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Gloabl Income Dynamics Conference
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UNIVERSITY OF COPENHAGEN

Global Income Dynamics Denmark

Søren Leth-Petersen
Johan Sæverud

Outline

- Common part: earnings (growth)
- Specific part:
  - Compare with disposable income
  - Estimate simple permanent-transitory income process for earnings and disposable income

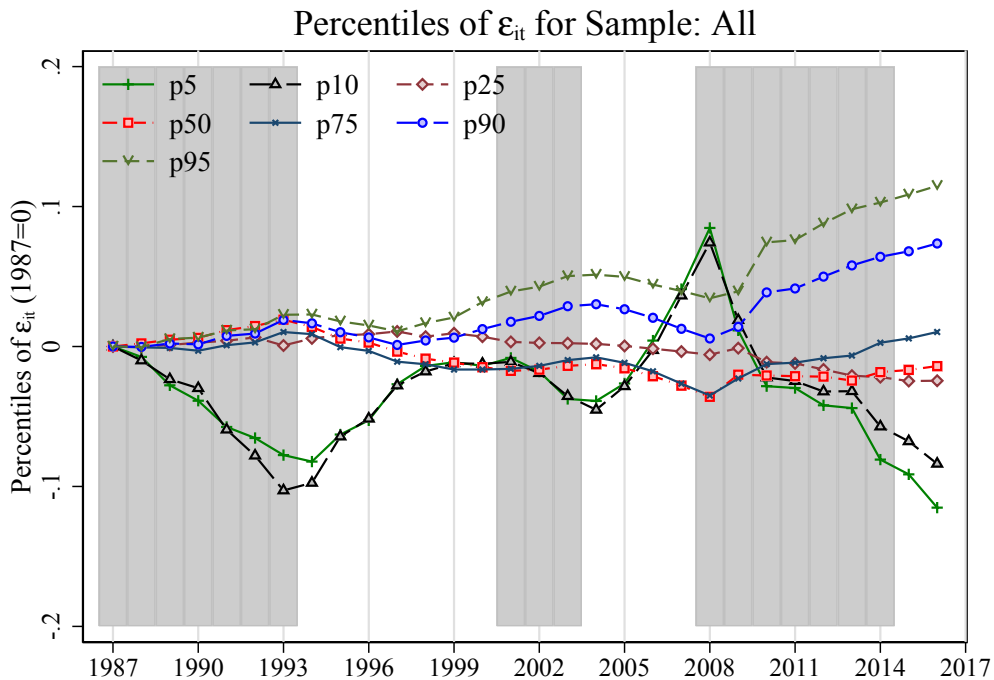
Data

- Register data from 1987-2016
- Workers aged 25-55 ($\approx$ 2.6 mill. obs. per year)
- Deflated annual income
- Both wage earnings and disposable income
- 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)
- Disposable income from tax return (mostly 3rd party reported items)
- No top-coding

Residualized log income, ε_{it}:

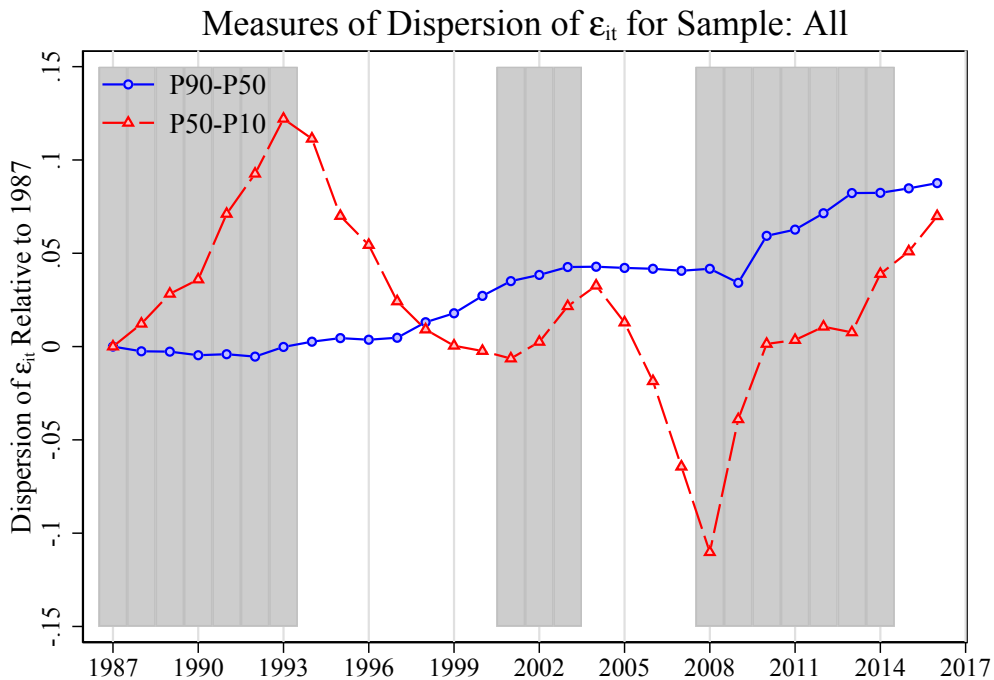
- Values $<$ DKK 28,500 a year are dropped (USD 1 $\approx$ DKK 7)
- We condition on both earned and disposable income above threshold
- log y_{it} regressed on full set of age, year, gender dummies

