

# Long-Term Changes in the Wage Structure of Taiwan:

## The Role of Educational Expansion

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## Motivation

One of the most pressing economic issues in Taiwan today is **wage stagnation**.

- ▶ Pay and salaries have been lagging for more than a decade but little systematic evidence showed the timing and the magnitude.
- ▶ Many have speculated that **educational expansions** took some of the blame for the stagnation.
- ▶ but little systematic analysis has been done.

## Choice of income measurement

I measure income by **full-time workers' hourly wage**, instead of family income, in order to

- ▶ isolate the issues of rising wage inequality from the drastic changes in family structures:
  - ▶ ageing, fertility drops, decreases in the number of extended families (Kuznets 1989; Chu & Jiang 1997).
  - ▶ and recent decreases in marriage rates.
- ▶ put aside the issues of changes in employment patterns driven by changes in globalization and immigration.
- ▶ wage inequality accounts for majority of income inequality across individuals and across families (Fei, Ranis & Kuo 1979);
- ▶ high-wage workers are the primary receivers of non-wage income and benefits;

## Data (1)

- ▶ “Manpower Survey” 1978-2010 – similar to the May CPS of the U.S.
- ▶ Constructed by the Directorate General of Budget, Accounting and Statistics (DGBAS)
- ▶ The data contains information about civilian earnings, education, employment, demographics, occupation, industry, seniority, and hours of work of individuals older than 15.
- ▶ The sampling frame:
  - ▶ National household frame based on the universal household registry at town level of the year. The first
  - ▶ Monthly sample size of about 20,300 households.
  - ▶ Two-stage sampling design:
    - ▶ 1st Stage - about 500 towns chosen;
    - ▶ 2nd Stage - for each town in the 1st stage, draw about 20,300 households from the administrative file of household registry.

## Data (2)

- ▶ Sample selection: - similar in spirit to Autor, Katz and Kearney (2006, 2008):
  - ▶ We include 848,363 full-time employees in both public and private sectors, who had positive earnings and were 15 to 64 years old.
  - ▶ include all industries; exclude self employers;
  - ▶ drop those below one half of the minimum wage; and
  - ▶ drop those with hourly wage greater than the hourly rate of the top-coded.
- ▶ We report the resulting using the CPI deflator. We also have experimented with the GDP deflator, and we find the results are robust.

## Data (3)

- ▶ Education is measured by **education levels**, not years of schooling, because Taiwan's education system is divided by two distinct pathways starting at grade 7:
  - ▶ one preparing pupils for vocational education, and the other for university education.
  - ▶ it's costly and time consuming to switch from one pathway to the other (at least prior to 2000).
  - ▶ the number of years of education in one path is typically not equivalent to that in the other.

However, the number of years of potential experience is approximated by an imposed number of years of schooling for each education level.

# Wage stagnation



## Wage stagnation

- ▶ Prior to 1990 wages grew together for both males and females and for the entire distribution.
- ▶ Wages of males started stagnating first:
  - ▶ The lower tail started first in mid 1990s
  - ▶ The 90th percentile started in mid 2000s.
- ▶ Wages of females stagnated later:
  - ▶ The lower tail started first, around early 2000s
  - ▶ The 90th percentile started later in mid 2000s - around the same time as their male counterpart
- ▶ Before the 2008 financial crisis started, wages has been stagnating at all parts of the distribution.



## Narrowing Gender Gap

- ▶ The gender wage gap has been falling (by 1/2) since the mid 1990s, although the narrowing trend appears to be associated with a delayed stagnation of women's wage compared to men's.
- ▶ Between 1995 and 2005, while median wage of male workers has stopped growing, female worker's continued to grow.
- ▶ In 2010 full-time male workers make about 20 % more than their female counterpart.

The previous study:

- ▶ Fernandez and Wong (2011) recently link the narrowing and eventually disappearing of the gender wage gap in the U.S. to the **convergence of gender gaps in educational opportunity**.

Work in progress - the effects and causes of converging gender gaps in educational opportunities in Taiwan.

