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Global Income Dynamics  
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UNIVERSITY OF COPENHAGEN

# Global Income Dynamics Denmark

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# Outline

- Common part
- Specific part: life cycle mobility and permanent income

# Data

- Register data from 1980-2016
- Annual population registry, about 2.6 mill. observations per year.
- Earnings is employer-reported to the Danish Tax Agency
  - Includes what is payed out: Earned income including value of fringe-benefits, severance payments and value of stock options, but excluding contributions to employer pension accounts
- No top-coding
- We link to education registry

## Choices:

- Education is constant for each individual, the highest level attained in the sample
- No notable differences between the genders -> 'all' is used

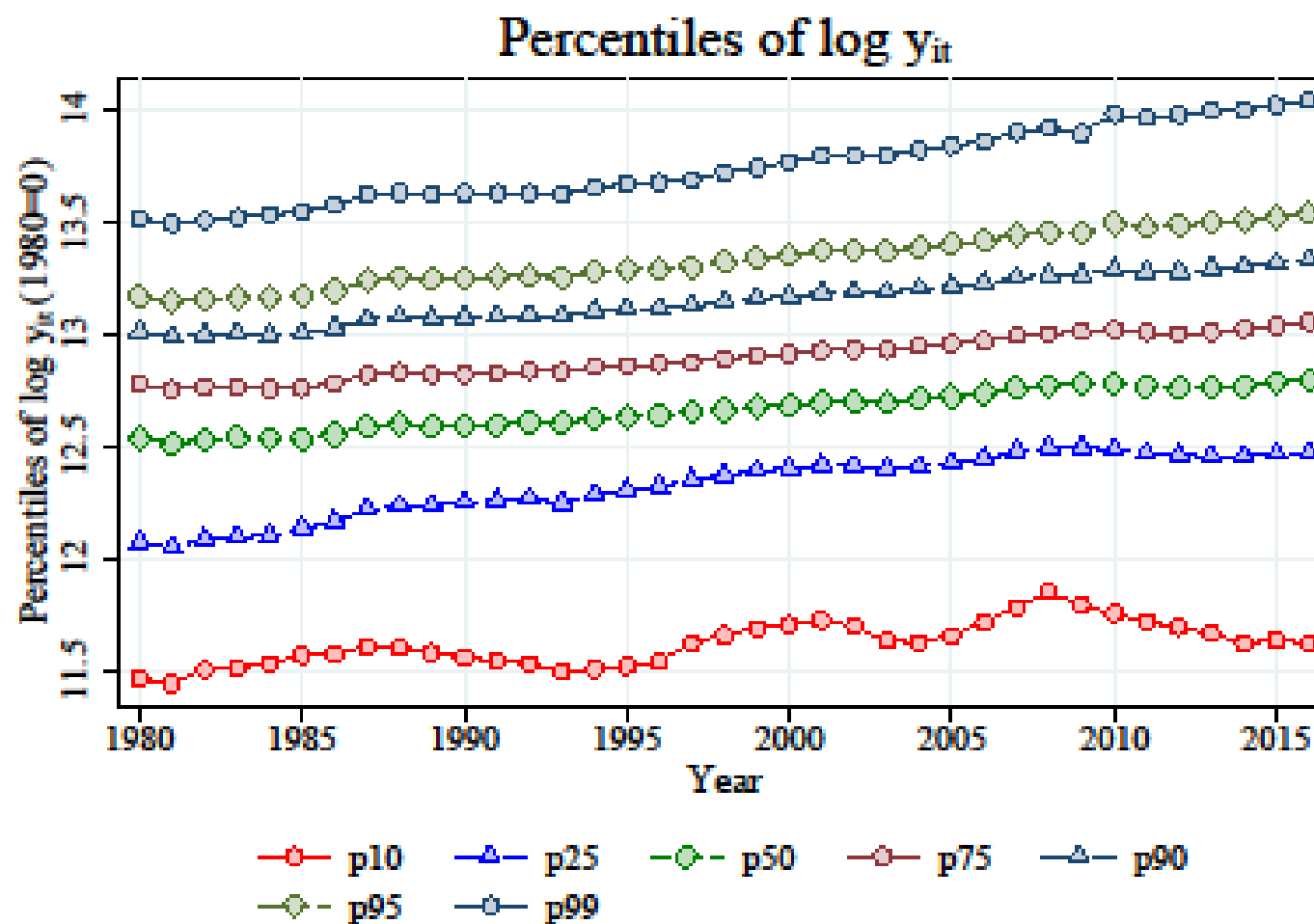
## Part A – common part

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Part A –  $\log y_{it}$

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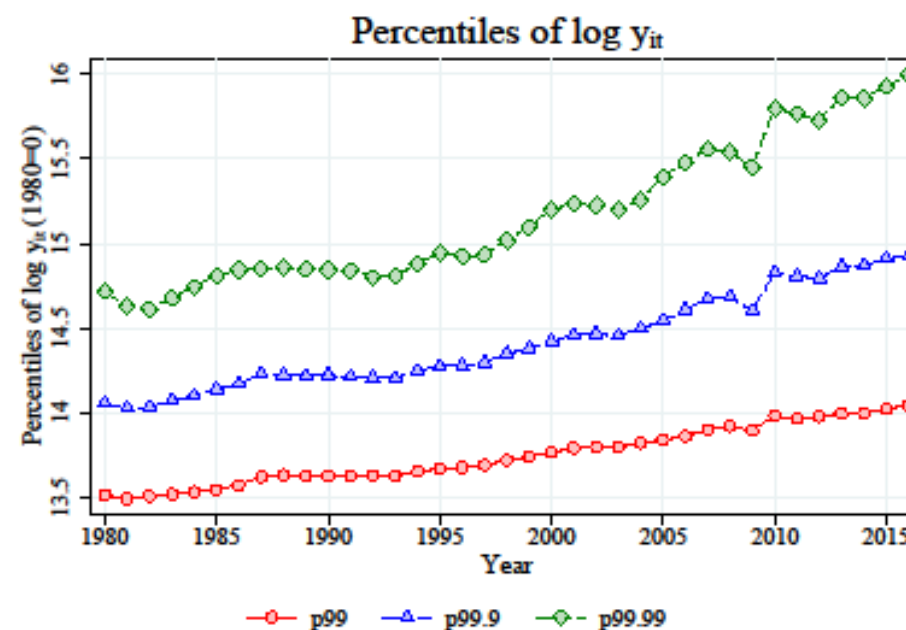
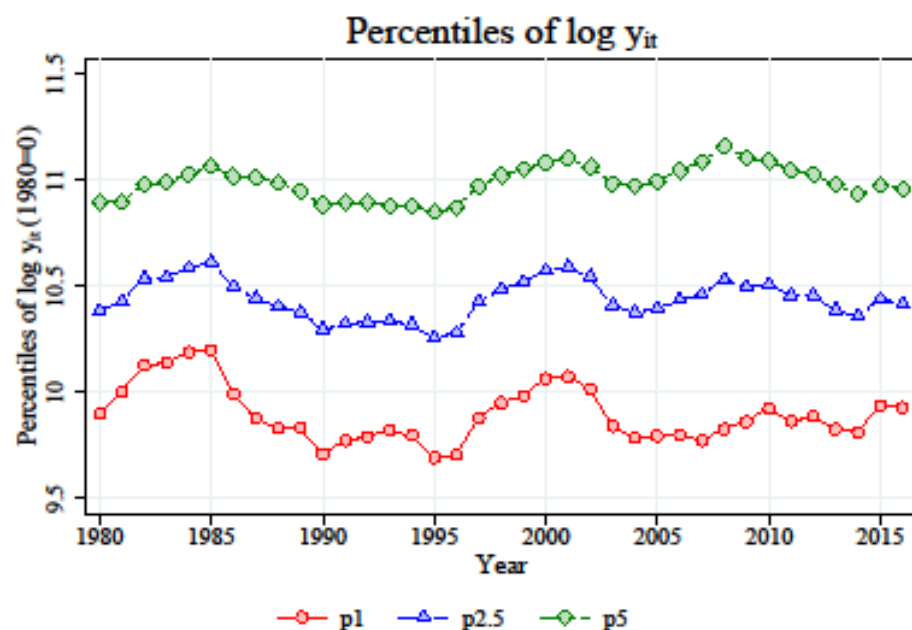
# Inequality and Concentration



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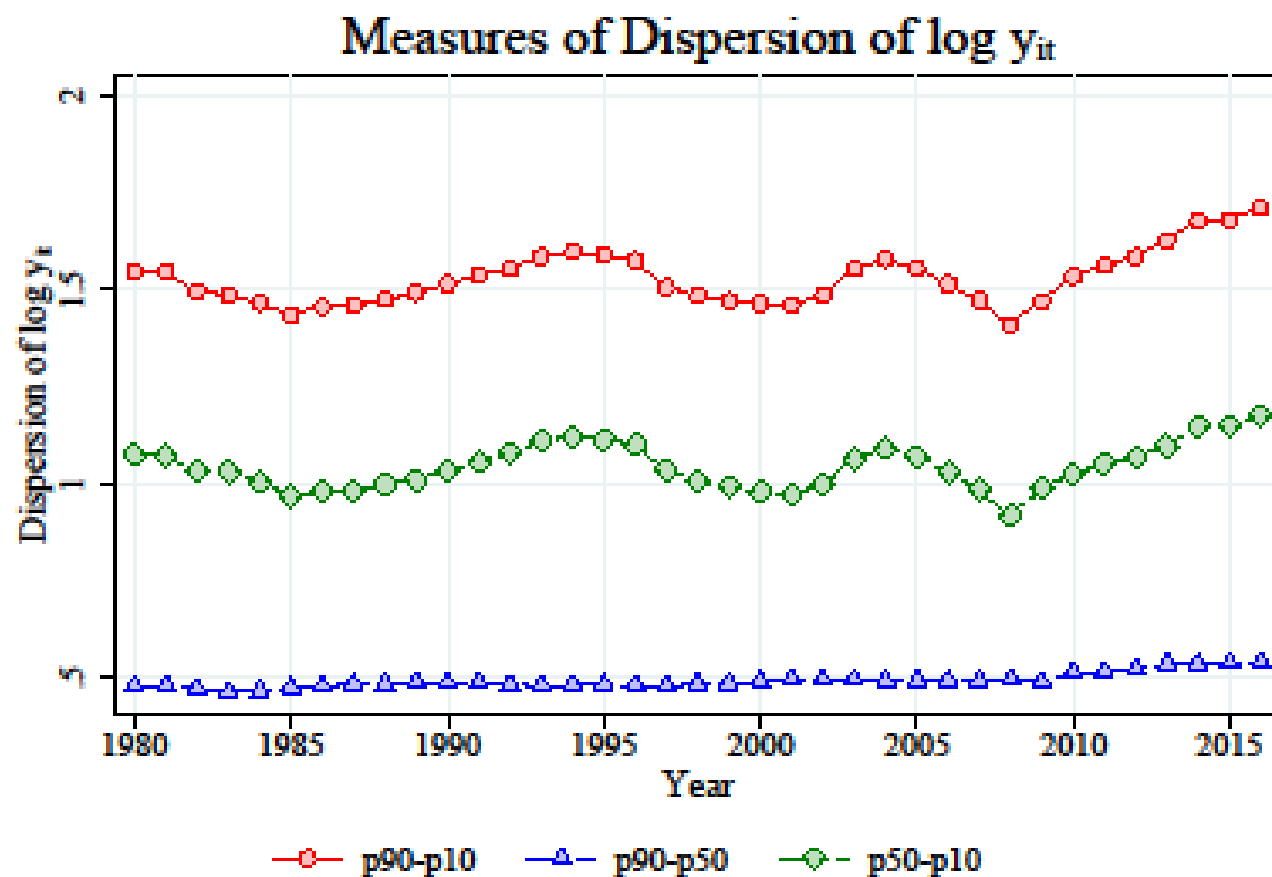
Bottom