Level: ε_{it}



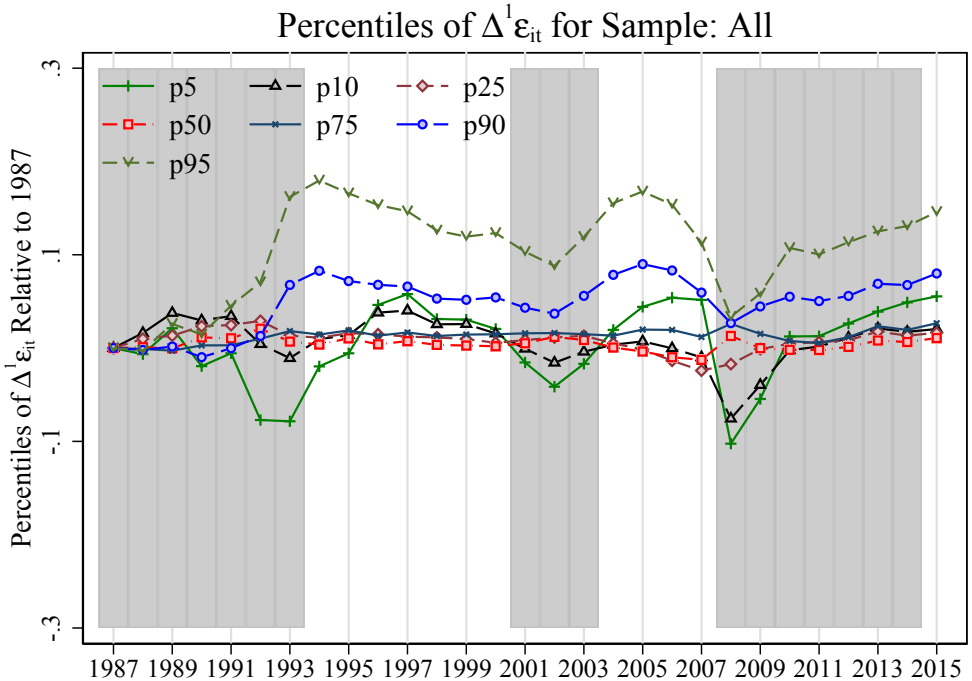
- Middle (p25 - p75) is stable
- Top ($\geq$ p90) takes off during recessions, particularly after 2010
- Bottom ($\leq$p10) - clearly suffers from recessions
- Recessions are defined as years with GDP growth $< 2\%$

Dispersion of ε_{it}



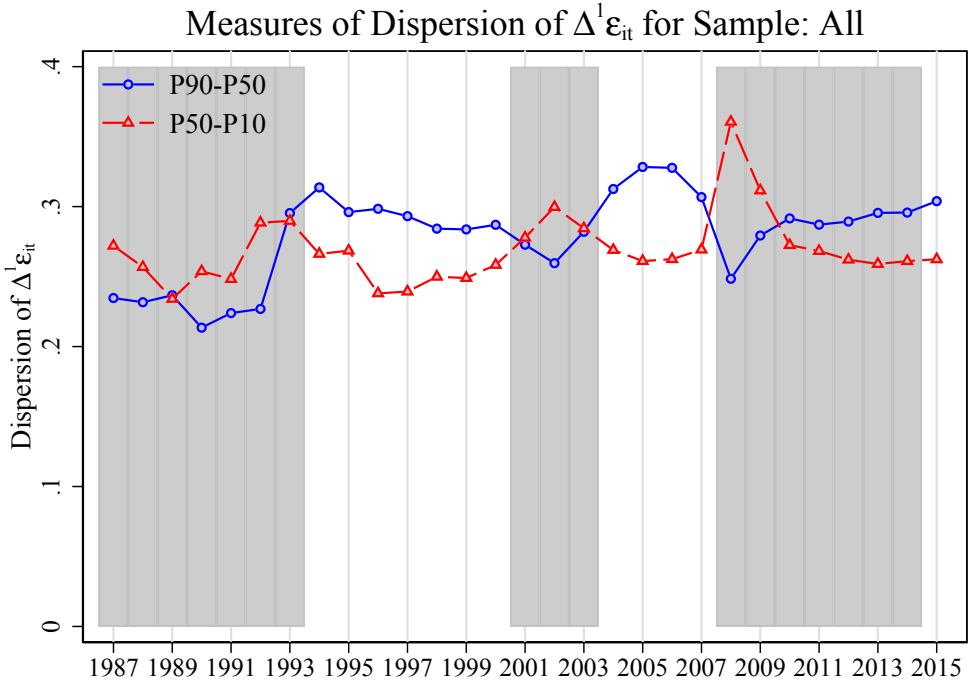
- Bottom is exposed to recessions
- The spread is steadily increasing in the top

