(Some) Economic Implications of Recent Findings on Earnings and Wage Dynamics

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CINTIA Workshop on
– Expectations and Risks affecting Households and Firms –
24–25 May 2019

Motivation

- Nature of income risk critical for many questions in economics. E.g.:
  - Saving and portfolio allocation
  - Consumption and wealth distribution
  - Ability to self-insure/welfare
  - $\Longrightarrow$ Scope for social insurance and redistribution

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  - $\Longrightarrow$ Scope for social insurance and redistribution
- Better datasets and new methods are challenging long held views about labour income risk

"Canonical" model of earnings dynamics

- Detrended labor earnings follow a (log-) linear process. E.g.

$$y_{it} = \delta_i + \eta_{it} + \varepsilon_{it}$$
$$\eta_{it} = \rho \eta_{i,t-1} + v_{it}$$

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  - Linearity: conditional 2nd and higher moments independent of $\eta_{i,t-1}$

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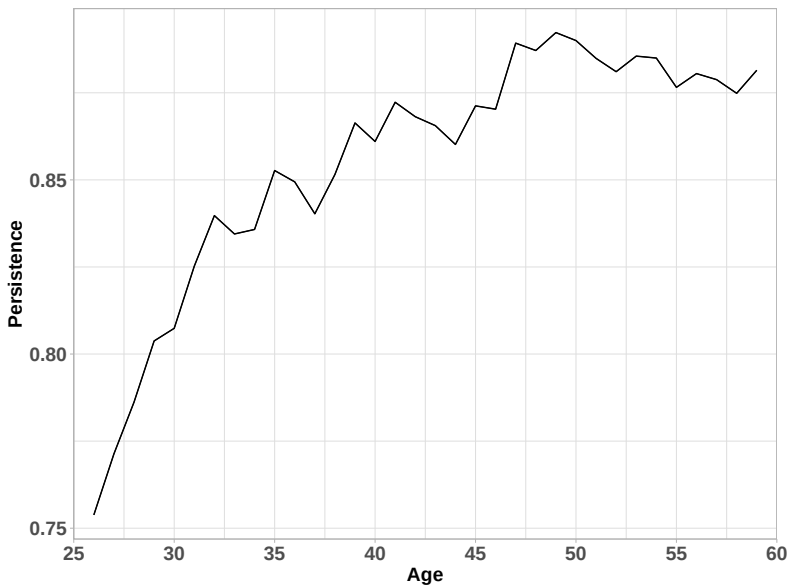

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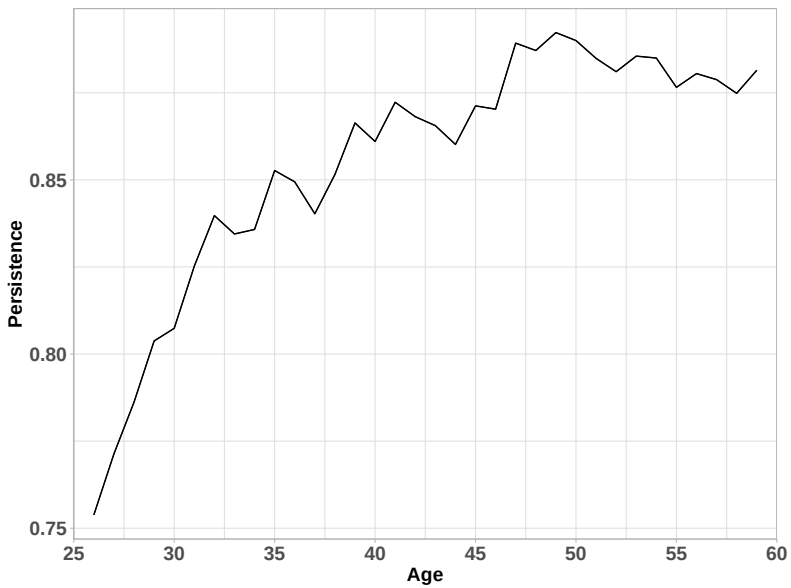

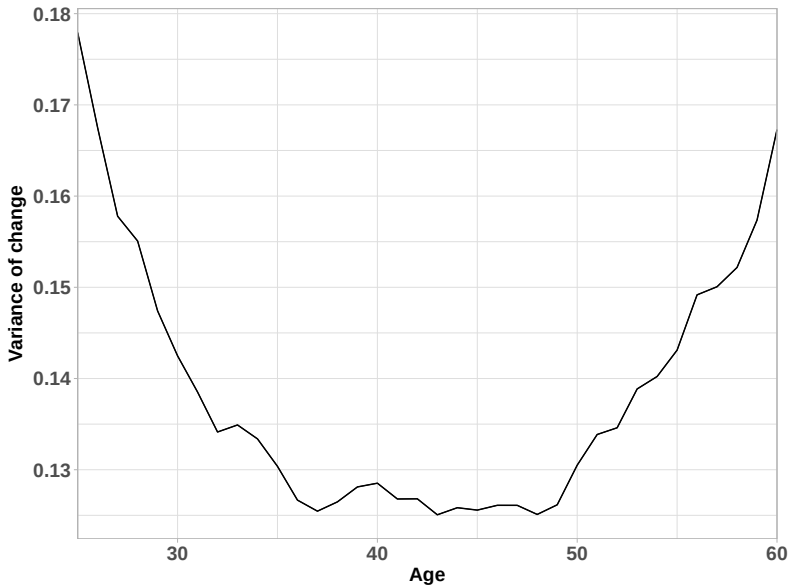

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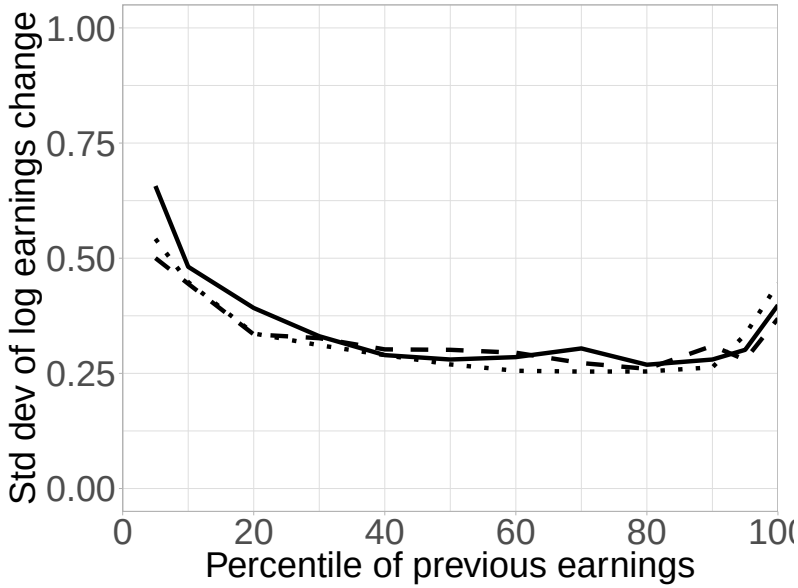

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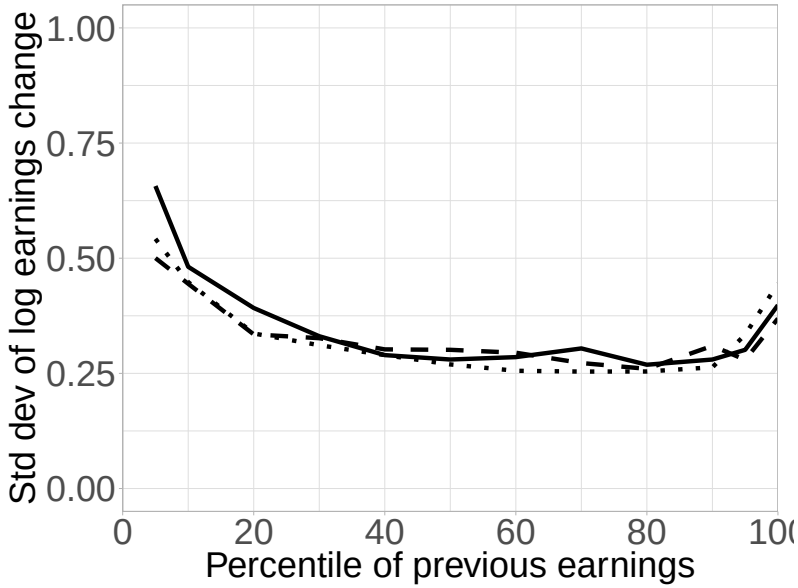