Top



- Business cycles affect low-income
- Largest growth for high-income (p25 is an exception)

# Dispersion of $\log y_{it}$



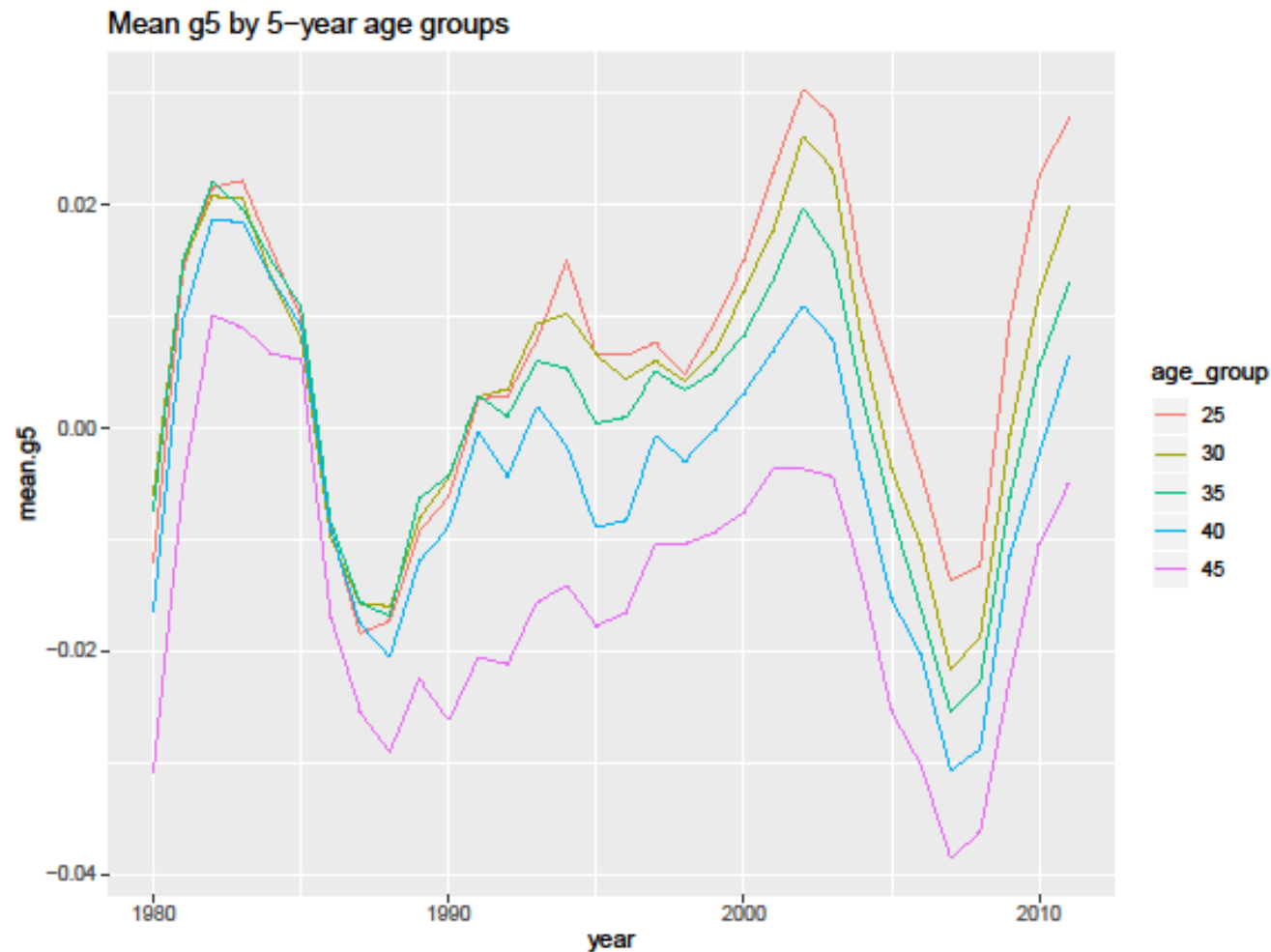
- Cross sectional dispersion is relatively constant
- Variability in dispersion is driven by low-income



## Part A – moments of $g_{it}^5$

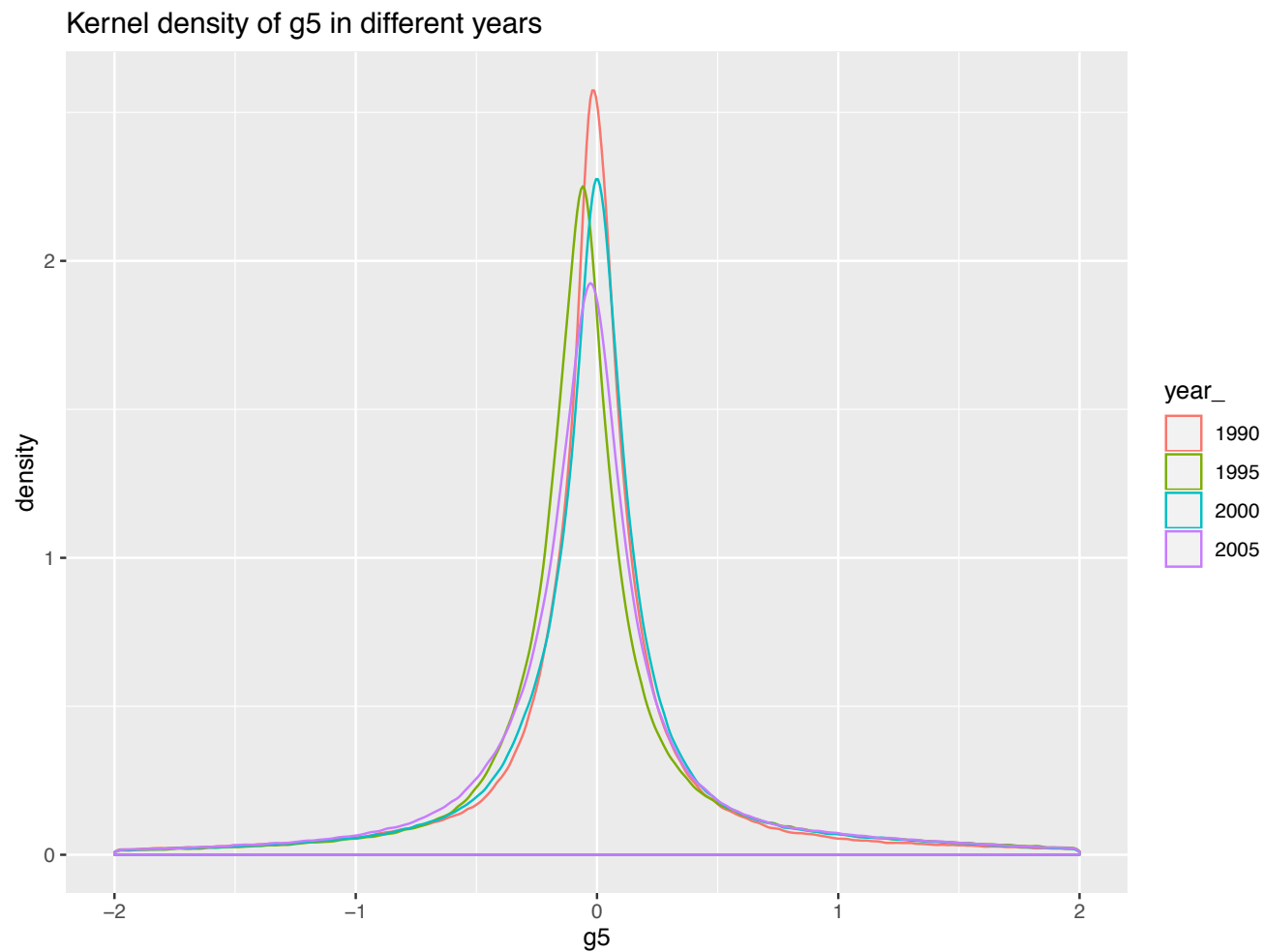
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# Volatility and Higher-Order Moments of $g_{it}^5$



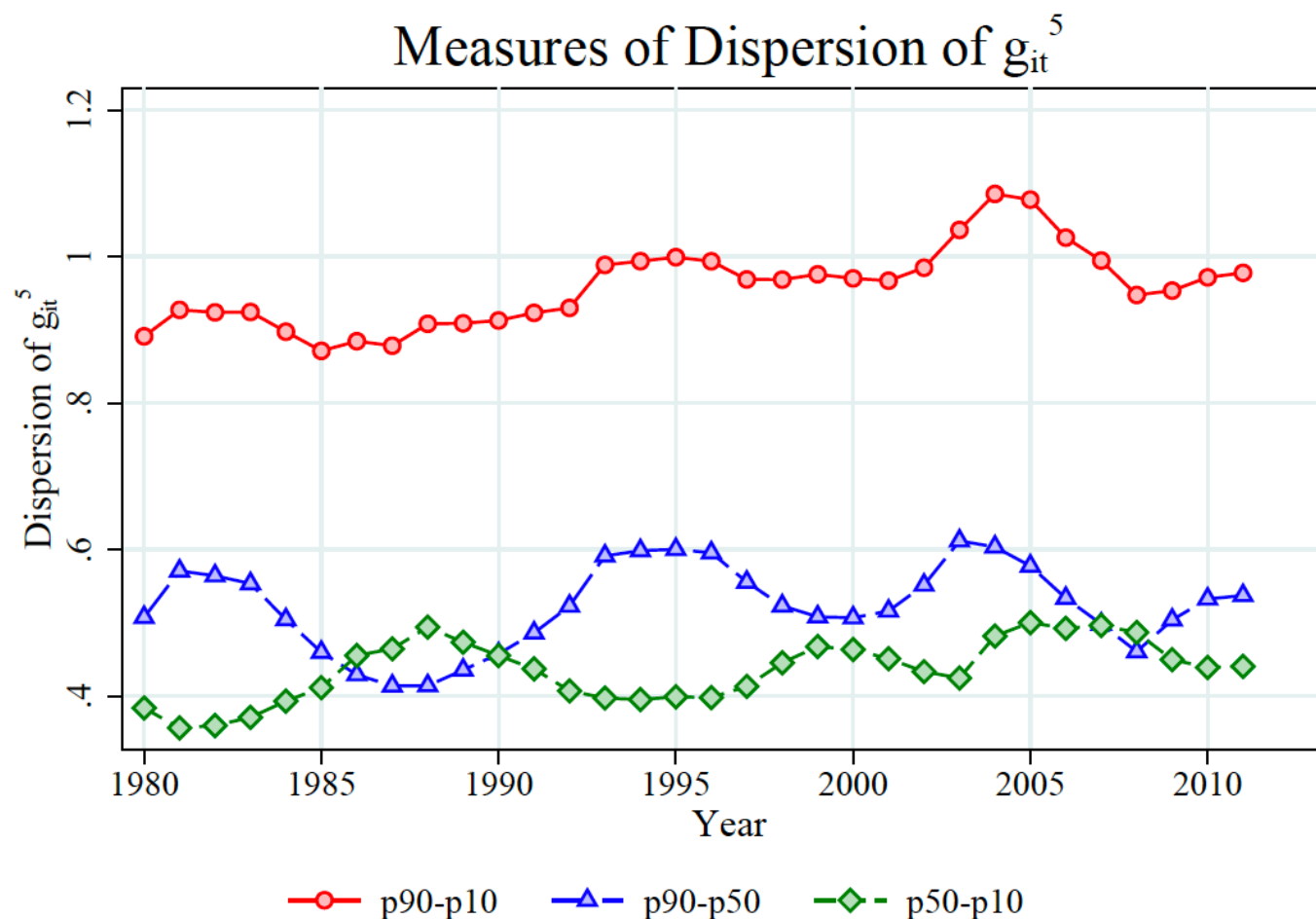
- mean of five year ahead growth rate,  $g_{it}^5$
- Co-varies with business cycle

