Consumption Inequality and Risk Sharing over the Life Cycle in a Developing Economy with Large Informal Employment

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Introduction

- Understanding the dynamics of economic inequality is important for various economics studies and policy designs.
  - Help to develop more realistic economic models that better capture economic inequality
  - Deliver implications for policies aimed at reducing inequality
- Most of the existing research has been concentrated on developed countries.
- Consumption inequality is less studied compared to income inequality.
- Moreover, dynamics of earnings/consumption inequality are informative about households' ability to insure against earnings risk

Introduction – Risk Sharing

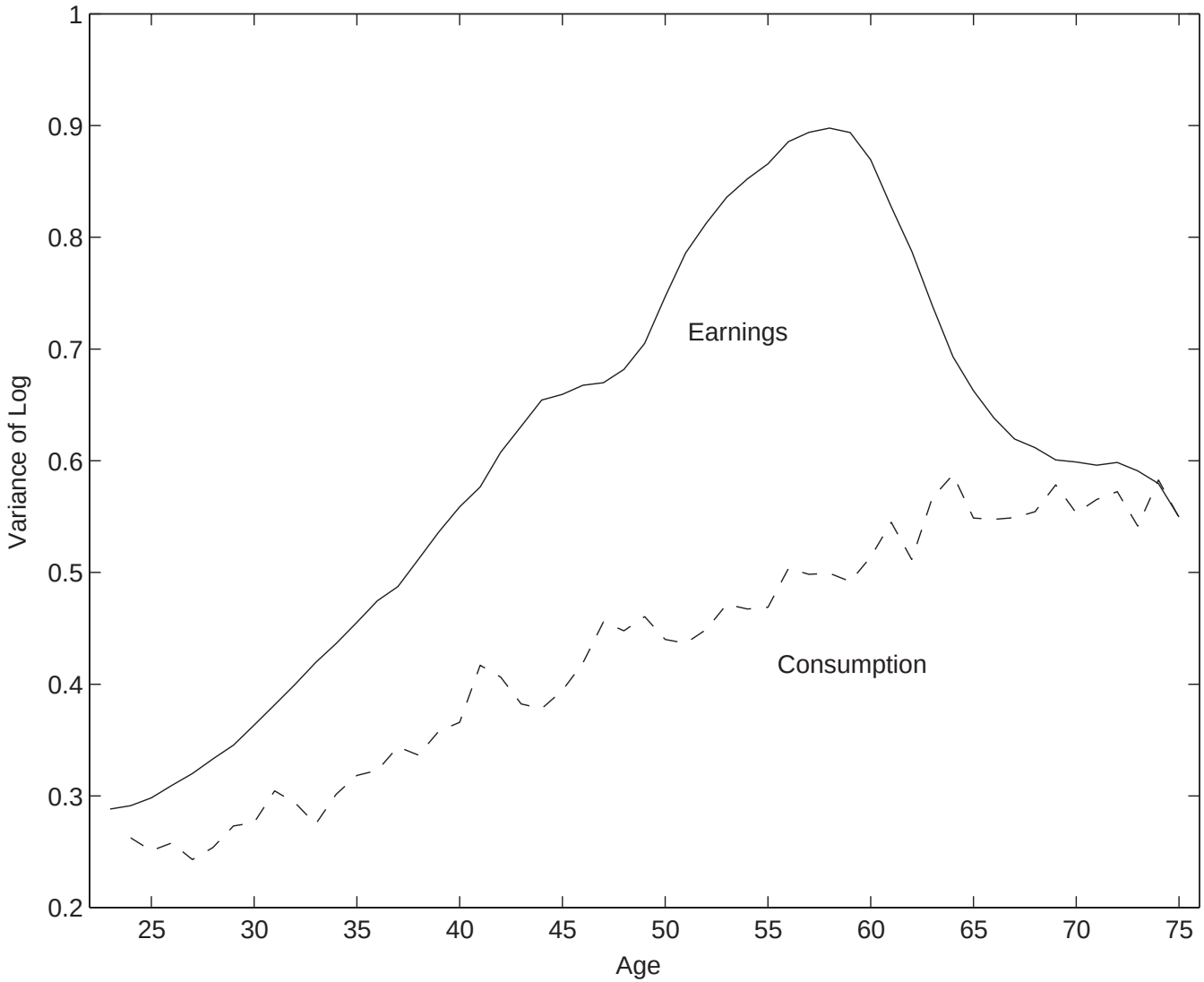
- To what extent can households insure against the uncertainties of their earnings?
  - If there is no risk sharing (no insurance) at all, consumption inequality will mimic earnings inequality over age.
  - If there is a complete market (full insurance), consumption inequality will be constant over age.
- Studying the patterns of inequalities in earnings/consumption over age helps us gain insights into the level of risk sharing in an economy.

Introduction – Findings in developed countries

- Storesletten, Telmer, and Yaron (2004, JME)
- Based on the approach in Deaton and Paxson (1994) with PSID (1969–1992) and CEX (1980–1990) data in the US:
  - 1) Inequality in earnings and consumption increases substantially up to age 60.
  - 2) The increase in consumption is less than the increase in earnings.
- The risk sharing of US households is in between the two extreme cases (full insurance / no insurance).