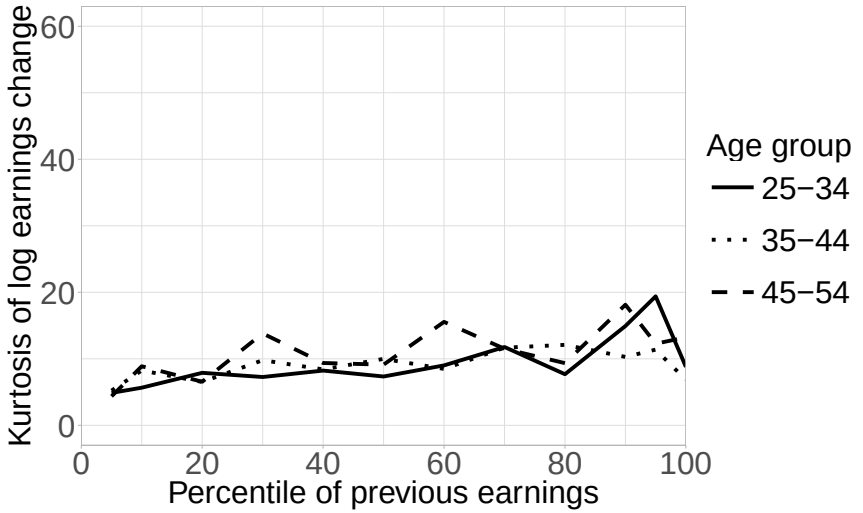

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- Non-parametric (+parameter calibration), individual administrative data, emphasis on non-normality: Guvenen, Ozkan and Song (2014), Guvenen, Karahan, Ozkan and Song (2019)

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- Semi-parametric, survey household data, emphasis on non-linear persistence: Arellano, Blundell and Bonhomme (2017)
- New findings making way in quantitative macro literature: Golosov, Troshkin and Tsyvinski (2016), McKay (2017), Kaplan, Moll and Violante (2018), De Nardi, Fella and Paz Pardo (various), ...

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1. Estimate state-of the art, flexible, persistent+transitory process for household, post-tax labor earnings

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1 and 2 joint with Mariacristina De Nardi and Gonzalo Paz Pardo,
3 ditto + Marike Knoepf and Raun Van Ooijen

Identifying labor income risk: issues

- Relevant income concept: HH, post-tax labor earnings
- Earnings risk

$$y_{it} = \eta_{it} + \varepsilon_{it}$$

  - Stemming from the unobservable persistent component η_{it}
  - Non-linearities in η_{it} process cannot be identified from autocovariances of y_t
- Earnings risk = wage risk + labor supply (choices vs risk)

A flexible NL but parsimonious model

Arellano, Blundell and Bonhomme (2017)

$$\eta_{it}(q) = Q_\eta(q|\eta_{i,t-1}, age_{it})$$
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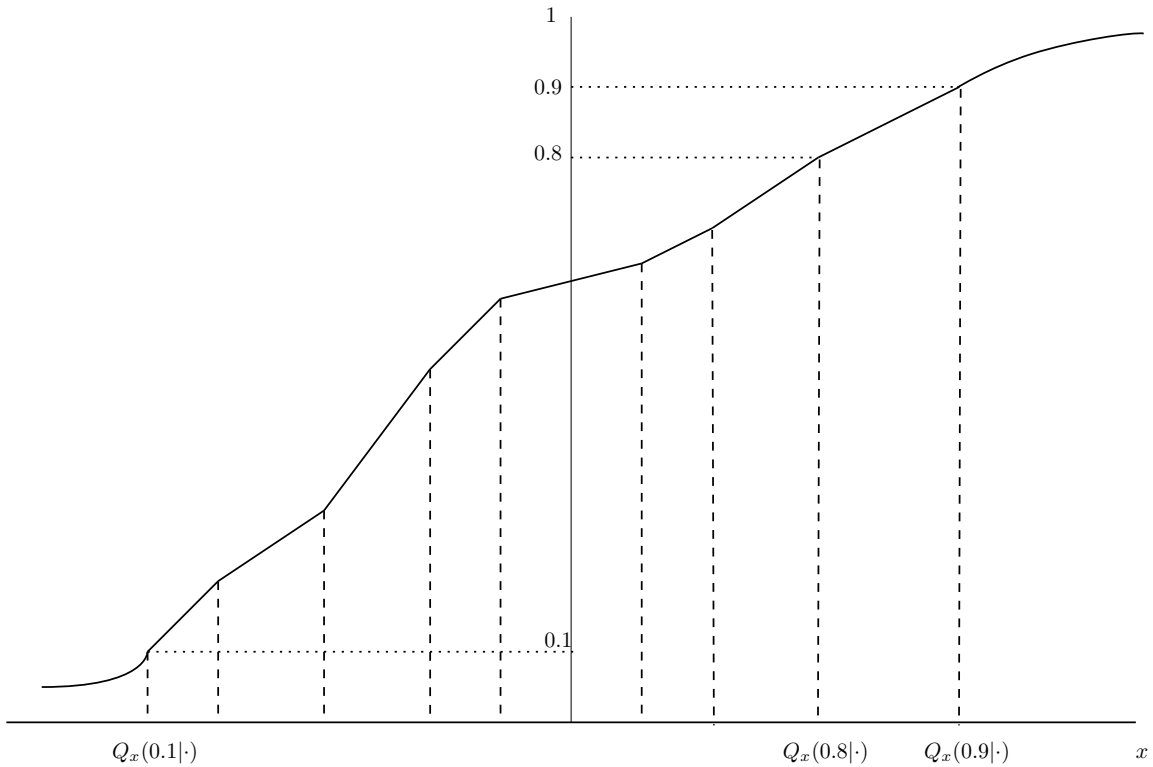
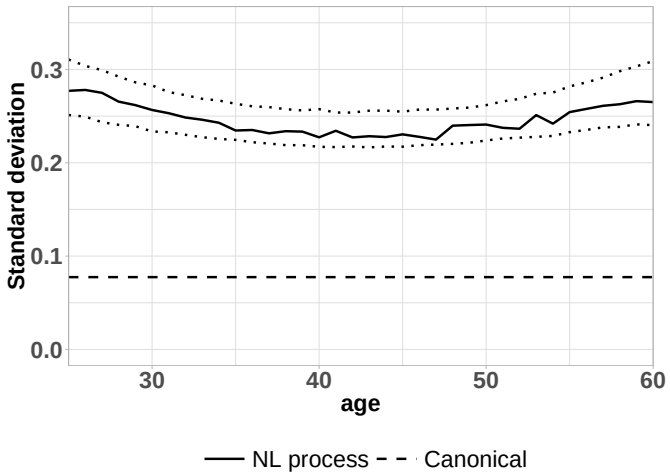