# Volatility and Higher-Order Moments of $g_{it}^5$



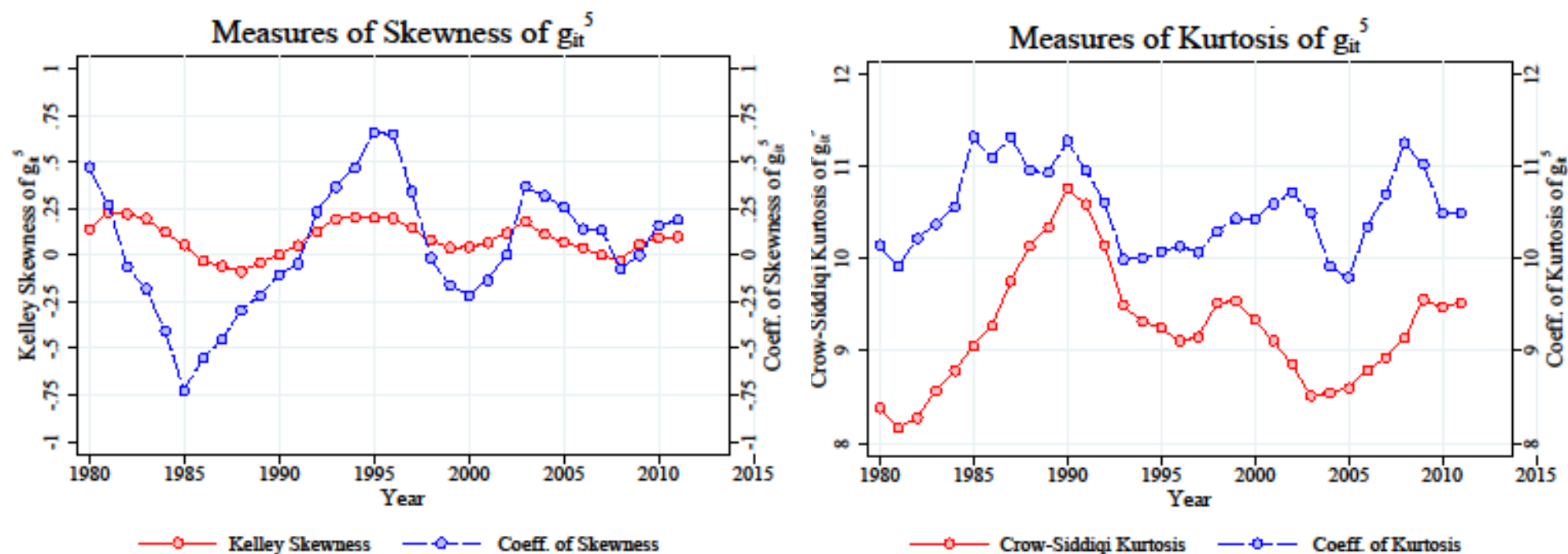
- Overall, distribution does not change much

# Volatility and Higher-Order Moments of $g_{it}^5$



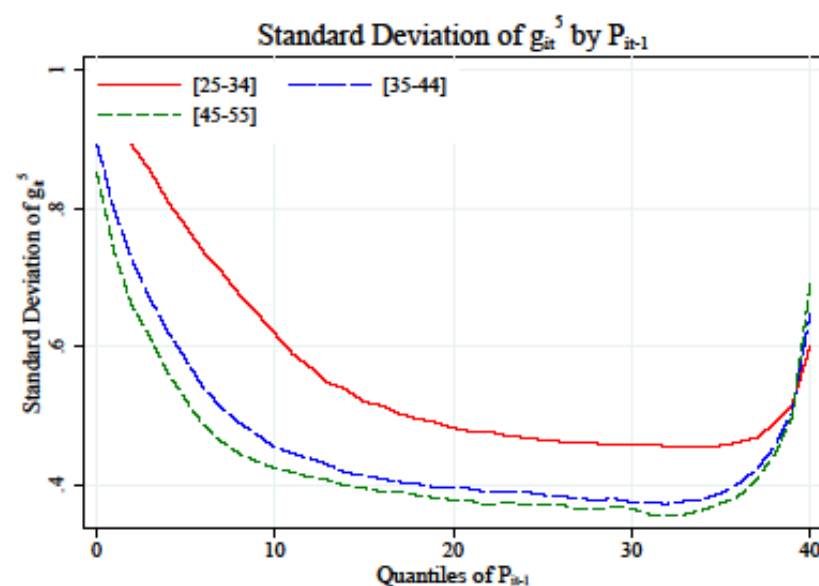
Some tendency that high and low income are mutually counter-cyclical

# Volatility and Higher-Order Moments of $g_{it}^5$

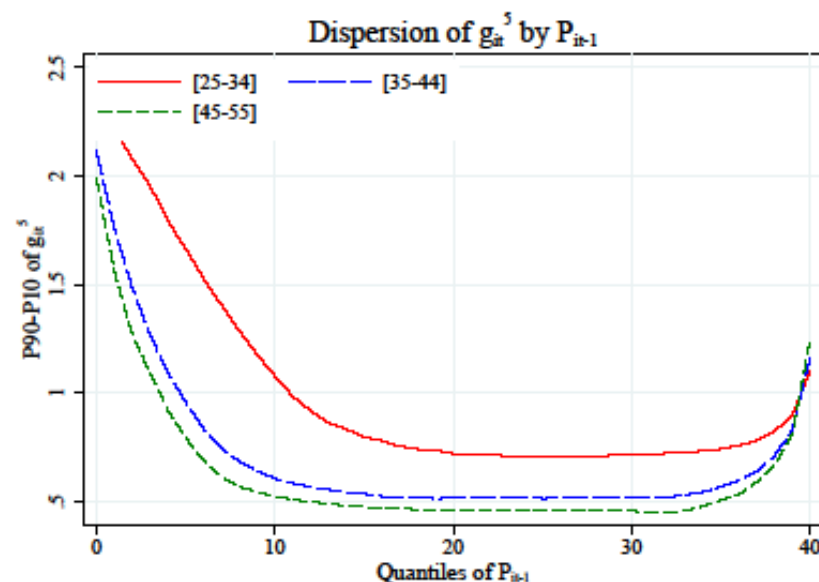


- Skewness has tendency to be cyclical
- Kurtosis reflects business cycle

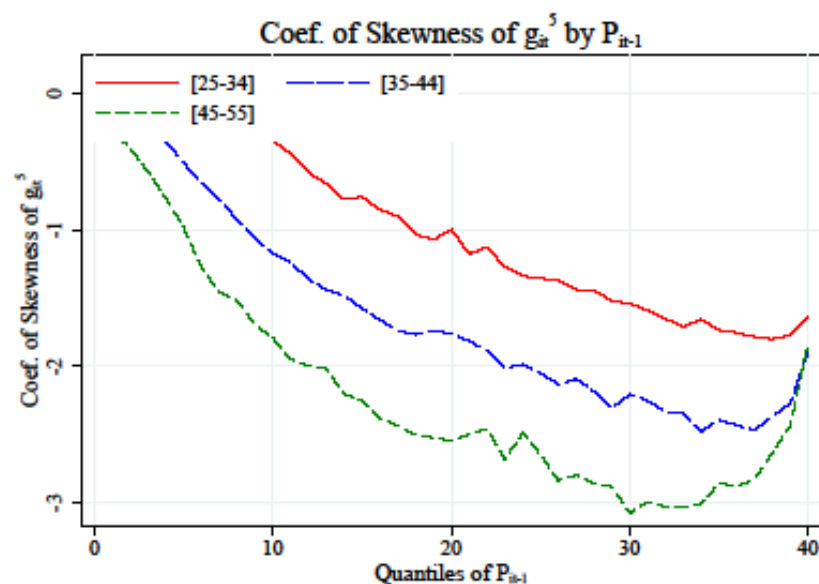
# Heterogeneity in 2<sup>nd</sup> moments of $g_{it}^5$



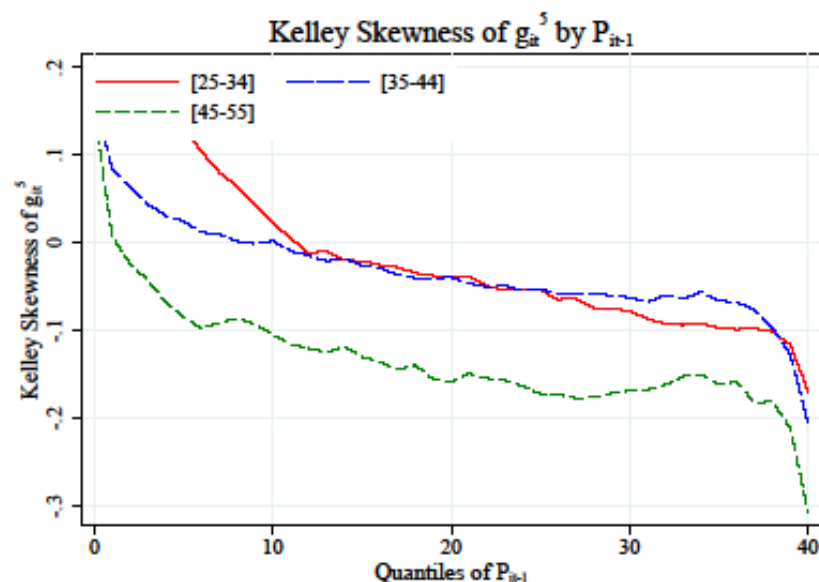
- Dispersion is largest for lower income (Except at the very top)
- Dispersion is decreasing in age
- No difference between standard and robust measure



# Heterogeneity in 3<sup>rd</sup> moments of $g_{it}^5$

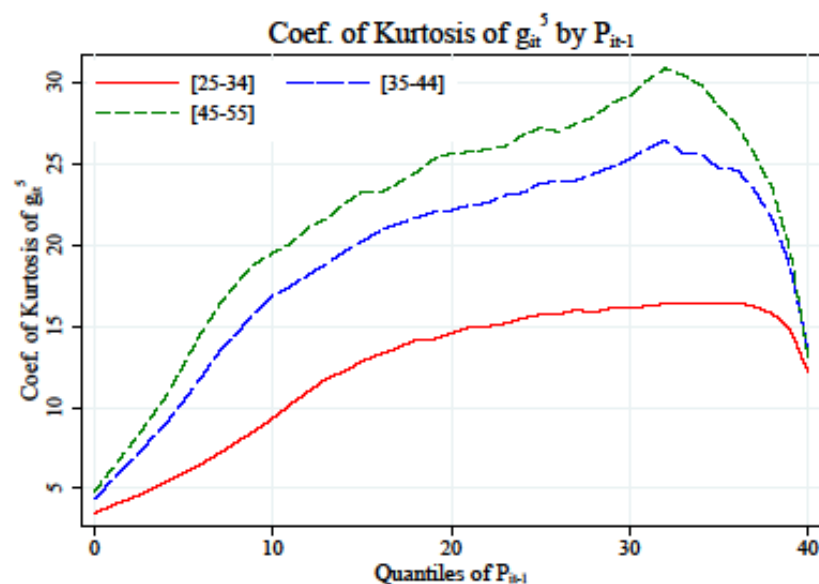


- Skewness negative for most levels of income
- Decreases as income rise
- Standard measure has skewness decreasing in age, zero at low income