Dynamics - Level: $\Delta\varepsilon_{it}$



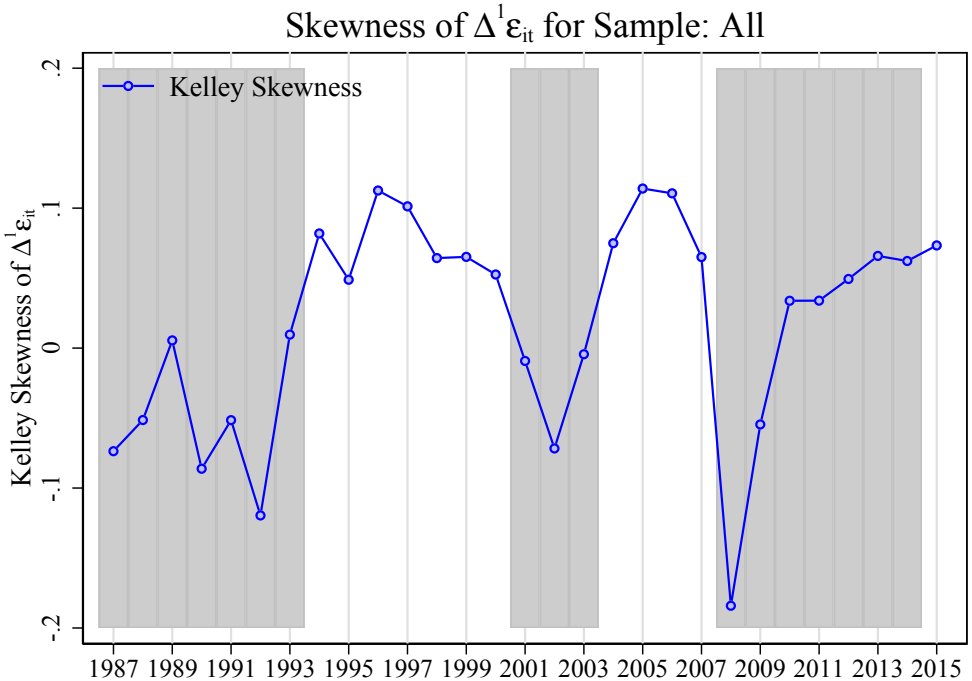
- Top: growth rate steadily increasing
- Middle: stable growth rates
- Bottom: fluctuating growth rates and not so tightly linked to business cycle

Dynamics - Dispersion: $\Delta\varepsilon_{it}$



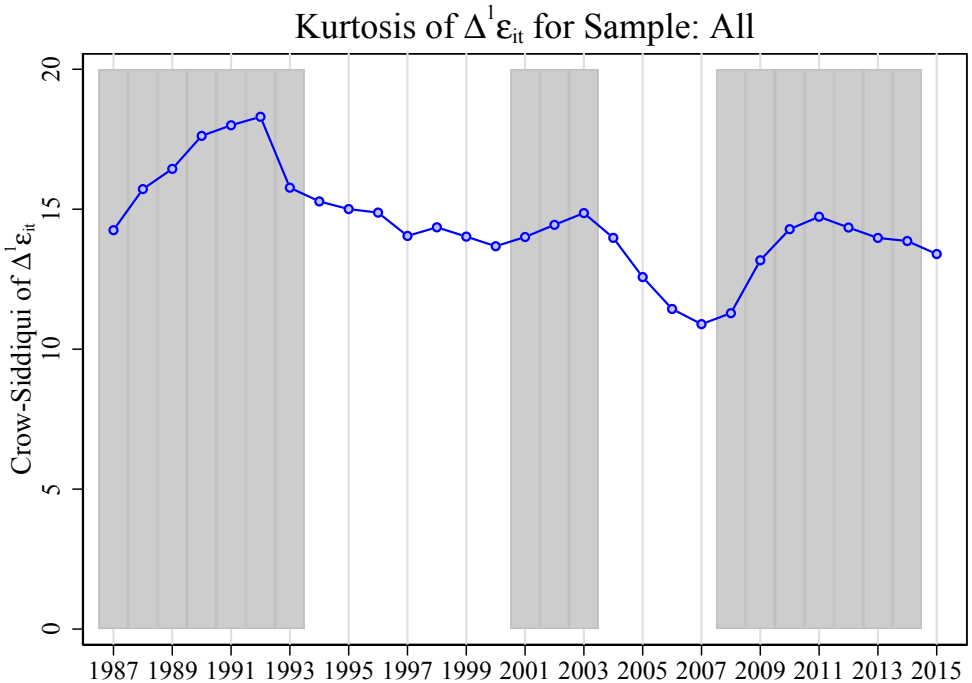
- Spread is fairly stable for both top and bottom
- Some business cycle variation in opposite directions

Dynamics - Skewness: $\Delta\varepsilon_{it}$



- Skewness is business cycle dependent.
- Negative in recessions $\Rightarrow$ bigger chance of drawing negative shock
- Positive in booms $\Rightarrow$ bigger chance of drawing positive shock

Dynamics - Kurtosis: $\Delta\varepsilon_{it}$



- Weak tendency for kurtosis to rise during recessions, i.e. risk of large shocks increase during recessions

Summary - Part 1

- Top part of distribution of $\Delta\varepsilon_{it}$ has persistently increased
- Middle part of distribution of $\Delta\varepsilon_{it}$ stable
- Bottom part of distribution of $\Delta\varepsilon_{it}$ appears variable
- Business cycle sensitivity in skewness and kurtosis
  $\Rightarrow$ chance of negative shock $\uparrow$ during recessions
  $\Rightarrow$ chance of large shock $\uparrow$ during recessions

