

General Equilibrium Analysis of Consumption Dynamics in Rural Economies

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Differences in Structure of Production Across Time and Space

- Focus on **fixed vs. reproducible factor share**, abstracting from TFP
 - For concreteness, think about

$$Y = T^x K^\nu L^{1-x-\nu}, \quad \text{Fixed Factor } T, \text{ Capital } K, \text{ Labor } L$$

- And consider Uganda vs. UK today or UK 250 years ago vs. UK today
- Result in **changes in private sector's elasticity of demand for prod. assets**
 - Higher fixed factor share \rightarrow more elastic demand
 - Household (hh) asset supply imperfectly elastic (like in **Aiyagari**)
 - \rightarrow hh consumption dynamics sensitive to factor share
- Provides novel explanation for differences in rural vs. urban hh cons. dynamics

What I Do in This Project

- **Research Q:** How do differences in fixed factor shares affect cons. dynamics?
 - Micro moments:
 - Passthrough from income shocks to consumption (Townsend, 1994)
 - Intergenerational persistence of income/consumption (Alesina et al., 2021)
 - Macro moment: Agg. saving rate

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 - Micro moments:
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 - Intergenerational persistence of income/consumption (Alesina et al., 2021)
 - Macro moment: Agg. saving rate
- **Main results:**
 - HH cons. dynamics sensitive to **prod. structure** in presence of **uninsurable risk** in **General Equilibrium**
 - Accounts for most of low rural passthrough
 - Accounts for most of higher rural intergenerational persistence
 - Differences in agg. saving rate: 7% in rural vs. 27% in urban
Laitner (2000) + quant. model with risk

Roadmap

1. Develop Aiyagari-style model with
 - (a) Fixed factor of production
 - (b) Persistent-transitory uninsurable income shocks
 - (c) Informal insurance margin as residual
2. Explore role of **fixed factor in GE**: comp. static with changing fixed factor share
3. Use income & consumption data from South Africa to discipline (b) and (c)
4. Quantify role of fixed factor share in accounting for differences in cons. dynamics across rural vs. urban
 - Consumption volatility and passthrough from income shocks to cons.
 - Intergenerational persistence of cons. across generations
 - Skip role of agg. shocks and agg. savings today

Literature

- **Idiosyncratic income risk in general equilibrium:** Bewley (1986), Huggett (1993), Woodford (1990), Aiyagari (1994), Aiyagari and McGrattan (1998), Achdou et al. (2022), Aguiar et al. (2024)
- **Income and consumption dynamics:** Deaton and Paxson (1994), Blundell et al. (2008), Kaplan and Violante (2010), Kaplan and Violante (2014), Kaplan and Violante (2022), Crawley et al. (2022)
- **In rural-urban context:** Rosenzweig and Stark (1989), Rosenzweig and Wolpin (1993), Townsend (1994), Ligon (1998), Banerjee and Newman (1998), Santaaulalia-Llopis and Zheng (2018), De Magalhaes and Santaaulalia-Llopis (2018), Morten (2019), Meghir et al. (2022), Attanasio et al. (2025), Lagakos et al. (2023)

Contribution: Role of fixed factor as safe assets impacts consumption dynamics

Model

Setup

- Time is continuous
- Stationary competitive equilibrium
- Households make consumption-saving choices in the presence of income risk
- Neoclassical production and frictionless financial sector
- Disclaimer:
 - Rural economy in autarky
 - Rural-urban migration is the focus of a companion paper
 - Not dealing with agg. risk
 - Touch on non-tradability of risky land later

Household Income Process

- Household i faces a stochastic income process with labor income W_i

$$W_i = w \cdot e^{p_i + \varepsilon_i}$$

$$dp_i = \sigma_p dZ_i$$

$$d\varepsilon_i = dN(\varepsilon'_i - \varepsilon_i)$$

- dZ is a Wiener process
 - Random walk in persistent component of income
- $\lambda_\varepsilon, \varepsilon' \sim N(0, \sigma_\varepsilon)$ are arrival rate and variance of imperfectly transitory shocks
- $\widetilde{\log W} = \log W + x$ allows for classical measurement error

