ARE THERE ANY HETEROGENEITIES OF EXCESS SENSITIVITY OF CONSUMPTION AT THE MICRO-LEVEL?
IF SO, WHY?

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OUTLINE

What I do

- Estimate and rationalize excess sensitivity of household consumption to income using Mongolian household data

What I find

- Heterogeneous excess sensitivity across income groups is found and moreover, the richer group has higher sensitivity than the poorer group

- When the country's economic development is considered, excess sensitivity is rationalized in the context of stochastic trend hypothesis

- Regional difference and exposure to different types of income shocks
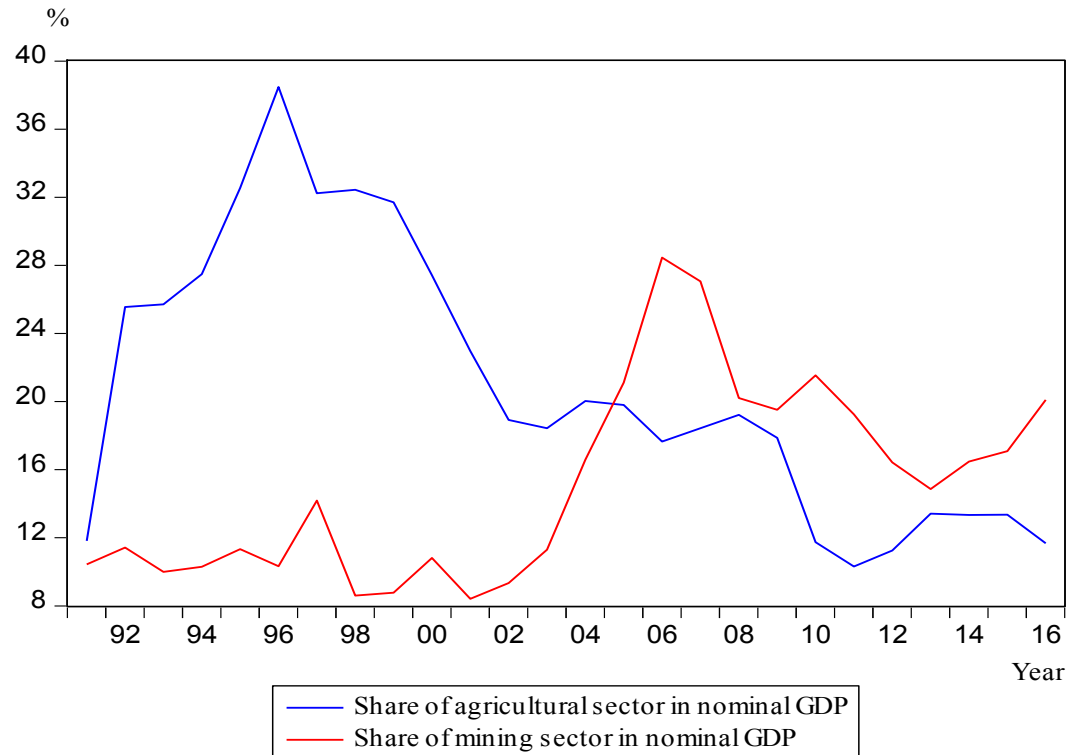
CONTENT

OUTLINE CONTEXT DATA EMPIRICAL ANALYSIS EMPIRICAL RESULTS

A prototypical low-income commodity-dependent country, Mongolia

Legend:
— Share of agricultural sector in nominal GDP
— Share of mining sector in nominal GDP

- Rapid increase in share of mining sector in early 2000s
  - 20% of GDP, 90% of export, and half of fiscal revenue (Tserendorj and Purevjav 2012)
- Boom of mining: discovery of Oyu Tolgoi mine, the largest financial undertaking
  - Joint venture between Mongolian Government and Rio Tinto Ltd.