## Narrowing Gender Gap

Figure 1b. Male and female log median hourly wage

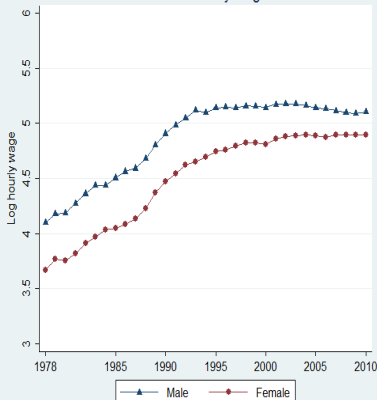
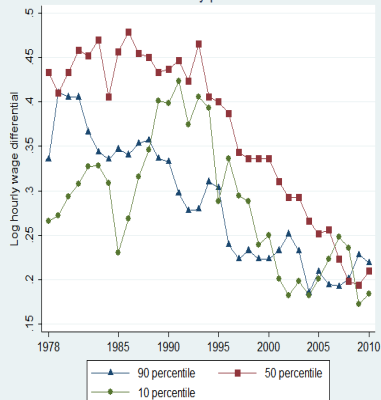
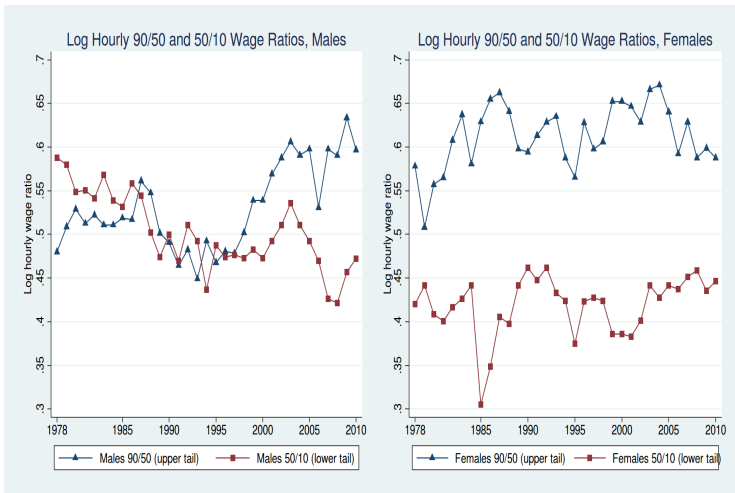


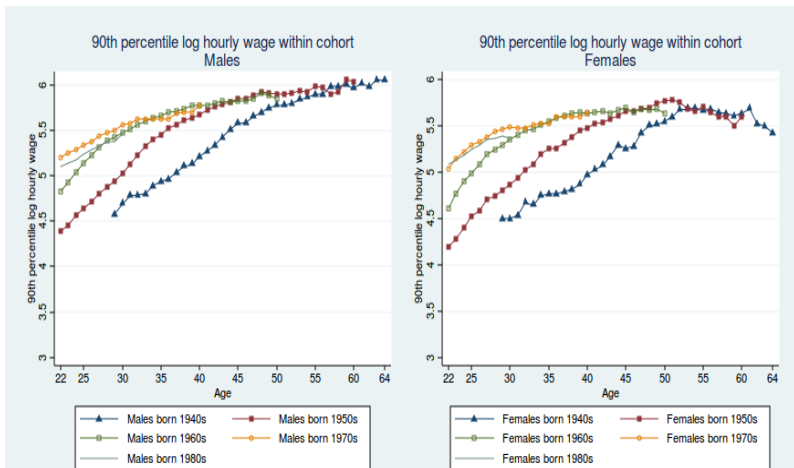
Figure 1c. Gap between male and female by percentile



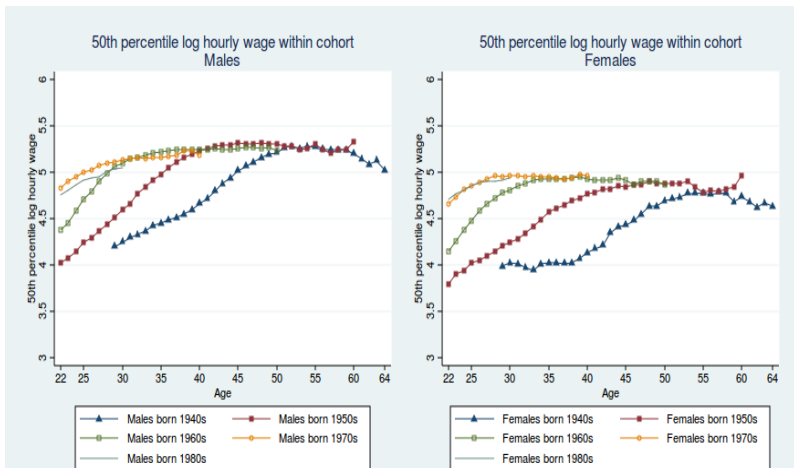
## Gender-specific pattern of polarization