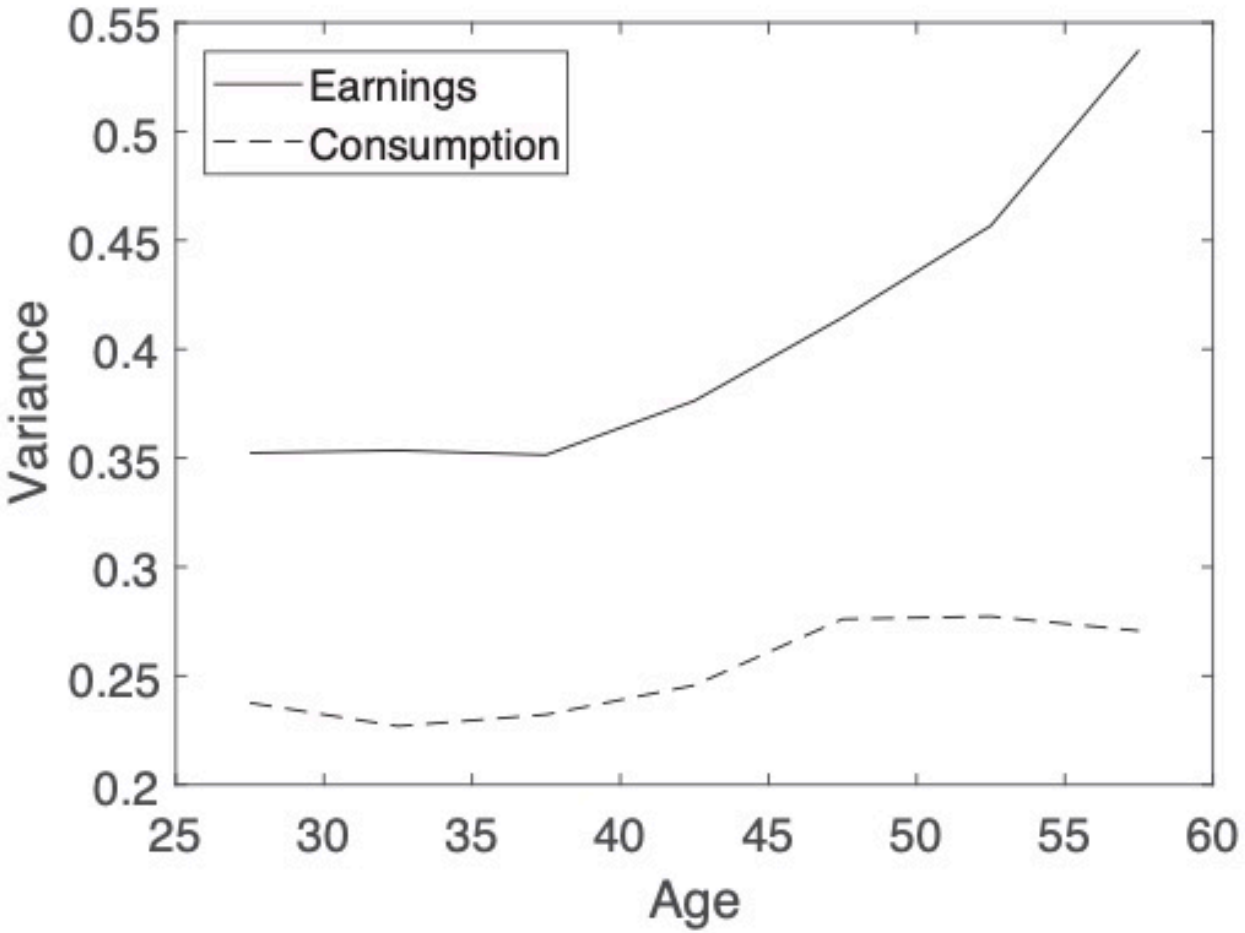
Introduction – Findings in developed countries

- Storesletten, Telmer, and Yaron (2004, JME)



Introduction – Findings in developed countries

- De Nardi, Fella, and Paz-Pardo (2020, JEEA)
- Following Storesletten et al. (2004) – using PSID and updated CEX (1980–2007) data.



Introduction – Findings in developed countries

- Similar findings in De Nardi et al. (2020)
  - Both earnings and consumption inequality increase over the working life
  - Earnings inequality rises substantially faster than consumption inequality starting from around age 40.

Introduction – How about developing countries?

- Life-cycle patterns of earnings and consumption inequality in developing countries are rarely studied.
- In particular, more than 50% of workers in developing countries are informal workers who:
  - Are mainly self-employed (e.g., street vendors) or work for small/family businesses.
  - Lack the protection (e.g., social security, unemployment insurance) and regulation (e.g., labor law) of the state.
  - Economic activities are generally not monitored, and revenues/incomes are not taxed

Questions of Interest

- What are the patterns of earnings and consumption inequalities over the life cycle in a developing economy with a large informal sector?
- Are the patterns different or consistent with those found in developed countries?
- What are the differences between formal and informal workers?
- Do informal workers have lower capacity to insure against earnings risk?

What We Do

- Use Thailand as our primary case for analysis
  - Compared with some other developing countries: Indonesia and Vietnam
  - Thailand has a relatively larger formal sector (roughly 40% of the total employment)
- A methodology similar to Deaton and Paxson (1994) and Storesletten et al. (2004)
  - Estimate household earnings/consumption inequality patterns over age by household head's sector (formal/informal).
  - Remove cohort and year effects
- Investigate the differences between formal- and informal-worker households

Rest of The Talk

- Data and Methodology
- Empirical findings
- Discussion and investigation
- Concluding Remarks

Data

- Thai Household Socio-economic Survey (HSES) from 2011-2019.
  - Repeated cross-sectional data.
- For robustness check
  - Indonesia Family Life Survey (IFLS) from 2000 to 2014 (three waves at seven-year intervals)
  - Vietnam Household Living Standard Surveys (VHLSS) from 2010 to 2018 (four waves at two-year intervals)
  - Higher Informal employment share: over 70% of total employment
  - VHLSS is nationally representative of Vietnam; IFLS represents 83% of the Indonesian population.

Data – Fromal/Informal-Worker Households

- Formal-worker households:
  - the household head receives medical services and welfare from government or employers
  - the household head is retired and receives pension benefits
- Informal-worker households:
  - those where the head does not meet the criteria for formal employment

Data – Earnings/Consumption

- Household earnings
  - Wages/salaries, overtime, bonuses, and welfare received from employers.
  - Net profits for self-employed/family workers, pension/annuity for the retired, and public/private transfers
- Household consumption
  - Follow Deaton and Paxson (1994) and Storesletten et al. (2004), focusing solely on non-durable and non-medical consumption.
- All adjusted to 2019 price level

Benchmark Estimation – Inequality over Life Cycle

Following the methodology in Deaton and Paxson (1994) and Storesletten et al. (2004)

- Extend their approach with a simple regression model
- Υ_{js}^{c}, variance of log earnings or log consumption, for households with a head in age j, employed in sector s and born in year c is modeled as follows:

$$\Upsilon_{js}^{c} = \alpha_c + \beta_{js} + \epsilon.$$

- α_c captures the cohort effect, β_{js} captures the age effect by sector, and ϵ is the residual with mean zero.

Benchmark Estimation – Inequality over Life Cycle (cont'd)

- The net-of-cohort-effect measure $\widehat{Y_{js}}$ is constructed with removing α_c and with a normalization (following Storesletten et al.,2004):

$$\widehat{Y_{js}} = \beta_{js} + m_s, \tag{1}$$

where m_s is a sector specific parameter used to scale up the net-of-cohort-effect variances so that $(\widehat{Y_{js}}|j = 42)$ is equal to $E(Y^c_{js}|j = 42, s)$ for sector s.