Development of the mining sector and accompanied features in the economy since 2000

1st phase

Suspension of 2nd phase

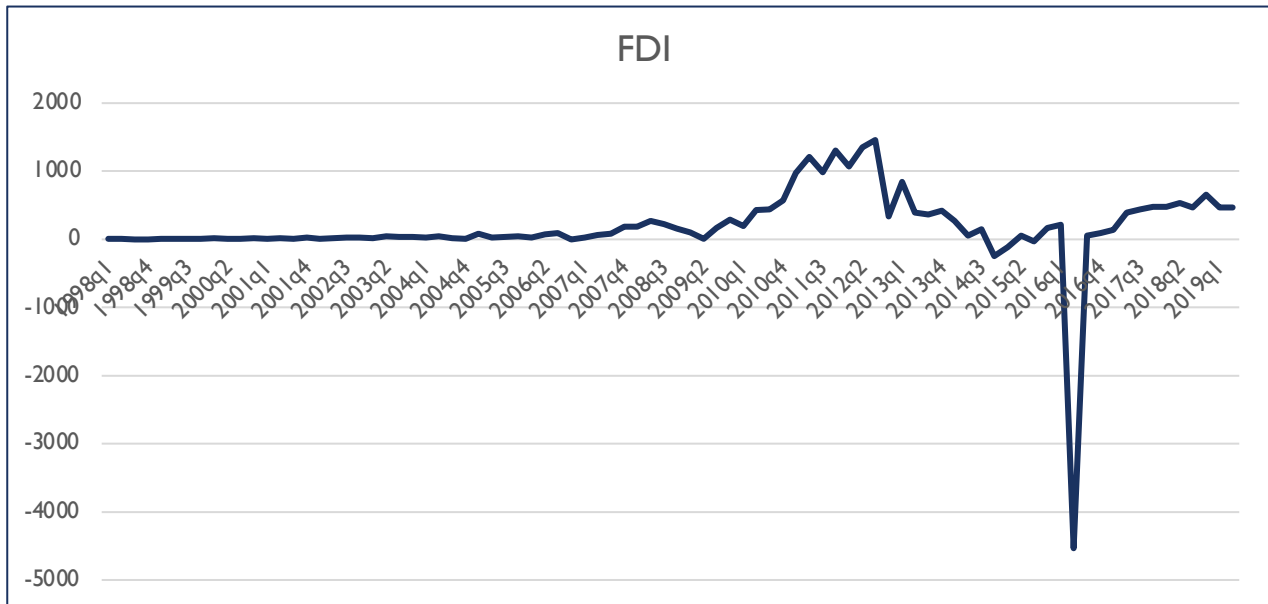| 2003 | ••• | 2009 | 2010 | 2011 | 2012 | 2013 | ••• | 2015 | 2016 | 2017 |

Expansion in economy (A)
- Increase in FDI
- Issuance of first sovereign bond
- Expansionary fiscal policy