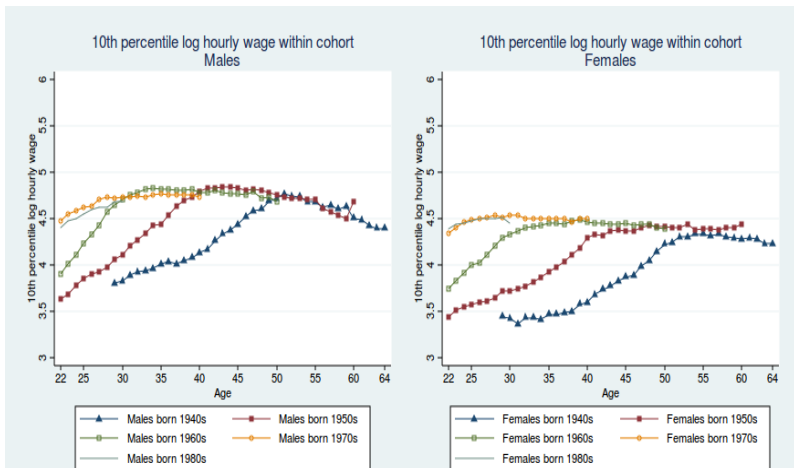
# The Lost Generations: the post-WWII Birth Cohorts



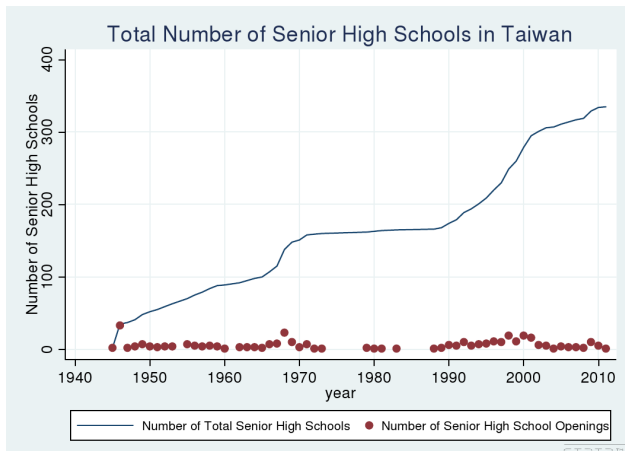
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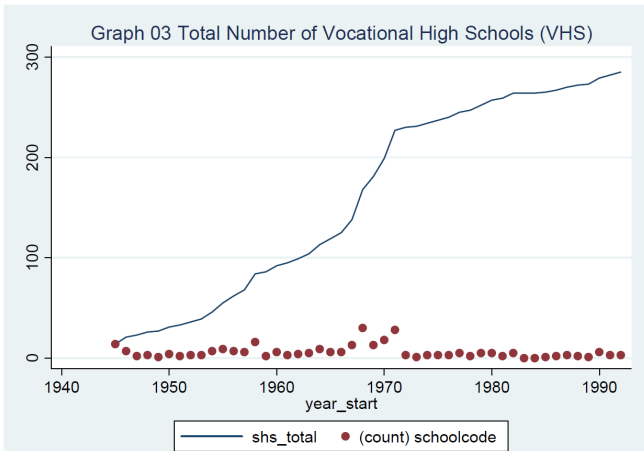
# The Lost Generations: the post-WWII Birth Cohorts



## The Great Expansion in Academic HS after 1990 and before 1970



# The Great Expansion in Vocational HS before 1970

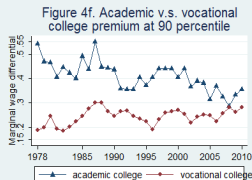
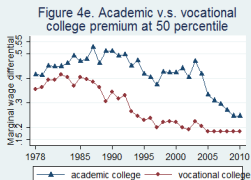
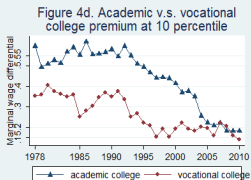
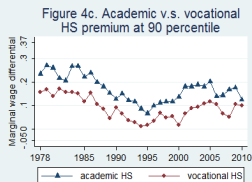
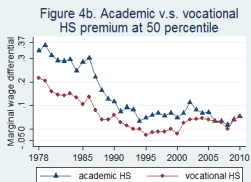
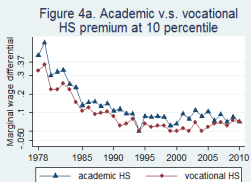