Household Death Shocks & Informal Insurance

- Measure of perpetually young households $i \in [0, L]$
 - Hit by death shock at rate ϕ
 - Entering hh draw human cap. $p_{(\text{age}=0)} \sim N(c_0, \sigma_0)$, $\varepsilon_{(\text{age}=0)} \sim N(0, \sigma_\varepsilon)$
 - Take over assets from “parents”
 - Need to stabilize income distribution given random walk
 - But want to nest neoclassical model
- Perpetual youth with accidental bequests

Informal Insurance

- Informal insurance κ defines effective household income

$$W^* = w \cdot e^{(1-\kappa)(p_i + \varepsilon_i) + d}$$
$$d = \log \left(\frac{\mathbb{E} [e^{p_i + \varepsilon_i}]}{\mathbb{E} [e^{(1-\kappa)(p_i + \varepsilon_i)}]} \right)$$

- Similar to tax function (Benabou, 2000; Heathcote et al., 2017) but unobserved

Household Problem

- Standard Consumption-Saving Problem

$$V(b, p, \varepsilon) = \max_{\{c, a\}_{s \geq t}} \mathbb{E}_t \left[\int_t^\infty e^{-(\rho + \phi)s} \frac{c_s^{1-\gamma}}{1-\gamma} ds \right]$$

s.t.

$$\dot{b} = rb + W^* - c$$

$$b \geq 0 \quad \text{(zero borrowing constraint)}$$

Neoclassical Production

- Production with fixed factor T , capital K , and labor L

$$Y = T^\chi K^\nu L^{1-\chi-\nu}$$

Fixed Factor Share χ , Cap. Share ν , Lab. Share $1 - \chi - \nu$

- Fix lab. share $1 - \chi - \nu = 1 - \theta$
 - Let $T = 1$ WLOG
- Standard market clearing and resource constraints

$$L = \int_i e^{p_i + \varepsilon_i} di$$

$$Y = C + I$$

$$\dot{K} = I - \delta_k K$$

General Equilibrium

- Competitive industries, optimizing households, **frictionless** financial sector
 - Arbitrage condition between fixed factor and capital holds

$$\frac{R_T}{p_T} + \frac{\dot{p}_T}{p_T} = R - \delta_k$$

- Market clearing + stationary aggregates/distributions/prices

$$\int b_i di = p_T + K$$

Firm's Elasticity of Demand for Assets

- Firms' normalized demand for assets, when lab. share fixed and $\mathbb{E}_i [e^{p_i + \varepsilon_i}] = 1$, is

$$\tilde{a} := \frac{p_T}{wL} + \frac{K}{wL} = \frac{\theta}{1-\theta} \left(\frac{\chi}{\theta} \frac{1}{r} + \frac{\nu}{\theta} \frac{1}{r + \delta_k} \right)$$

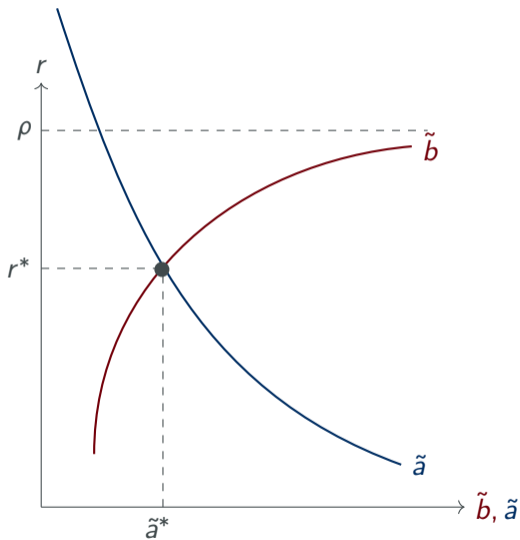
- Define normalized agg. hh supply of assets: $\tilde{b} := \frac{\int b_i di}{wL}$

Proposition 1

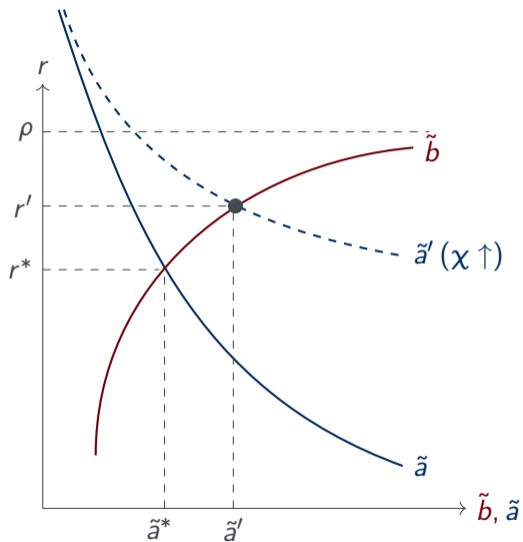
A higher fixed factor share increases the semi-elasticity of asset demand in the interest rate, i.e., $\frac{\partial}{\partial \chi} \left| \frac{\partial \log \tilde{a}(r)}{\partial r} \right| > 0$ if and only if $\delta_k > 0$. [Details proposition 1](#)