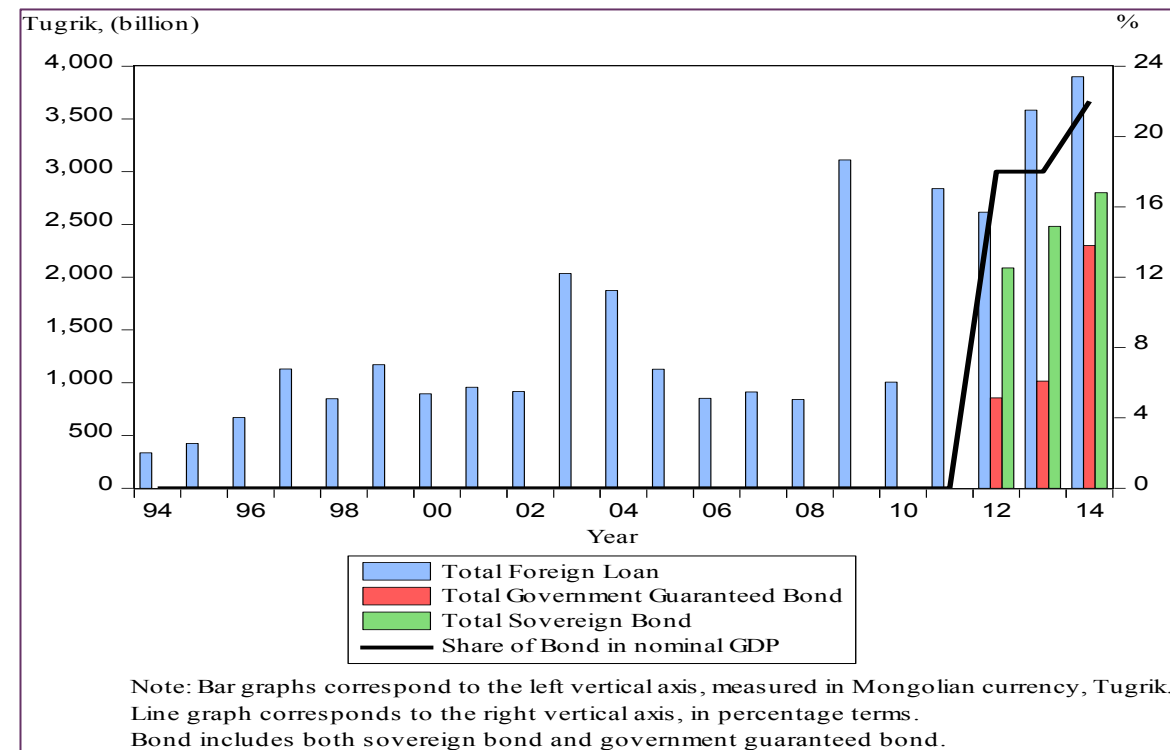**Recession and financial crisis in economy (B)**
- Rapid depreciation of exchange rate
- Sharp accumulation of external debt
- Rapid decline in foreign exchange reserves
- Increase in government off-budget spending
- IMF bailout package in late 2016

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FDI AND SOVEREIGN BOND (SCENE)

Amount of components of total foreign debt

FDI

Horizontal axis: Million dollars

Tugrik, (billion)

Note: Bar graphs correspond to the left vertical axis, measured in Mongolian currency, Tugrik.
Line graph corresponds to the right vertical axis, in percentage terms.
Bond includes both sovereign bond and government guaranteed bond.

Legend:
- Total Foreign Loan
- Total Government Guaranteed Bond
- Total Sovereign Bond
- Share of Bond in nominal GDP

- Accumulated FDI during 1st construction process
- The first sovereign bond issuance in 2012 and accumulation of the bonds

HOUSEHOLD SOCIO-ECONOMIC SURVEY

Survey description

- Household's monthly income and expenditure (data desc2)

- Time wave: 2009-2018

- More than 10,000 households are interviewed each year (data desc1)