Estimated NL vs canonical earnings process

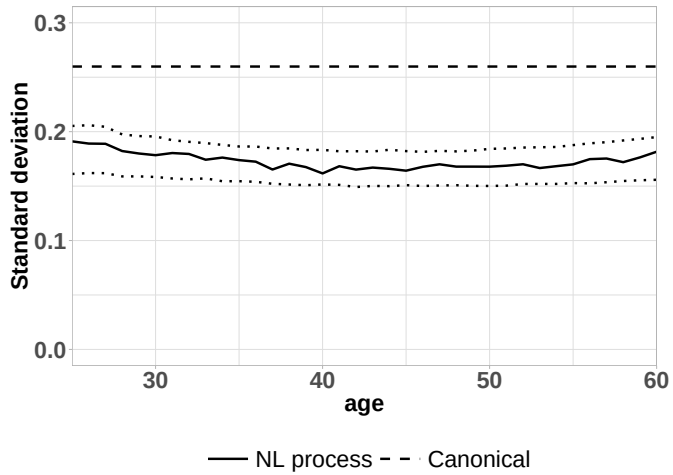
Age-dependent second moments

▸ Estimates

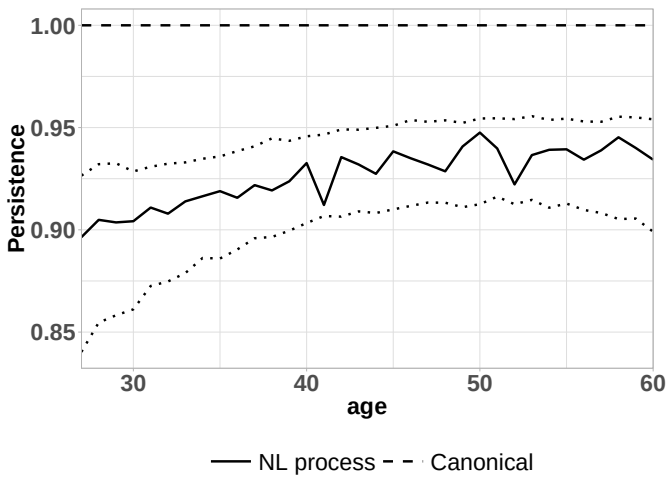
$\sigma^t_{\eta - E[\eta|\cdot]}$



σ^t_{ε}



ρ^t



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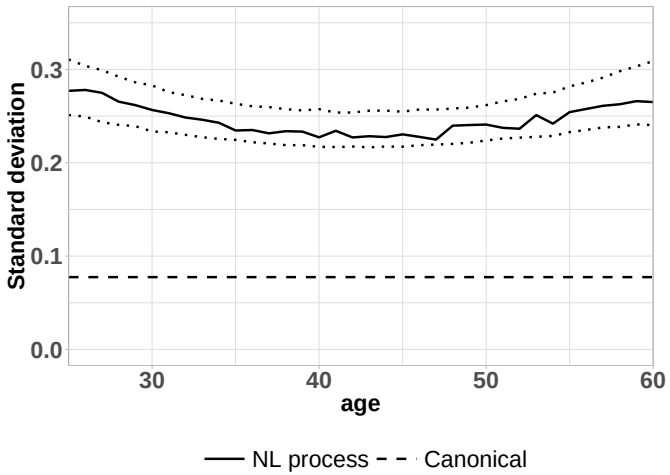

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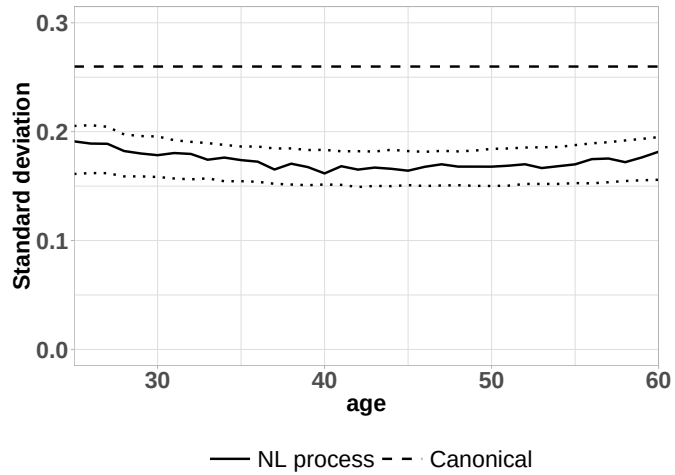

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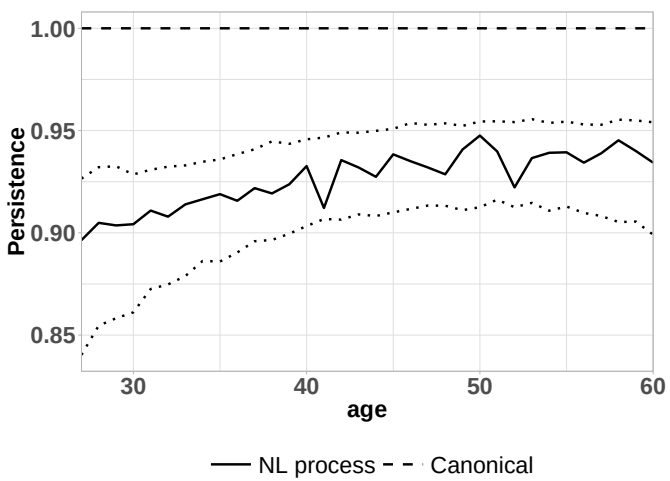
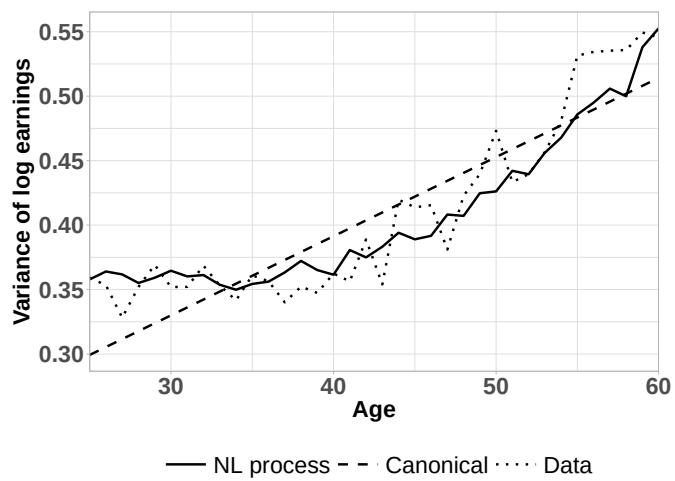


$\sigma^2_{\log y_t}$



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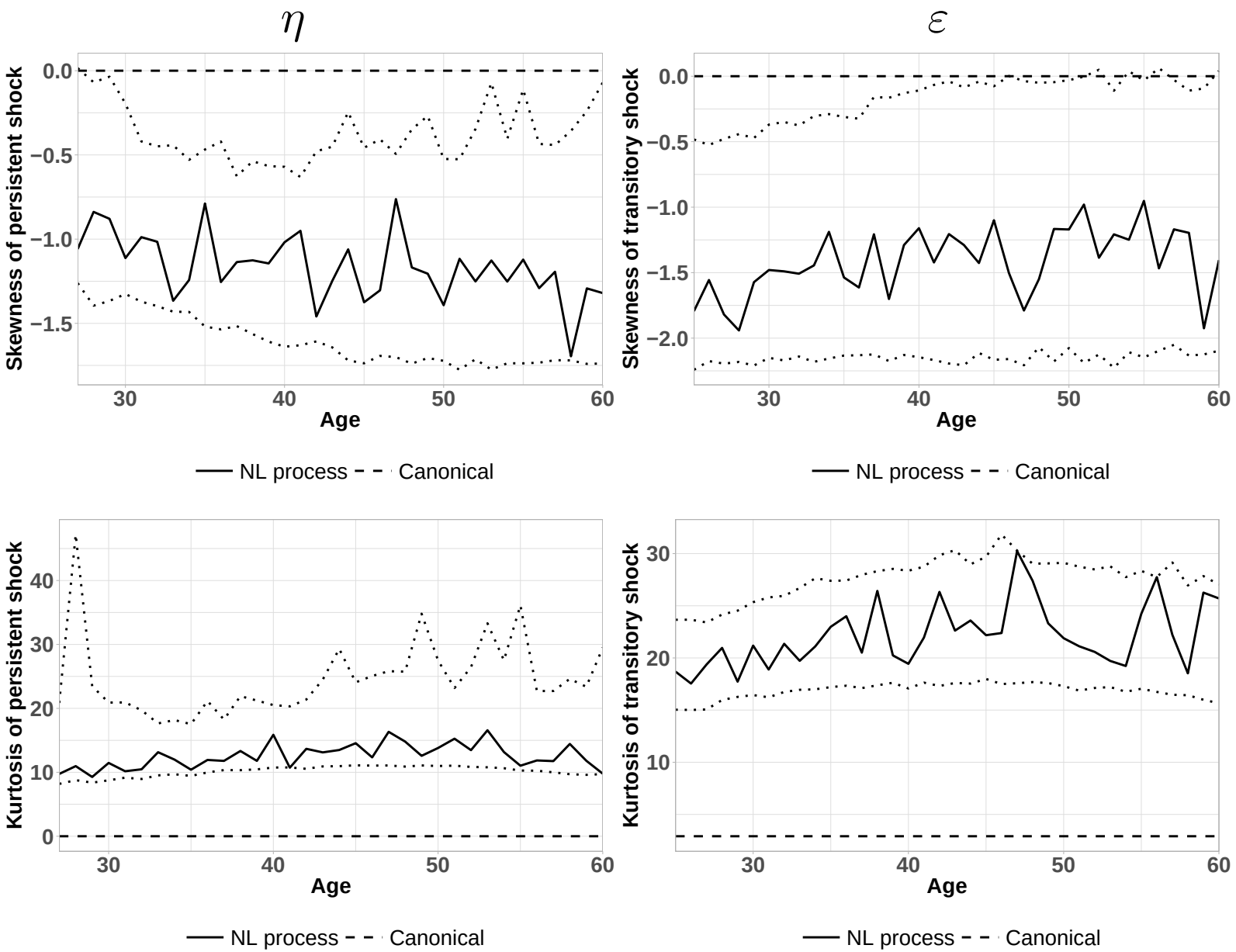

