

FINANCE, GROWTH, INEQUALITY: CROSS-COUNTRY PANEL VAR EVIDENCE

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Roadmap

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1. Motivation: Conflicts in the finance, growth, inequality literature
2. Panel VAR Model
3. Impulse Response Analysis for the Dynamic Relationship among Finance, Growth, and Inequality
4. Policy Implications on Finance, Growth, and Inequality

MOTIVATION:
CONFLICTS IN FINANCE, GROWTH,
AND INEQUALITY LITERATURE



Finance in Theory

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- Surface level functions of finance (Levine, 2005)
 1. To **produce information** ex ante about possible investments and allocate capital
 2. To **monitor** investments and exert corporate governance
 3. To facilitate the **trading, diversification, and management of risks**
 4. To **mobilize and pool savings**
 5. To **ease the exchange** of goods and services
- Fundamental role of finance
 1. **Expansion of the set of available state-contingent claims**
 2. Consequence should be the improvement of the efficiency of resource allocation, particularly in terms of risk and intertemporal trade

Finance in Reality

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Finance, Growth, and Inequality: Panel VAR Evidence, Hyeok Jeong

OWS: What made them to occupy?

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Conflicting Evidence (1)

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- Growth and inequality
 1. Inverted-U shaped inequality change with growth: Kuznets(1955)
 2. Discordant cross-country evidence effect of inequality for growth
 - Negative: Alesina and Rodrik (1994), Alesina and Perotti (1996), Benabou (1996)
 - Positive: Forbes (2000)
 - Negative among poor but positive among rich: Barro (2000)
 - Any changes in inequality reduce growth: Banerjee and Duflo (2003)

Conflicting Evidence (2)

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- Growth and inequality via financial development
 1. Poverty and inequality reduction: Beck et al. (2007)
 2. Promoting growth in many cases: Levine (2005) survey
 3. Mixed results on inequality: Demirgüç-Kunt and Levine (2009)
 4. Kuznets curve via finance: Jeong and Townsend (2008)
 5. Reducing inequality for poor but increasing inequality among rich: Park and Shin (2015)

Limitation of Existing Empirical Methods

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- **Reduced-form cross-country evidence**
 1. Results are not robust to specification and frequency
 2. Fundamental reason of this sensitivity: Single-equation approach ignoring **interactive and nonlinear dynamic responses** among key variables
- **Structural dynamic approach evidence for a given economy**
 1. Evidence is refutable in a systemic way, hence open to progress in research!
 2. Specification bias issues still remain.
 3. **Hard to generalize for the worldwide issues**

Methods of This Paper

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- **Use cross-country data:**
To capture the worldwide general patterns among growth, inequality and finance
- **Use Panel VAR (simultaneous-equation approach) rather than single-equation regression**
 1. To capture the interactive and nonlinear dynamic responses among key variables
 2. Very first attempt in the growth and inequality literature as far as we know
 3. Try 18 different VAR models to seek out robust results
- **Differentiate the financial development measures:**
“Financial depth” vs. “Financial access”

PANEL VAR MODEL



Limitations of Existing Empirical Studies

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- **Reduced-form cross-country evidence**
 1. Results are not robust to specification and frequency
 2. Fundamental reason of the sensitivity: Single-equation approach ignoring interactive and simultaneous dynamic responses among key variables
- **Structural approach time-series evidence for a given economy**
 1. Evidence is refutable in a systemic way, hence open to progress in research!
 2. Specification bias issues still remain.
 3. Hard to generalize and difficult to use for the world level issues

Methods of This Paper

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- **Use cross-country data:**
To capture the worldwide general patterns among growth, inequality and finance
- **Use Panel VAR (simultaneous-equation approach) rather than single-equation regression**
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 3. Try 18 different VAR models
- **Differentiate the financial development measures:**
Aggregate financial depth vs. financial access

Benchmark VAR Models

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□ Panel VAR specification

$$y_t^i = c^i + B(L)y_{t-1}^i + u_t^i$$

□ Two benchmark models

1. Model 1: {Y, Gini, CR}

2. Model 2: {FA, Y, Gini, CR}

Y: Real GDP per capita, Gini: Gini coefficient

CR: Financial depth

FA: Financial access

□ Other specifications

1. Two lags for all variables

2. Sample period: 1960-2012 for M1, 2001-2012 for M2

Measurement of Key Variables

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- Y: real GDP per capita in 2005 US dollar (WDI)
- GINI: Gini coefficient of disposable income (SWIID)
- CR (WB)
 1. Domestic private credit to GDP ratio
 2. Liquid liability to GDP ratio
 3. Stock market capitalization to GDP ratio
- FA (WB)
- #commercial bank branches per 1000 km²
- #commercial bank branches per 100,000 adults
- #ATM machines per 1000 km²
- #ATM machines per 100,000 adults

Macro Outreach/Access and Micro Barriers

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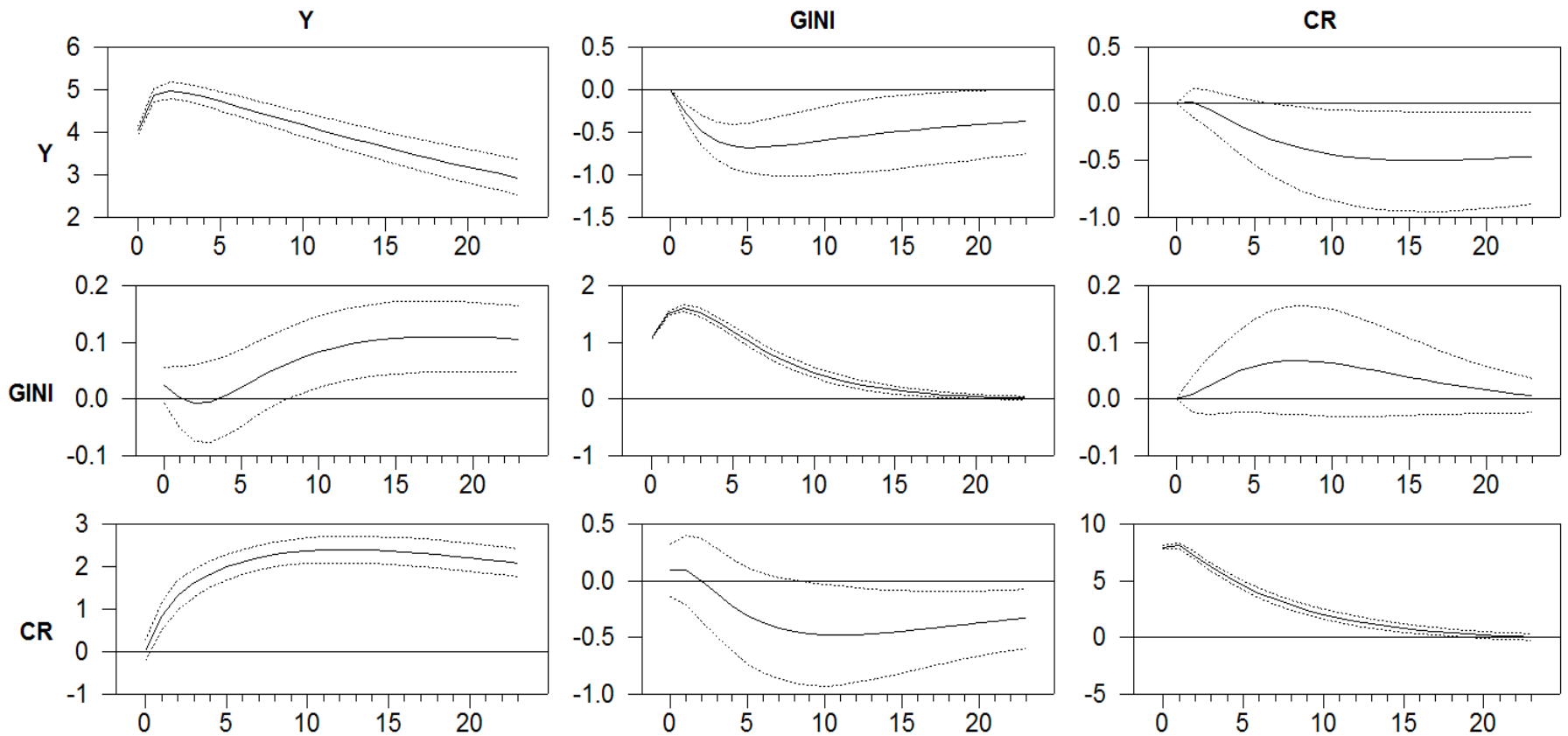
- Financial outreach/access variables:
 1. Number of commercial bank branches per 1000 km²
 2. Number of loans and deposits (i.e., bank use) per capita
 3. Adult population share with access to financial services
- Barriers to financial system: minimum balances for checking accounts, annual fees, document requirements associated with the accounts, the number of delivery channels for lending products, minimum amounts for consumer loans relative to GDP per capita, and days to process consumer loans etc.
- Beck, Demirgüç-Kunt, and Martinez Peria (2007): **Two groups of variables are strongly correlated!**

