

# Labour Income Dynamics and the Insurance from Taxes, Transfers, and the Family

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- ▶ Inequality has many dimensions
  - individual earnings → joint earnings → income → consumption
- ▶ Here we explore the links between individual earnings, and individual and family disposable income over the life cycle
- ▶ Examining the role of taxes and transfers, and spouse's labour income to smooth/attenuate shocks
- ▶ Make use of detailed population register (panel) data from Norway
- ▶ Provide a detailed picture of life-cycle inequality dynamics by following many birth cohorts across their working life-time

- ▶ An extensive literature has concentrated on assessing the types and levels of income risk (for a review see Meghir and Pistaferri, 2011).
  - ▶ This literature has pointed out three key ingredients of potential significance:
    - persistence of shocks
    - age and time dependence in the variance of shocks
    - heterogeneous age profiles
- 
- 1** How do these factors vary over the life-cycle and differ across education groups and birth cohorts in Norway?
  - 2** To what extent does the tax and transfer system attenuate these various factors in the evolution of life-cycle inequality in Norway?
  - 3** What happens when we add in income sources of other family members?

- ▶ The nature of labour income dynamics in Norway
  - quite different by skill groups
  - quite different at different points in the life-cycle
  - quite different at different points in time
  
- ▶ The impact of taxes and transfers in Norway
  - remarkable flattening of life-cycle inequality
  - reduces persistence of shocks
  - reduces the variance of transitory and permanent shocks
  
- ▶ The comparison with family income dynamics:
  - spouse's income seem to matter less for the dynamics of inequality
  - balance between assortative matching and insurance

- ▶ For each birth cohort we write log-income of individual  $i$  of age  $a$  as

$$\log Y_{i,a} = \mathbb{X}'_{i,a}\varphi + \alpha_i + \beta_i a + v_{i,a} + \tau_{i,a}$$

- $\mathbb{X}$  includes a polynomial in age and its interaction with education, dummies for region, marital status and family size and the interaction of the latter.
- $\beta_i a$  is an individual-specific linear trend in age, allow for correlation between  $\alpha$  and  $\beta$ .
- $v_{i,a}$  is the persistent process,

$$v_{i,a} = \rho v_{i,a-1} + u_{i,a}$$

where  $u_{i,a}$  is a mean-zero shock with variance  $\sigma_a^2$ .

- $\tau_{i,a}$  is the transitory component assumed to follow an MA(1) process,

$$\tau_{i,a} = \varepsilon_{i,a} + \theta \varepsilon_{i,a-1}$$

where  $\varepsilon_{i,a}$  is a mean-zero shock with variance  $\omega_a^2$

- ▶ We allow variances to vary in an unrestricted way with age and across birth cohorts and education groups. By averaging across cohorts at a given age we account for calendar time effects.

- ▶ Panel data covering the entire Norwegian population, 1967-2006
  - several registry databases linked through unique identifiers for each individual
  - include individual demographic information (including gender, date of birth, and marital status) and socioeconomic data (including years of education, market income, cash transfers)
  - unique family identifiers allow us to match spouses and parents to their children
  
- ▶ Income variables
  - *individual market income*: annual pre-tax earnings
  - *individual disposable income*: annual earnings and cash transfers net of taxes
  - *family disposable income*: pooled disposable income of the spouses adjusted by the square root equivalence scale

- ▶ Transfer system (including DI benefits, child benefits, etc.)
  - Since 1967, key program parameters are fairly stable over time
  
- ▶ Tax system (2006): Progressive through deductions and surtaxes
  - 7.8% social security contribution on labour income
  - (taxable income - deductions) is taxed at a flat rate of 28%
    - ▶ single persons/dual earner couples: 50% of standard deductions
    - ▶ two surtax brackets adding an additional 9 and 12 percent to the marginal tax rates

#### ▶ Marginal Tax Rates 2006

- over time, the the Norwegian tax system has become less progressive through a series of policy changes