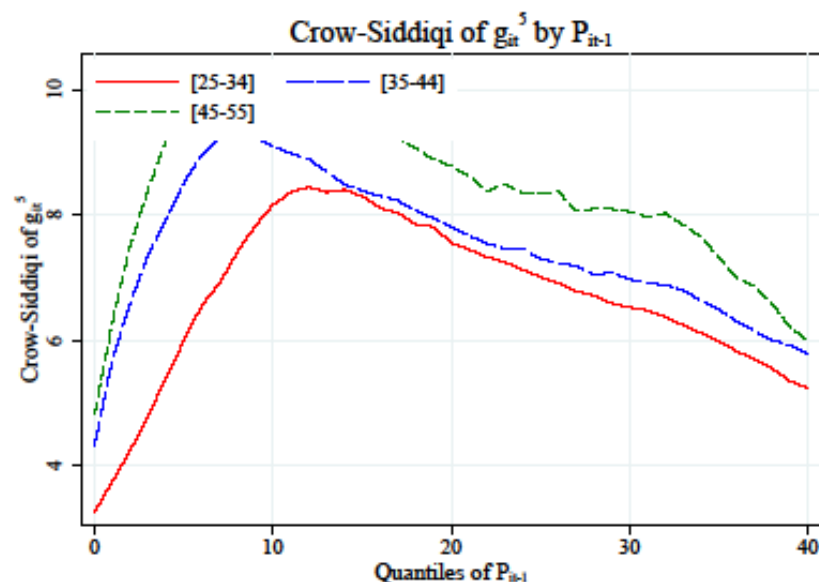


- Robust measure: also decreasing in age, but age pattern less clear

# Heterogeneity in 4<sup>th</sup> moments of $g_{it}^5$



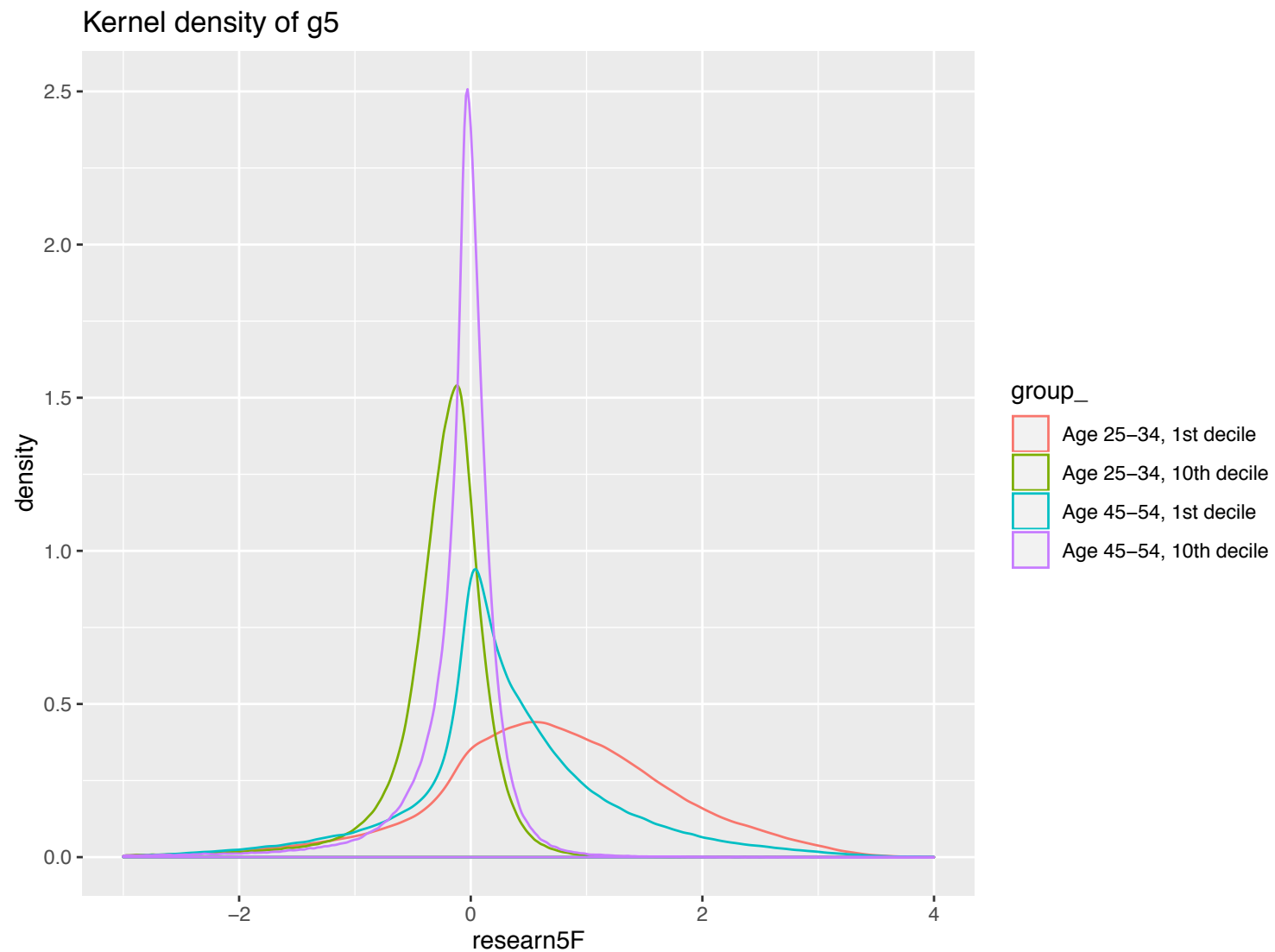
- High level of kurtosis
- Standard measure has kurtosis increasing in both income and age



- Robust measure has kurtosis increasing in income at low income levels, but decreasing in income at mid-high income. Increasing in age



# Distributions for subgroups



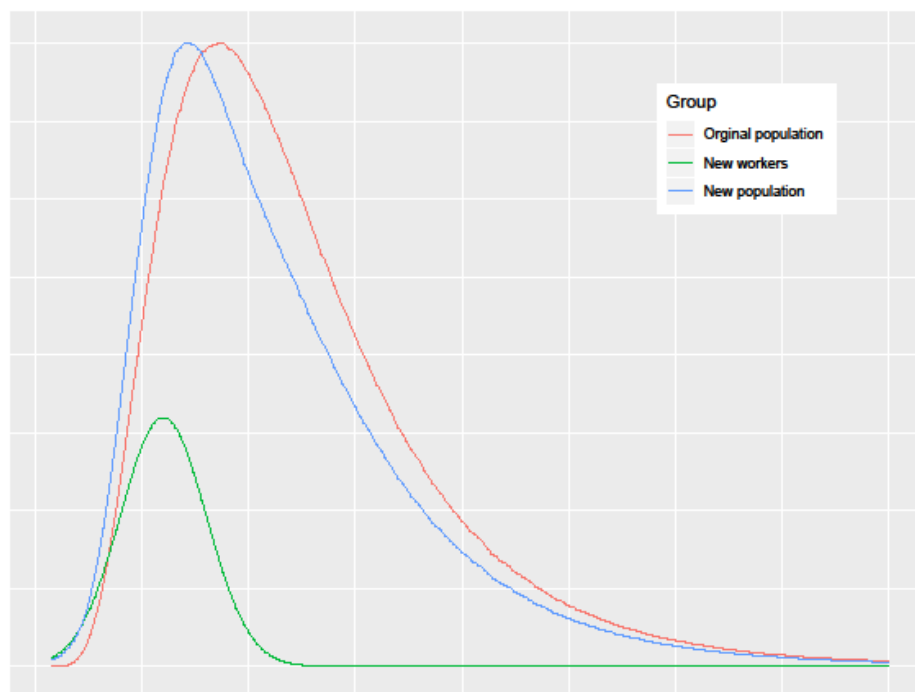
## Possible explanation – extensive margin



- Analysis includes employed people only, movements in/out of the labor force substantial
- In Denmark it is relatively easy to fire employees (and therefore less risky to hire)
- During boom periods, low-skilled workers are hired -> Affects distribution

## Synthetic pop – add low income workers

- When a group of low income workers enter the labor market, moments change
- Changes in the extensive margin can explain changes in moments

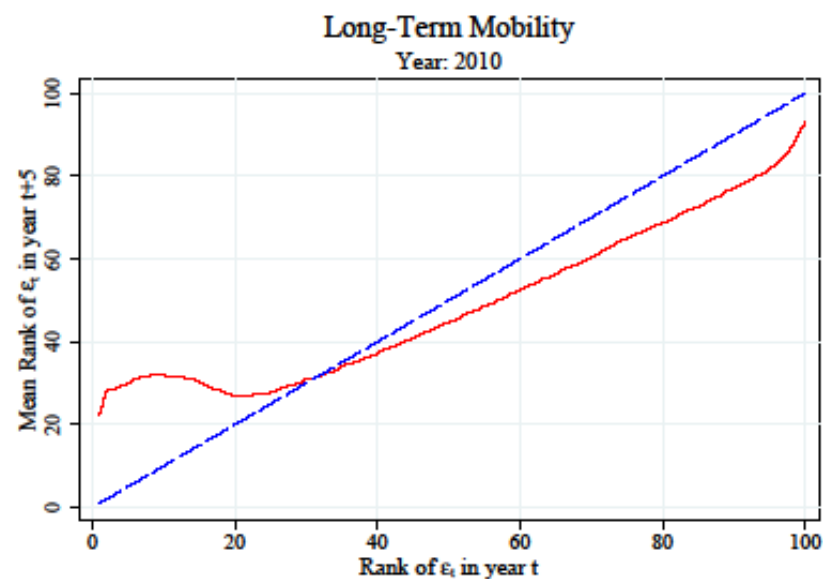
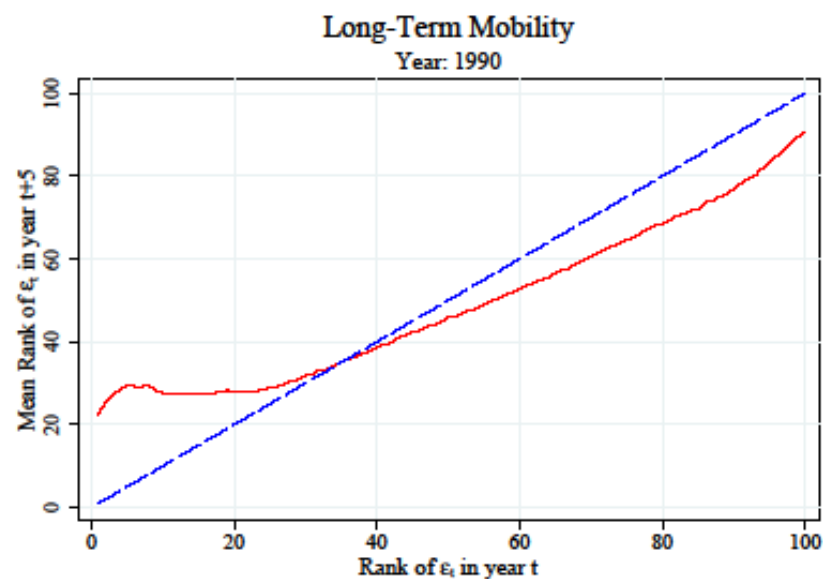
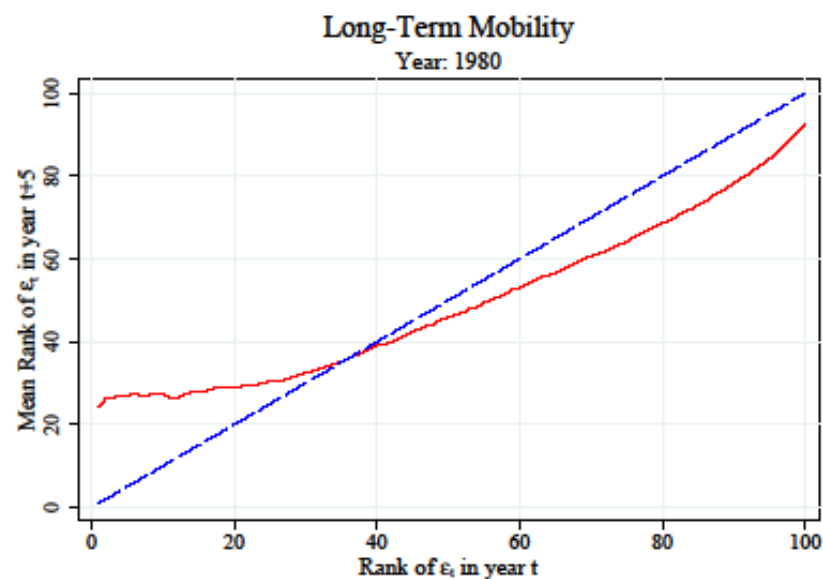