IMPULSE RESPONSE ANALYSIS



Impulse Response Function of Model 1 (private credit to GDP)

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Results of Model 1

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- Directions of responses to shocks

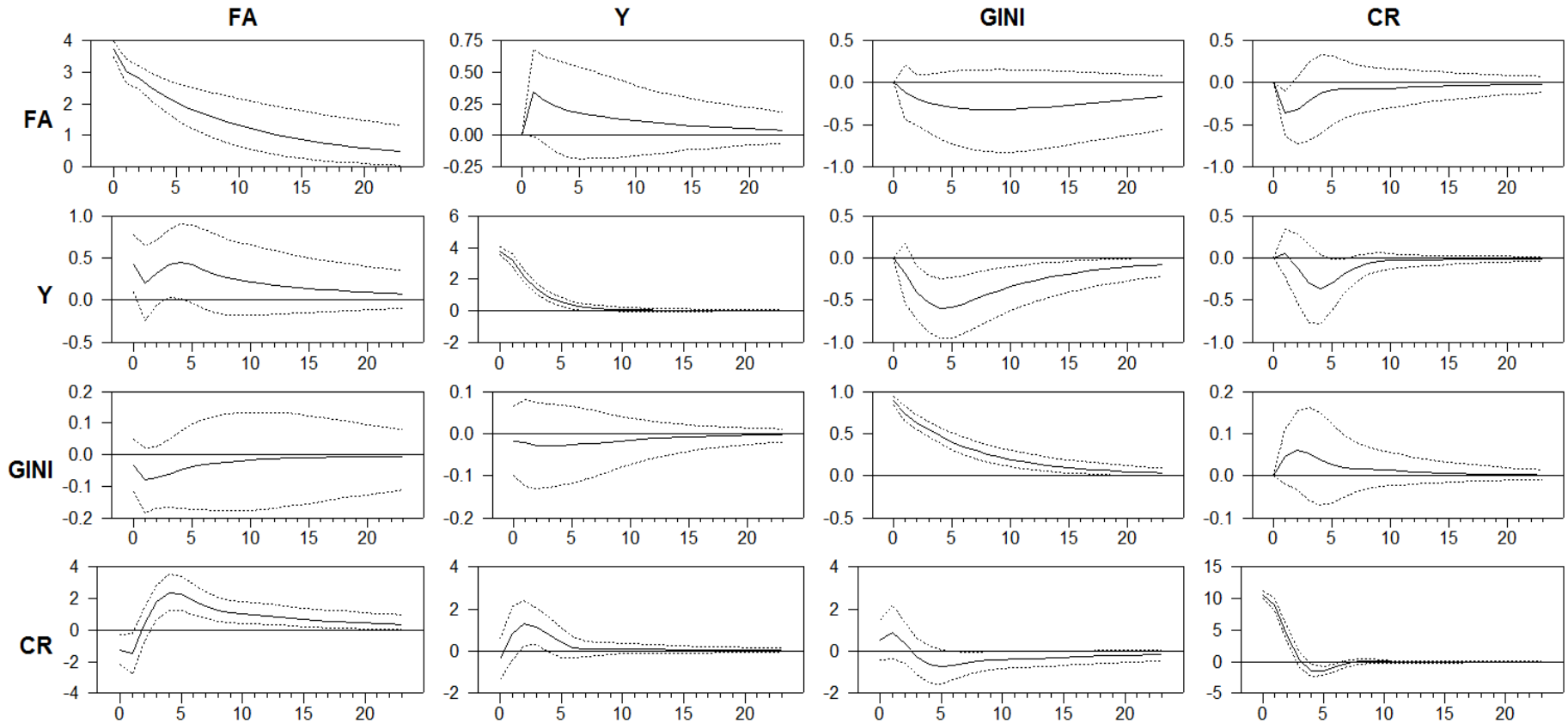
Y → GINI	GINI → Y	CR → GINI	GINI → CR	CR → Y	Y → CR
↑ ↑	↓ ↓	↑ ↑	↓ ↓	↓ ↓	↑ ↑

- Remarks

- Asymmetric responses: simultaneous-equation approach is indeed important!
- Existing negative associations between finance and inequality or between growth and inequality seem to be induced by the inequality movements!
- Short-term and long-term effects can differ, i.e. data frequency matters!
 - Income growth initially reduces inequality but the direction is reversed eventually
 - Increase in inequality promotes financial deepening for short but deteriorates it in the long-run

Impulse Response Function of Model 2 (bank branch per km²)

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Results of Model 2 (1)

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□ Directions of responses to shocks

Y→GINI	GINI→Y	CR→GINI	GINI→CR	CR→Y	Y→CR
↓	↓ ↓	↑ ↑	↓ ↓	↓ ↓	↑ ↑
FA→CR	CR→FA	FA→GINI	GINI→FA	FA→Y	Y→FA
↑ ↑	↓ ↓	↓ ↓	↓ ↓	↑ ↑	↑ ↑

□ Remarks

1. Contrasting effects for growth and inequality between CR(aggregate size of financial transaction) and FA(access to finance)
2. FA promotes CR but not the other way around

Results of Model 2 (2)

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□ Remarks

1. Negative effect of inequality for growth remains robust.
2. Negative effects of inequality for financial development for both CR and FA.
3. Increase in inequality first promotes CR but eventually reduces CR, while it reduces FA throughout.