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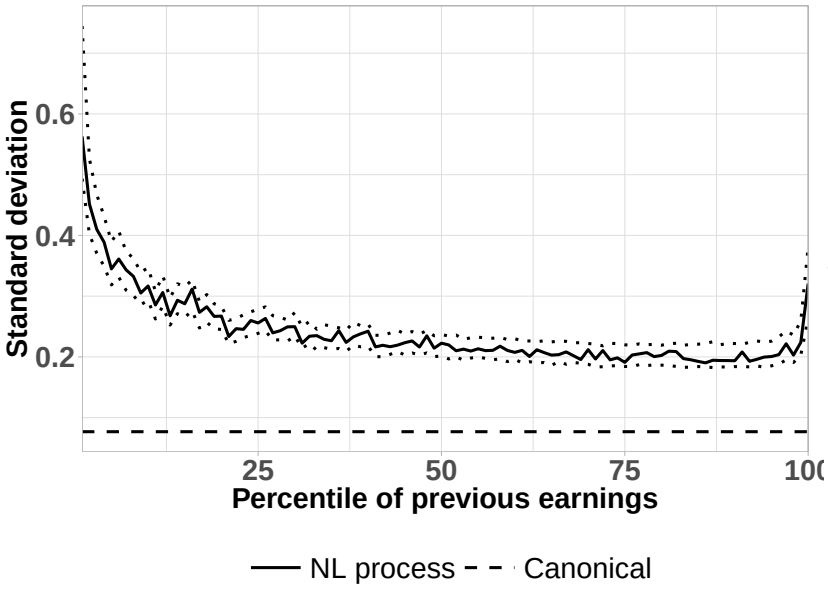
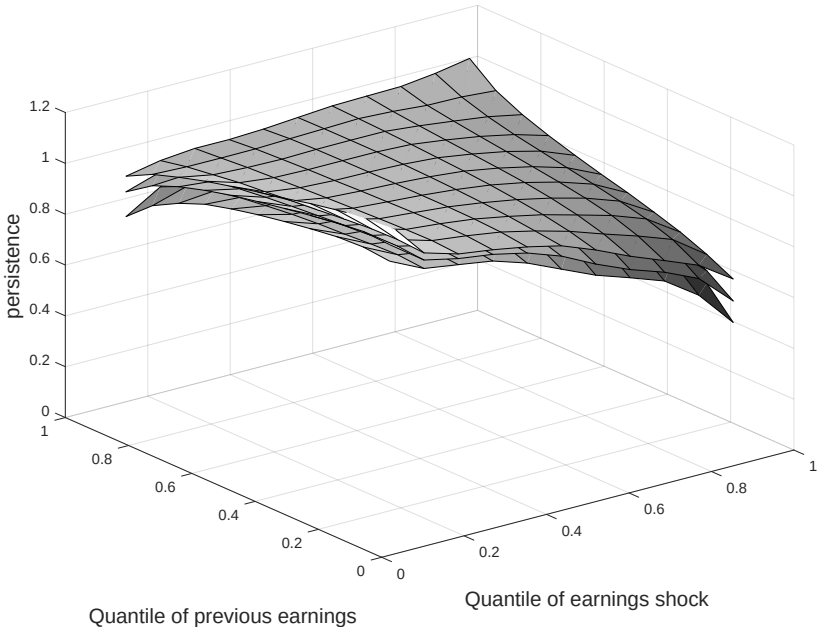
Nonlinearity

σ_η



$$\rho(\eta_{it}|\eta_{i,t-1}) = \mathbb{E}_t \frac{\partial Q_\eta(q|\eta_{i,t-1},t)}{\partial \eta_{i,t-1}}$$



Study consumption, wealth and welfare

(De Nardi, Fella and Paz Pardo, JEEA forth.)

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- Decompose the contribution of the different features of the NL earnings process

Model implications

OLG model, key features

- Ex-ante identical agents, work 25-60, retirement 61-86
- CRRA preferences
- Inelastic labor supply
- Single risk-free asset, no borrowing
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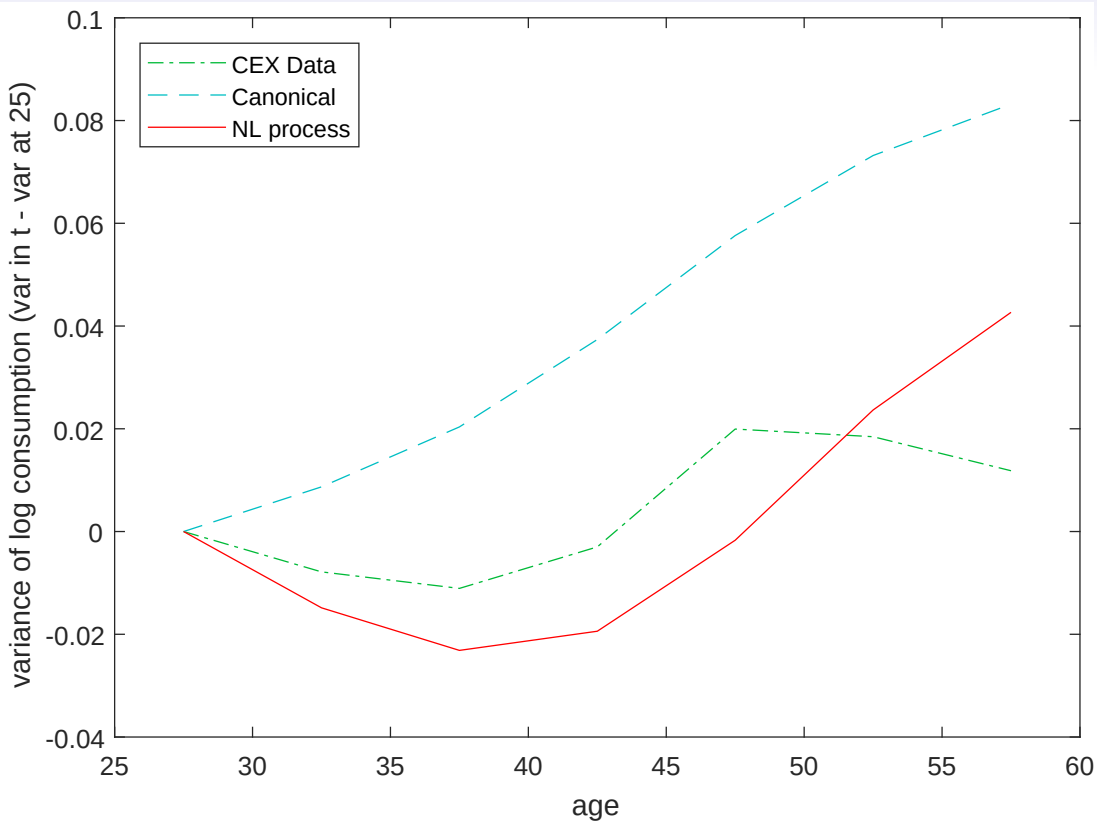
- Infinitely-lived government, old age Social Security
- Earnings follow, alternatively, the two empirical processes described
  - β recalibrated to match 3.1 wealth/income ratio