- Bottom line
 - Fixed factor share in production $\uparrow \rightarrow$ semi-elasticity of asset demand \uparrow
 - All about depreciation – any fixed factor trivially satisfies

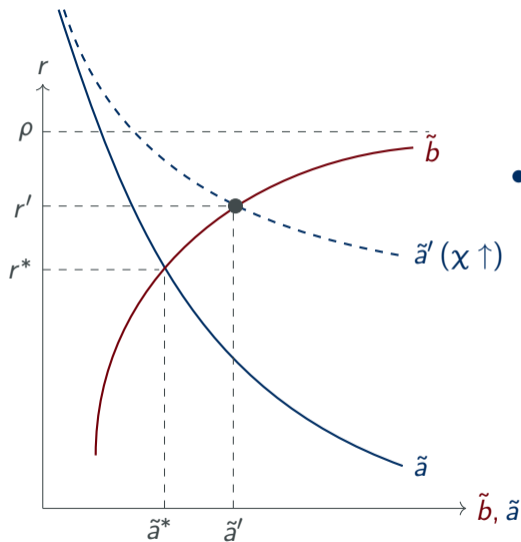
Canonical Asset Market Clearing Diagram from Aiyagari (1994)



Canonical Asset Market Clearing Diagram from Aiyagari (1994)



Canonical Asset Market Clearing Diagram from Aiyagari (1994)



- High interest rate matters for household consumption dynamics
 - High interest rates good for self-insurance
 - High interest rates generate persistence of consumption across generations
 - Channel mute in repr. agent model because trivially r equals disc. factor
 - Turn to illustrative simulation to understand mechanism

Illustrative Simulation: Interest Rates and Income Shares

Figure 1: Interest rate

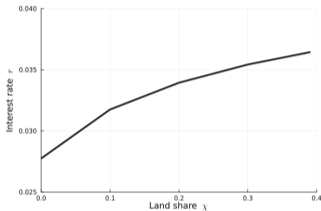
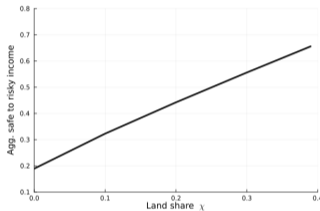


Figure 2: Safe to risky income



- Interest rate 1 pp higher in land-intensive economy
 - More stable income when lab. income the risky bit
- Higher net capital income to labor income share

$$\frac{rB}{wL} = \frac{\theta}{1-\theta} - \frac{\nu}{1-\theta} \frac{\delta_k}{r + \delta_k}$$

Illustrative Simulation: Land Share, Interest Rates, and Consumption Dynamics

Figure 3: Passthrough perm. shock

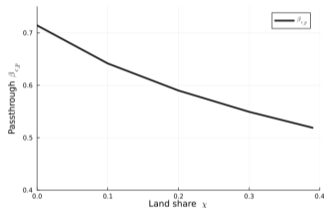
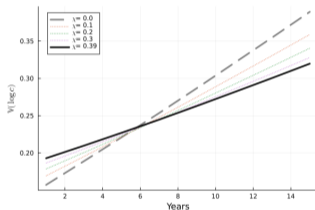


Figure 4: Cons. Inequality



- Why is passthrough falling in χ ? $\frac{\Delta C_t}{C_t} \approx \frac{r}{ra_t + wh_t} \Delta a_t + \underbrace{\frac{wh_t}{ra_t + wh_t}}_{\text{perm. passthrough}} \frac{\Delta wh_t}{wh_t}$
 - Note: key not human to fin. wealth but human to fin. income
 - Flipside: less mobility over the life cycle, more initial inequality driven by assets