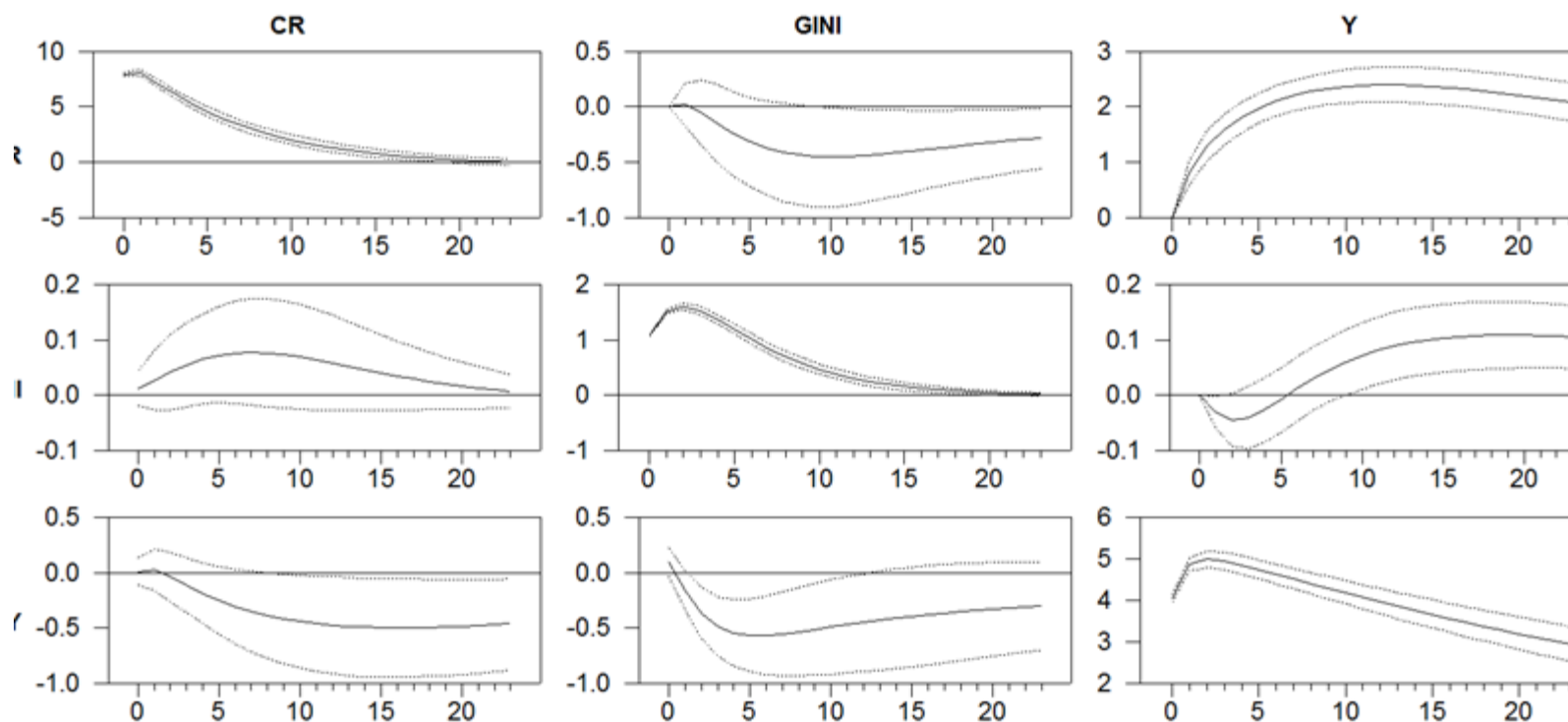
Sensitivity Analysis

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- Robust to changing identification ordering
- Robust to alternative CR measures
- Robust to alternative FA measures (with ATM measures, effects become a little weaker)
- Robust to controlling for confounding factors in the regression analysis literature as Park and Shin (2017)
 1. Trade openness: $(\text{exports} + \text{imports})/\text{GDP}$
 2. Government expenditure share of GDP
 3. High-technology exports share of manufactured exports

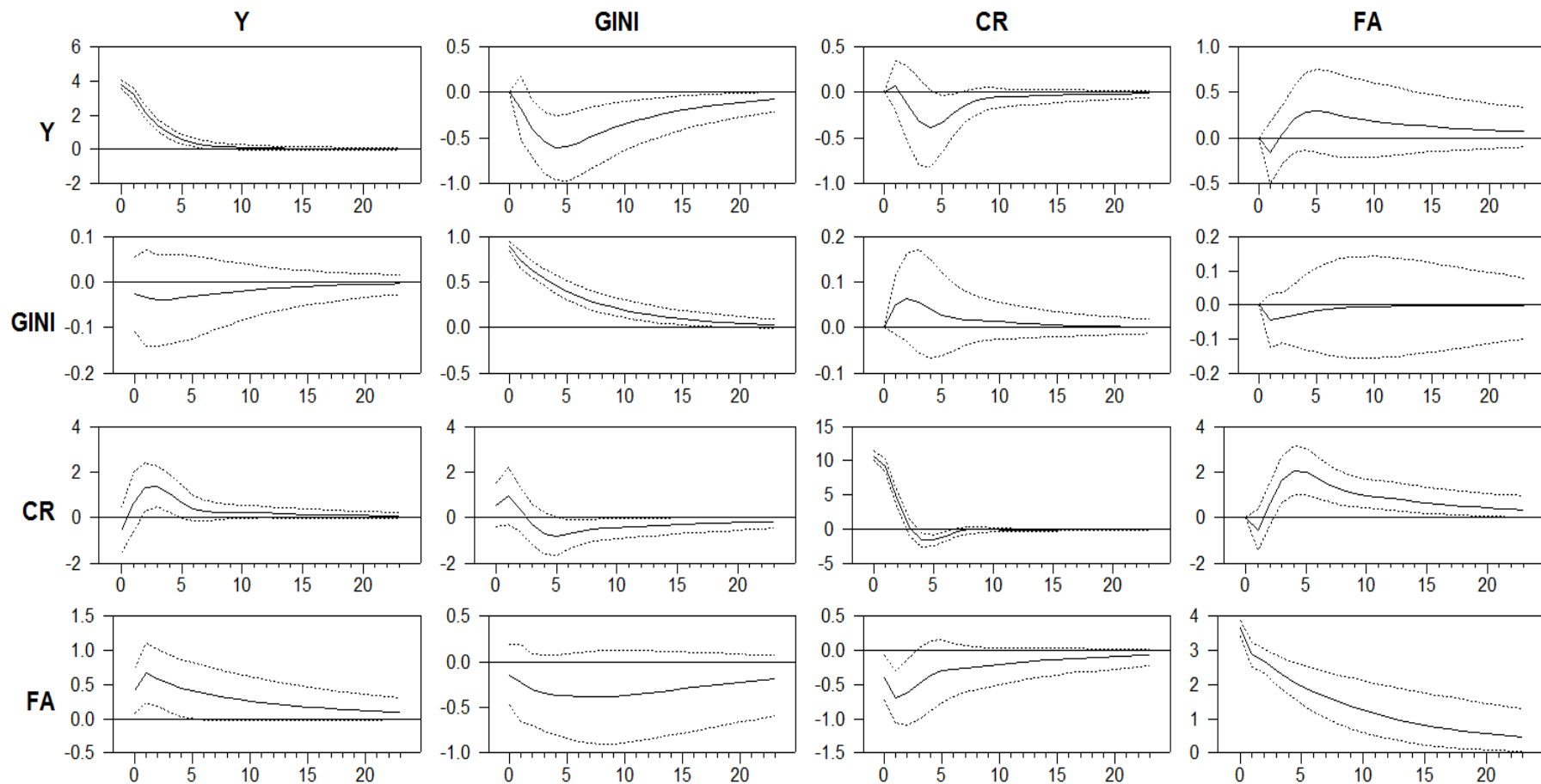
Identification ordering change for Model 1