|                     | Mean | Dispersion | Kelley's Skewness | Crow-Siddiqui |
|---------------------|------|------------|-------------------|---------------|
| Original population | 0.30 | 0.88       | 0.71              | 1.92          |
| New population      | 0.28 | 0.82       | 0.74              | 2.16          |

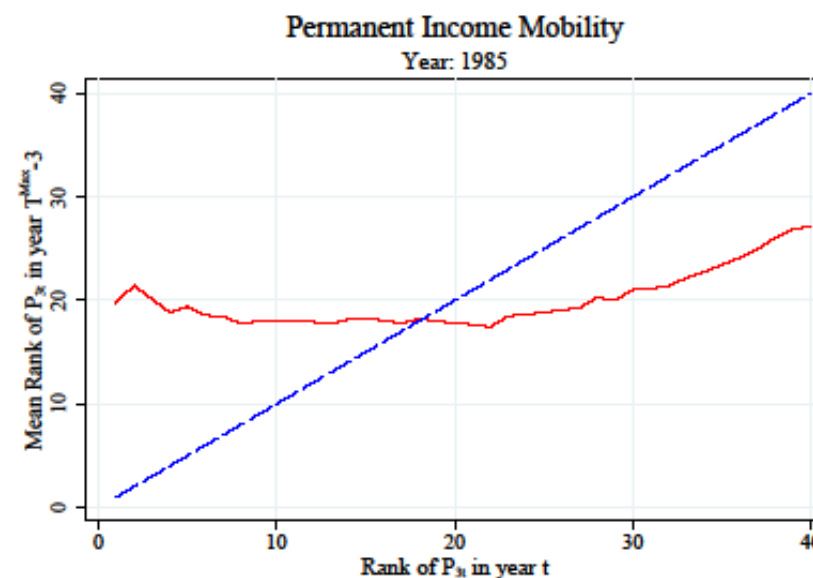
## Part A – Long-term mobility

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# Five-year ahead mobility

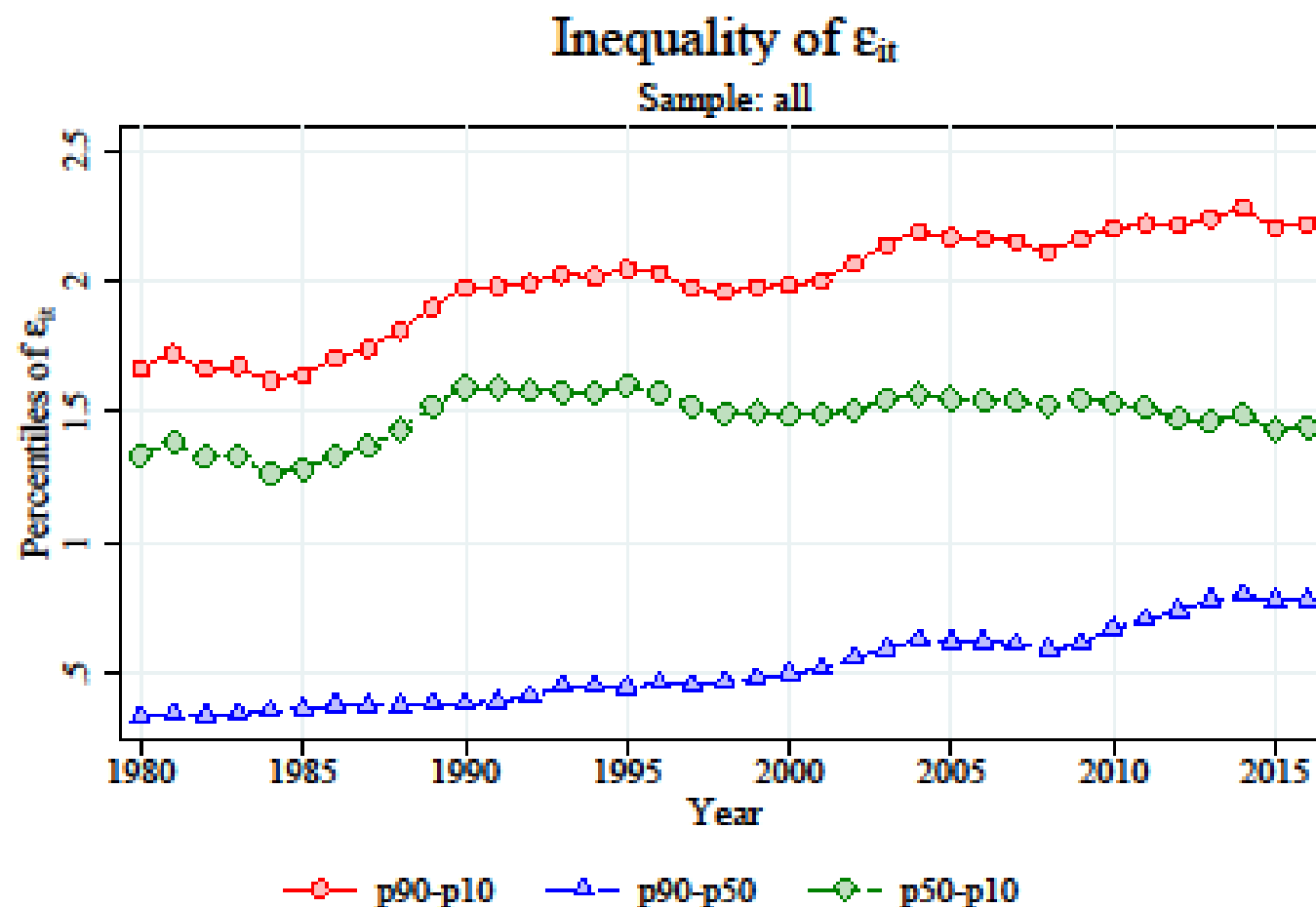


# Permanent Income Mobility, 1985



- Longer time frame flattens slope
- Note
  - Pooling of cohorts
  - 1985-2013 holds few cohorts,
  - Do youth observations predict permanent income?
- Part 2 - heterogeneity in long term mobility

# Initial conditions



- Inequality at age 25 has increased over time
- Left-tail: only increase from 1984-1990
- Right-tail: drives rise in inequality

## Part 2 – Long term mobility and permanent income

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# Motivation

- One of the advantages of the Danish data is that the panel dimension is long.
- Contains entire work history (25-55) for several cohorts
- Use this to
  - A. look into heterogeneity in long-term mobility
  - B. Assess how well permanent income is approximated by short averages

## Part 2A – Heterogeneity in Income Mobility

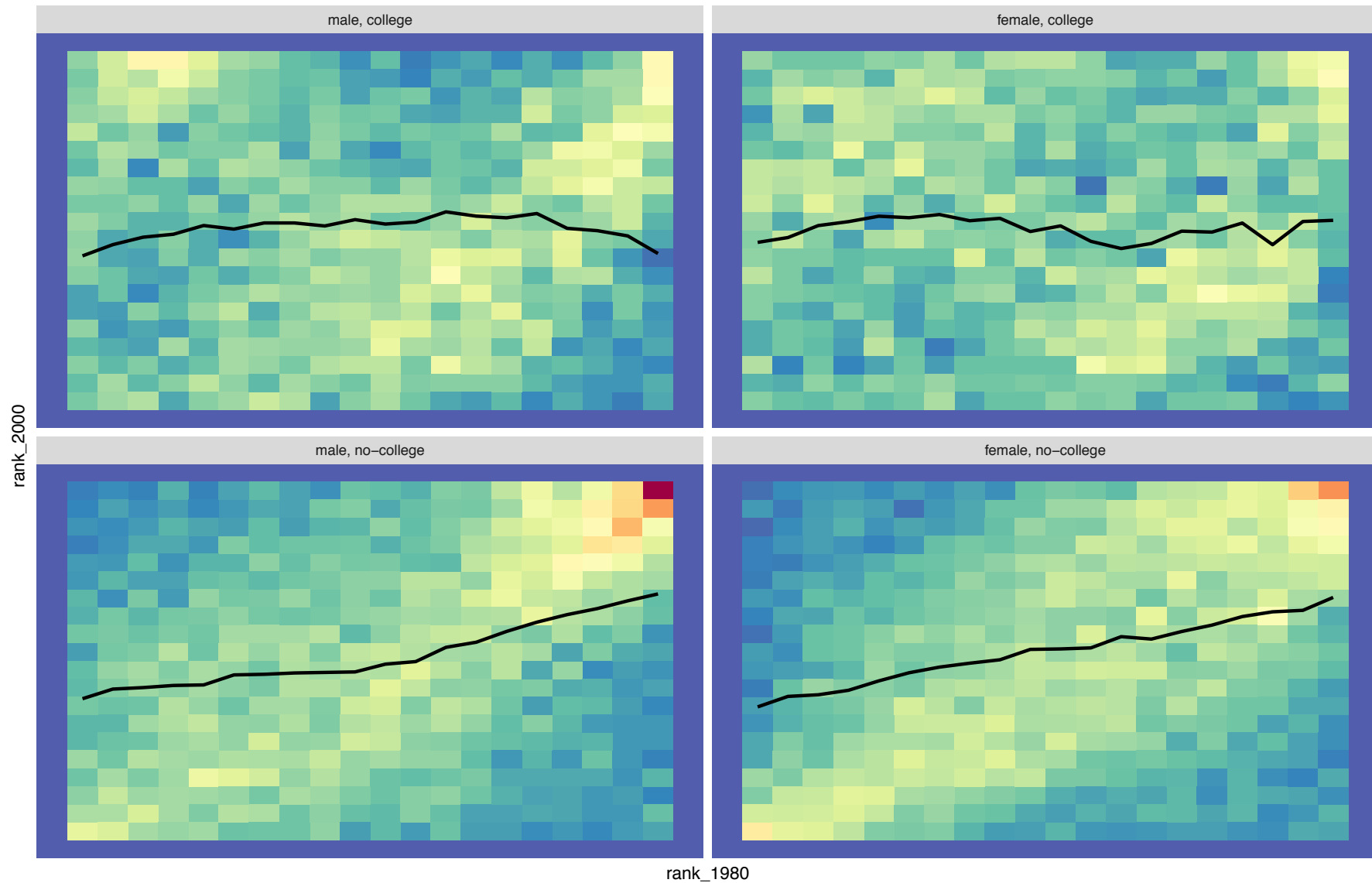
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## Long term mobility