Consumption implications

Variance of log consumption, data and models



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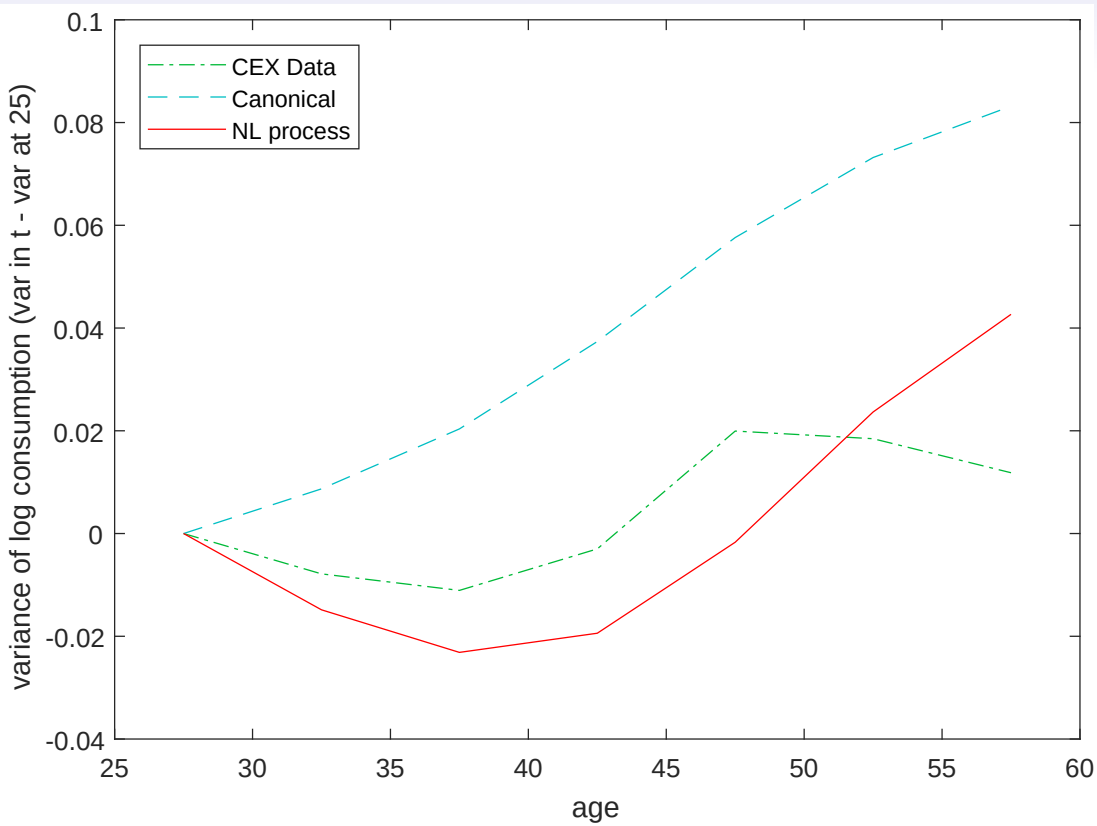

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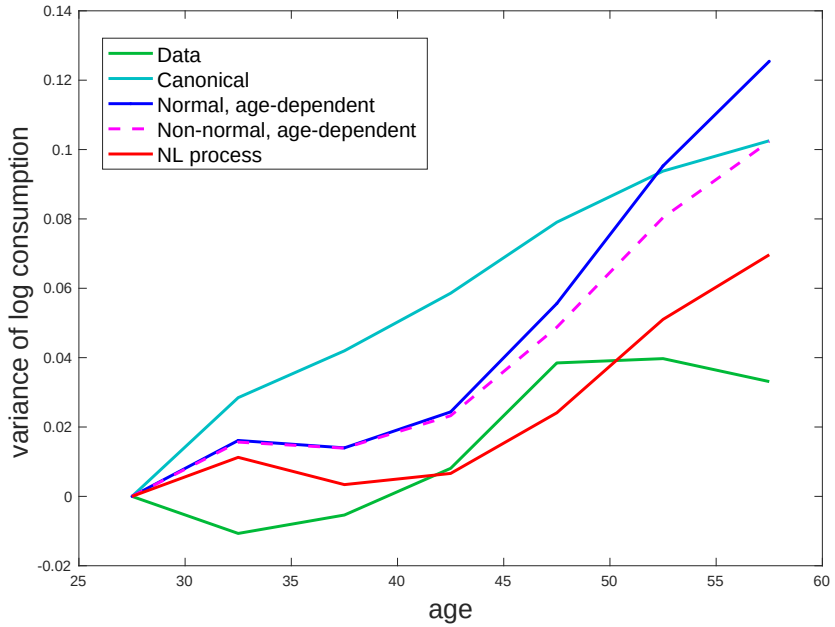
- Very hard to match without HIP (Guvenen 2007; Huggett, Ventura and Yaron 2011)

Opening the black box

Age-dependent second moments



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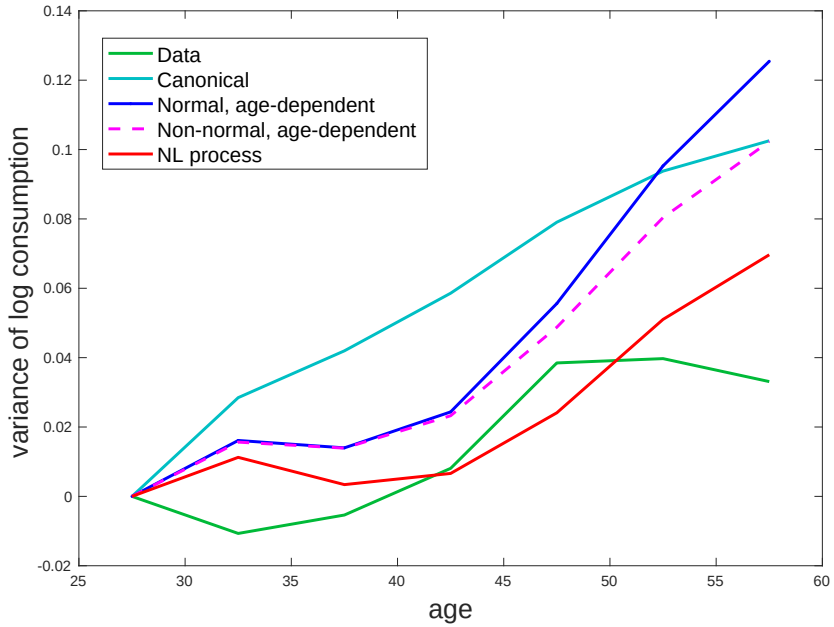