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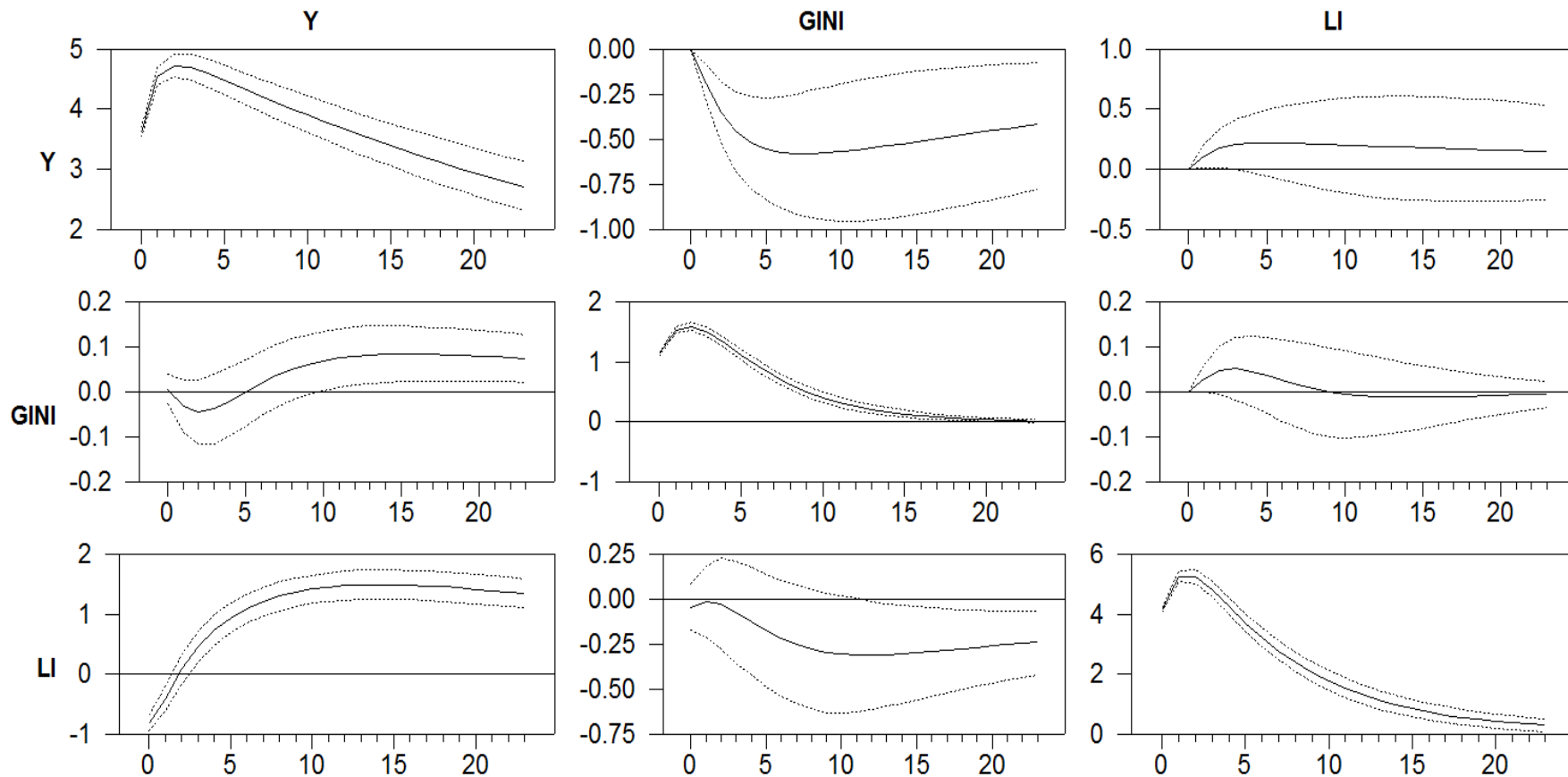
Identification ordering change for Model 2

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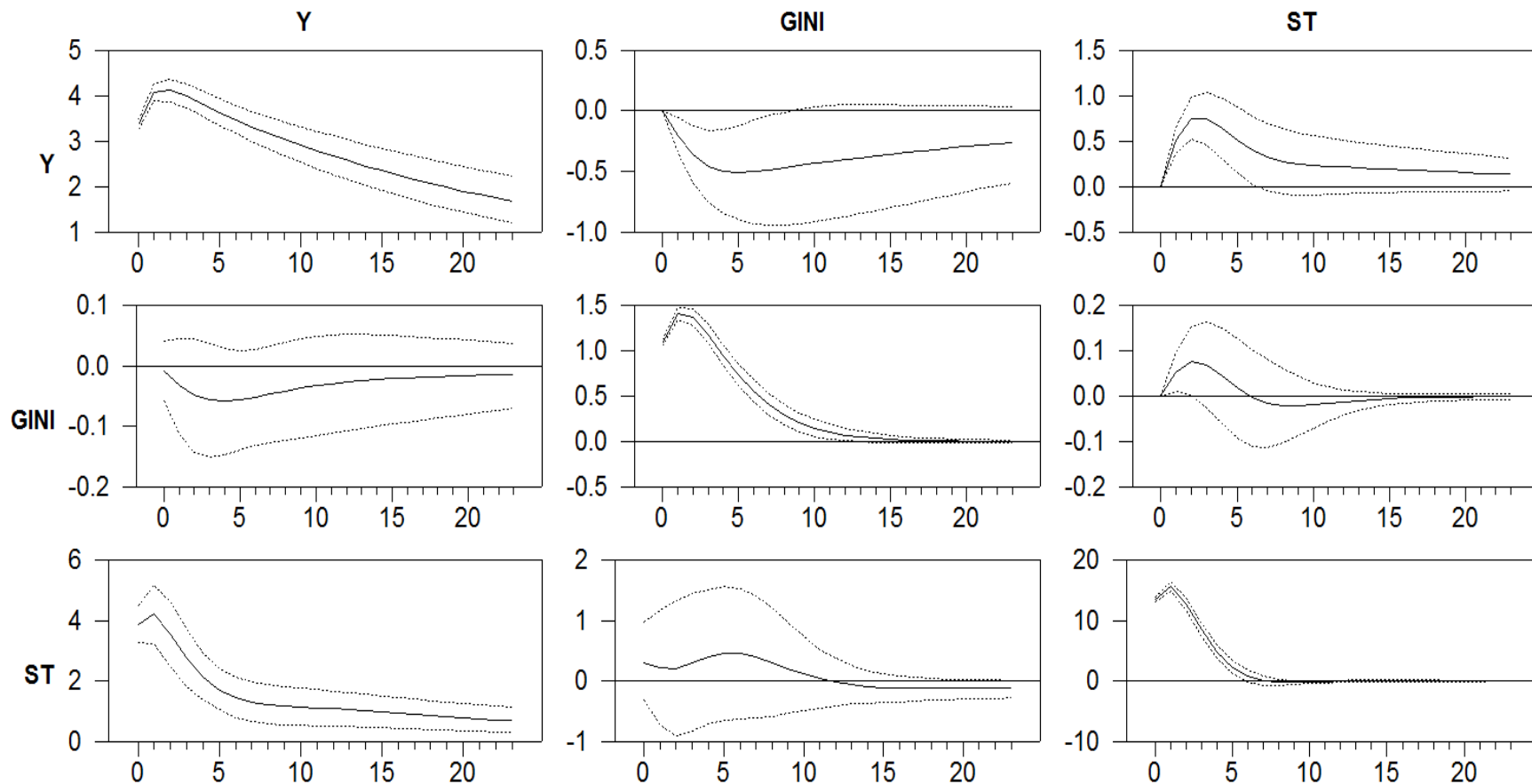
Alternative CR Measure LLY Model 1

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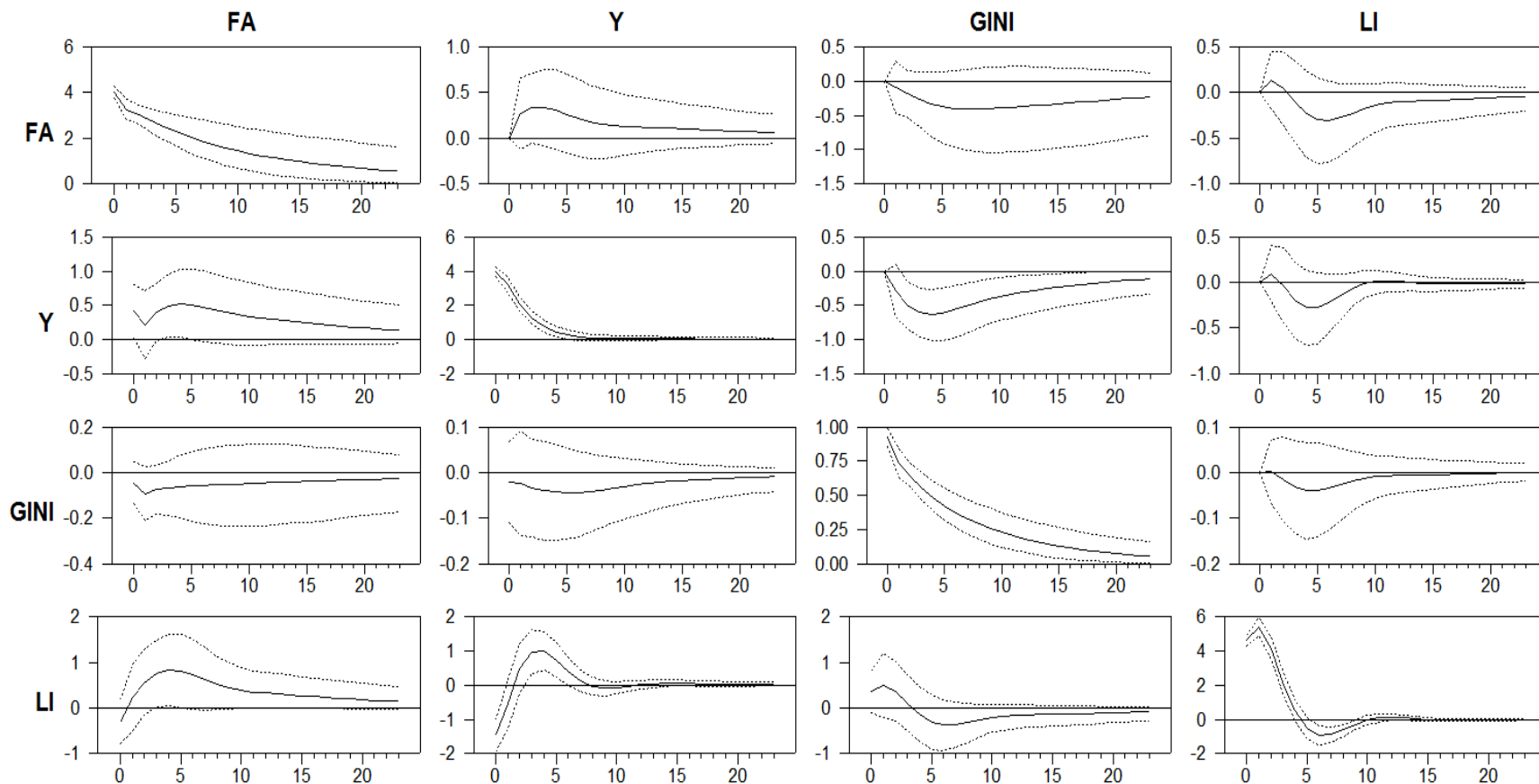
Alternative CR Measure SMC Model 1