#### ▶ Average Tax Rates over Time

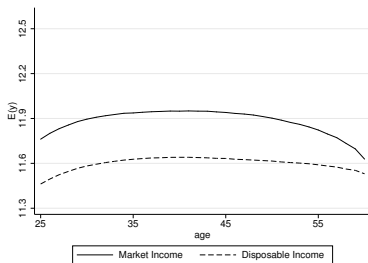
In each year we select

- ▶ males born between 1925 and 1964
  - between the ages of 25 and 60
  - non-immigrants and non-self-employed
  - with non-zero earnings
- ▶ Non-participation
- ▶ Applying these restrictions gives us an unbalanced panel with
  - 40 time periods
  - 1,004,294 individuals ( 25,107 individuals on average per cohort)
- ▶ This sample is then partitioned into three mutually exclusive groups according to educational levels
  - low-skilled (33%): not having completed high school
  - medium-skilled (48%): high school degree
  - high - skilled (19%): attended college

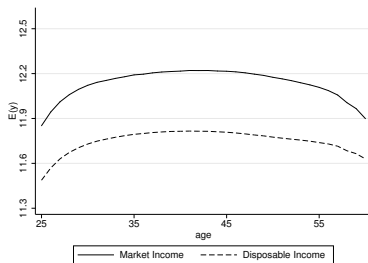
▶ Participation of the Spouse

▶ Marriage Rates

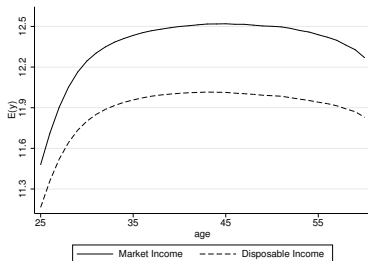




Low-Skilled



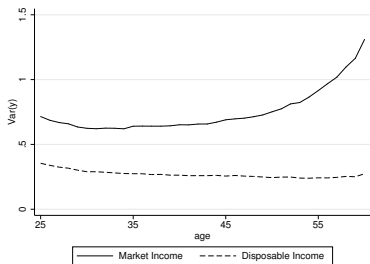
Medium-Skilled



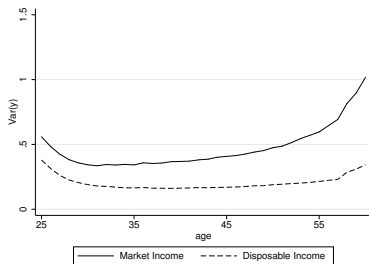
High-Skilled

- ▶ concave profile over the life-cycle
- ▶ very flat for the low-skilled, very steep for the high-skilled early in life
- ▶ progressive nature of the tax and transfer system dampens the the income differentials between high skilled and low skilled after age 35

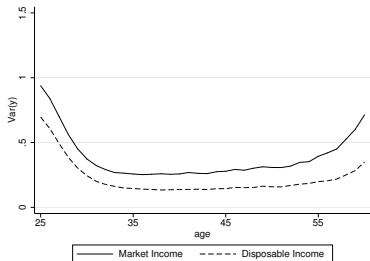
# AGE PROFILES - VARIANCES OF INDIVIDUAL EARNINGS



Low-Skilled



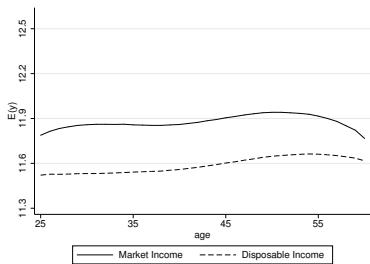
Medium-Skilled



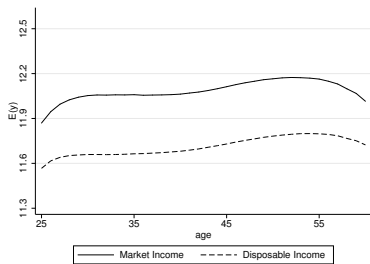
High-Skilled

- ▶ U-shaped profile over the life-cycle
- ▶ remarkable flattening of the increase in the variance of individual log-income due to the tax and transfer system especially for the low-skilled at the end of the life-cycle