Quantify the Model Using Income and Consumption Data from South Africa

- NIDS 2008-2018 household (hh) panel data

Further Details

- Rural-Urban dichotomy
 - Clearly imperfect but emerging market a good place to start
 - Modern sector + traditional rural sector
- Income concept
 - Labor income very broadly defined + net gov transfers
 - Note that business and agricultural income included (also own consumption)
- Goal: Estimate Parameters for Rural vs. Urban Households
 - Follow Blundell et al. (2008) and Crawley et al. (2022)
 - ▶ Sample Selection
 - ▶ Residualize household income data using demographics
 - ▶ Use level moments of log hh income autocovariance matrix

Summary Parameters Baseline

Parameter	Description	Rural	Urban	Target/Source
ρ	Discount factor	0.02	0.02	Standard value
ϕ	Death shock	0.025	0.025	Avg. work life
γ	Risk aversion	2.0	2.0	Standard value
δ	Capital depreciation	0.07	0.07	Standard value
ν	Capital share	0.1	0.4	Hansen/Prescott (2002)
χ	Land share	0.3	0	Hansen/Prescott (2002)
κ	Informal insurance	0.0	0	See text
σ_p^2	Variance perm. shock	0.01	0.01	Trouvain (2025)
λ_ε	Arrival trans. shock	0.6	3.0	Trouvain (2025)
σ_ε^2	Variance trans. shock	0.25	0.2	Trouvain (2025)
σ_0^2	Variance init. p	0.13	0.13	Trouvain (2025)
c_0	Avg. init. p	-0.4	-0.4	Trouvain (2025)
$\sigma_{y,error}^2$	Income meas. error	0.1	0.1	Trouvain (2025)
$\sigma_{c,error}^2$	Cons. meas. error	0.15	0.15	Trouvain (2025)

Details land share

Key statistic: Passthrough from Income to Consumption

- Passthrough persistent income shocks to consumption given by

$$\beta_{c_p} = \mathbb{E}_i \left[\frac{\Delta \log c_{i,t}}{\Delta p_{i,t}} \right]$$

- Why this focus?
 - Transitory shocks easy to insure using bufferstock savings
 - Determines fanning out of inequality over the life cycle
- In the data we can use Blundell et al. (2008)

$$\beta_{c_p}^{BPP} = \frac{\text{Cov}(\Delta \log c_t, \Delta \log y_{t-2} + \Delta \log y_t + \Delta \log y_{t+2})}{\text{Cov}(\Delta \log y_t, \Delta \log y_{t-2} + \Delta \log y_t + \Delta \log y_{t+2})}$$

- Note $\beta_{c_p} > \beta_{c_p}^{BPP}$ when income shocks imperfectly transitory – related but distinct from Kaplan/Violante (2010)

Passthrough – Decomposition

- Gap between urban and rural β_{c_p} – how much accounted for by land share

	Decomposition		
	Urban	(χ)	(χ, κ)
β_{c_p}	0.74	0.57	0.49
%	-	68%	32%
$\beta_{c_p}^{BPP}$	0.74	0.31	0.26

- Incorporate informal insurance κ to hit $\beta_{c_p}^{BPP} = .25 \Rightarrow \kappa = .18$
- Land-intensity helps a lot! But cannot do without mean-reverting income process
- Order matters because land-intens. more helpful when risk higher

Additional Implications and Robustness

- Skipping today
 - Intergenerational Persistence in Consumption
 - Aggregate savings in rural vs. urban economy Agg savings rate
 - Insurance role of fixed factor flipped upside down for agg. shocks Aggregate shock
- Robustness
 - What if some land non-tradable? Non-Tradable Risky Land

Conclusion

- Higher fixed factor share impacts consumption dynamics in GE
 - Less consumption volatility, lower passthrough from income shocks
 - Less mobility and higher intergenerational persistence
 - Really about avg. depreciation rate and how this sustains interest income

Thank You!