Part 2

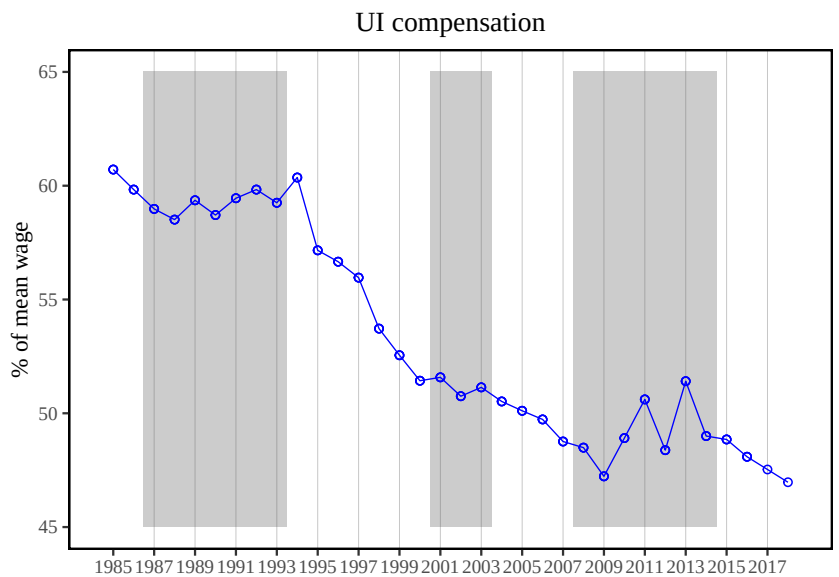
Part 2

- What really matters for people is their disposable income
- There is a lot of redistribution in Denmark $\Rightarrow$ the dynamics of disposable income can potentially look quite different from the dynamics of earned income
- We can construct disposable income from information in income-tax registry
- In this part we show how moments of $\Delta\varepsilon_{it}$ change when we move from earned income to disposable income

Institutional Setting

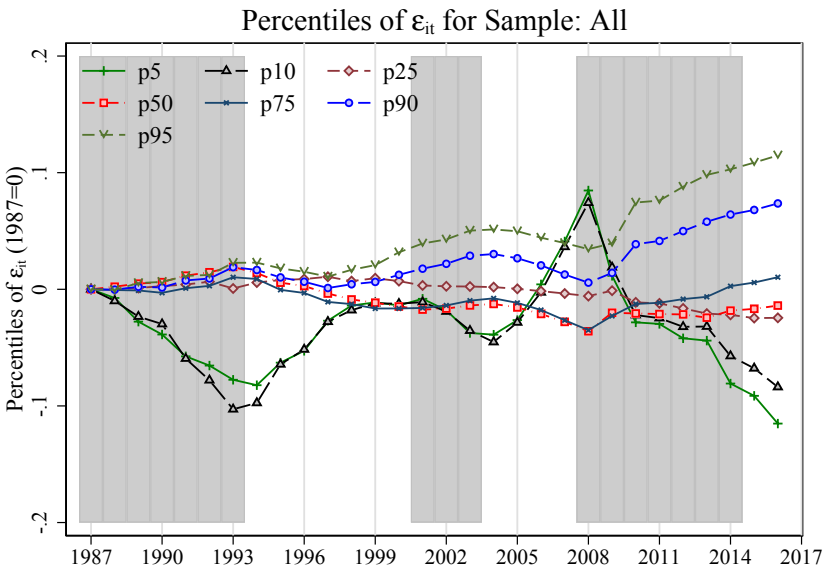
- Taxation
  - Two tax brackets (since 2010)
  - MTR=42% if income $<$ DKK424k (USD60k; 75th pctl.)
  - MTR=56% if income $>$ DKK424k
  - Sequence of tax reforms has reduced top (bottom) bracket MTR from 68% (50%) in 1987

- UI benefits (capped at 240k/year DKK)
  - Several reforms reduce the maximum duration of UI benefits from 7 years (1993) $\rightarrow$ 5 years (1996) $\rightarrow$ 4 years (1999) $\rightarrow$ 2 years (2010)
  - Indexed by CPI (not real wages) $\Rightarrow$ reduction in relative value