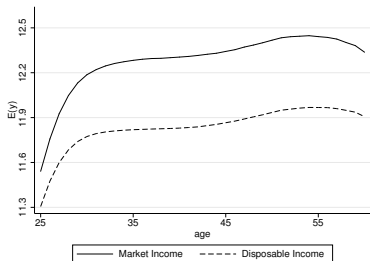
# AGE PROFILES IN FAMILY EARNINGS



Low-Skilled

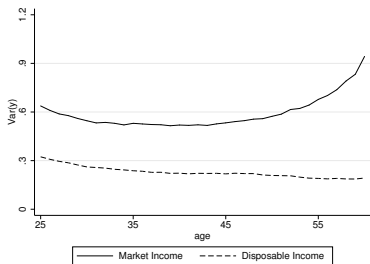


Medium-Skilled

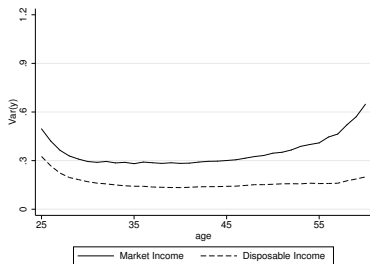


High-Skilled

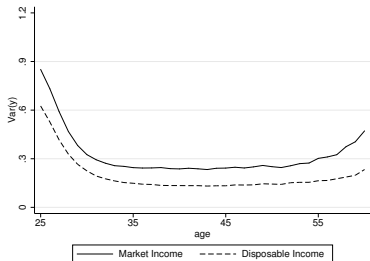
# AGE PROFILES - VARIANCES OF FAMILY EARNINGS



Low-Skilled



Medium-Skilled

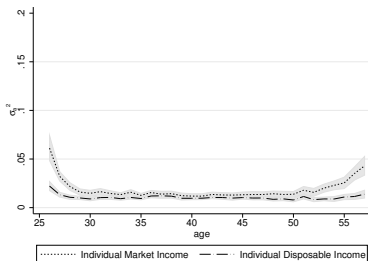


High-Skilled

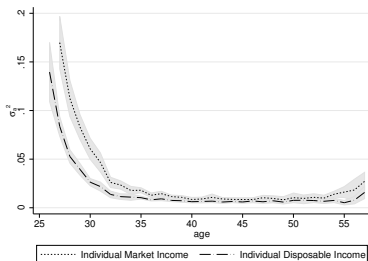
	Individual Market Income			Individual Disposable Income			Family Disposable Income		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
$\rho$	1.000 (0.000688)	1.000 (0.000571)	1.000 (0.027814)	0.822 (0.008926)	0.928 (0.014485)	0.881 (0.023016)	0.819 (0.006960)	0.861 (0.006742)	0.788 (0.018279)
$\sigma_\alpha^2$	- -	- -	- -	0.068661 (0.010491)	0.000616 (0.004425)	0.025430 (0.028066)	0.052308 (0.008960)	0.045921 (0.014064)	0.028585 (0.022444)
$\sigma_\beta^2$	0.000000 (0.768047)	0.000000 (0.491246)	0.000000 (0.032024)	0.000030 (0.000005)	0.000008 (0.000003)	0.000046 (0.000018)	0.000026 (0.000004)	0.000026 (0.000005)	0.000024 (0.000009)
$\theta$	0.254247 (0.007009)	0.256168 (0.006322)	0.316701 (0.010004)	0.218405 (0.007418)	0.233300 (0.006241)	0.292595 (0.010581)	0.224079 (0.008485)	0.250136 (0.005868)	0.294728 (0.011812)

- ▶ Taxes and transfers reduce the persistence of shocks; e.g. when  $\rho = 0.82$  the effect of an income shock is reduced to 14 percent of its initial value in ten years
- ▶ Persistence only changes little when we go from individual disposable income to family disposable income
- ▶ Some evidence for heterogenous profiles, but not in market income ▶ Profiles