- Consider 20-year income mobility (looks similar to 30 mobility), 25-45
- Assess stability across cohorts (1955, 1975)
- Split by completed education and gender

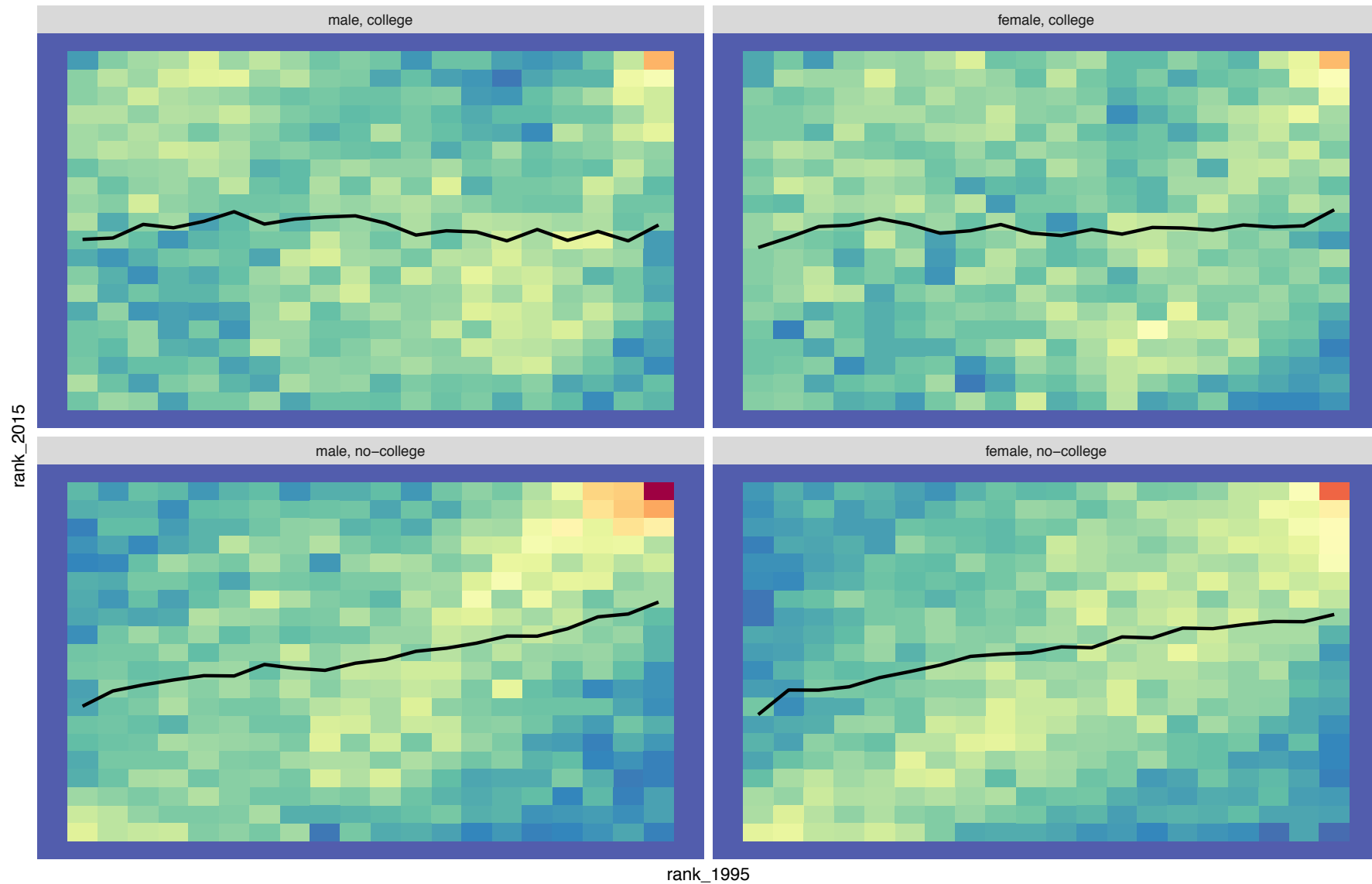
# Long-term rank mobility, 1955, age 25-45

1955-25-45



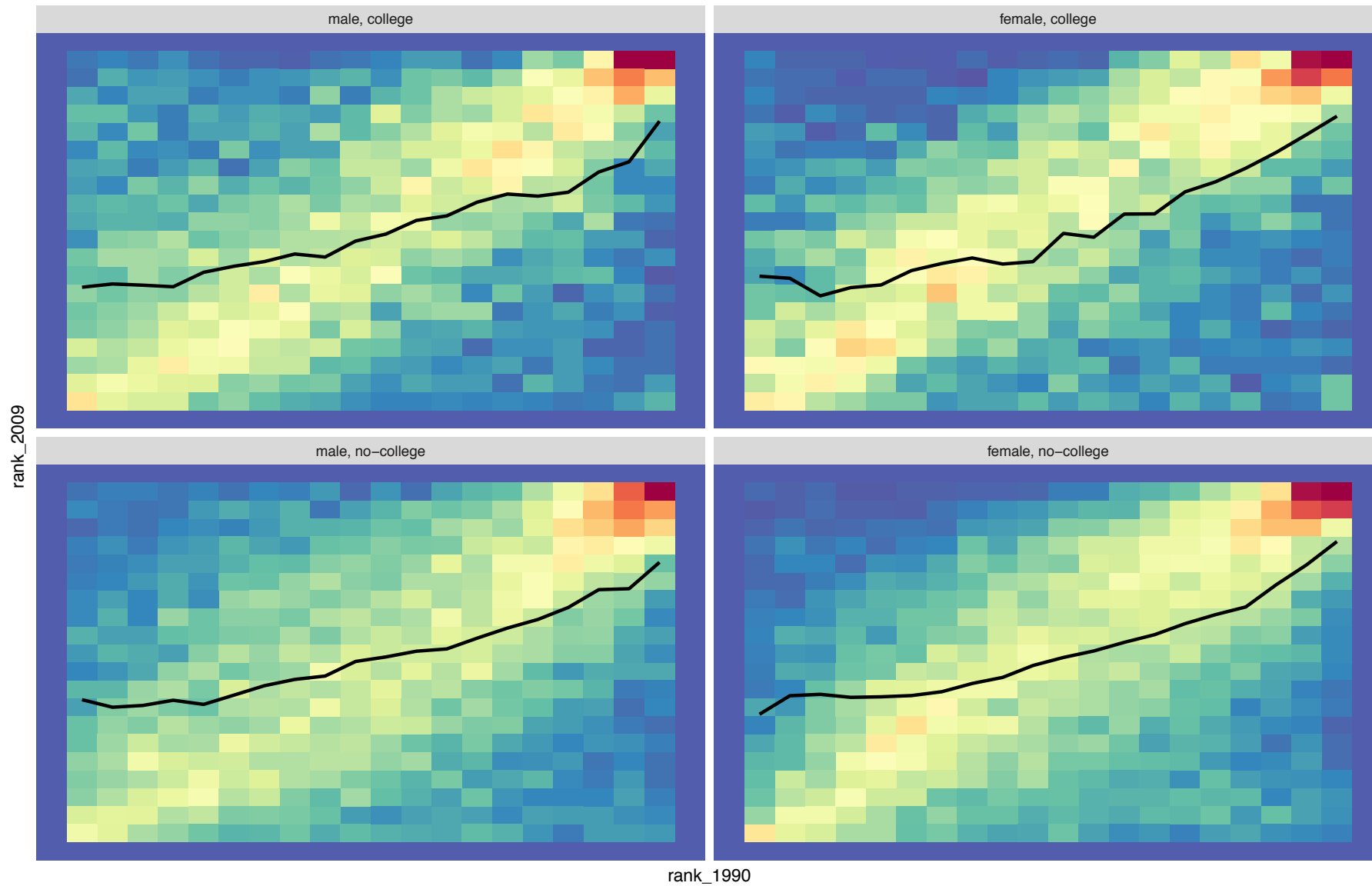
# Long-term rank mobility, 1970, age 25-45

1970-25-45



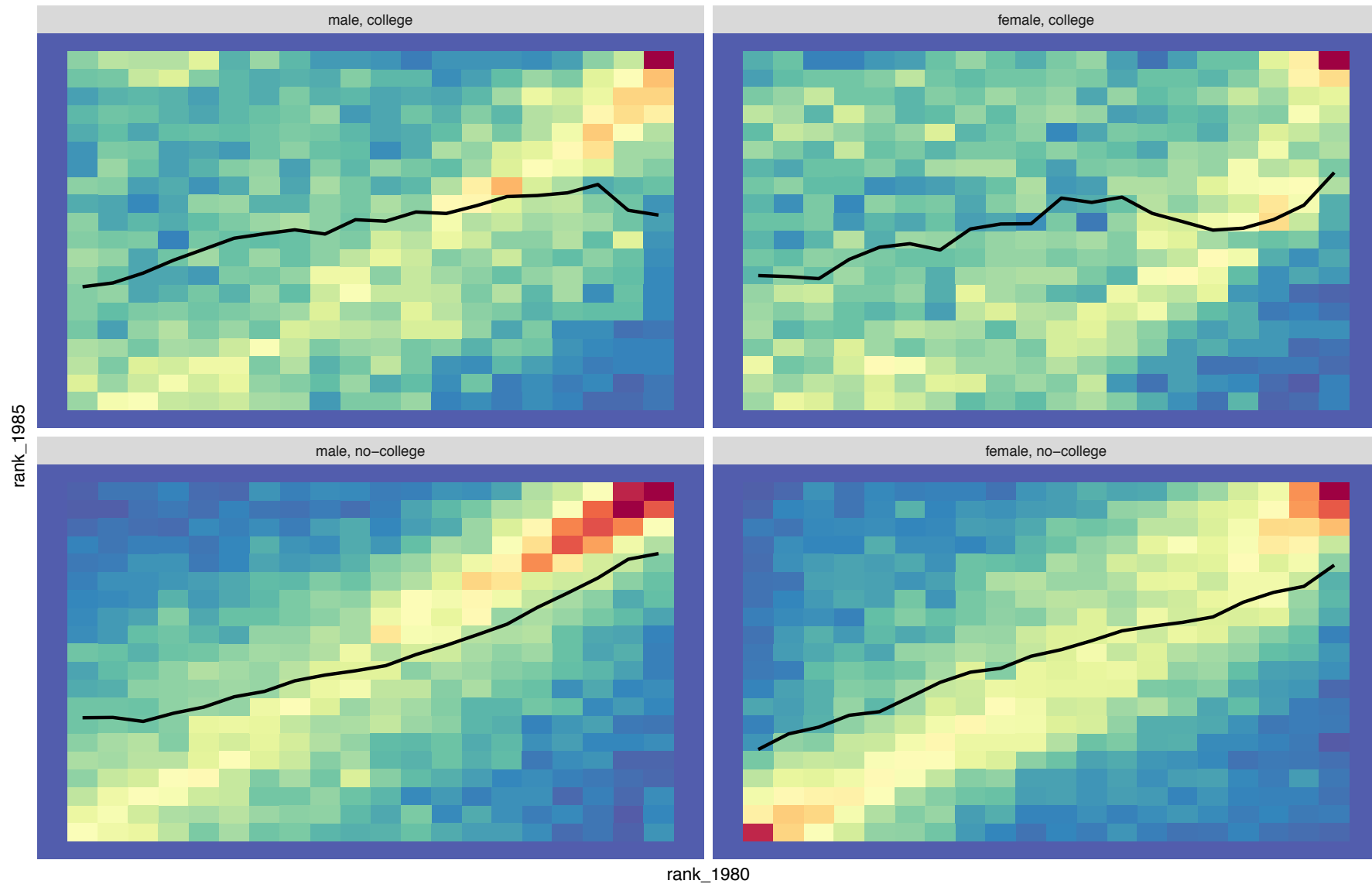
# Long-term rank mobility, 1955, age 35-54