- Repeated cross-sectional data

Construction of income quintiles

- Income groups are constructed based on the household's total income

- 21 provinces * 5 income groups → Constructed panel for 105 groups

Log of real household income and expenditure by income groups
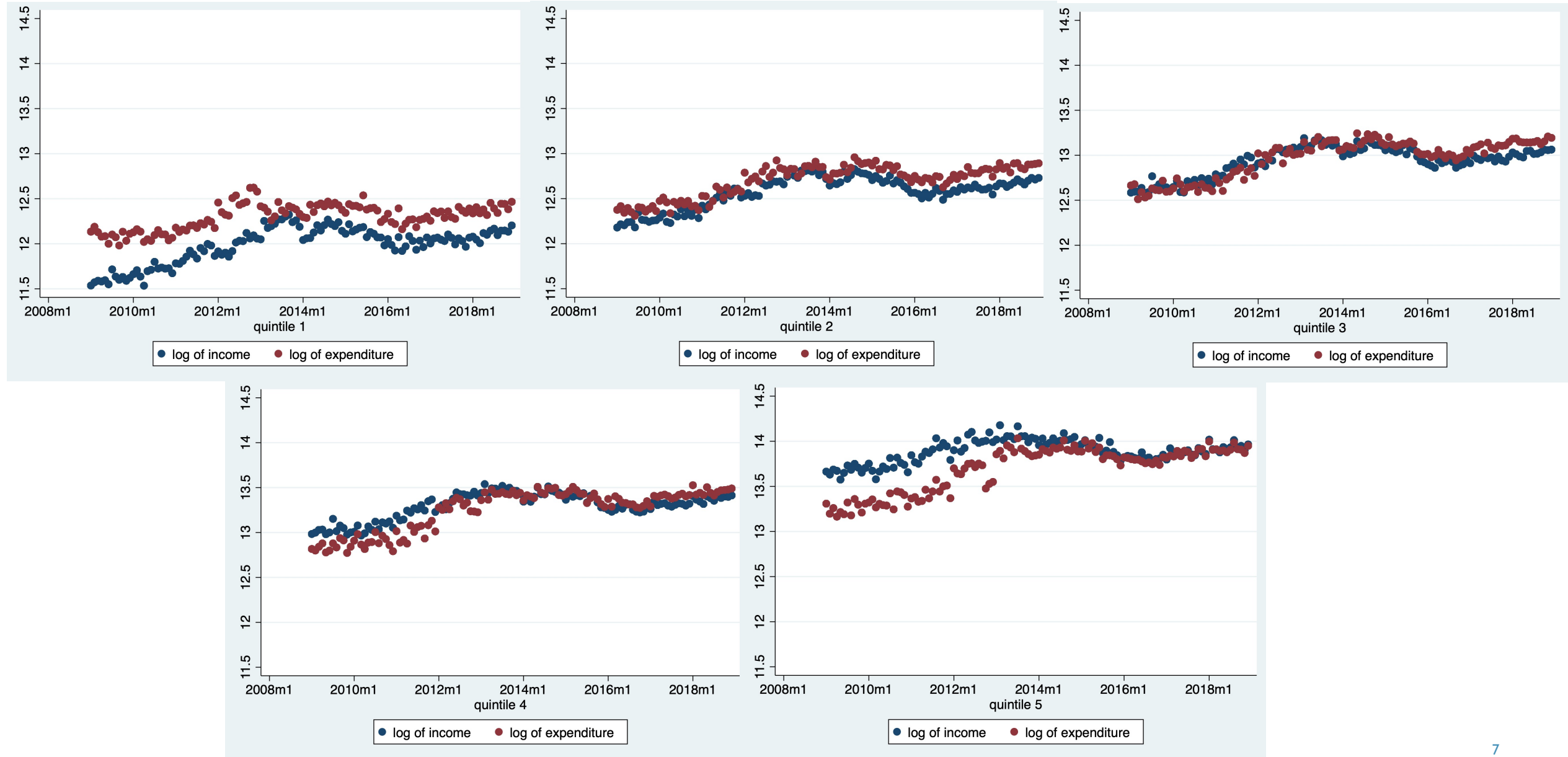
1st group (the lowest income group); expenditure > income
Other groups: expenditure ≈ income

Change in trend component of consumption by income groups

- Same pattern over time for all income groups
- Increasing consumption change till 2012
- Decreasing consumption change from 2012 to 2016
- Richer group has larger change of consumption than the poorer group at specific points (2012, 2014, and 2015)

Horizontal axis: percentage by multiplying 100

reg
slope

$$\Delta logc_{i,t} = \alpha_i + \alpha_t + \beta\Delta logy_{i,t} + \Delta\varepsilon_{i,t}$$

- Model in risk-sharing (Townsend 1994; Ravallion and Chaudhuri 1997)
- Separation of aggregate risk from idiosyncratic risk
- How β varies across income groups?
  - Excess sensitivity for low-income groups (Zeldes 1989)