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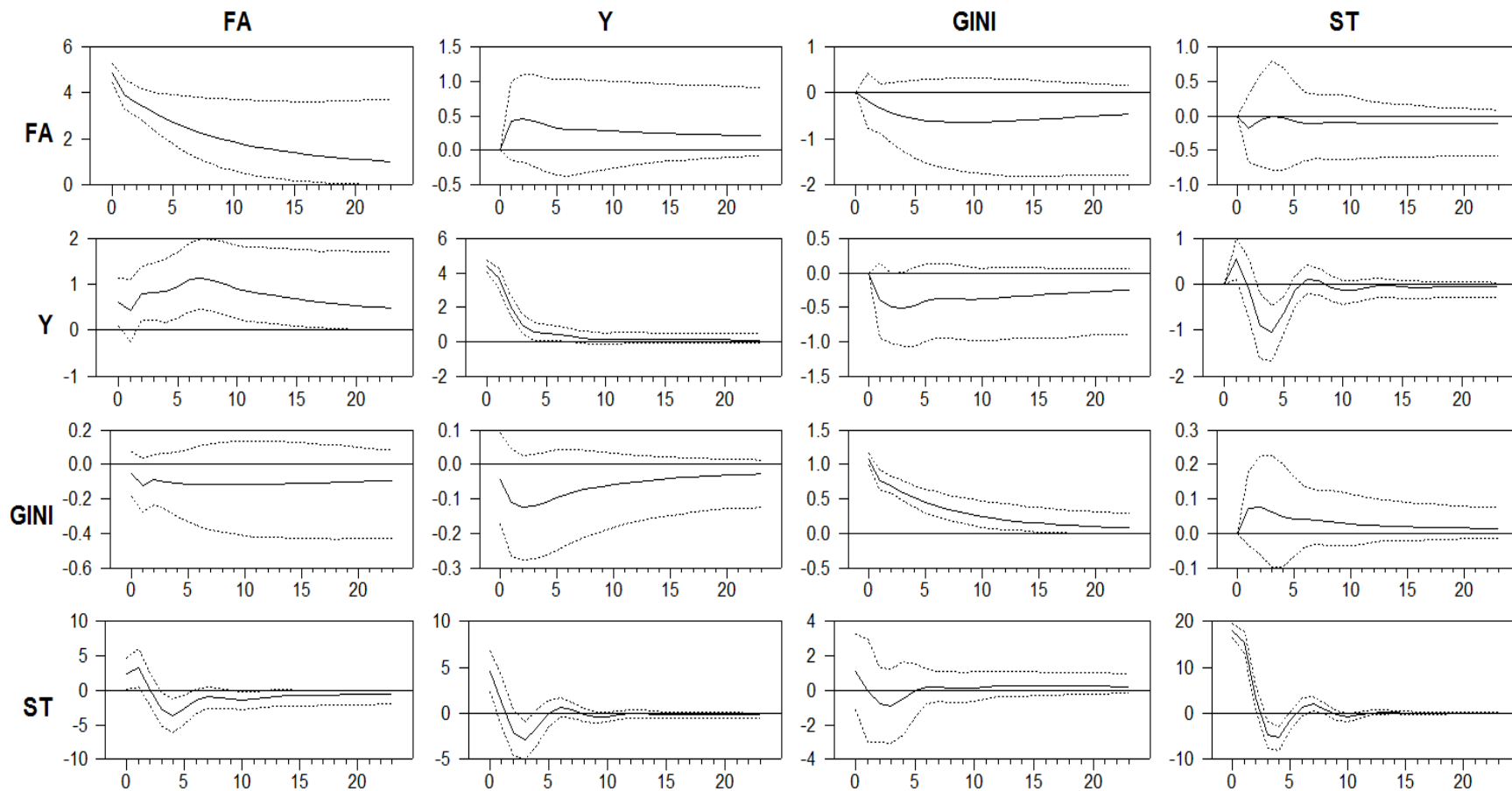
Alternative CR Measure LLY Model 2

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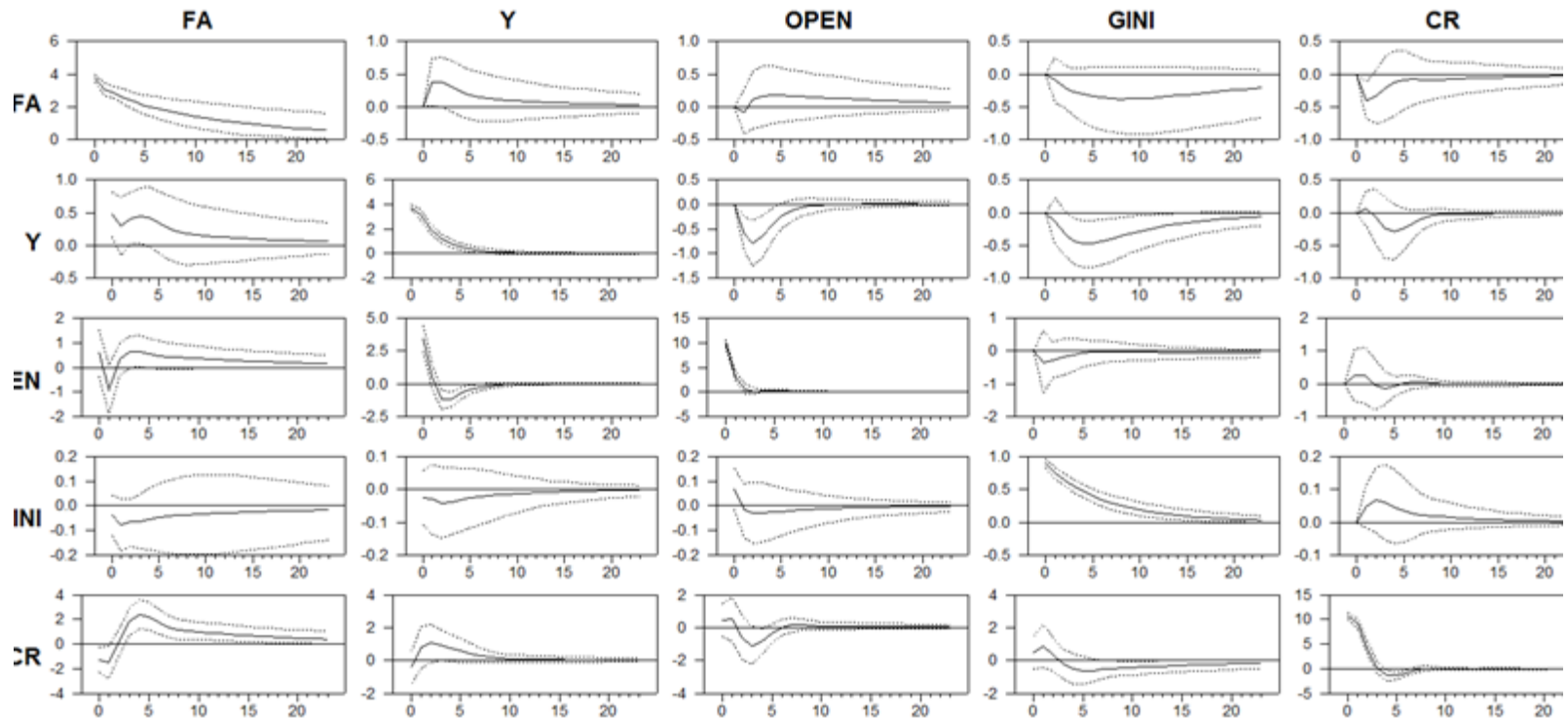
Alternative CR Measure SMC Model 2