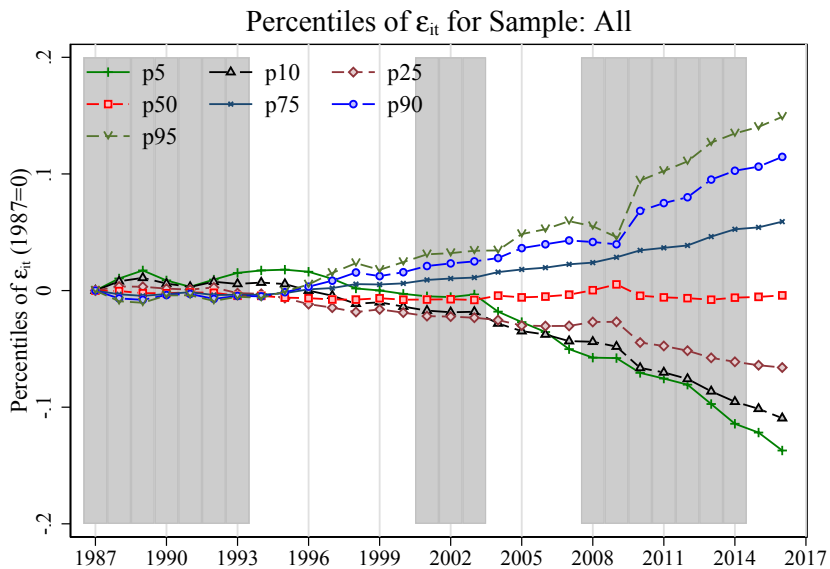


ε_{it}

Earned income



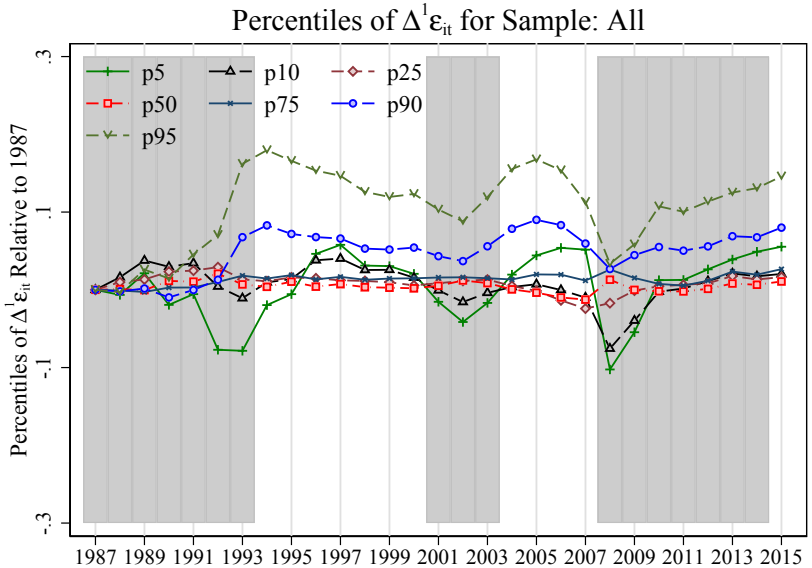
Disposable income



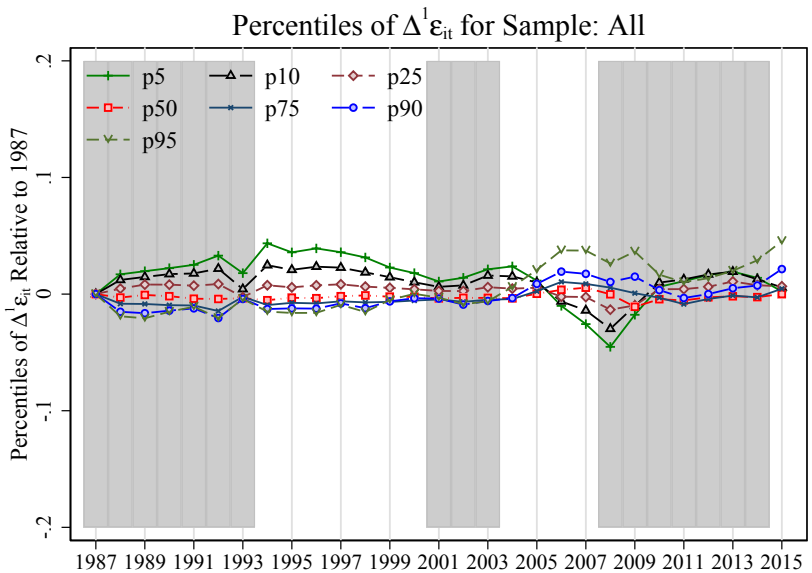
- Disposable fluctuates less than earnings
- Clear fanning-out pattern of disposable income, taking off since 2000

