Macroprudential Policy and Income Inequality: Trade-off Between Crisis Prevention and Credit Redistribution

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Introduction and Motivation

- Rising income inequality since the 1990s (especially in Europe and the US)
- A growing popularity of studies exploring the link between finance and inequality
  - Empirical literature agrees that financial development decreases income inequality (Demirgüç-Kunt & Levine, 2009)
  - But the relationship is not linear (Cihak & Sahay, 2020)
- The finance-inequality literature has not (yet) explicitly accounted for the role of macroprudential policy (MaPP)
  - MaPP plays an important role in shaping the financial sector
  - Theoretical exploration is troublesome since different MaPP measures can affect the distribution of income in different ways
- We provide cross-country evidence that variations in MaPP (may) result in differences in income distribution

Data

- Country-level data for 105 advanced economies (AE) and emerging market and developing economies (EMDE) over the period 1990–2019

- Dependent variable – income inequality measure
  - Data source: The Standardized World Income Inequality Database (SWIID) – the longest and widest data sample
  - Baseline measure: the Gini index, the best coverage
  - We explore also alternative measures with less coverage
  - The data on wealth inequality is low quality or not available at all

- Explanatory variable – macroprudential policy index
  - Data source: the Integrated Macroprudential Policy (iMaPP) Database maintained by the IMF
  - Dummy-type indicators which count the number of tightening (a positive integer) and loosening (a negative integer) actions in a given year
  - Capital- and liquidity-based measures (CLBM) and borrower-based measures (BBM)

Hypotheses (1/2)

- We formulate two possible channels through which macroprudential policy affects income inequality
  - Credit redistribution channel
  - Crises prevention & mitigation channel

Hypothesis 1. Under the credit redistribution channel, macroprudential policy *increases* income inequality.

- The credit (income) redistribution channel has been described in the context of monetary policy (Auclert, 2019)
- Macroprudential policy can also, in theory, have a disproportionate effect on income and welfare
  - BBM restricts the ability of risky households to finance the purchase of real estate using excess leverage
  - Peydro *et al.* (2020) show that macroprudential borrowing limits affect low-income borrowers more than high-income borrowers

Hypotheses (2/2)

Hypothesis 2. Under the crises prevention & mitigation channel, macroprudential policy *decreases* income inequality.

- MaPP aims to reduce the likelihood of financial crises which have redistributive effects
  - In the global financial crisis episode, higher unemployment was found to be a significant driver of rising market income inequality in Europe and the US (Jenkins *et al.*, 2012; Vacas-Soriano & Fernández-Macías, 2018)
  - Bridges *et al.* (2021) show that higher bank's capitalization may affect income distribution indirectly through the prevention of financial crises

Hypothesis 3. The crisis prevention & mitigation channel is more likely to dominate in countries with riskier banking sector characteristics.

- MaPP tightening aims to increase resilience and decrease riskiness of financial activities, thus decreasing the probability and/or impact of the financial crisis and its negative re-distributive effects

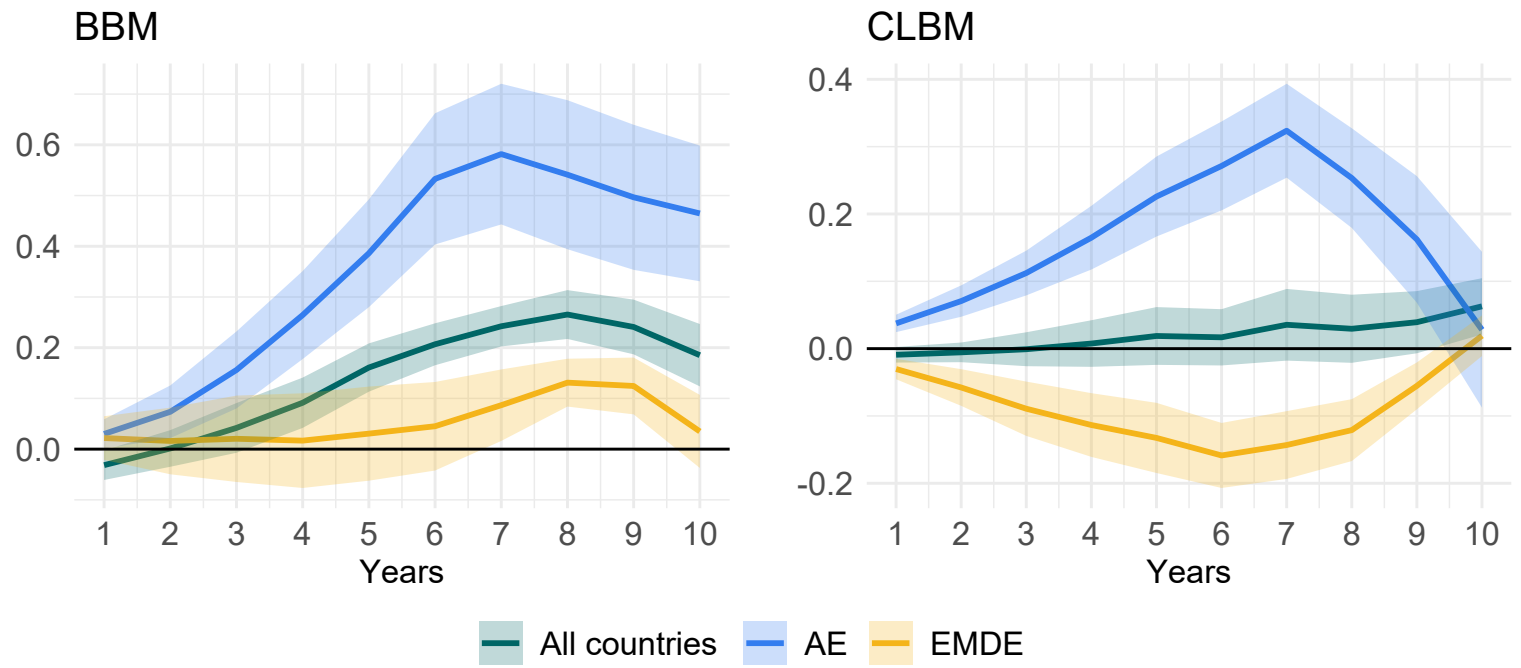
Estimation procedure

- Local projections method (Jorda, 2005)
  - A separate regression model is estimated for each forecast horizon *t+h*
  - β^h are used to calculate impulse response functions at a given horizon *h*