Variables	Label
$c_{i,t}$	Household's real consumption at time t
α_i	Fixed characteristics of constructed groups
α_t	Time fixed effect (monthly date)
$y_{i,t}$	Household's disposable real income $\Delta y_{i,t}$: Separation of aggregate risk from idiosyncratic income risk *The estimates of beta will be consistent under the (H_0: $\beta = 0$) or (H_0: $\beta > 0$) based on Ravallion and Chaudhuri (1997)

Excess sensitivity test by income groups

Dependent variable: change of consumption

	(1)	(2)	(3)	(4)	(5)
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
D.log(y)	0.617***	0.806***	0.837***	0.846***	0.704***
	(0.055)	(0.028)	(0.026)	(0.025)	(0.028)
Constant	0.078	0.142	0.076	-0.025	-0.063
	(0.057)	(0.085)	(0.058)	(0.070)	(0.088)
Obs	2499	2499	2499	2499	2499
Adj R2	0.286	0.426	0.432	0.466	0.439
Time FE	YES	YES	YES	YES	YES
Stratum-Quintile FE	YES	YES	YES	YES	YES

- Significant coefficients for all income groups
- Sensitivity is higher for the richer groups (beside the richest group)
- Sensitivity of Q5 is higher than Q1 but lower than other groups
- Similar result is obtained when L1.log(y) is used

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: Standard errors are in parentheses and are robust to heteroscedasticity of unknown form and to arbitrary serial correlation of disturbances within income quintiles.

THEORETICAL FRAMEWORK

Two approaches based on modern business cycle framework (DSGE), Mendoza (1991)
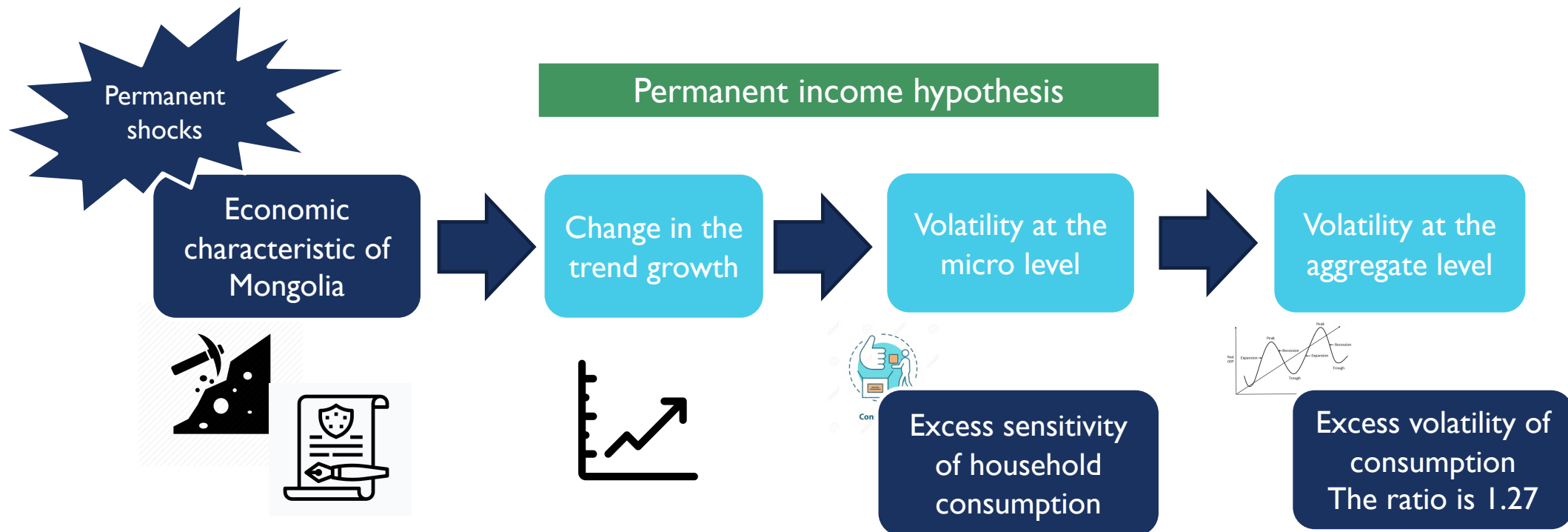
Stochastic trend hypothesis