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- Achdou, Y., J. Han, J.-M. Lasry, P.-L. Lions, and B. Moll (2022). Income and wealth distribution in macroeconomics: A continuous-time approach. *The review of economic studies* 89(1), 45–86.
- Aguiar, M., M. Amador, and C. Arellano (2024). Micro risks and (robust) pareto-improving policies. *American Economic Review* 114(11), 3669–3713.
- Aiyagari, S. R. (1994). Uninsured idiosyncratic risk and aggregate saving. *The Quarterly Journal of Economics* 109(3), 659–684.
- Aiyagari, S. R. and E. R. McGrattan (1998). The optimum quantity of debt. *Journal of Monetary Economics* 42(3), 447–469.
- Alesina, A., S. Hohmann, S. Michalopoulos, and E. Papaioannou (2021). Intergenerational mobility in africa. *Econometrica* 89(1), 1–35.
- Attanasio, O., C. Meghir, C. Mommaerts, and Y. Zheng (2025). Growing apart: Declining within-and across-locality insurance in rural china. *Journal of Development Economics* 172, 103366.
- Banerjee, A. V. and A. F. Newman (1998). Information, the dual economy, and development. *The Review of Economic Studies* 65(4), 631–653.

- Benabou, R. (2000). Unequal societies: Income distribution and the social contract. *American Economic Review* 91(1), 96–129.
- Bewley, T. (1986). Stationary monetary equilibrium with a continuum of independently fluctuating consumers. *Contributions to mathematical economics in honor of Gérard Debreu* 79.
- Blundell, R., L. Pistaferri, and I. Preston (2008). Consumption inequality and partial insurance. *American Economic Review* 98(5), 1887–1921.
- Crawley, E., M. Holm, and H. Tretvoll (2022). A parsimonious model of idiosyncratic income.
- De Magalhaes, L. and R. Santaaulalia-Llopis (2018). The consumption, income, and wealth of the poorest. *The Journal of Development Economics*.
- Deaton, A. S. and C. Paxson (1994). Saving, growth, and aging in taiwan. In *Studies in the Economics of Aging*, pp. 331–362. University of Chicago Press.
- Heathcote, J., K. Storesletten, and G. L. Violante (2017). Optimal tax progressivity: An analytical framework. *The Quarterly Journal of Economics* 132(4), 1693–1754.
- Hsieh, C.-T. and P. J. Klenow (2007). Relative prices and relative prosperity. *American Economic Review* 97(3), 562–585.

- Huggett, M. (1993). The risk-free rate in heterogeneous-agent incomplete-insurance economies. *Journal of Economic Dynamics and Control* 17(5-6), 953–969.
- Kaplan, G. and G. L. Violante (2010). How much consumption insurance beyond self-insurance? *American Economic Journal: Macroeconomics* 2(4), 53–87.
- Kaplan, G. and G. L. Violante (2014). A model of the consumption response to fiscal stimulus payments. *Econometrica* 82(4), 1199–1239.
- Kaplan, G. and G. L. Violante (2022). The marginal propensity to consume in heterogeneous agent models. *Annual Review of Economics* 14(1), 747–775.
- Lagakos, D., A. M. Mobarak, and M. E. Waugh (2023). The welfare effects of encouraging rural–urban migration. *Econometrica* 91(3), 803–837.
- Laitner, J. (2000). Structural change and economic growth. *The Review of Economic Studies* 67(3), 545–561.
- Ligon, E. (1998). Risk sharing and information in village economies. *The Review of Economic Studies* 65(4), 847–864.
- Meghir, C., A. M. Mobarak, C. Mommaerts, and M. Morten (2022). Migration and informal insurance: Evidence from a randomized controlled trial and a structural model. *The Review of Economic Studies* 89(1), 452–480.

- Morten, M. (2019). Temporary migration and endogenous risk sharing in village india. *Journal of Political Economy* 127(1), 1–46.
- Rosenzweig, M. R. and O. Stark (1989). Consumption smoothing, migration, and marriage: Evidence from rural india. *Journal of political Economy* 97(4), 905–926.
- Rosenzweig, M. R. and K. I. Wolpin (1993). Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: Investments in bullocks in india. *Journal of political economy* 101(2), 223–244.
- Santaeulalia-Llopis, R. and Y. Zheng (2018). The price of growth: consumption insurance in china 1989–2009. *American Economic Journal: Macroeconomics* 10(4), 1–35.
- Townsend, R. M. (1994). Risk and insurance in village india. *Econometrica: journal of the Econometric Society*, 539–591.
- Valentinyi, A. and B. Herrendorf (2008). Measuring factor income shares at the sectoral level. *Review of Economic Dynamics* 11(4), 820–835.
- Weil, D. N. and J. Wilde (2009). How relevant is malthus for economic development today? *American Economic Review* 99(2), 255–260.

Woodford, M. (1990). Public debt as private liquidity. *The American Economic Review* 80(2), 382–388.