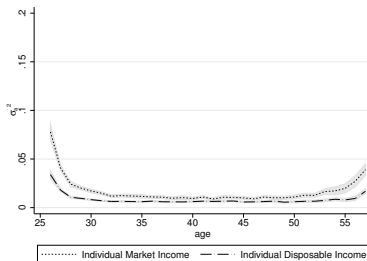
▶ Robustness



Low-Skilled



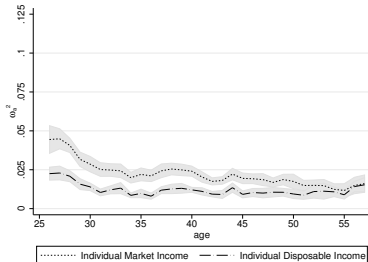
High-Skilled



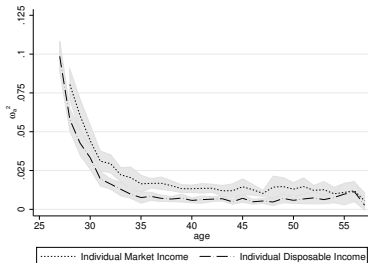
Medium-Skilled

- ▶ U-shaped profile over the life-cycle: importance of non-stationarity in age
- ▶ quite different across skill groups: large shocks for high-skilled early in life and for low-skilled at the end of the life-cycle
- ▶ taxes and transfers: flattening of the age profiles; e.g., a permanent shock of one standard deviation implies a 16 (10) percent change in market income (disposable income) for a low-skilled aged 55.
- ▶ adding spouse's income: closely mirroring, slightly larger

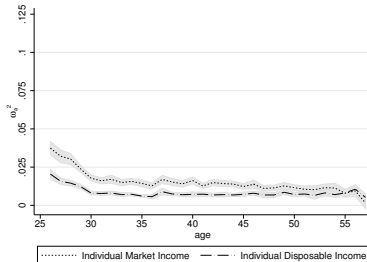
▶ Robustness



Low-Skilled

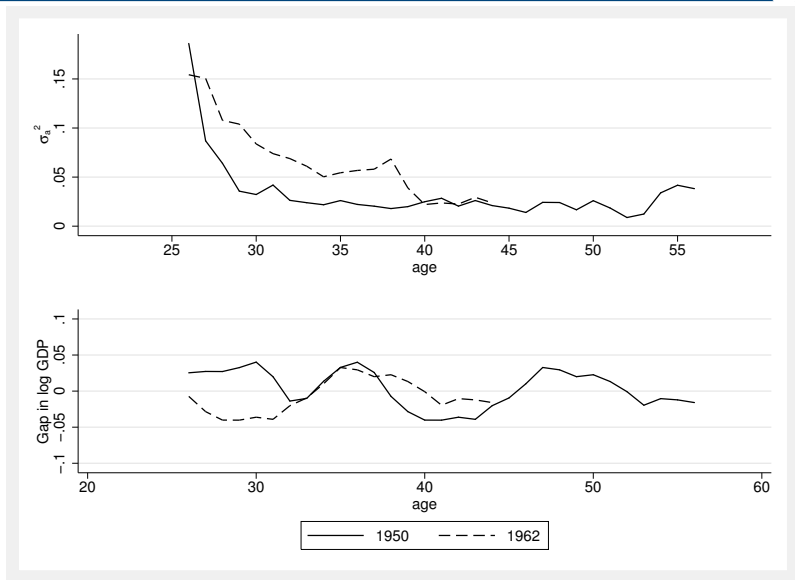


High-Skilled



Medium-Skilled

- ▶ a decreasing and convex profile over the lifetime: importance of non-stationarity in age
- ▶ early in life transitory shocks are much larger for the high-skilled than for the low-skilled + a larger MA(1) parameter
- ▶ adding spouse's income: closely mirroring, slightly larger





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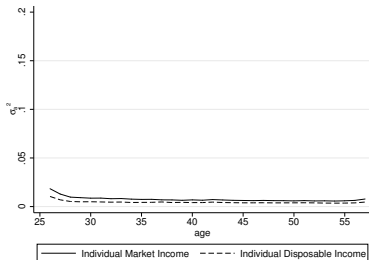
▶ Back

- ▶ Let  $y_{i,a,t} \equiv \log Y_{i,a,t} - \mathbb{X}'_{i,a,t} \hat{\phi}_t$  be the residual income of individual  $i$  at age  $a$  and time  $t$ .
- ▶ For a given cohort, the theoretical moments we use is the Covariance matrix of the quasi-difference  $(\Delta^\rho y_{i,a} \equiv y_{i,a} - \rho y_{i,a-1})$ ,