Earnings and Consumption Inequality over the Life Cycle

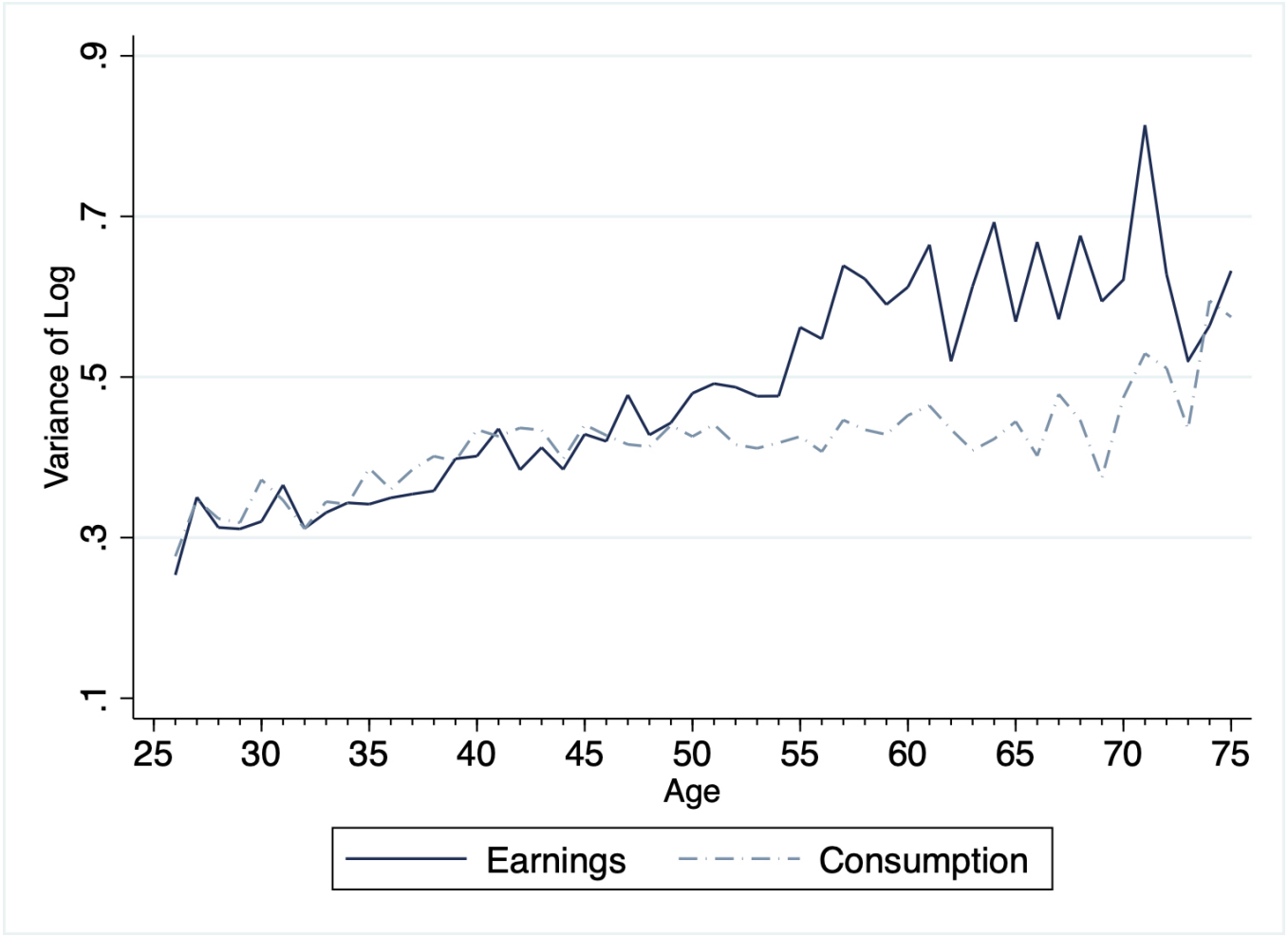


Figure: Variances of log earnings/consumption, Thailand (Formal)

Earnings and Consumption Inequality over the Life Cycle (cont'd)

From formal-worker households:

- Both earnings and consumption inequality increase over the working life (similar to the US)
- Earnings inequality and consumption inequality grow at about the same rate until age 45.
- Younger formal-worker households seem to have a lower ability to insurance against earnings risk

Earnings and Consumption Inequality over the Life Cycle (cont'd)

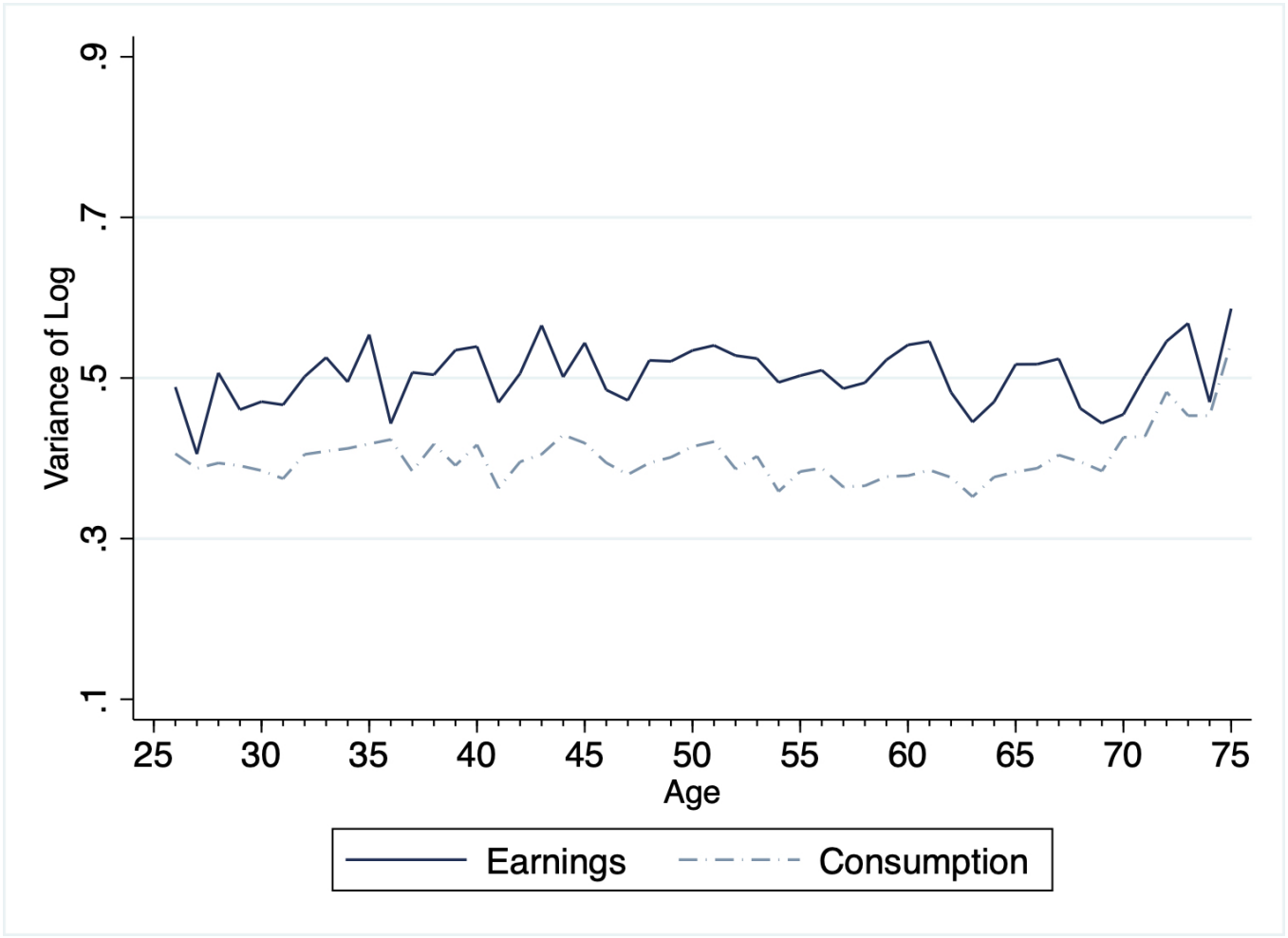


Figure: Variances of log earnings/consumption, Thailand (Informal)