Sample Selection South Africa

Table 33. Sample Selection in South Africa

(a) Rural			(b) Urban		
Restrictions	Households	Observations	Restrictions	Households	Observations
All	2663	12597	All	3646	17340
No movers	2093	10002	No movers	3165	14904
Missing month	1749	8369	Missing month	2431	11444
Ages 27 to 62	1281	6200	Ages 27 to 62	1872	8881
Household splits	1158	5592	Household splits	1763	8376
Labor market attachment	875	4196	Labor market attachment	1545	7316
Income outliers	748	3671	Income outliers	1373	6357
Max one missing	335	1661	Max one missing	615	3051

NIDS from 2008 to 2017.

Agg. Saving Rate

- Insight due to Laitner (2000):
Agg. saving rate increases as economy shifts from land to capital intensive production because national accounting treats valuation gains different from investment in reproducible capital
- Explore Laitner's insight quantitatively and incorporate precautionary savings

Agg. Saving Rate

- In a stationary closed economy the agg. sav. rate is defined as $s_{\text{agg}} = \frac{S}{Y} = \frac{Y-C}{Y}$
- Agg. saving match capital depreciation leading to

$$s_{\text{agg}} = \frac{\delta}{r + \delta} \nu \quad (1)$$

- Note: $\int_i \underbrace{r b_i + w h_i - c_i}_{\text{net savings}} di = 0$ – key issue again role of depreciation!
 - Note: difference in savings even larger with long-run p.c. growth
- Depreciation key, and income risk amplifies the channel

Agg. Saving Rate – Complete Markets vs. Aiyagari

- Complete markets benchmark with $r = \tilde{\rho} = \rho + \phi$
- Compute difference between rural (R) and urban (U) sav. rate

$$\Delta s_{\text{agg}}^{\text{complete}} = \frac{\delta}{\tilde{\rho} + \delta} (\nu_U - \nu_R) \quad (2)$$

$$\Delta s_{\text{agg}}^{\text{Aiyagari}} = \frac{\delta}{r_U + \delta} \nu_U - \frac{\delta}{r_R + \delta} \nu_R \quad (3)$$

- Easy to show that $\Delta s_{\text{agg}}^{\text{Aiyagari}} > \Delta s_{\text{agg}}^{\text{complete}}$

Agg. Saving Rate Results

	Urban	(χ)	(χ, κ)
$s_{agg}^{complete}$	24.35	6.09	6.09
$s_{agg}^{Aiyagari}$	27.32	6.63	6.46

- Big difference in nom. savings rates mostly driven by structure of production
- Gap widens further ones household income risky
 - I have pursued a conservative calibration
consider dynamic inefficiency with $r = 0$, then $s_{agg}^{Aiyagari} = 40\%$

Take to the data

- Shortcut – use two-sector structure with agr. and non-agr.
- Economy wide saving rate simple weighted average, use weight $\omega_R = \frac{Y_{agr}}{Y_{agr} + Y_{non-agr}}$
 - Approximate two-sector structure using value added agr. vs. non-agr.
 - GGDC dataset , otherwise maintain calibration
 - Unchanged if country-specific rel. cost of capital (Hsieh and Klenow, 2007)

$$s_{agg} = \omega_R \frac{\delta}{r_R + \delta} \nu_R + (1 - \omega_R) \frac{\delta}{r_U + \delta} \nu_U \quad (4)$$

- Back of the envelope calculation using WDI data
 - Take average saving rates of countries before 2000
 - Plot against agricultural value added share

Regression Results

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Table 1

	Sav rate	Sav rate	Sav rate	Sav rate
VA agr. share	-0.318*** (0.0347)	-0.335*** (0.0352)	-0.196*** (0.0631)	-0.271* (0.161)
Log gdp p.c.			1.998** (0.919)	
Intercept	25.31*** (0.886)	25.68*** (3.967)	5.960 (8.950)	23.16*** (7.406)
Year fe	No	Yes	No	Yes
Country fe	No	No	No	Yes
<i>N</i>	221	221	221	221

Agg. Shocks flips link between land and self-insurance

- TFP drops by 10% in first quarter, mean reverts fully within 2.5 years
 - Since no investment in rural, has to come out of consumption!
 - Makes consumption smoothing hard and shocks costly
 - Look at dynamic response
- Also interesting: secular increase in $\sigma_p^2 \uparrow$
 - Price of fixed factor can jump, capital stock cannot
 - Note: confounding adjustment dynamics due to diff. capital share with jump vs. slow-moving state variable