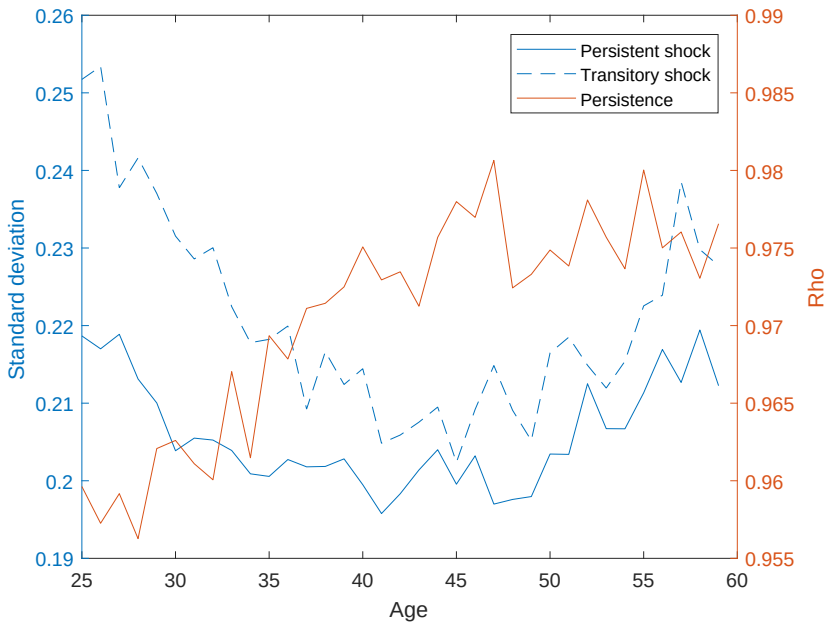

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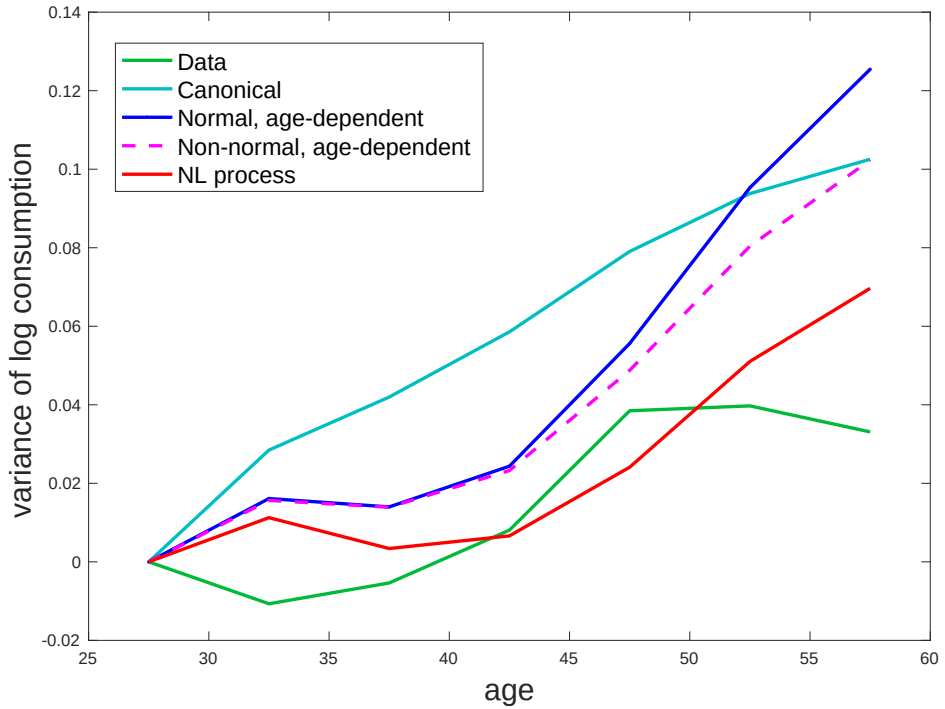
Age-dependent moments + non-normality



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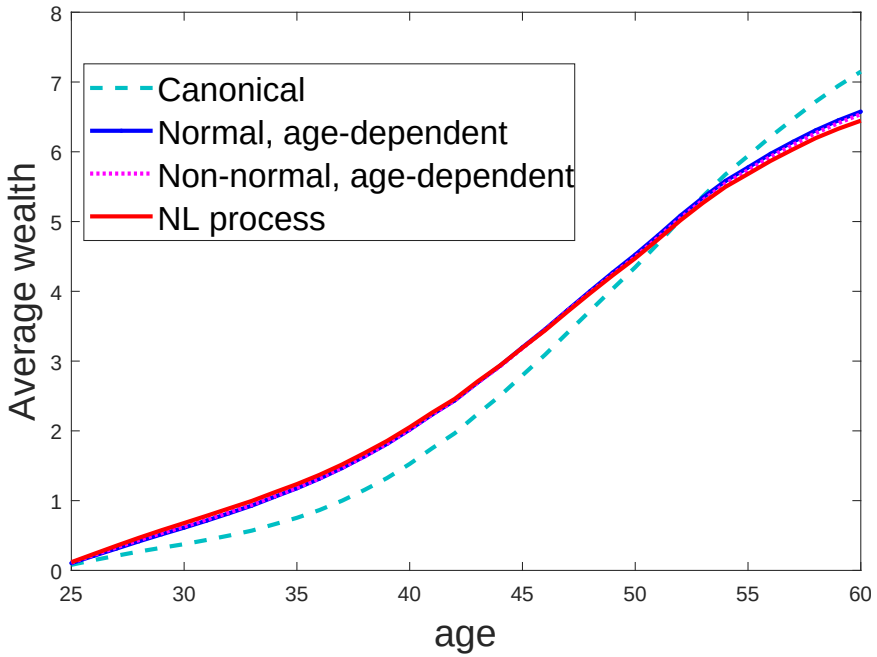
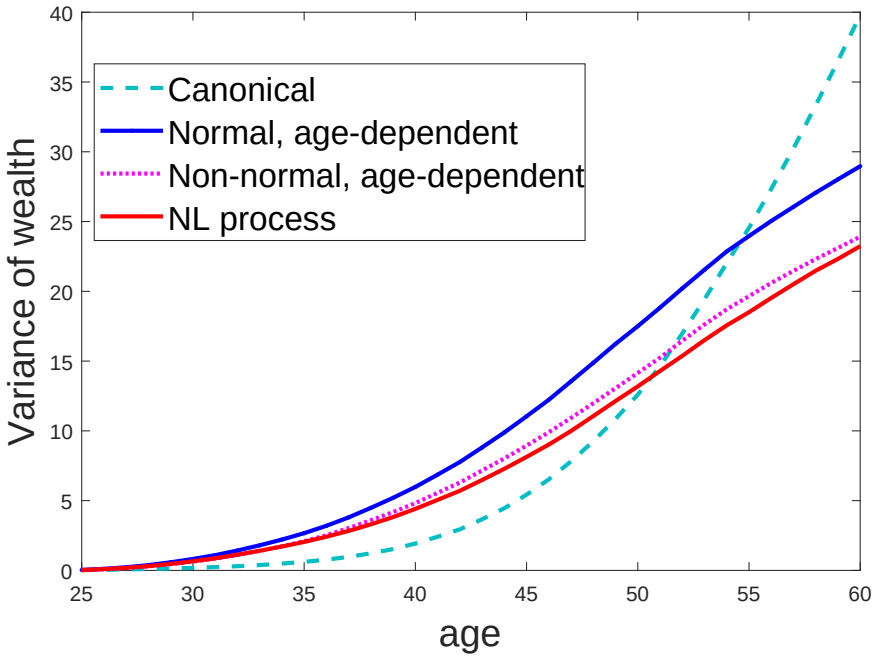
Mechanism





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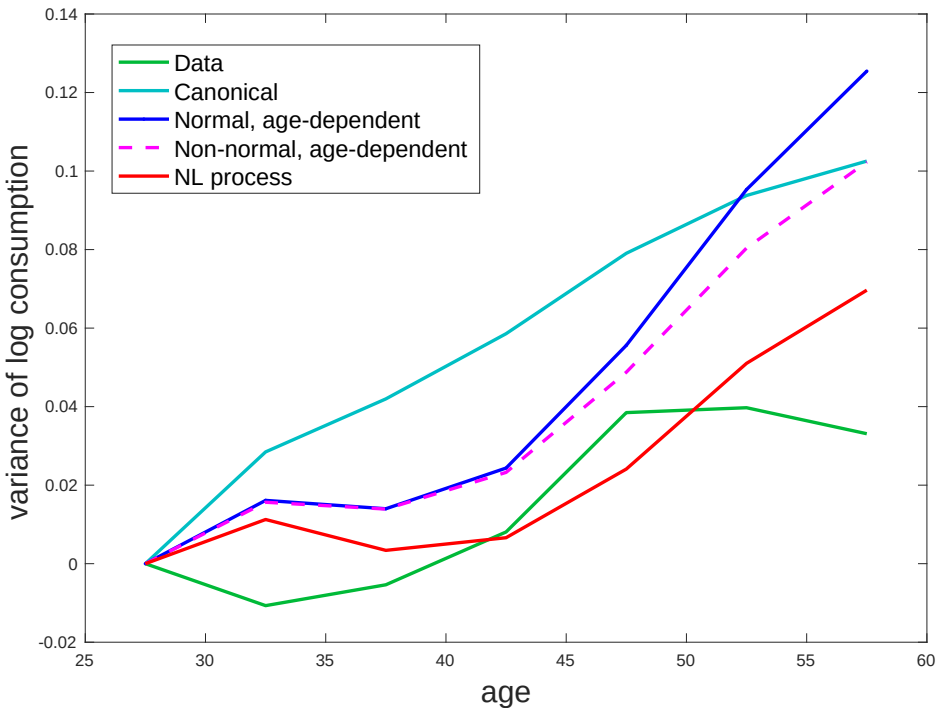
Full NL