Earnings and Consumption Inequality over the Life Cycle (cont'd)

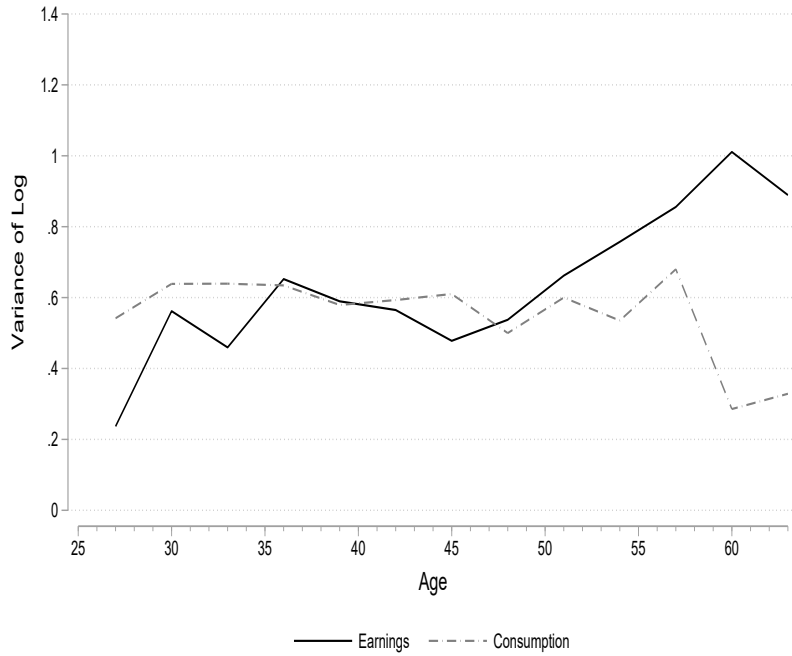
From informal-worker households:

- Both earnings and consumption inequality are flatter
- Earnings inequality is consistently higher than consumption inequality
- Informal-worker households seem to have a good ability to insurance against earnings risk

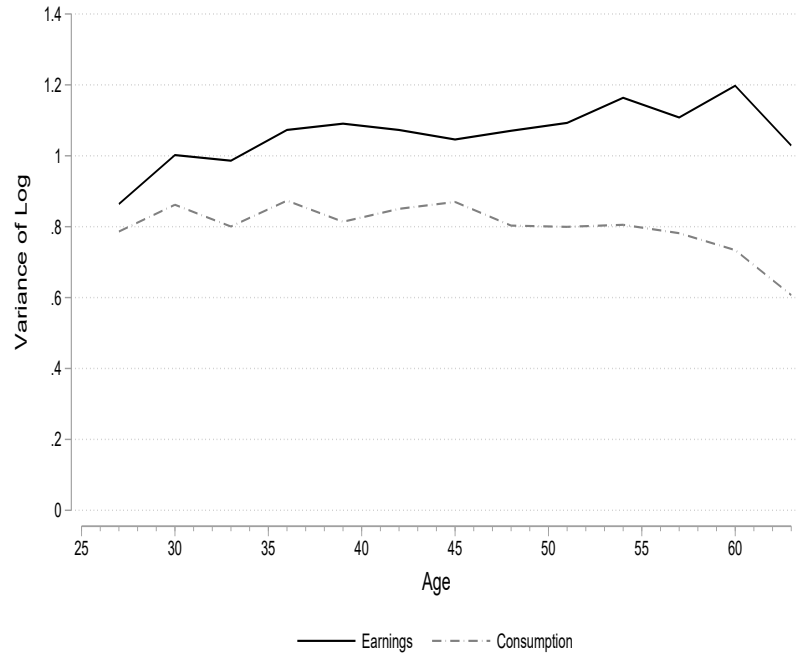
Consumption Inequality over the Life Cycle (cont's)

- We further apply the same methodology to Indonesia and Vietnam.
- The sample sizes are smaller and the number of observations for old households is limited, we use dummies of 3-year age groups covering from age 26 to 64, instead of dummies for each age.

Inequality over the Life Cycle (Indonesia)



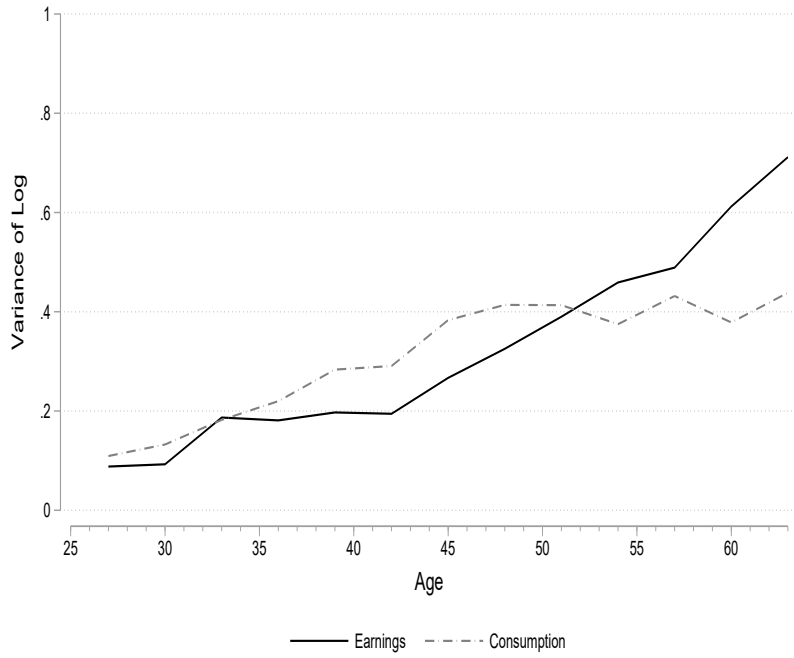
(a) Formal



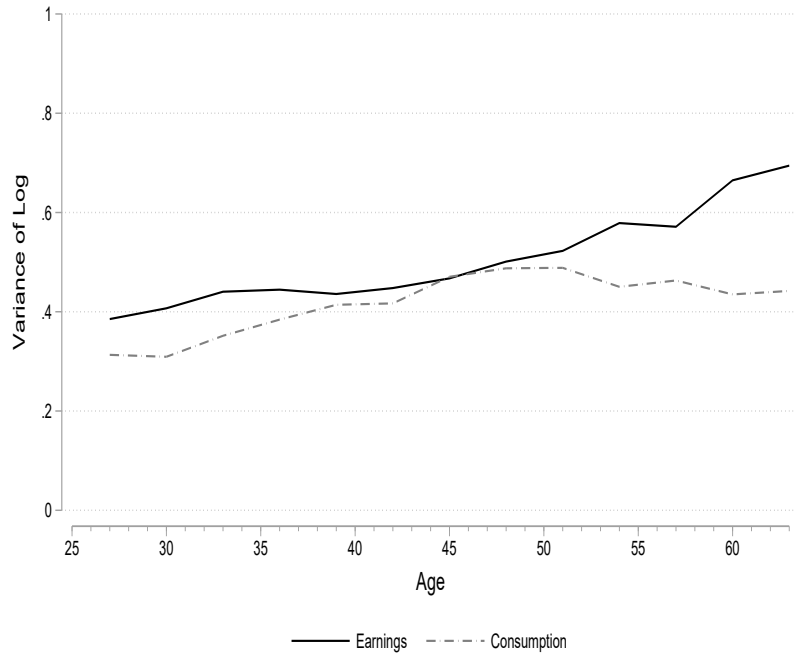
(b) Informal

Figure: Variances of log earnings/consumption, Indonesia (2000 - 2014)