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Estimate Income risk & Informal Insurance

- Income process is identified by autocovariances

$$\mathbb{E}_i [y_{i,t} y_{i,t+k}] = \sigma_0^2 + \sigma_p^2 \cdot t + e^{-\lambda_\epsilon k} \sigma_\epsilon^2 + \mathbf{1}_{\{k=0\}} \sigma_x^2$$

	y_t	y_{t+2}	y_{t+4}	y_{t+6}	y_{t+8}
y_t	0.52				
y_{t+2}	0.27	0.55			
y_{t+4}	0.23	0.27	0.49		
y_{t+6}	0.22	0.18	0.25	0.48	
y_{t+8}	0.18	0.16	0.23	0.34	0.57

(a) Rural

	y_t	y_{t+2}	y_{t+4}	y_{t+6}	y_{t+8}
y_t	0.52				
y_{t+2}	0.27	0.63			
y_{t+4}	0.24	0.26	0.58		
y_{t+6}	0.26	0.25	0.32	0.53	
y_{t+8}	0.23	0.26	0.32	0.34	0.56

(b) Urban

How robust to land trading frictions?

- Suppose fraction ζ of land **non-tradable** with **risky** return $R_{i,t}x_i$
 - x_i is fixed – add. state variable in form of pers. household type
 - Only because non-tradable do we have to worry about idiosyncratic risk
 - Agg. risk an issue impacting portfolio choice (land vs. capital)
- Virtually no adjustment on household side: $\dot{b} = rb + \underbrace{wh + Rx}_{w\hat{h}} - c$
 - Measurement already incorporated risky own production
- Adjustment only on the supply of land: $K + (1 - \zeta) p_T = B$, need $\zeta < \frac{1}{2}$
- Final Comments:
 1. Little land trade consistent with frictionless model
 2. Land trading frictions fine – shape of \tilde{b} , not \tilde{a}
 3. Bigger picture: rural sector sustains higher interest rate income
 - Not about land, about low depreciation in GE
 - Moves rural consumption dynamics in the right direction!

Land and Capital Shares

- Recent estimates for the USA (Valentinyi and Herrendorf, 2008)
 - Land share approx 20% in agriculture in USA Table 2 Herrendorf/Valentinyi 2008
- For developing economies very different
 - Weil and Wilde (2009) summarize literature and suggest land share of 50%
 - I use conservative estimate with 30%

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Land and Capital Shares

Table 2

Income shares of land, structures, and equipment at the sectoral level (in producer prices)

	Capital	Land	Structures	Equipment
Agriculture (A)	0.54	0.18	0.14	0.22
Manufactured consumption (M)	0.40	0.04	0.11	0.25
Services (S)	0.34	0.06	0.15	0.13
Equipment investment (E)	0.34	0.03	0.09	0.22
Construction investment (C)	0.21	0.03	0.06	0.12
Agriculture (A)	0.54	0.18	0.14	0.22
Manufacturing ($M + E + C$)	0.33	0.03	0.09	0.21
Services (S)	0.34	0.06	0.15	0.13
Consumption ($A + M + S$)	0.35	0.06	0.15	0.14
Investment ($E + C$)	0.28	0.03	0.07	0.18
Tradables ($A + M + E$)	0.37	0.04	0.10	0.23
Nontradables ($S + C$)	0.32	0.05	0.14	0.13
Agriculture (A)	0.54	0.18	0.14	0.22
Nonagriculture ($M + S + E + C$)	0.33	0.05	0.13	0.15
GDP ($A + M + S + E + C$)	0.33	0.05	0.13	0.15

Valentinyi and Herrendorf (2008)

Consumption Covariance Matrix

(a) Rural						(b) Urban					
	y_t	y_{t+2}	y_{t+4}	y_{t+6}	y_{t+8}		y_t	y_{t+2}	y_{t+4}	y_{t+6}	y_{t+8}
y_t	0.54					y_t	0.54				
y_{t+2}	0.21	0.62				y_{t+2}	0.27	0.69			
y_{t+4}	0.17	0.23	0.43			y_{t+4}	0.21	0.22	0.52		
y_{t+6}	0.13	0.13	0.22	0.41		y_{t+6}	0.27	0.24	0.26	0.44	
y_{t+8}	0.10	0.09	0.10	0.20	0.37	y_{t+8}	0.22	0.23	0.25	0.26	0.46

Log household consumption includes food and non-food items measured within a month (30 days). Included are food, non food, rental expenditure (imputed for owners). There is unfortunately no distinction between more or less durable consumption. Consumption is residualized using a first-stage regression controlling for age, education, sex, race, and household size as well as time effects, separately for urban and rural households. Cross-sectional weights are applied, and additional details are provided in Trouvain (2025b).