## Educational Expansions

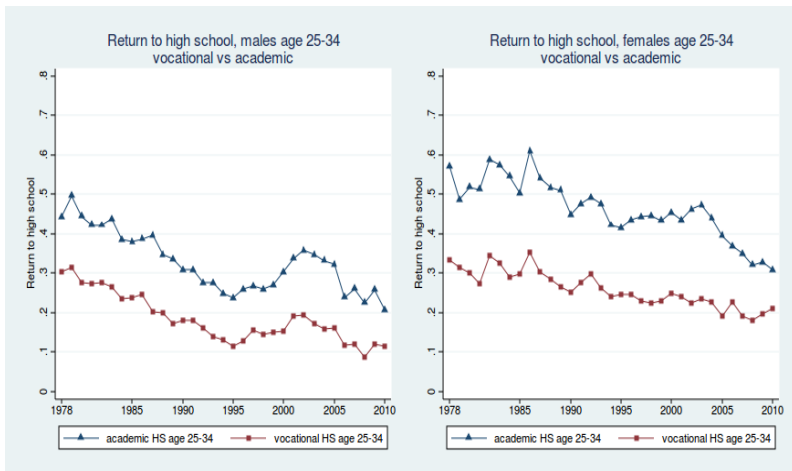
- ▶ HS Opening
  - ▶ Expansion in vocational HS: continuing increasing particularly prior to 1970
  - ▶ Expansion in academic HS: from 1989 to 2000, the number of academic HS increases by 1/3.
- ▶ College Opening
  - ▶ The greatest expansion in univ. between 1996-2002.
- ▶ Empirical goal: Link high school/college opening to changes in the return to education
- ▶ The following is some preliminary results:

## Unconditional Premiums

Unconditional Educational Wage Differentials:  
Academic vs Vocational

Control for experience, by age

## Return to HS (age 25-34), Controlling for Work Experience

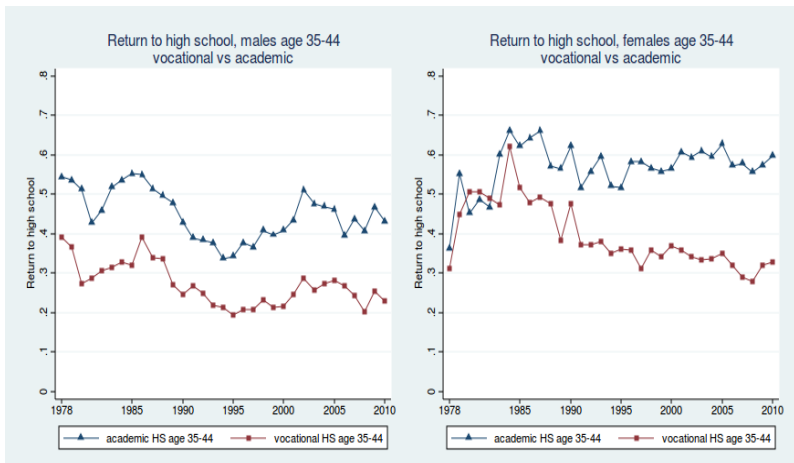


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Long-Term Changes in the Wage Structure of Taiwan:

Control for experience, by age

## Return to HS (age 35-44), Controlling for Work Experience

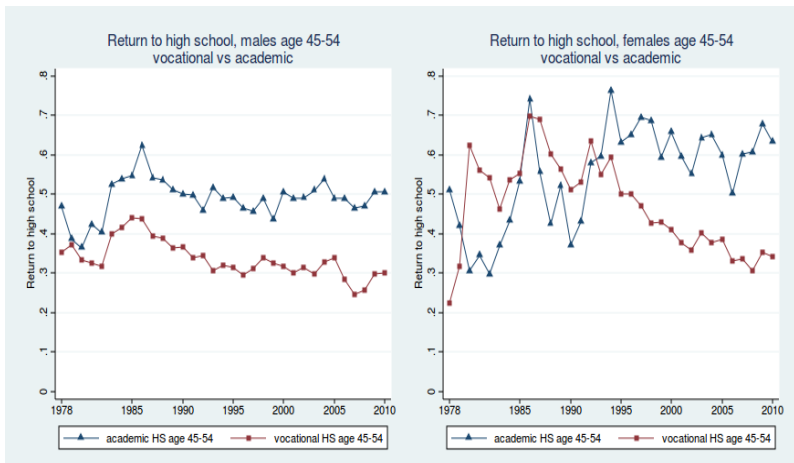


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Control for experience, by age