- Differentiation between transitory and permanent shocks, emphasis on the latter as it affects trend growth (Aguiar and Gopinath 2007)

- Intuition: PIH (i.e., a change in the trend of income implies a stronger response of consumption than a transitory fluctuation around the trend)

Role of financial frictions

- Introduction of foreign interest rates, country risk spread (Neumeyer and Perri 2005; Uribe and Yue 2006)

- Limited access to international borrowing

Understanding excess senstitivty of the consumption at the micro-level in the context of Stochastic Trend Hypothesis

The rising mining sector and policy changes towards the sector play the role of permanent shocks to trend growth, and therefore, agents' expectation and consumption behavior are adjusted accordingly.

Permanent shocks

Permanent income hypothesis

Economic characteristic of Mongolia

Change in the trend growth

Volatility at the micro level

Volatility at the aggregate level

Excess sensitivity of household consumption

Excess volatility of consumption
The ratio is 1.27

FINDINGS

Are there any heterogeneities in excess sensitivity of consumption at the micro-level? If so, why?

- Yes, heterogenous excess sensitivity of consumption is observed

- It is rationalized in the context of stochastic trend hypothesis when country's volatile economic development dependent on the mining sector is taken into account

Why is the consumption sensitivity higher for the richer?

- If the liquidity constraint is the bottleneck, the sensitivity is expected to be higher for the low-income group

Appendix

Are there any regional difference?

Dependent variable: change of consumption

	(1) Quintile 1	(2) Quintile 2	(3) Quintile 3	(4) Quintile 4	(5) Quintile 5
D.log(y)	0.569***	0.798***	0.812***	0.813***	0.687***
	(0.073)	(0.040)	(0.020)	(0.028)	(0.033)
mine=1 X D.log(y)	0.133	0.020	0.073	0.092**	0.053
	(0.089)	(0.053)	(0.073)	(0.037)	(0.057)
Constant	0.074	0.141	0.072	-0.030	-0.066
	(0.059)	(0.085)	(0.058)	(0.071)	(0.087)
Obs	2499	2499	2499	2499	2499
Adj R2	0.289	0.426	0.432	0.467	0.439
Time FE	YES	YES	YES	YES	YES
Stratum-Quintile FE	YES	YES	YES	YES	YES

- 7 regions engaged in the mining sector based on contribution of the mining sector
- Significant coefficient for the 4th quintile is confirmed

Note: Standard errors are in parentheses and are robust to heteroscedasticity of unknown form and to arbitrary serial correlation of disturbances within income quintiles.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

ARE INCOME GROUPS EXPOSED TO DIFFERENT TYPES OF INCOME SHOCK?

- Identification of the permanent and transitory shock variances for income groups

- Joint analysis of households' income and consumption dispersion (e.g., Blundell and Preston 1998; Blundell, Low, and Preston 2013)

- Changes in transitory and permanent shock variances are estimated by the moment conditions

$$var_{k,t}(c) - 2var_{k,t-1}(c) + var_{k,t-2}(c) = \Delta var_{k,t}(v)$$
$$cov_{k,t}(c,\ y) - 2cov_{k,t-1}(c) + cov_{k,t-2}(c) = \Delta var_{k,t}(v)$$
$$\Delta var_{k,t}(y) - \Delta var_{k,t}(c) = \Delta var_{k,t}(u)$$