$\Delta\varepsilon_{it}$

Earned income



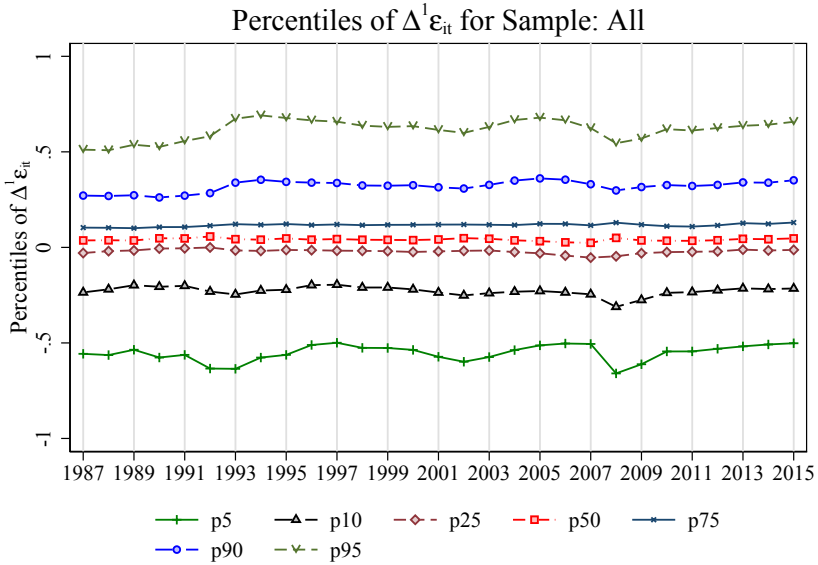
Disposable income



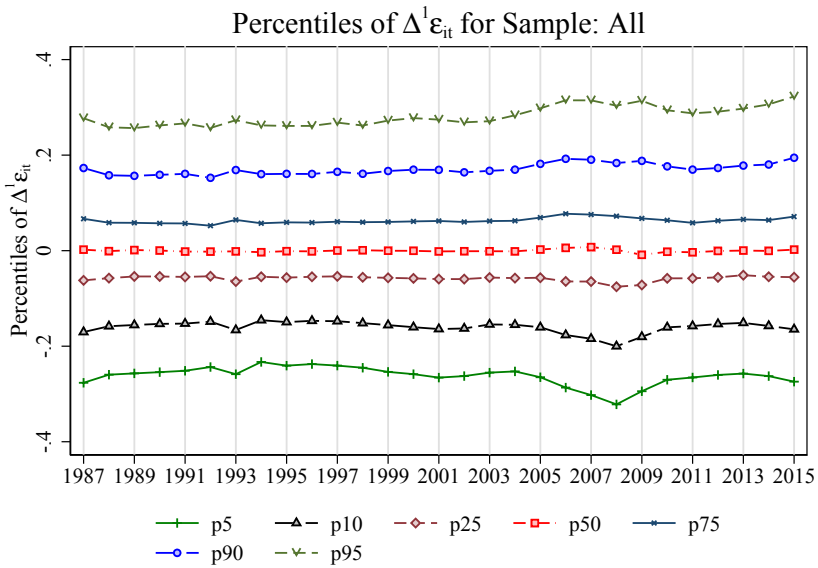
- Note difference in scale of y-axis
- Distribution of growth rates more compressed
- Growth rates more stable for disposable income

$\Delta\varepsilon_{it}$ (not indexed)

Earned income



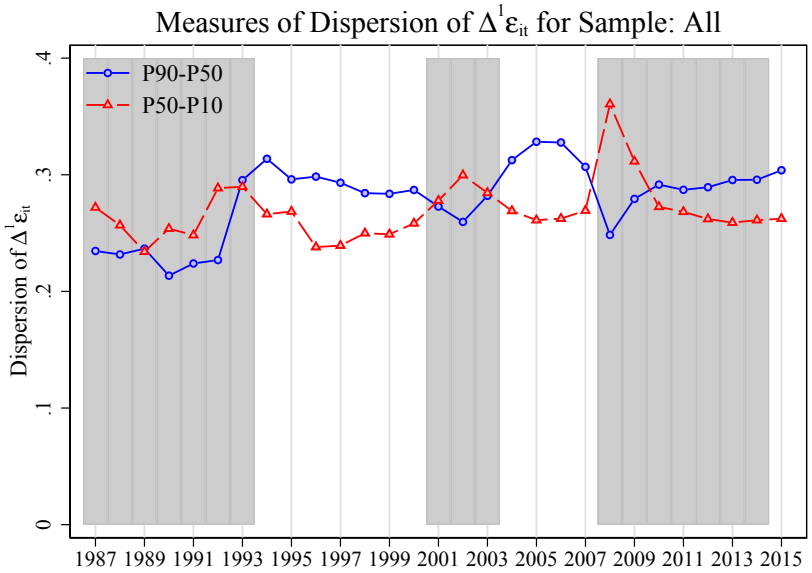
Disposable income



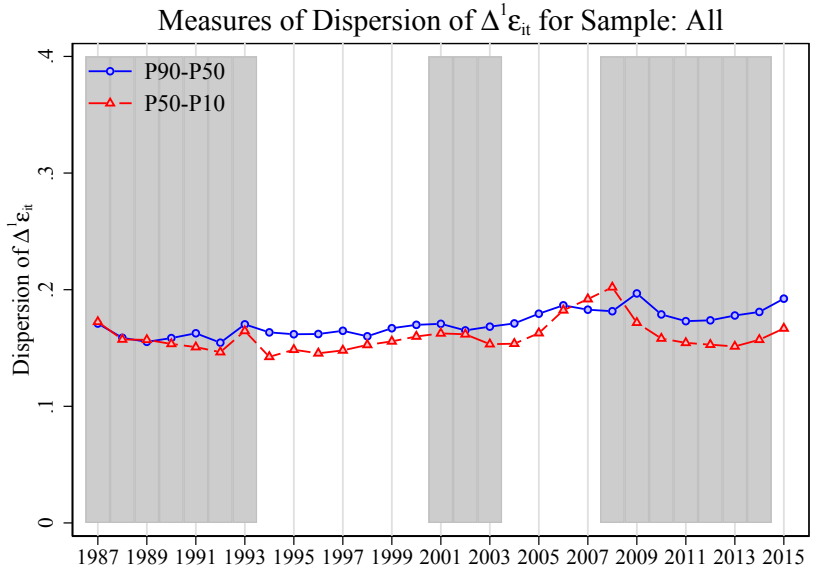
- Note difference in scale of y-axis
- Distribution of growth rates more compressed
- Growth rates more stable for disposable income for top and bottom