## Return to HS (age 45-54), Controlling for Work Experience

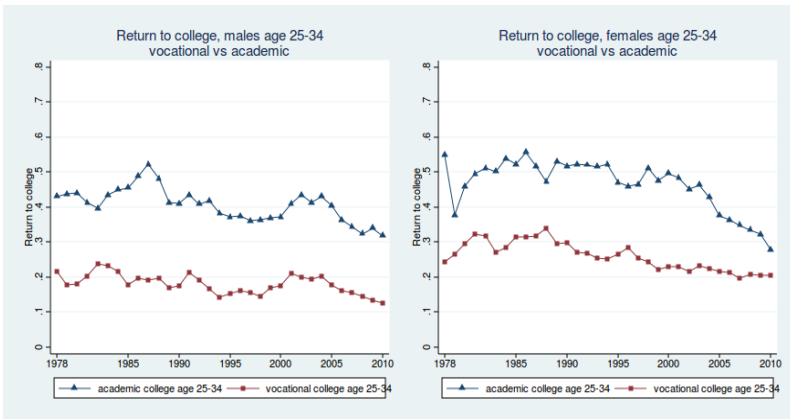


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## Return to College (age 25-34), Controlling for Work Experience

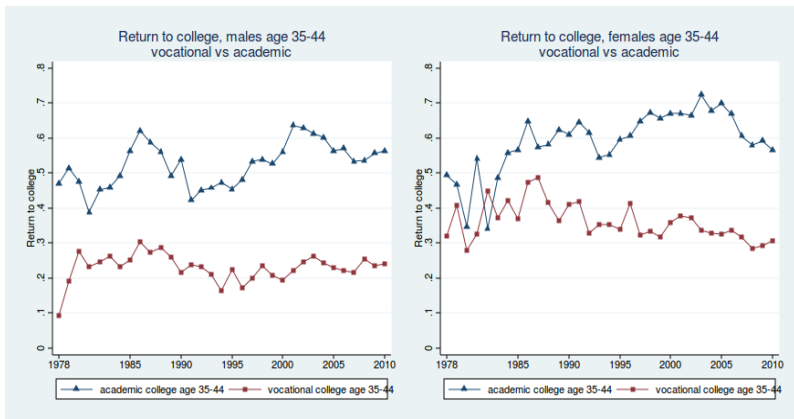


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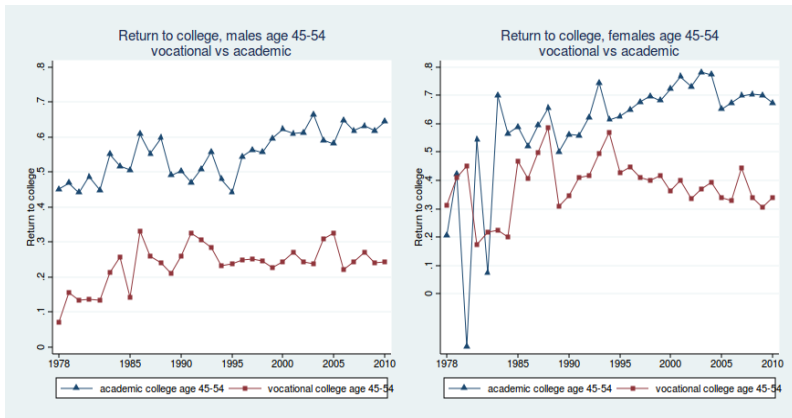