1955-35-54



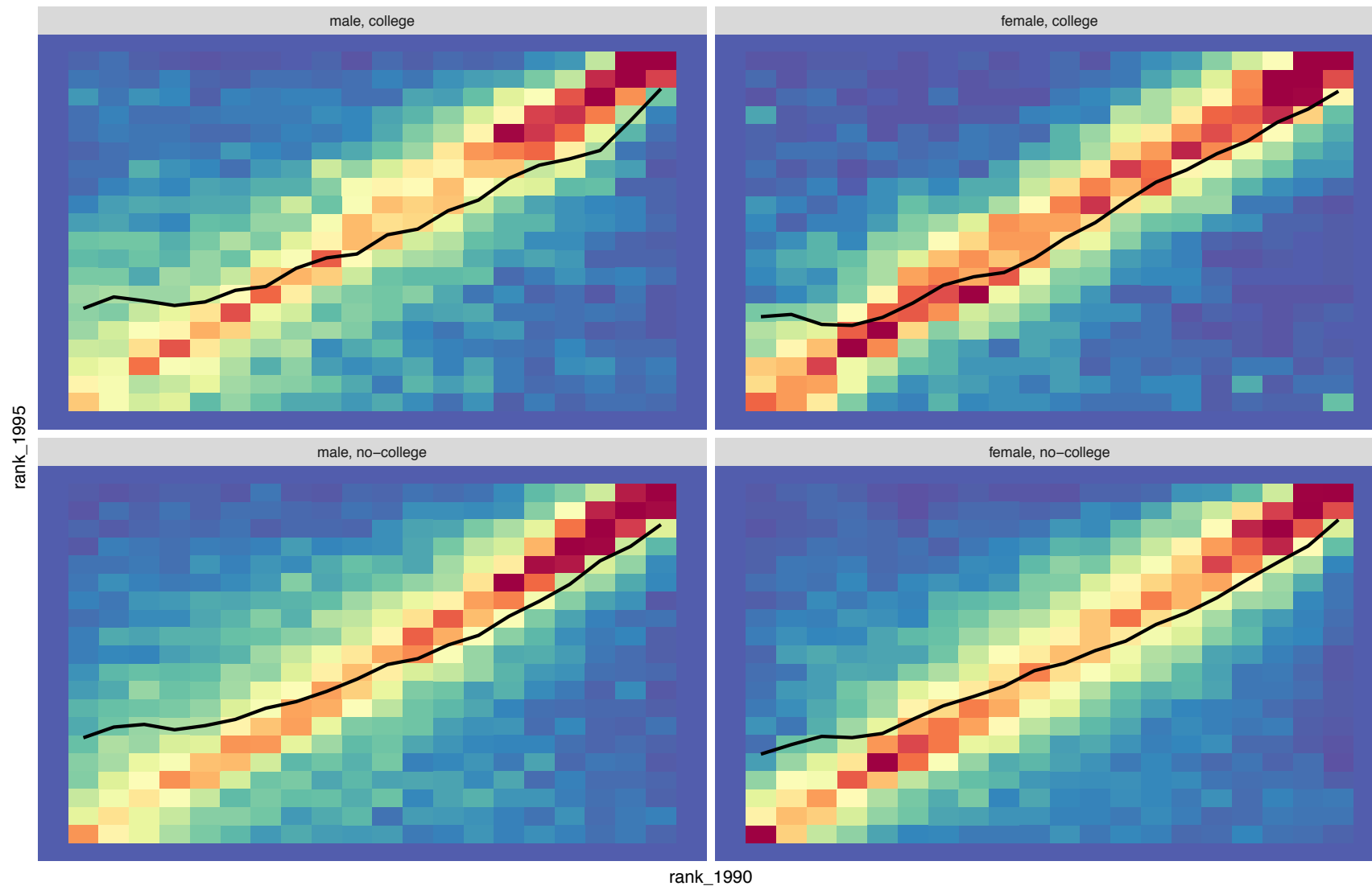
# Short-term rank mobility, 1955, age 25-30

1955-25-30



# Short-term rank mobility, 1955, age 35-40

1955-35-40





# Mobility heterogeneity

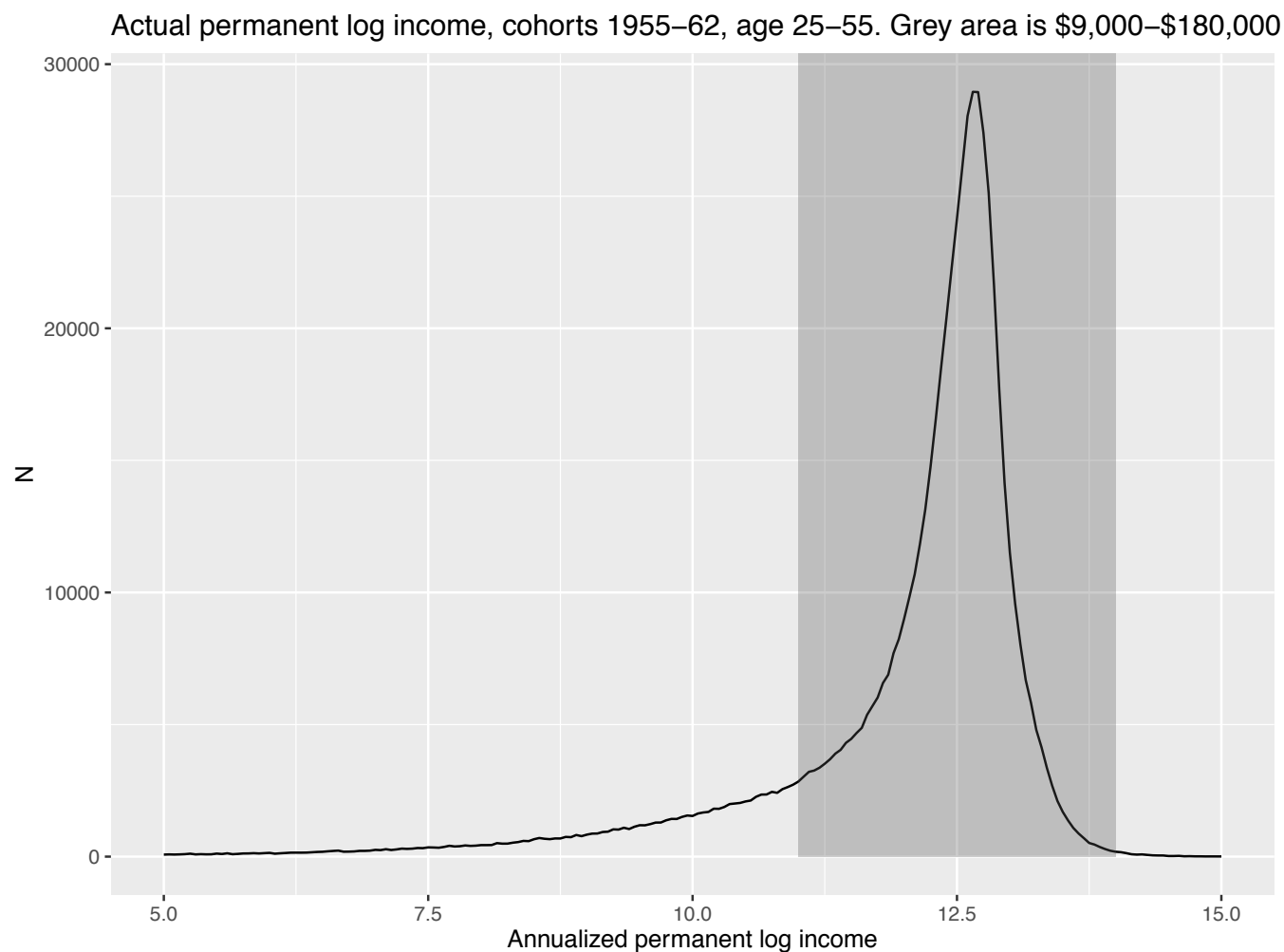
- Long-term mobility (25-45) is stable across cohorts
- More mobility for college
- Most mobility is at young ages, <35
- The starting age is critical for the mobility statistic, in particular for college
- Future: combine this with life time inequality and initial conditions