Dispersion $\Delta\varepsilon_{it}$

Earned income



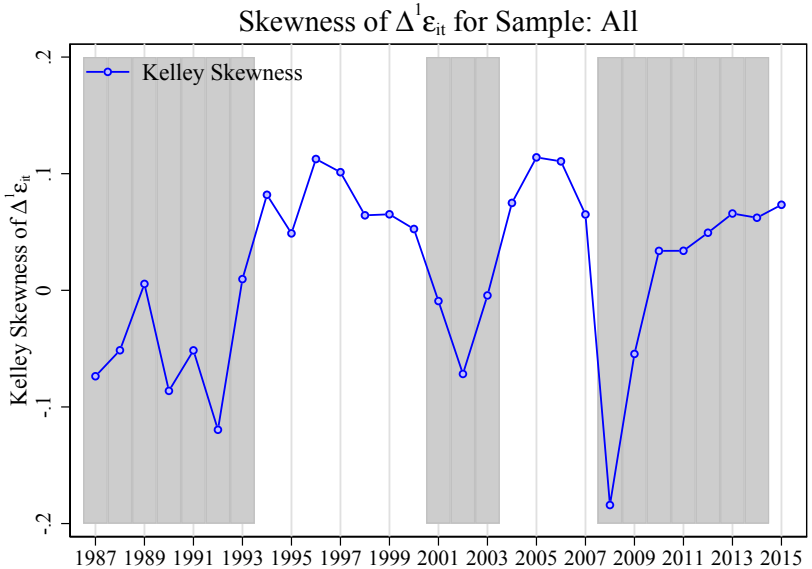
Disposable income



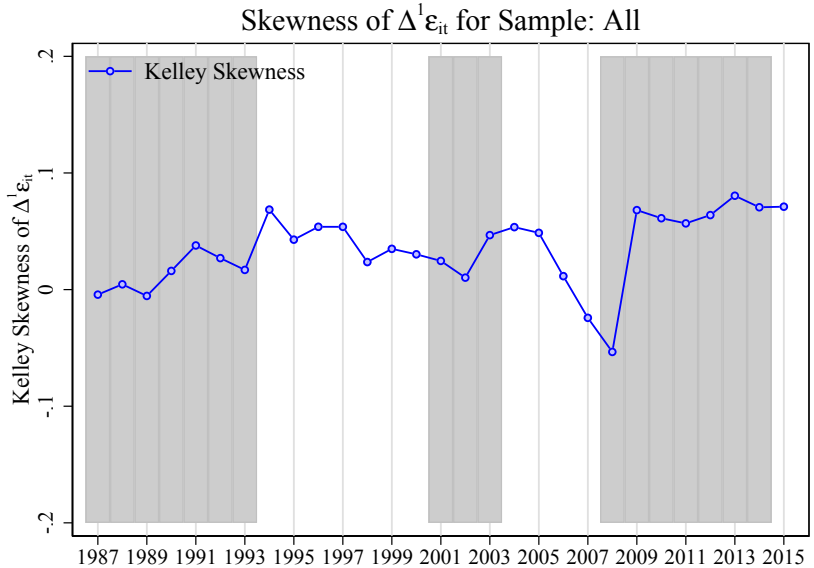
- Dispersion is much smaller for disposable income.
- No business cycle variation.

Skewness $\Delta\varepsilon_{it}$

Earned income



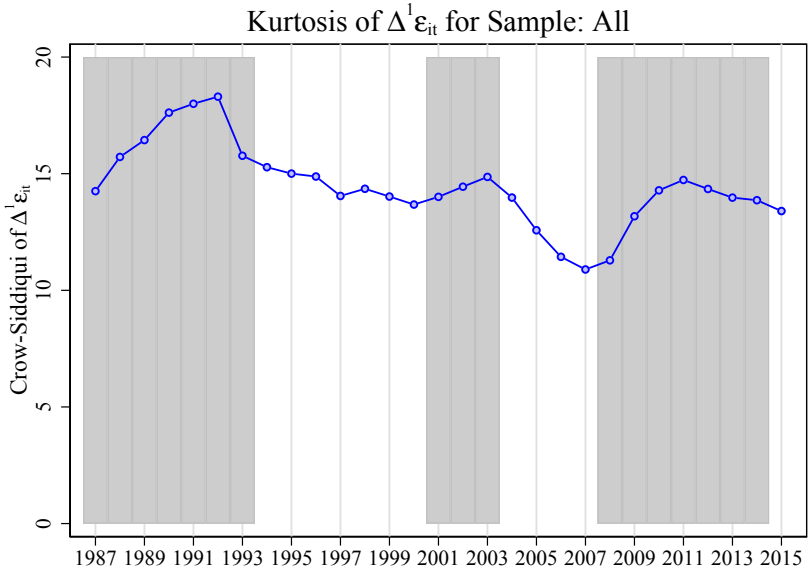
Disposable income



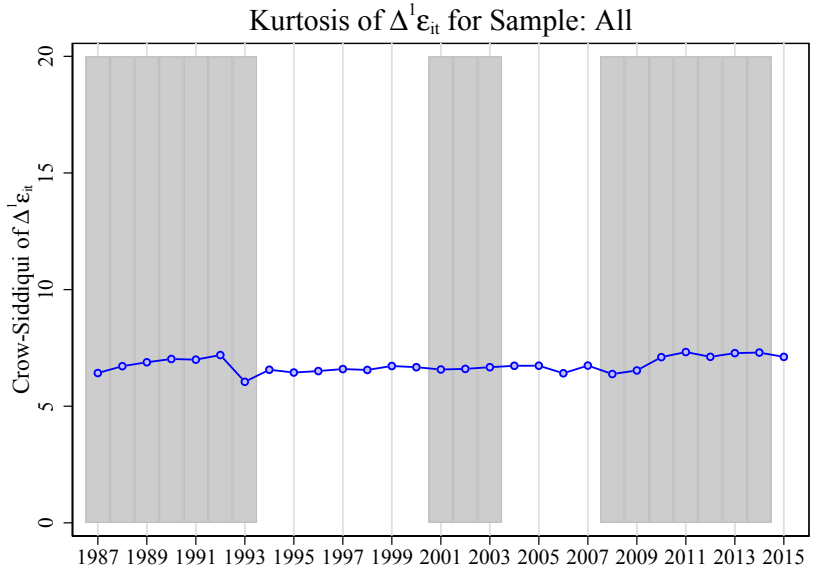
- Tendency for cyclicality for earned income (negative shocks in recessions).
- Much less skewness for disposable income.