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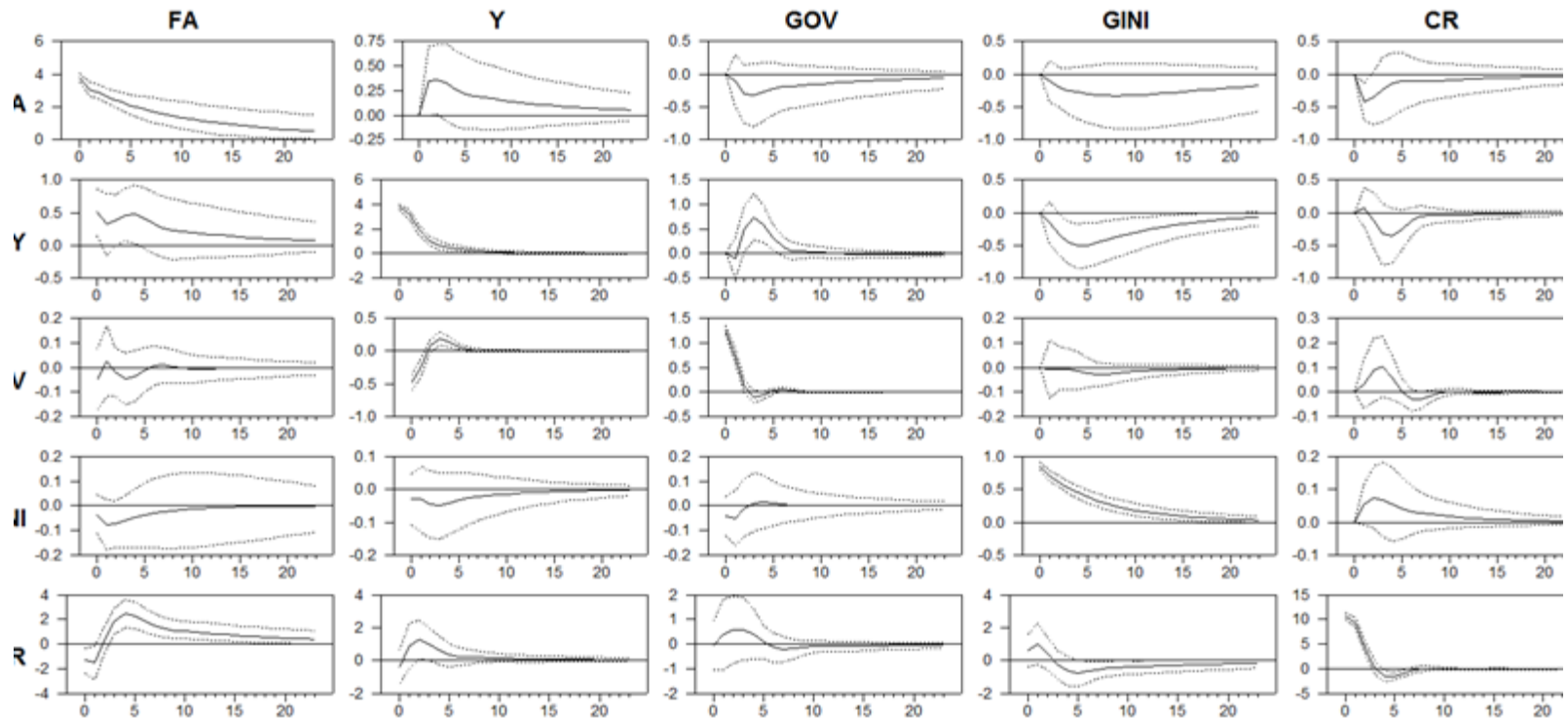
Trade openness control

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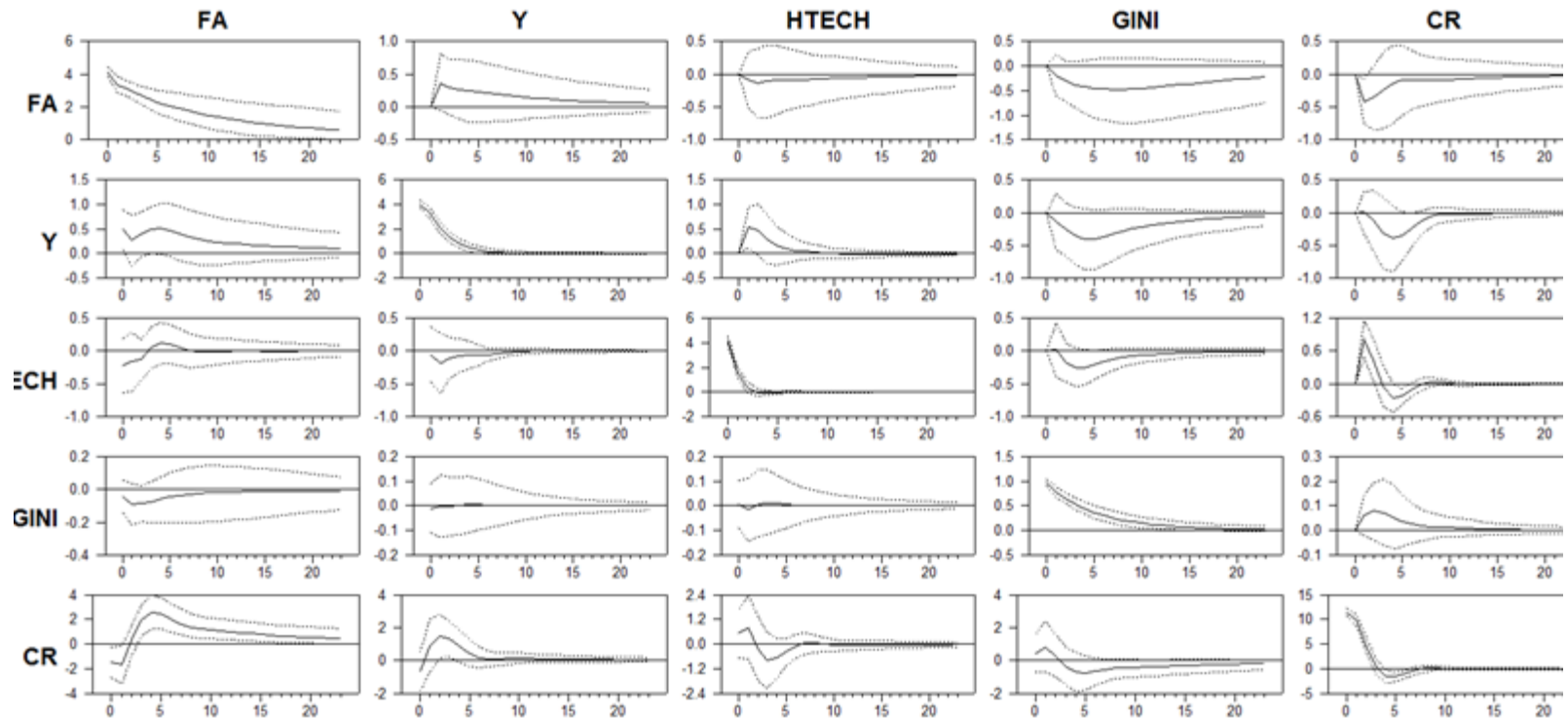
Government expenditure control

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High-tech export share control

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Summary of Main Findings

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- Inequality is bad for growth controlling for financial development either by CR only or by both CR and FA
- Income growth induces financial development for both CR and FA measures
- FA-financial development, not CR-financial development, leads to income growth.
- CR-financial development increases inequality, while the FA-financial development decreases inequality.
- The above results do not change by including the effects of dynamic responses of trade, government size, or high technology share of exports.