## Part 2B – Permanent income

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# Motivation

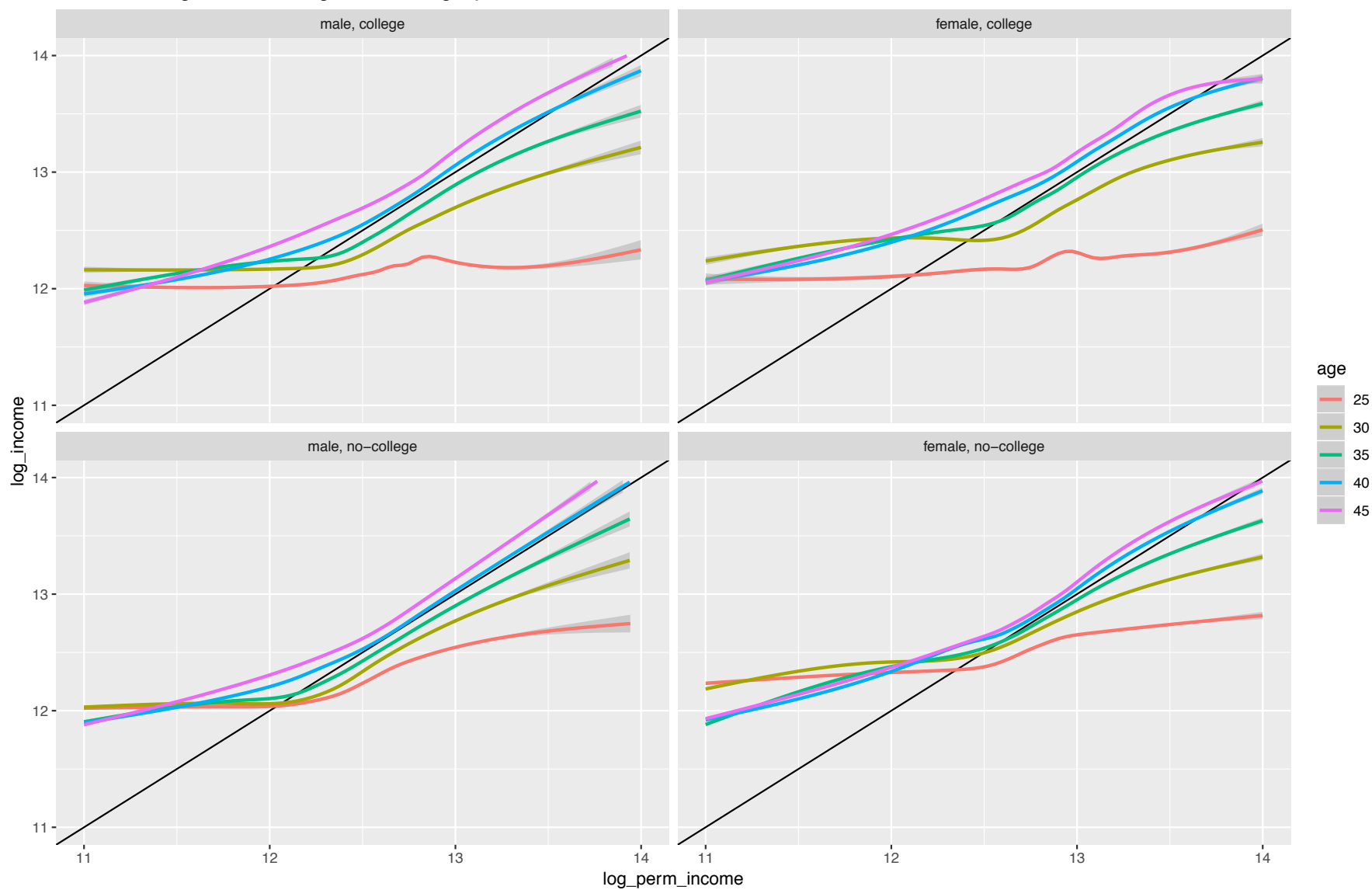
- Our long panel has several cohorts where follow entire work history (25-55)
- How well do short averages approximate “permanent income”?
- Take life time average, see how log income at different ages predict life time average



# Permanent income, 1 year

- Cohorts 1955-62, Heterogeneous groups, Ages: 25,30,35,40,45

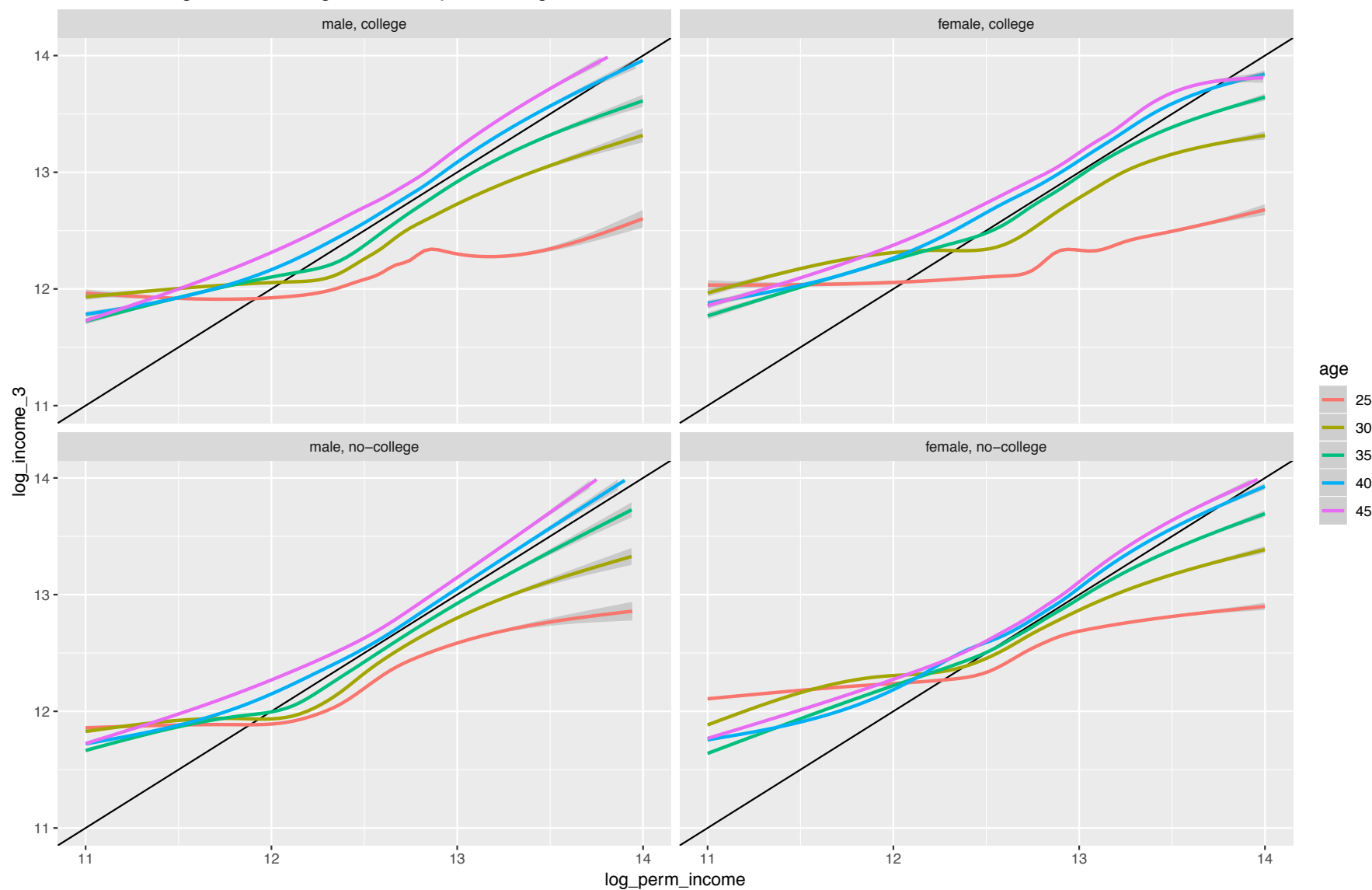
Permanent log income vs. log income, single year observations, \$9,000–\$180,000



# Permanent income, 3-year average

- Cohorts 1955-62, Heterogeneous groups, Ages: 25,30,35,40, 45

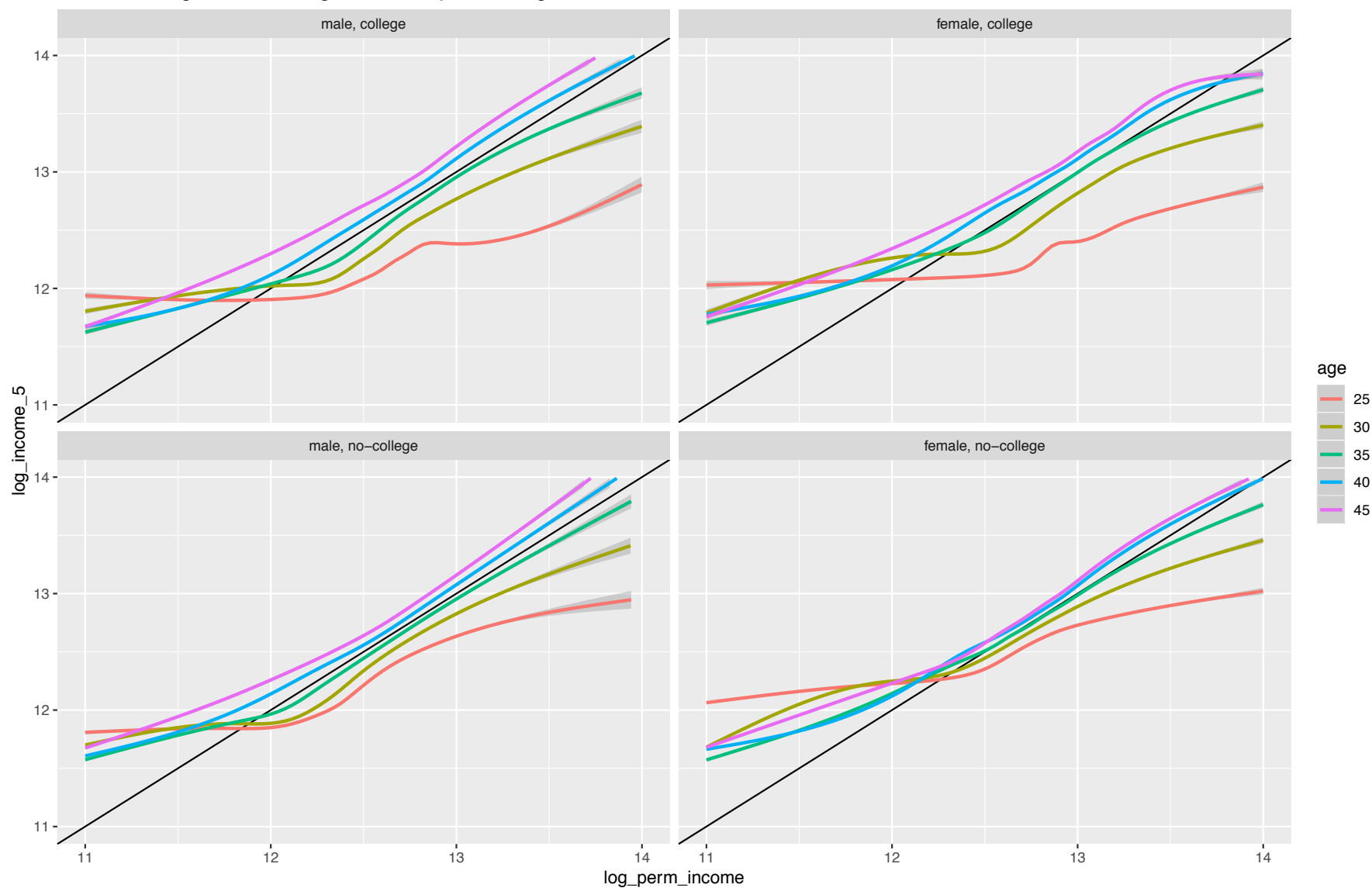
Permanent log income vs. log income, 3-year averages, \$9,000–\$180,000



# Permanent income, 5-year average

- Cohorts 1955-62, Heterogeneous groups, Ages: 25,30,35,40, 45

Permanent log income vs. log income, 5-year averages, \$9,000–\$180,000



# Permanent income

- 5-year averages approximate permanent income well from age 35
- 3-year averages approximate permanent income well from 35, but less well than 5-year average
- Yearly observations less well than short averages
- For all measures there are people at the bottom of the “permanent income” distribution who are not approximated well by any of the measures. They have phases of life without income
- These results are consistent with long term mobility results from part 2A showing that most mobility takes place before age 35.
- The findings are broadly consistent with Haider and Solon (2006)

# Summary

- Cross-sectional dispersion is relatively constant
- The very top (>p99) has taken off (stable trend)
- The bottom is sensitive to business cycle => larger dispersion
- Dispersion in growth rates is biggest at low income levels and for young
- Participation seems to be important
- Important part of mobility happens before age 35 => difficult to approximate permanent income with short averages for young and low income people
- Plan to unfold description inequality in life time income and how this relates to initial conditions and early mobility