Kurtosis $\Delta\varepsilon_{it}$

Earned income



Disposable income



- Tendency for countercyclicality for earned income.
- Much lower (and constant) kurtosis for disposable income.

Summary Part 2

$\Delta\varepsilon_{it}$ of disposable income is

- More compressed
- Less volatile
- Less skew
- Less kurtosis

Standard Permanent-Transitory Income Process

$$\varepsilon_{it} = \alpha_i + u_{it} + \nu_{it}$$

$$u_{it} = u_{i,(t-1)} + \omega_{it}$$

$$\nu_{it} = \rho\nu_{i,(t-1)} + \gamma_{it}$$

- ε_{it}: residualized log income
- α_i: individual effect
- u_{it}: permanent component
- ω_{it}: permanent shock
- ν_{it}: transitory component
- ρ: AR parameter
- γ_{it}: shock to transitory component

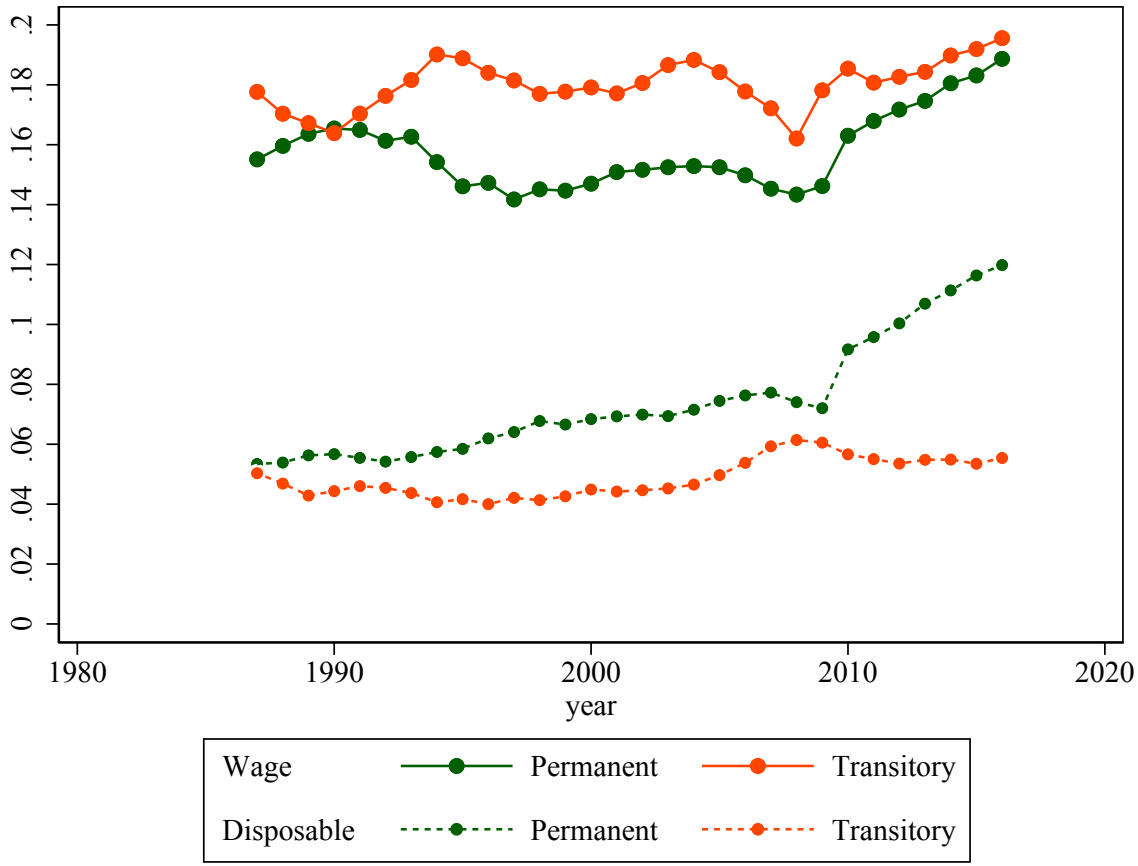
- Does the process look different when considering disposable income rather than gross earnings?
- Caveat: does not take into account 3rd and 4th moment.
- Estimate variance of transitory (σ^2_γ) and permanent (σ^2_ω) shocks.

Estimation of Shocks

	Earned income	Disposable income
σ^2_α	0.0219	0.0020
	(0.0003)	(0.0001)
ρ	0.3525	0.3782
	(0.0004)	(0.0007)
σ^2_{v1}	0.1776	0.0503
	(0.0006)	(0.0002)
σ^2_γ	0.1860	0.0301
	(0.0025)	(0.0004)
σ^2_w	0.0101	0.0039
	(0.0001)	(0.0001)

- Smaller variance in disposable income.

Predicted Variance Components over Time



- Variance(disp. inc) $\approx 1/3 \times$ variance(earnings)
- Less fluctuation in variance components of disposable income.
- Permanent component more important for disposable income.
- Permanent component $\uparrow$ is consistent with tax reforms and reductions in transfer incomes

Summary

- Redistribution is important in Denmark
  - Tax reforms and reductions in generosity of UI benefits (and other types of transfer income) $\Rightarrow$ increased inequality in level of disposable income
- Earnings growth rates
  - Skew and kurtosis varies with business cycle
- Disposable income growth rates
  - Skew and kurtosis less important and not varying with business cycle
- Stochastic properties of disposable income much different from earned income