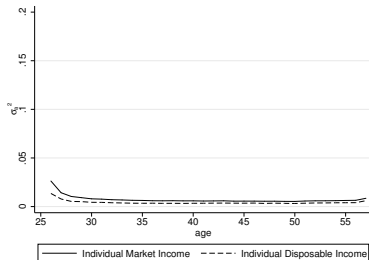
$$\text{Var}(\Delta^\rho y_i) = ((1 - \rho) \iota, \Delta^\rho a) \begin{pmatrix} \sigma_\alpha^2 & \rho_{\alpha\beta} \sigma_\alpha \sigma_\beta \\ \rho_{\alpha\beta} \sigma_\alpha \sigma_\beta & \sigma_\beta^2 \end{pmatrix} ((1 - \rho) \iota, \Delta^\rho a)' \\ + \text{Var} \left( u_i + \left[ 1 + (\theta - \rho) L^1 - \rho \theta L^2 \right] \varepsilon_i \right)$$

- ▶ Calendar time effects are accounted for by averaging these moments across cohorts (equal weights) for a given age
- ▶ For a given  $\rho$ , we then minimize the distance between the theoretical and empirical moments and pick the estimates associated with  $\rho$  that yields the minimum norm.

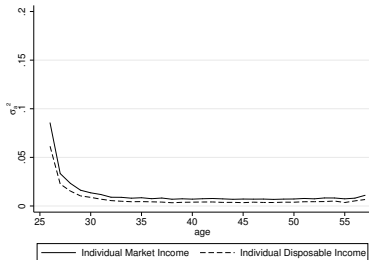
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Low-Skilled

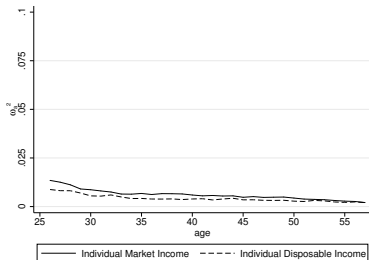


Medium-Skilled

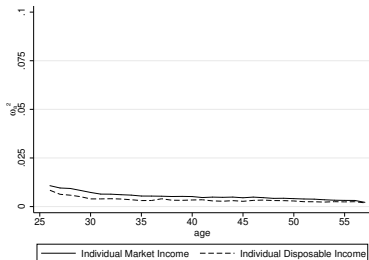


High-Skilled

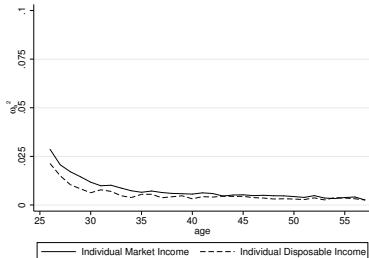
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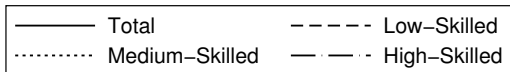
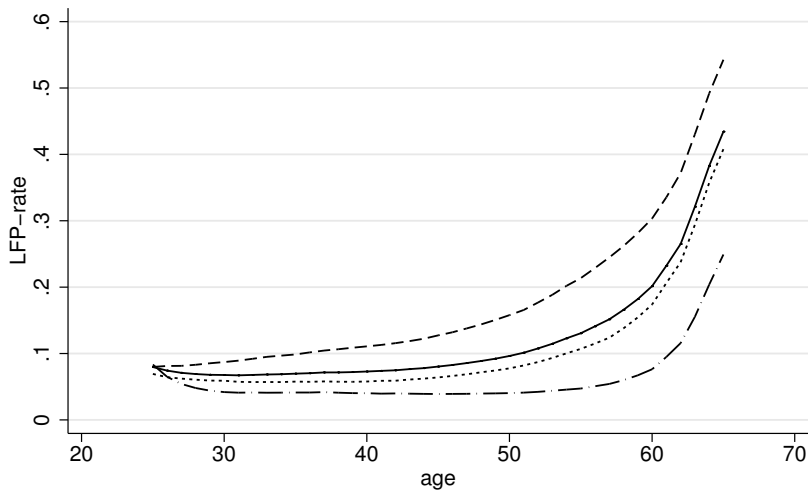
Low-Skilled