Inequality over the Life Cycle (Vietnam)



(a) Formal



(b) Informal

Figure: Variances of log earnings/consumption, Vietnam (2010-18)

Inequality over the Life Cycle – Key Patterns

The key characteristics of Indonesia/Vietnam align closely with the case of Thailand:

- (1) Formal-worker households:
  - both earnings inequality and consumption inequality increase with age.
  - consumption inequality is not consistently lower than earnings inequality for younger households.
- (2) Informal-worker households:
  - Flatter life-cycle patterns of earnings and consumption inequality
  - Consumption inequality is generally lower than earnings inequality $\Rightarrow$ Theoretically implying a greater ability to insure consumption against earnings risk (**puzzling**)

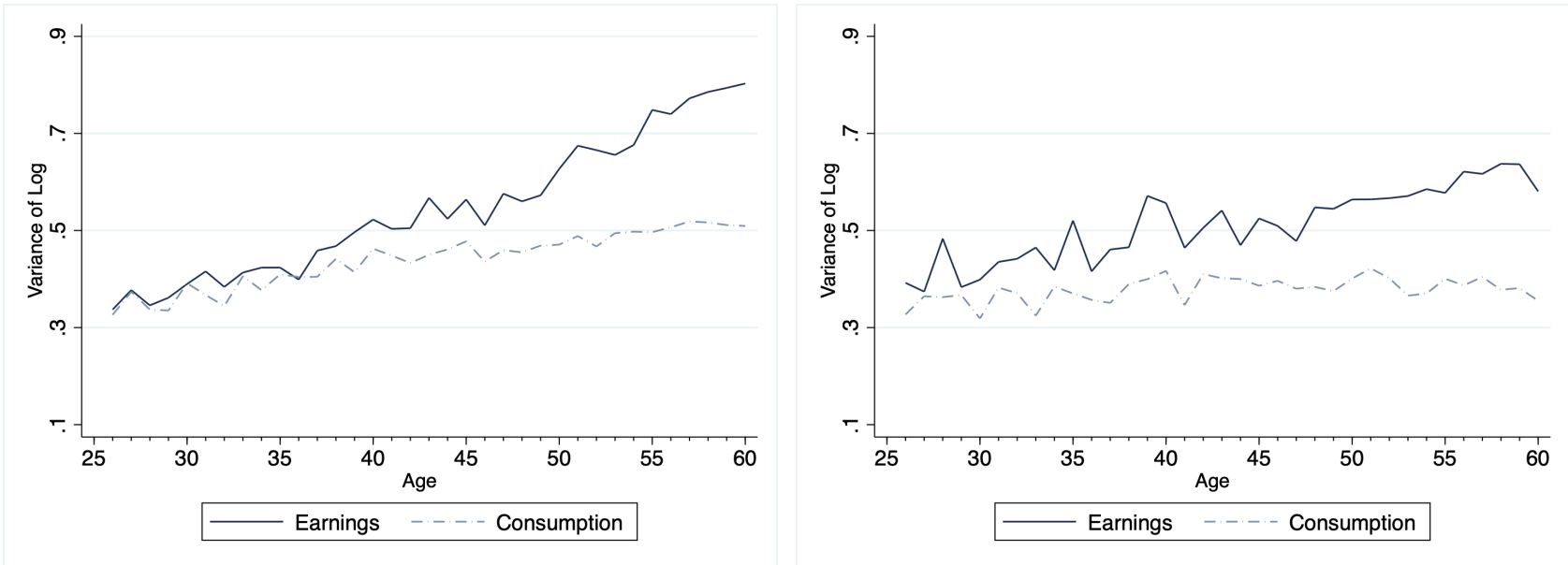
Discussion and Investigation

- Why do informal-worker households seem having a better ability of risk sharing?
- Check factors correlated with employment formality
  - Urbanization
  - Education
  - Industry
- Factors might lead to the puzzling finding
  - Sector-specific labor shocks
  - Family structure, networks, ...

Inequality over Age – Alternative Model (Urbanization)

- Y_{ja}^{c}, variance of log earnings or log consumption, for households with a head in age j, born in year c, and located in area a ('urban' or 'non-urban') is modeled as follows:

$$Y_{ja}^{c} = \alpha_c + \beta_{ja} + \epsilon.$$



(a) Urban

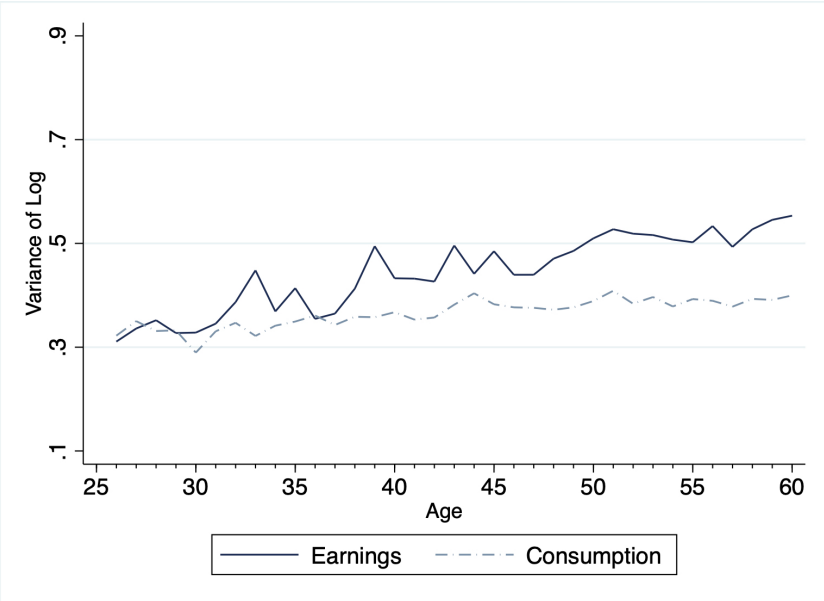
(b) Non-Urban

Figure: Earnings and consumption inequality by urbanization level

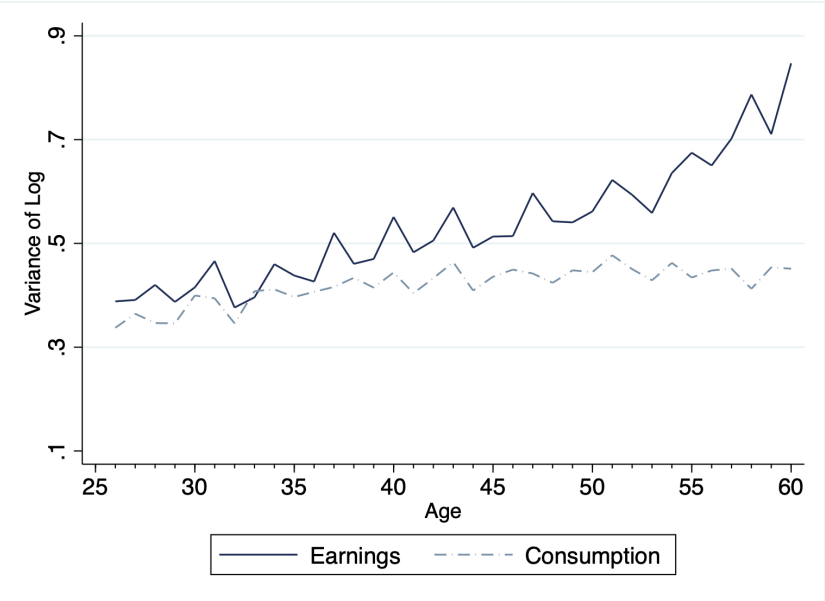
Inequality over Age – Alternative Model (Education level)

- Y_{je}^{c}, variance of log earnings/consumption, for households with a head in education level e ('High school and above' or 'Below high school') is modeled as follows:

$$Y_{je}^{c} = \alpha_c + \beta_{je} + \epsilon.$$



(a) High school and above

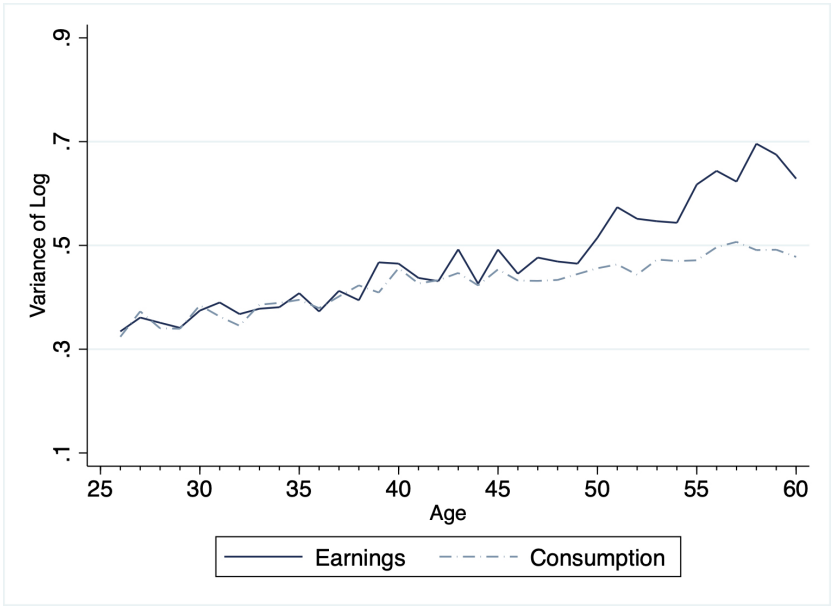


(b) Below high school

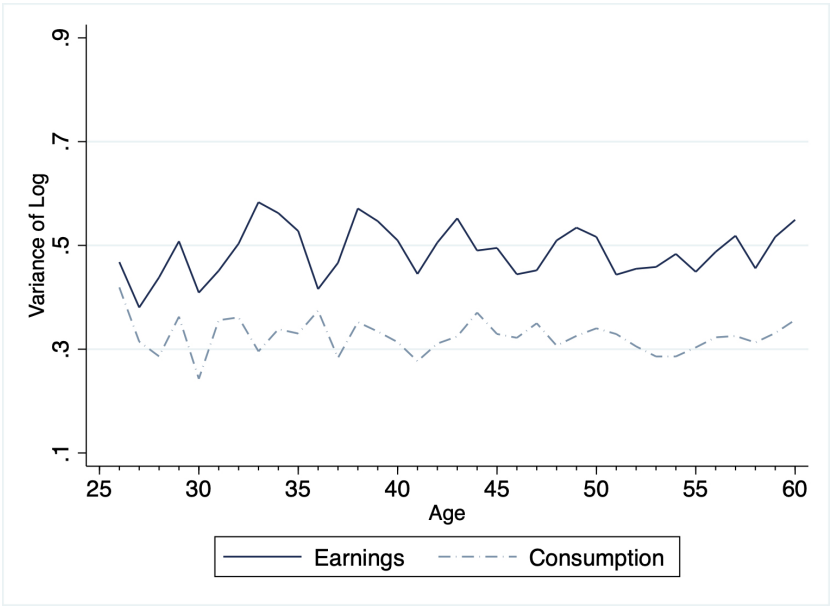
Figure: Earnings and consumption inequality by education level

Inequality over Age – Alternative Model (Industry)

- Industry i – 'Agriculture' or 'Non-Agriculture'



