the three time intervals

Wage Structure Effect from Education

Composition Effect from Education

Total Effect from Education

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Concluding Remarks

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- Should question the merit of government subsidy given to students in public universities (~70% of tuition fees)