Estimates of the changes in the variance of permanent shocks by income group
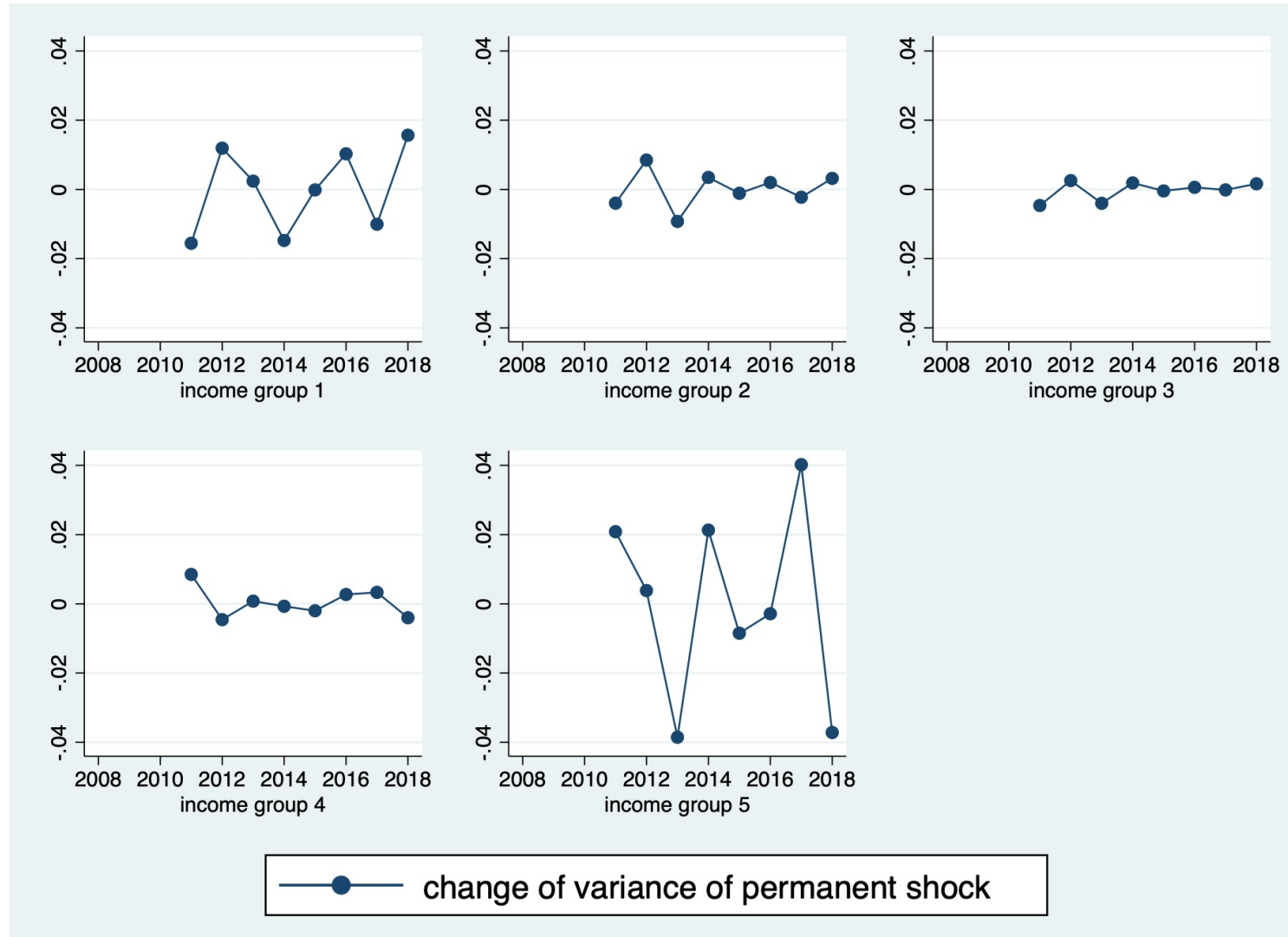
- Volatile changes for the lowest and the highest income groups
- Significant changes for the highest income group

CONCLUSION

Are there any heterogeneities in excess sensitivity of consumption at the micro-level? If so, why?

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Higher sensitivity of the consumption of the richer than the poorer

- Regional difference and different type of income shocks

- Conjecture: benefits from the mining sector might be shared among the wealthy

Thank you very much for your attention