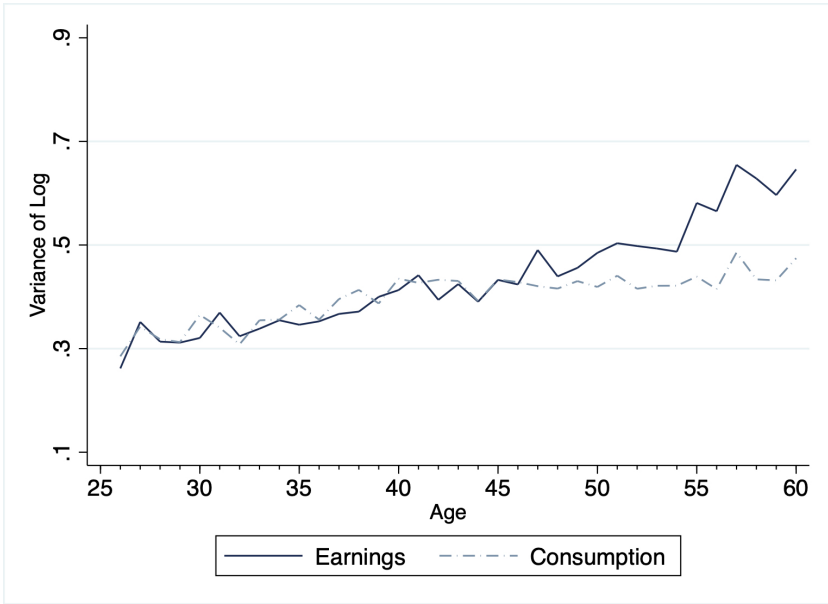
(a) Non-Agriculture



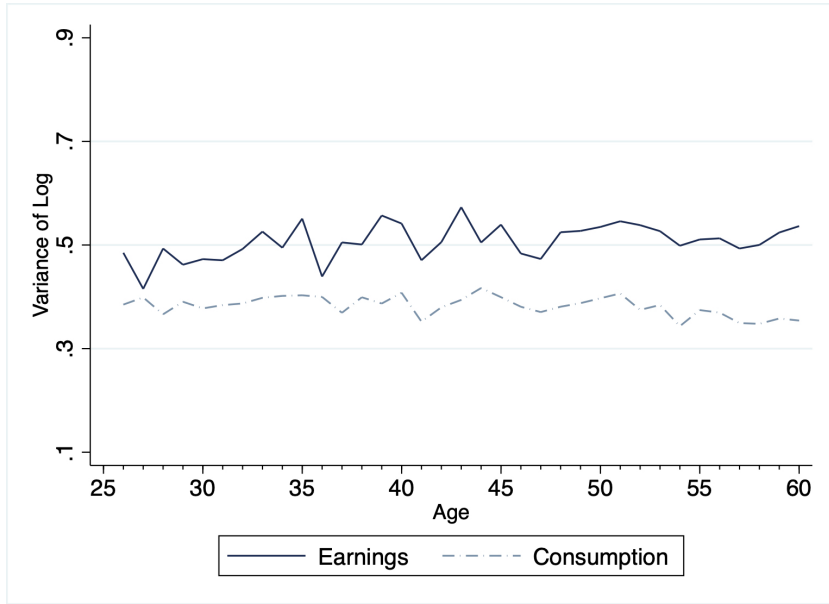
(b) Agriculture

Figure: Earnings and consumption inequality by industry

Recall – Benchmark (by Formal/Informal Sector)



(a) Formal



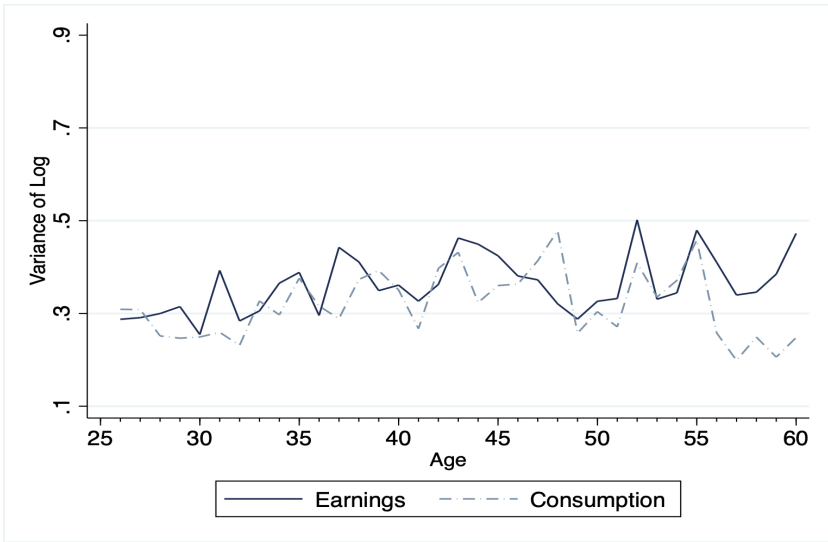
(b) Informal

Figure: Earnings and consumption inequality by sector

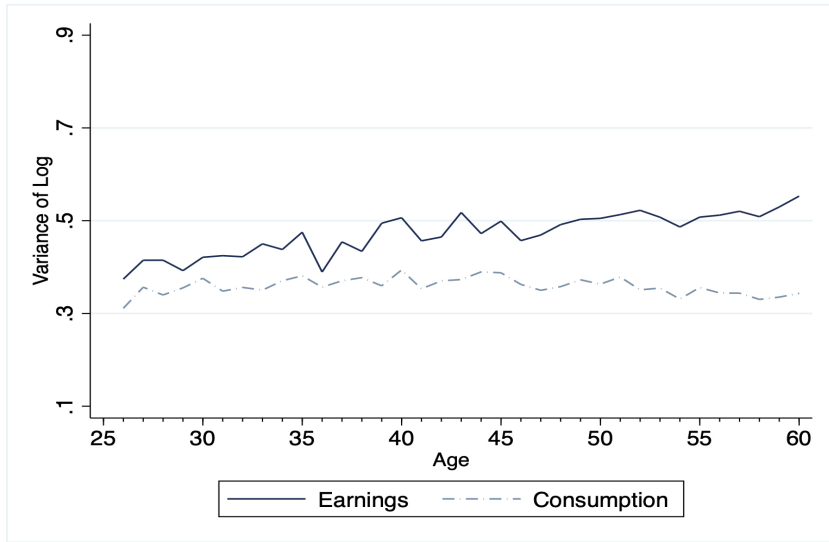
Inequality over the Life Cycle – Further Investigation

- Family may play an important role for risk sharing
- Blundell, Graber, and Mogstad (2015, JPuE), Blundell, Luigi Pistaferri, and Itay Saporta-Eksten (2016, AER), and Wu and Krueger (2020, AEJ:Macro) – structural models illustrating spouse/family members' role of providing insurance against earnings risk
- What are the inequality patterns by family type?