POLICY IMPLICATIONS



Relationship between Growth and Inequality

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- From growth to inequality: not robust
 1. Controlling financial depth only, positive income shock reduces inequality only in the short run but raises inequality eventually
 2. Controlling both financial depth and access, positive income shock reduces inequality only weakly
- From inequality to growth: Either way, increase in inequality reduces income. That is, **harmful effect of inequality for growth is robust.**

Role of Finance for Growth

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- Increasing financial depth reduces income, but increasing income raises financial depth. This may imply that the positive association between credit expansion and income growth reflects the demand-side response of credit to income growth.
- Increasing financial access raises income and increasing income increases financial access, which is consistent with existing theories of finance and growth as in Greenwood and Jovanovic (1990) and Jeong and Townsend (2008).
- Key driving force for growth is the expansion of access to finance at the extensive margin rather than the financial deepening at the intensive margin of more credit for fixed access to finance.

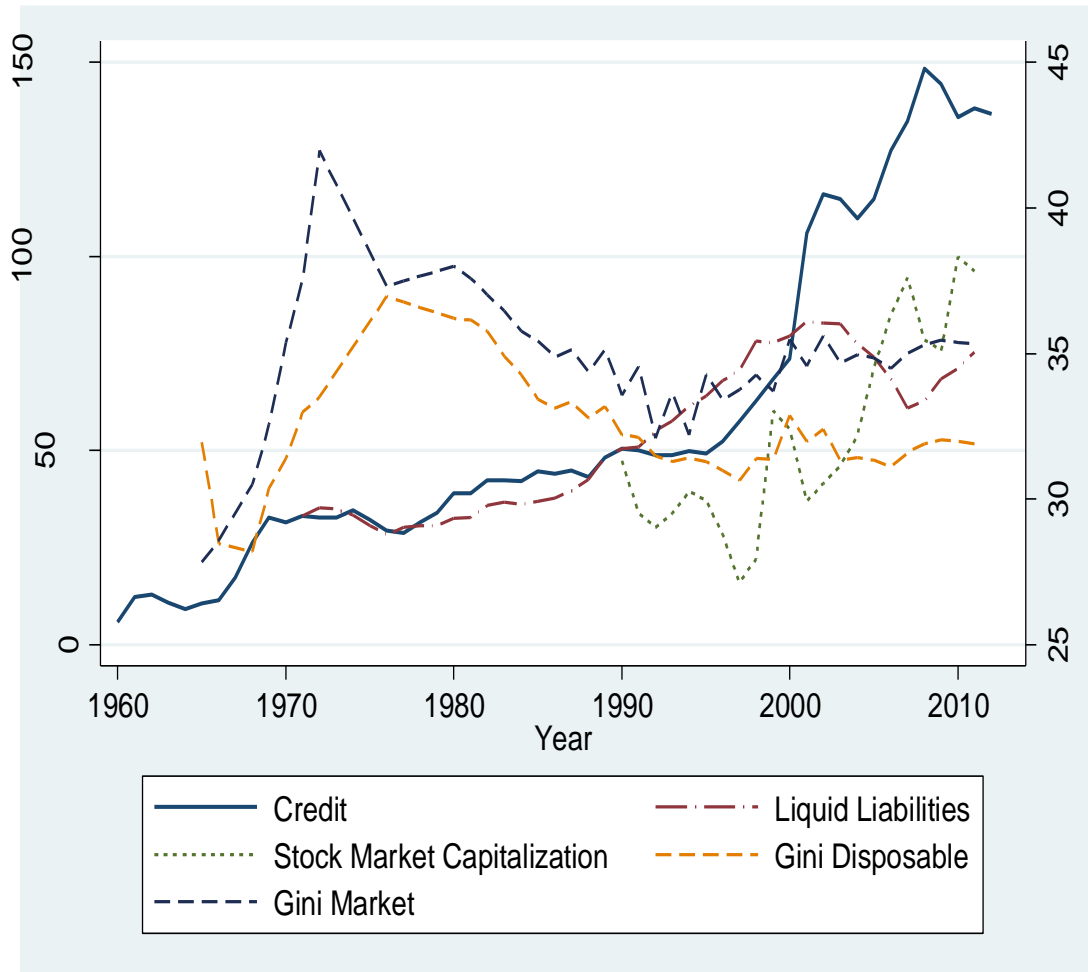
Role of Finance for Inequality

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- Adding more credit (with fixed access) increases inequality, while expansion of access to finance reduces inequality.
- Increasing inequality reduces financial development in terms of both financial depth and financial access.
- Combining the above results, the empirical evidence of positive role of finance for growth and inequality seems to be due to the financial development of access to finance, i.e., the extensive-margin financial development. In fact, this is the link which most theories of finance, growth and inequality emphasizes.

Korea's Financial Development and Inequality

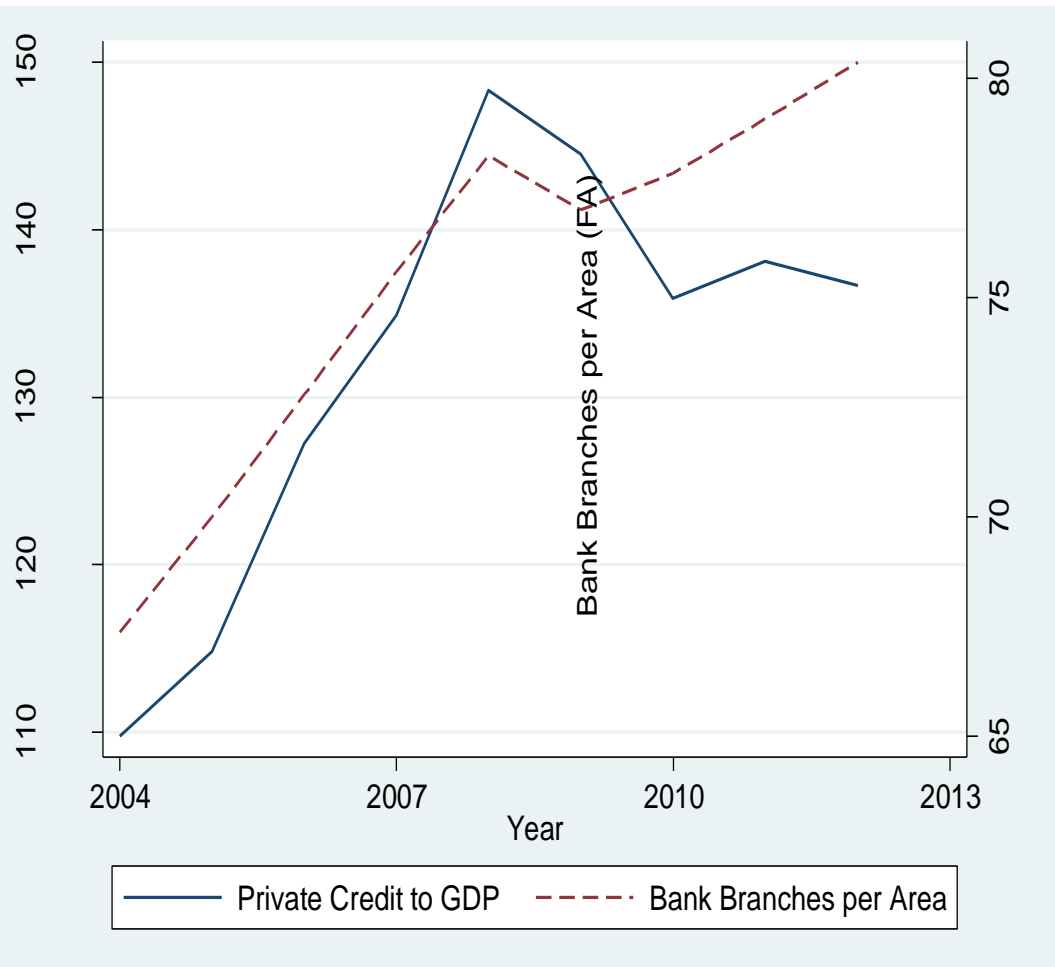
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- Not much long-run correlation between financial depth and inequality.
- Neither for the short-run correlation