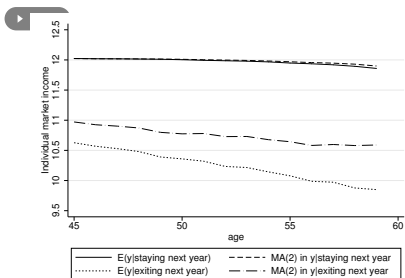


Medium-Skilled

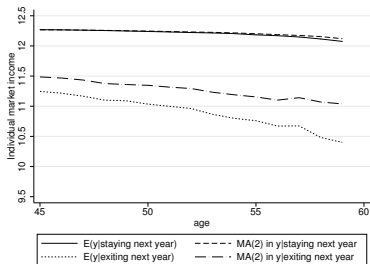


High-Skilled

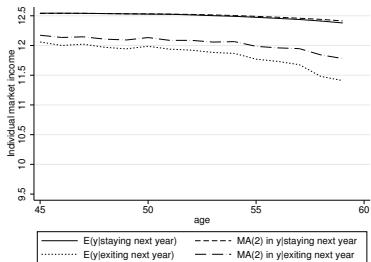
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Low-Skilled



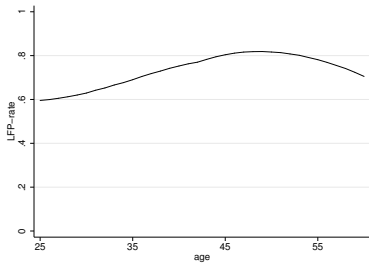
Medium-Skilled



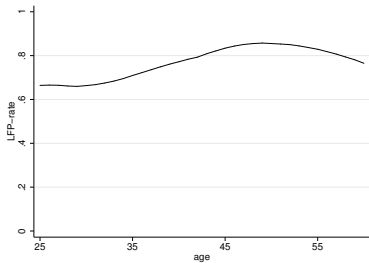
High-Skilled

# PARTICIPATION RATES SPOUSE

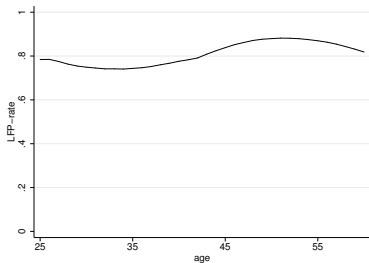
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Low-Skilled



Medium-Skilled

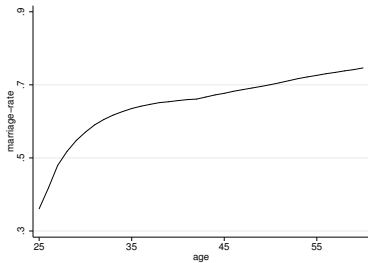


High-Skilled

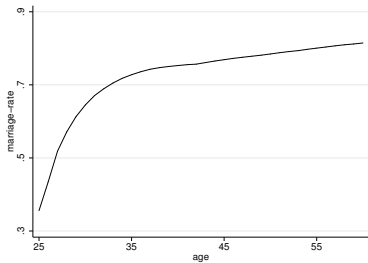


# MARRIAGE RATES

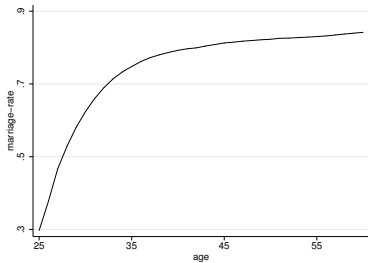
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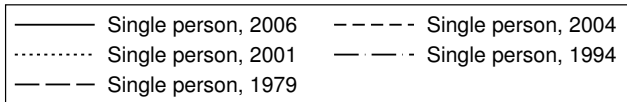
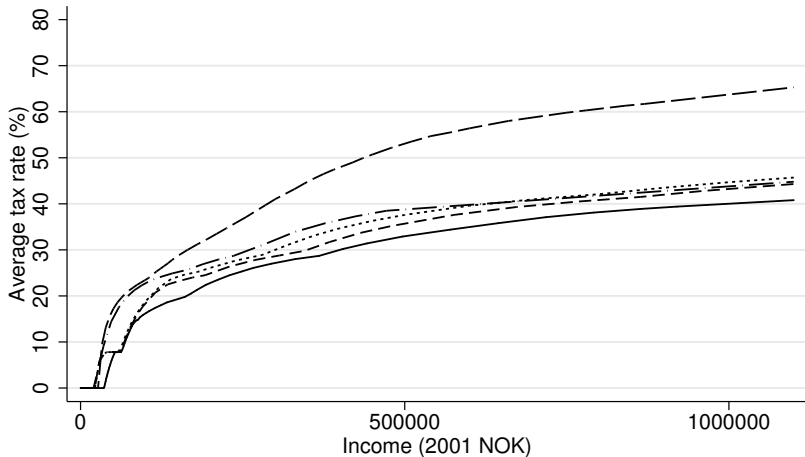
Low-Skilled