Inequality over age – Family Type



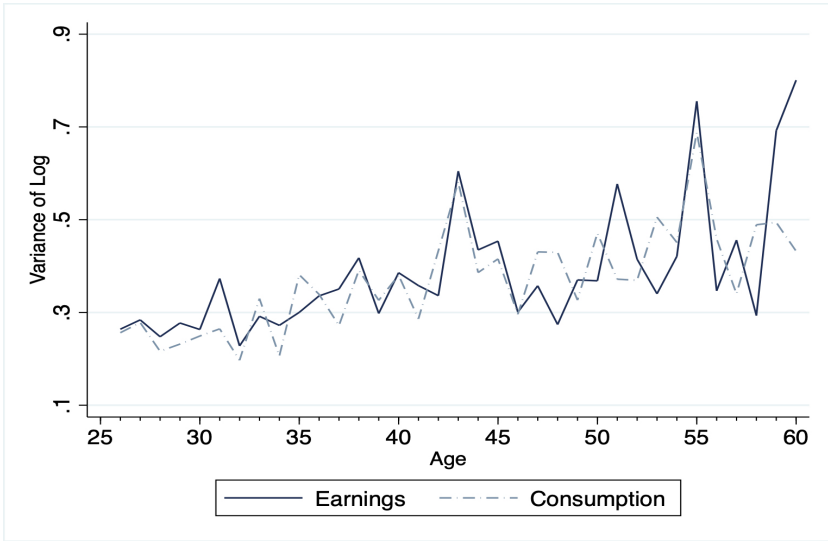
(a) Singles



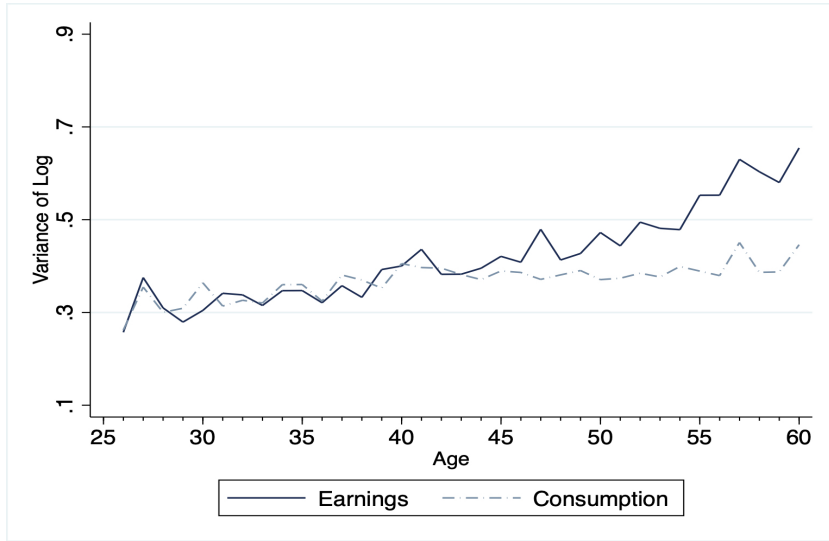
(b) Married couples

Figure: Earnings and consumption inequality by family type

Inequality over age – Family Type (Formal Workers)



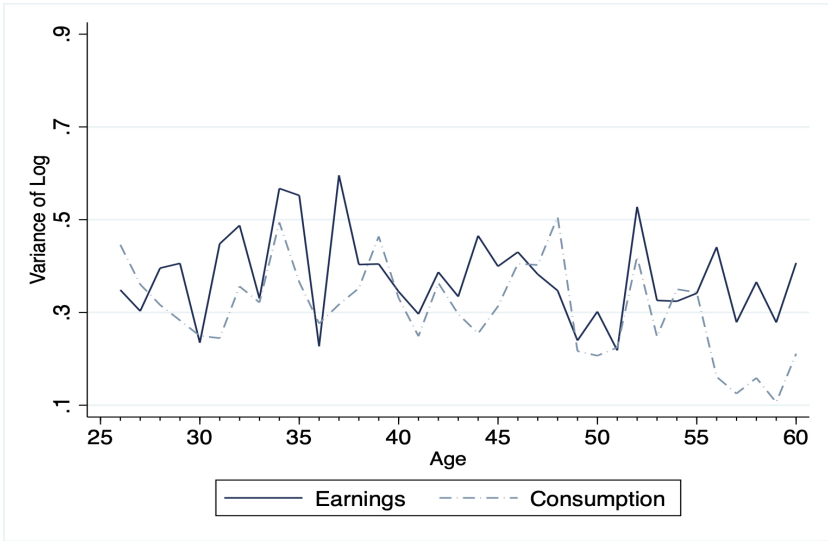
(a) Singles (Formal)



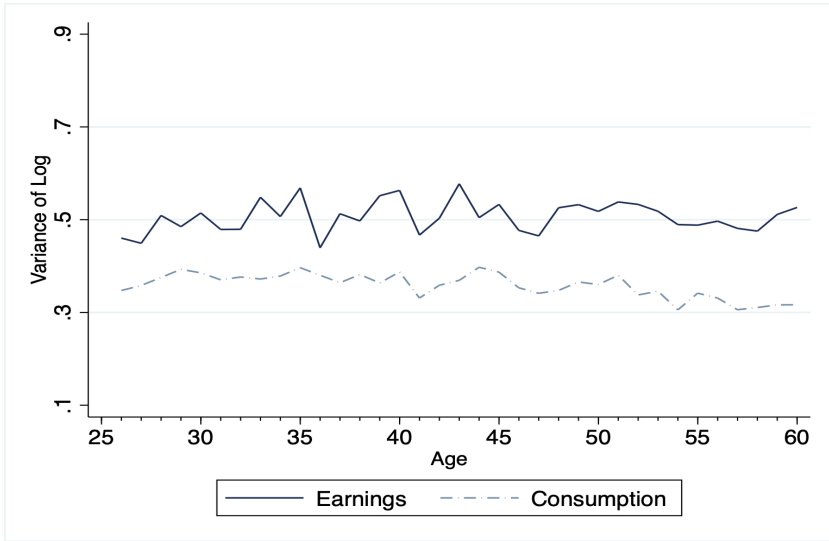
(b) Married couples (Formal)

Figure: Earnings and consumption inequality by family type (Formal)

Inequality over age – Family Type (Informal Workers)



(a) Singles (Informal)



(b) Married couples (Informal)

Figure: Earnings and consumption inequality by family type (Informal)

Further Investigation – Possible factors affecting risk sharing

- Storesletten, Telmer, and Yaron (2004, JME)
  - Standard life-cycle model with incorporating estimated earnings shock process
  - Can explain consumption inequality patterns well by considering asset accumulation (precautionary saving) and social security
- Blundell, Luigi and Saporta-Eksten (2016, AER), and Wu and Krueger (2020, AEJ:Macro)
  - Two-earner Life-cycle model with incorporating estimated wage shock processes
  - After considering asset accumulation, family labor supply, taxes, and social welfare, there is little evidence of additional insurance (in the US)

Further Investigation – Possible Factors (cont'd)

- Potential factors accounting for inequality patterns among formal/informal workers:
- Sector-specific shock process, Precautionary saving, Taxation, Social welfare, Family structure, Networks of relatives and friends
- A structural model?

Further Investigation – Potential Structural Model

The optimization problem for a household in age j with 2 earners:

$$V\left(a,e_m,e_f,w_m,w_f,j|H\right) = \max_{c,a',h_f} \; u(c,h_m,h_f) + \beta E[V(a',e'_m,e'_f,w'_m,w'_f,j+1|H)]$$

subject to

$$c + a' = y - T(y) + (1+r)a + tr^g(H) + tr^p(H)$$
$$y = w_m(e_m)\epsilon_j^m h_m + w_f(e_f)\epsilon_j^f h_f$$

where H is vector of household characteristics; e_i and w_i are employment shock (formal, informal, not working) and wage shock for a member with gender i; $tr^g(H)$ and $tr^p(H)$ measure transfers from the government and private networks

Concluding Remarks

- (1) Formal-worker households:
  - both earnings inequality and consumption inequality increase with age.
  - consumption inequality is not lower than earnings inequality for younger households (below 45).
  - Implication: young households without accumulating sufficient assets have a lower ability to insure against earnings risk (due to less social insurance?)

Concluding Remarks (cont'd)

- (2) Informal-worker households:
  - Pattern of earnings and consumption inequality is flatter
  - Consumption inequality is generally lower than earnings inequality
  - Implication: Earnings shocks are mainly transitory; A greater ability to insure consumption against earnings risk (**future investigation required**)

Concluding Remarks (cont'd)

- (3) Singles v.s. Married
  - Singles have a lower ability to insure consumption, compared with the married
  - Still can not explain the difference between formal and informal workers
- (4) Next step: a structural model
  - Extend from Blundell et al. (2016) and Wu and Krueger (2020)