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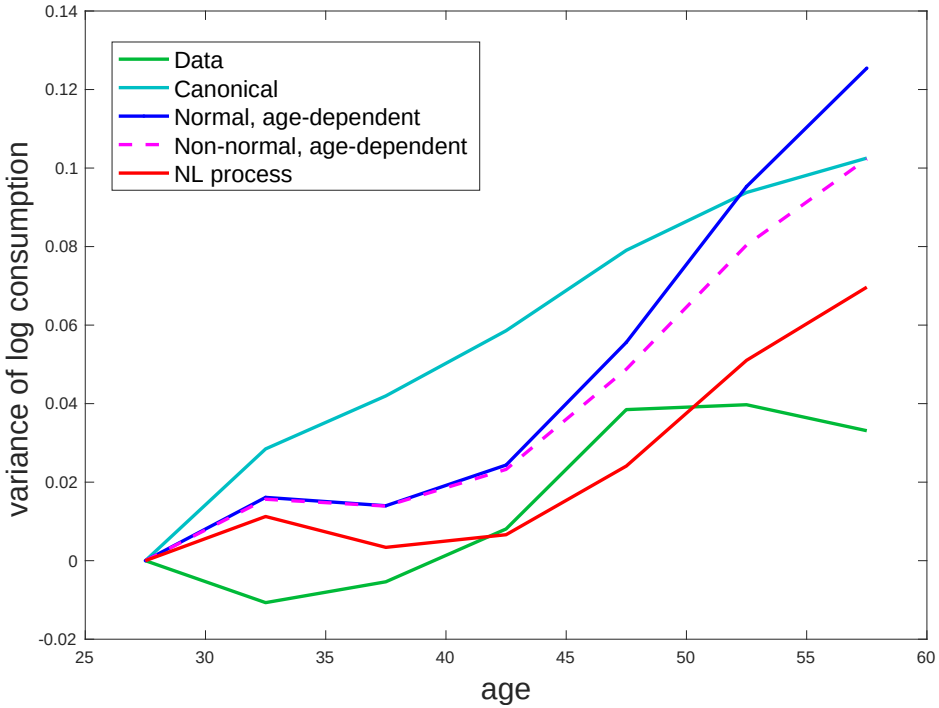

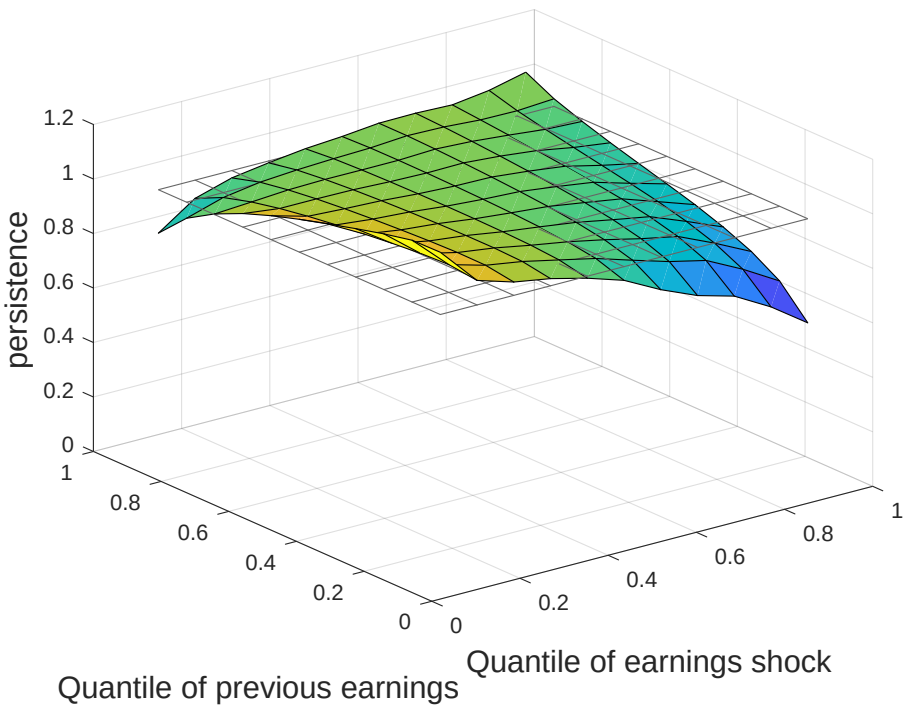

Self-insurance and welfare

BPP insurance coefficients

- Blundell, Pistaferri and Preston (2008): Fraction of earning shock $x = \eta, \varepsilon$ not reflected in consumption response

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- Model true coefficients: earnings shocks are observed
- In the data, BPP identification (assuming "canonical" process):

$$\phi^\eta = 1 - \frac{\text{cov}(\Delta c_{it}, y_{i,t+1} - y_{i.t-2})}{\text{cov}(\Delta y_{it}, y_{i,t+1} - y_{i,t-2})}, \; \phi^\epsilon = 1 - \frac{\text{cov}(\Delta c_{it}, \Delta y_{i,t+1})}{\text{cov}(\Delta y_{i,t}, \Delta y_{i,t+1})}$$

BPP insurance coefficients

Process/Coefficients	ψ^{p}_{BPP}	ψ^{tr}_{BPP}	ψ^{p}	ψ^{tr}
	Data: BPP (2008)			
Canonical	0.36	0.95	–	–
(S.E)	(0.09)	(0.04)		
	Model			
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	Model			
Canonical	0.14	0.88	0.30	0.91
Nonlinear process	0.43	0.81	0.46	0.89
Normal, age-dependent	0.41	0.82	0.46	0.88
Non-normal, age-dependent	0.41	0.82	0.45	0.84

Welfare costs of earnings risk

	Welfare cost
Canonical process	28.2%
Nonlinear process	26.1%

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Nonlinear process	26.1%
Normal, age-dependent	24.3%
Non-normal, age-dependent	25.4%

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- Through the lens of a life-cycle model, these richer dynamics
  - can account for, previously, hard to explain empirical findings
  - imply lower welfare gains from social insurance
- Age-dependent and non-linear persistence are crucial

Open questions

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- Employment risk vs endogenous choice: particularly for secondary workers
- Rest of this talk
  - Non-parametric, bird's eye view
  - Wages vs earnings (changes, **not** risk)
  - Family vs government

Earnings, wages, family and government

(De Nardi, Fella, Knoef, Paz Pardo and Van Ooijen, 2019)

- Dutch Income Panel Study (IPO): administrative data 1989-2014
- Representative sample: 95,000 individuals (25-60) **and** their household members
  - Attrition only through emigration or death

Earnings, wages, family and government

(De Nardi, Fella, Knoef, Paz Pardo and Van Ooijen, 2019)

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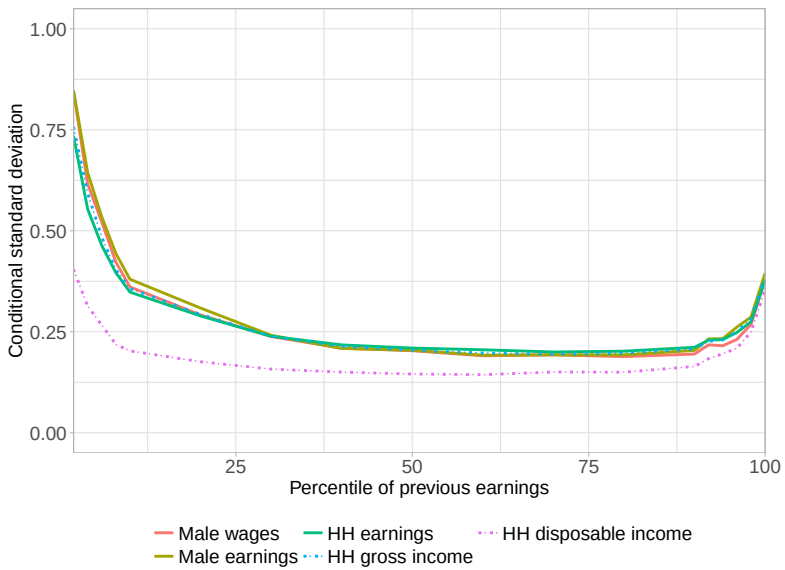
- Linked to Social Security data on yearly hours