Recent Korea's Financial Development: CR vs. FA

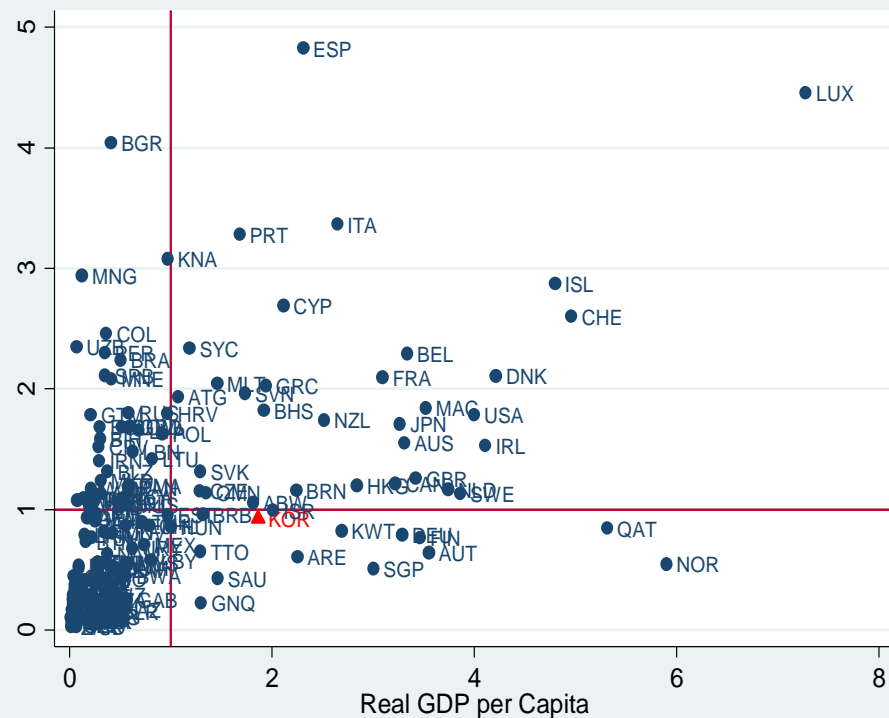
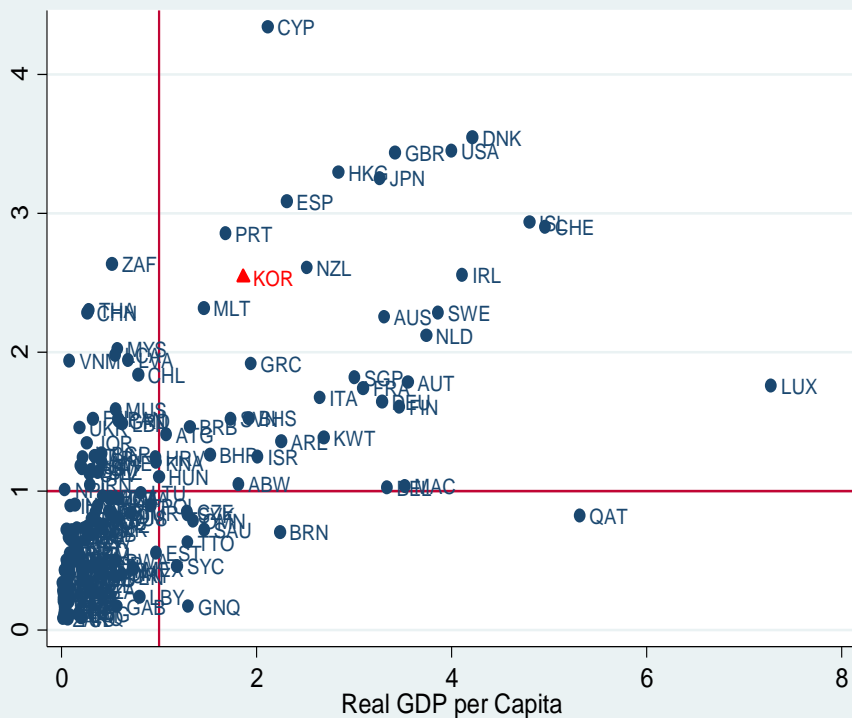
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- Recent slow-down of financial development both by financial depth (absolute decrease) and by financial access after global financial crisis.

- Both movements are inequality reducing.

International Position of Korea's Economic and Financial Development (2009-2011)

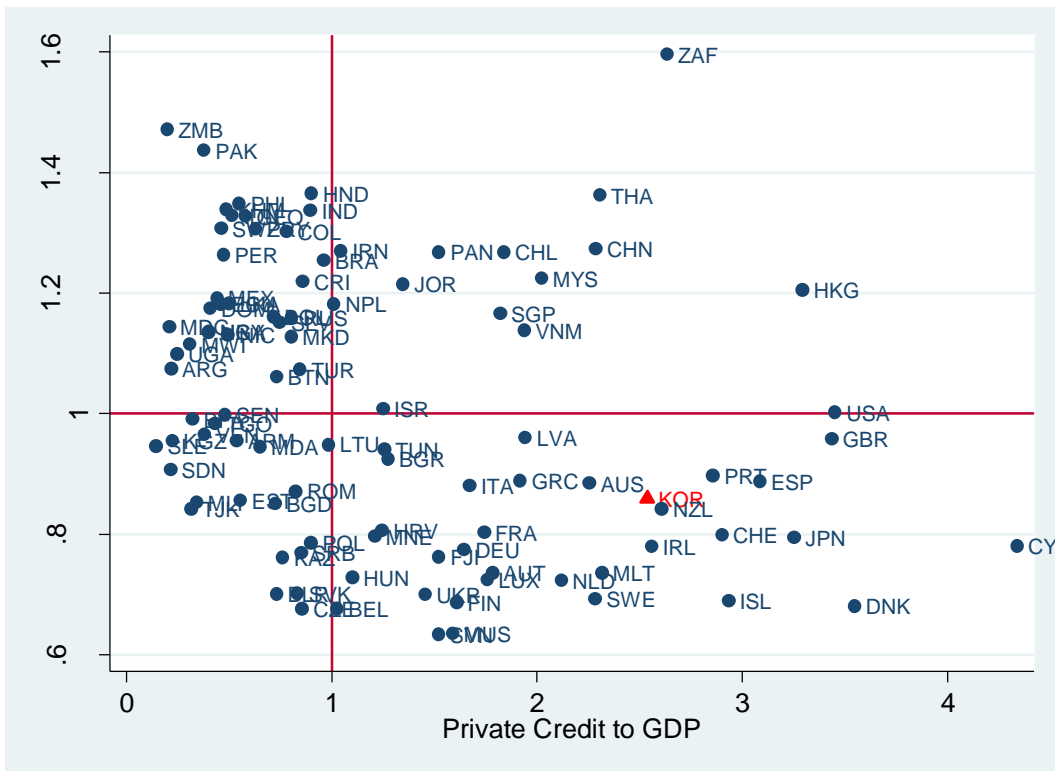


Financial depth is higher than income level.

Financial access is lower than income level.

International Position of Korea's Financial Development and Inequality (2009-2011)

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Not much need to worry about exacerbating inequality from further financial deepening

THANK YOU!