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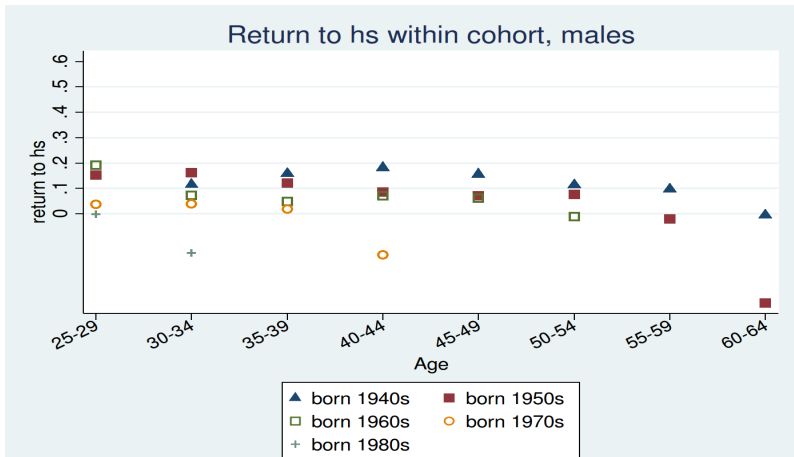
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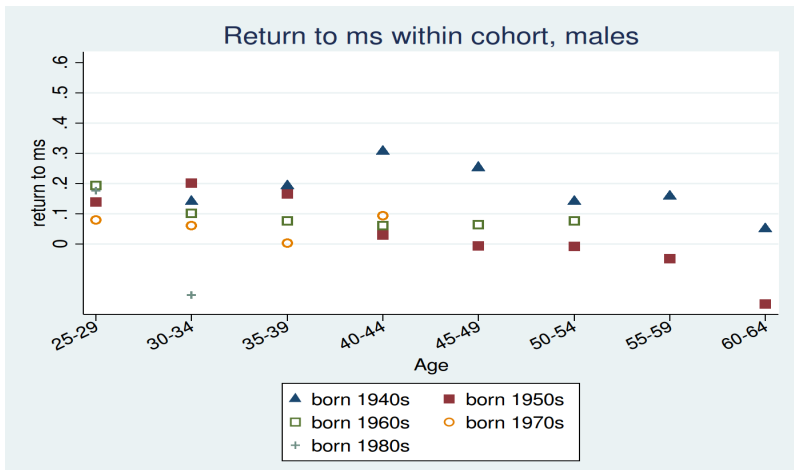
Control for experience, by birth cohort

## Return to High School



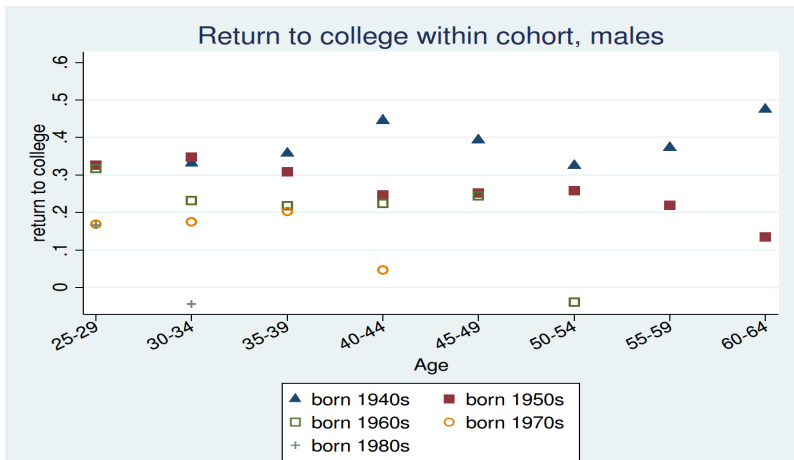
Control for experience, by birth cohort

## Return to Middle School



Control for experience, by birth cohort

## Return to College



## Remarks on Education Premiums

- ▶ Overall the education premiums have no obvious upward trends (esp. during the recent decades), contrary to what the theory of skilled bias technical changes has suggested.
- ▶ Unconditional edu wage differentials in the academic track (HS & univ) dominate those in the vocational track, but the gap is falling or disappearing.
- ▶ After controlling for work experience, educational wage premiums are large and persisting over time for all age groups.

## Some remarks

- ▶ The new evident trends in Taiwan wage structure during the past 33 years are stagnation and polarization.
- ▶ The greater wage growth and the delayed arrival of the stagnation among female full-time workers help closing the gender wage gap.
- ▶ The timing and the patterns of wage stagnation in Taiwan can be explained neither by skilled-bias tech changes nor by the recent financial crisis.
- ▶ Unconditional gap in education premiums between academic and vocational tracks are disappearing.

## Some remarks

- ▶ After controlling for work experience, the gap remains and persists.
- ▶ Educational premiums within the cohort show similar patterns across educational levels; even for the premium on mid-school education.
- ▶ The link between educational expansions and the recent trends of educational premiums awaits further investigation.