Non-linearities are a robust feature

Of earnings **and** wages

$\sigma_{|y_{t-1}}$



$\rho^{t}_{|y_{t-1}}$

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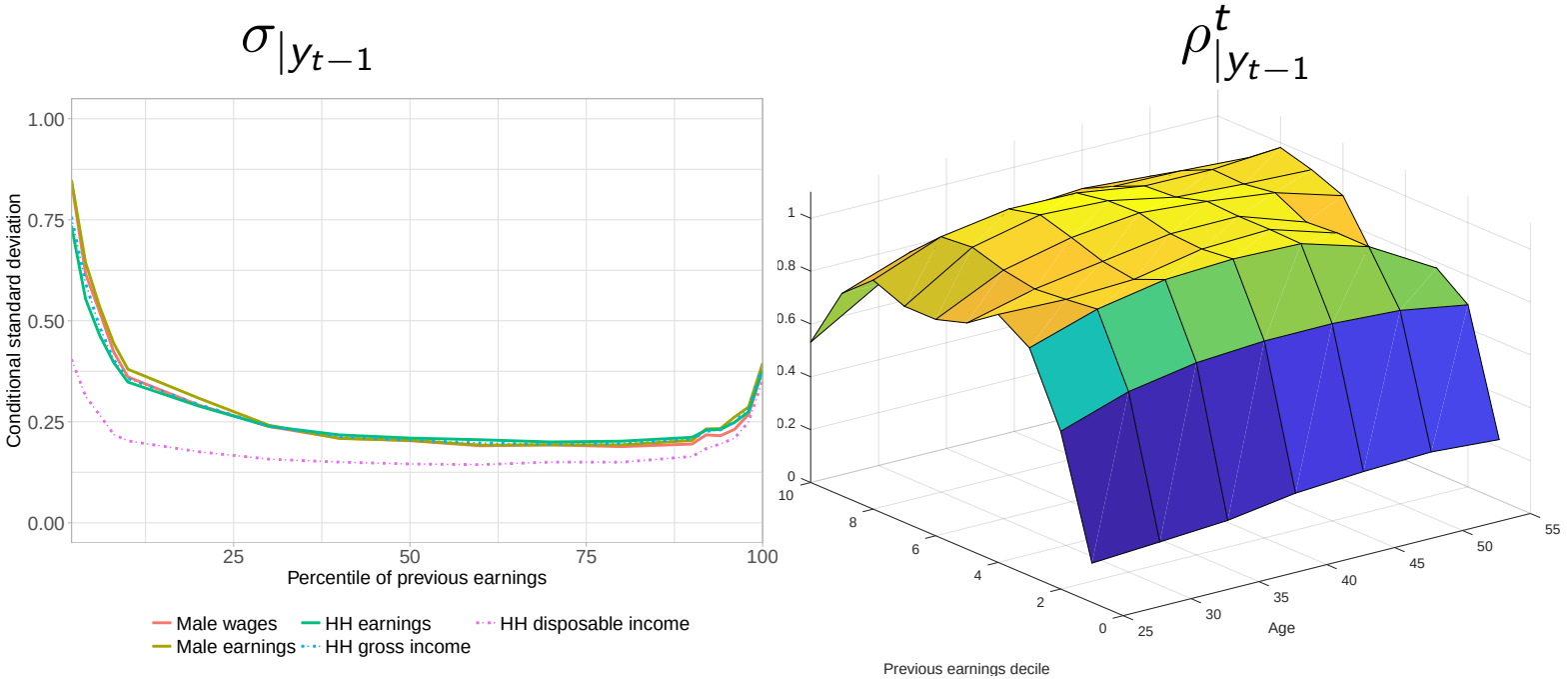
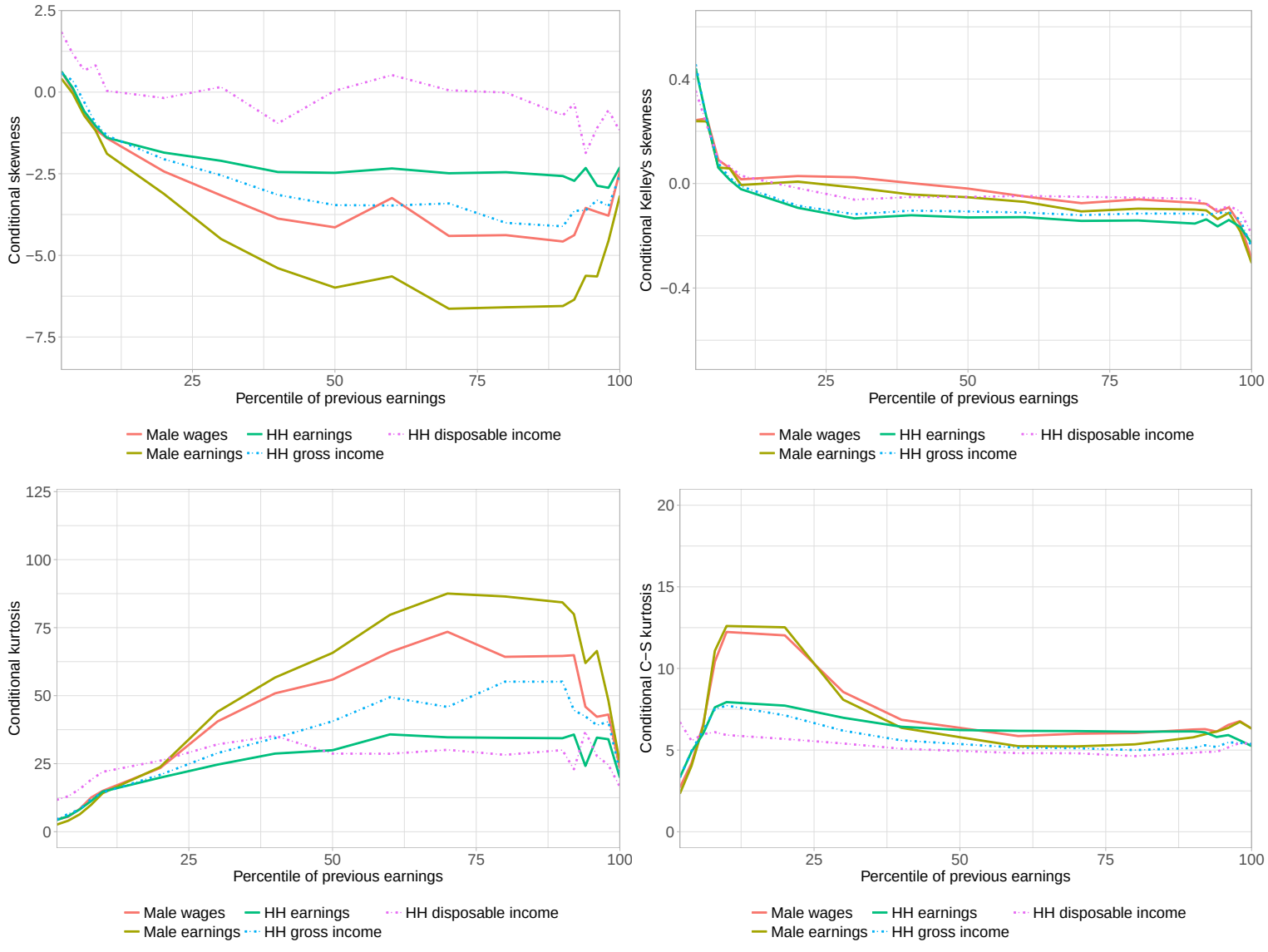


Non-normality mostly driven by tails

Mainly due to wages



Takeways

- Non-linearities are important
  - in both (male) wages and earnings changes
  - wage and earnings changes are more variable but less persistent at the bottom and top of the distribution of previous earnings
- Non-normality is mainly driven by the tails of the distribution of wage and earnings changes
  - In the tails, negative skewness and high kurtosis in earnings are mainly, but not only, driven by wages
  - Similar to Norway (Halvorsen, Holter, Ozkan and Storesletten, 2019) but unlike Italy (Hoffmann and Malacrino, 2016),
- Government main channel of insurance

What have we learned and what next

- What have we learnt
  - Neglecting age-dependence, non-linearities and non-normalities in earnings may substantially bias our findings about shock insurability and the need for social insurance
  - Age-dependence and non-linearities are particularly important quantitatively (De Nardi, Fella and Paz Pardo, in progress)
- Future research:
  - Endogenizing employment choice
  - Cyclicality of non-linearities vs non-normality
  - Implications for portfolio choices
  - ...

Canonical benchmark

	σ^2_ϵ	$\sigma^2_{\eta_1}$	σ^2_ν	ρ
Benchmark	0.0675	0.2363	0.0059	1

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