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Moment Conditions $\mathbb{V}(y)$

- Two cases

- $\eta = 0 \Rightarrow$ Random Walk

$$\mathbb{V}(y_t) = \sigma_{\text{int}}^2 + \sigma_p^2 t$$

- $\eta > 0 \Rightarrow$ AR(1)

$$\mathbb{V}(y_t) = e^{-2\eta t} \sigma_{\text{int}}^2 + (1 - e^{-2\eta t}) \frac{\sigma_p^2}{2\eta}$$

Detail CFPS

- Chinese Family Panel Study (CFPS) from 2010 – 2018 Details
 - HHead
 - Measurement

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Detail NIDS

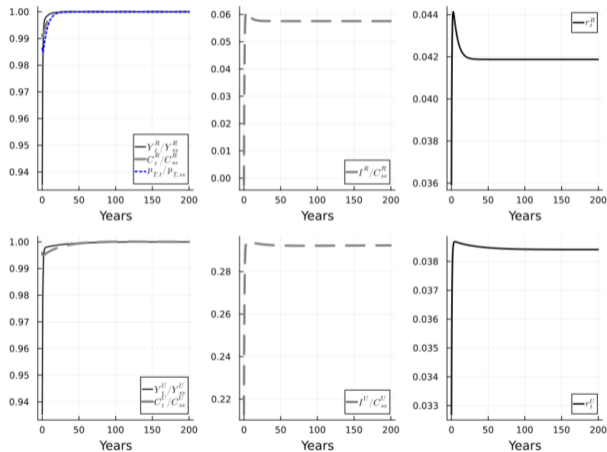
- NIDS
 - HHead
 - Measurement

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Urban vs. Rural Intra-Generational Risk in China

- Skipping today
- Looks like permanent shocks larger in urban sector
- While transitory shocks large in rural

TFP Shock: Rural vs. Urban



The calibration is based on $\sigma_p^2 = .017$, $\lambda_\epsilon = 2$, $\sigma_\epsilon^2 = .15$, $\delta_k = .05$, $1 - \chi - \nu = .6$ and there is no informal insurance, $\kappa = 0$.

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Downward-Sloping Normalized Asset Demand

- Define normalized asset supply $\tilde{b} = \frac{\int b_i di}{wL}$ where $i \in [0, 1]$ indexes household and $H = \tilde{h}L = L$
 - Standard consumption-saving problem with income shocks + CES preferences
 - B is homogenous of degree one in w & L : $B(r, \Theta, w, L) = \tilde{B}(r, \Theta) wL$
 - Exploit several times – neat separation between first and **second moment** concerns
- Define normalized asset demand $\frac{A}{wL} := \tilde{a}$

$$\tilde{a} = \frac{p_T T + P_K K}{wL} = \frac{\theta}{1 - \theta} \left(\frac{\chi}{\theta} \frac{1}{r} + \frac{\nu}{\theta} \frac{1}{r + \delta_k} \right)$$

- Compute asset semi-elasticity $\frac{\partial \tilde{a}}{\partial r}$, which is a function of χ

Downward-Sloping Normalized Asset Demand as a Function of Land Share

- Asset demand becomes flatter/**more elastic** as increase χ for fixed labor share ($\chi + \nu = \theta, d\theta = 0$)

$$\frac{\partial}{\partial \chi} \left| \frac{\partial \tilde{a}}{\partial r} \right| = \frac{1}{1 - \theta} \left[\left(\frac{1}{r} \right)^2 - \left(\frac{1}{r + \delta_k} \right)^2 \right] \quad (5)$$

- $\frac{\partial}{\partial \chi} \left| \frac{\partial \tilde{a}}{\partial r} \right| > 0$ iff $\delta_k > 0$
 - Really about depreciation – can do with T accumuable and $\delta_T = 0$