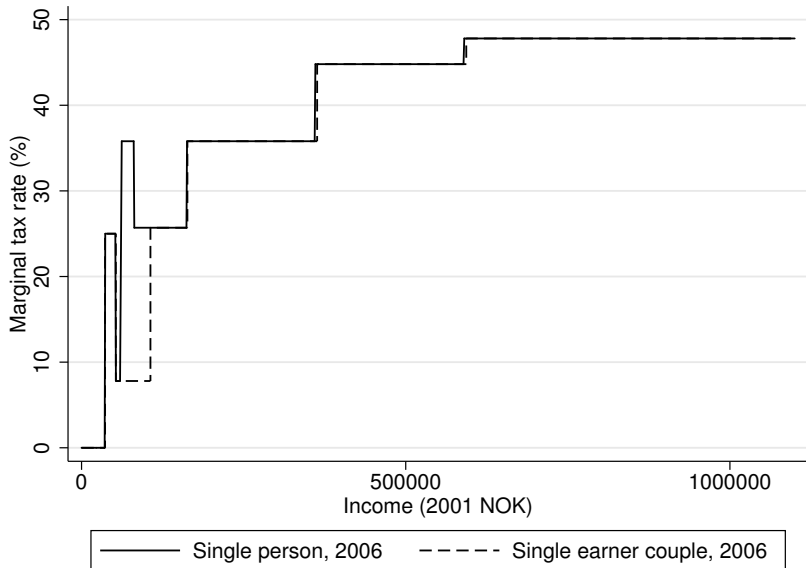


Medium-Skilled



High-Skilled



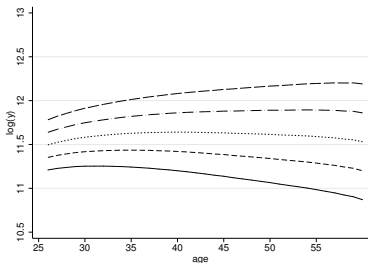


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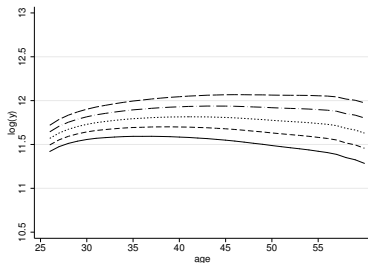
Total household income by income source for each decile:

<i>Decile</i>	<i>Labour income</i>	<i>Self-employment</i>	<i>Capital income</i>	<i>Cash Transfers</i>
1	42%	4%	-5%	59%
2	45%	5%	1%	49%
3	58%	5%	1%	36%
4	68%	4%	1%	26%
5	74%	4%	1%	21%
6	77%	4%	2%	17%
7	79%	5%	2%	14%
8	81%	5%	2%	12%
9	82%	6%	3%	9%
10	69%	11%	15%	5%

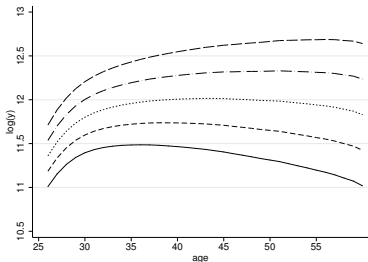
▶ Back



Low-Skilled



Medium-Skilled



High-Skilled

- ▶ non-negligible fanning out
- ▶ Note however, negative correlation between initial conditions and growth rate. Thus some of the fanning out will be offset.

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