$$GI_{i,t+h}^{gap} = \beta^h MaPP_{i,t} + \gamma^h GI_{i,t}^{cs\_trend} + \sum_{j=1}^{2} \delta_j^h Z_{i,t-j} + \alpha_i^h + \alpha_t^h + \epsilon_{i,t}$$

- Following Bridges *et al.* (2021), we use two types of the trend for the Gini index
  - Global trend to calculate $GI_{i,t+h}^{gap}$
  - Country-specific trend $GI_{i,t}^{cs\_trend}$ as a control variable
  - Conservative approach – to shield estimated effects from the impact of long-term structural developments and attenuate the size of any cyclical effects that we estimate
- Detrending
- Identification

Responses of Gini Index to MaPP

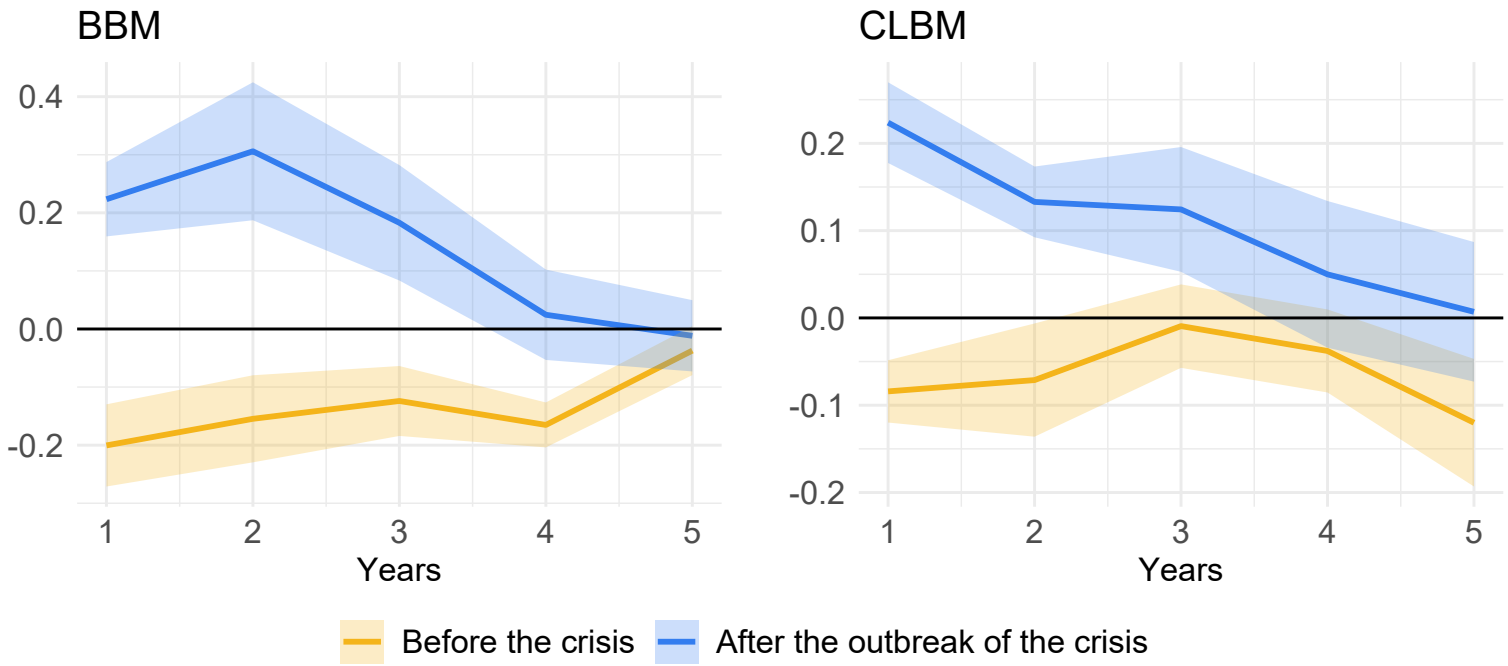


- Macroprudential policy actions have a significant effect on income inequality
- The direction and magnitude of the effect depend on the type of macroprudential policy used and the region
- Evidence of both credit redistribution channel and crisis prevention & mitigation channel

Crises *Mitigation* Channel – Setup

- We compare the effects of ex-ante macroprudential policy (before the financial crisis outburst) with ex-post policy (after the financial crisis outburst)
  - Crisis periods: identified using a binary dummy variable by Laeven & Valencia (2020)
  - Estimation sample: crisis period +/- 3 years; only countries with recorded crisis
  - Model 1: macroprudential policy tightened before the crisis (preemptive action)
  - Model 2: macroprudential policy tightened after the outbreak of the crisis (repressive action)

Crises *Mitigation* Channel – Results



- MaPP reduces income inequality when tightened before the crisis → works preemptively
- MaPP increases income inequality when tightened after the outbreak of the crisis → works repressively

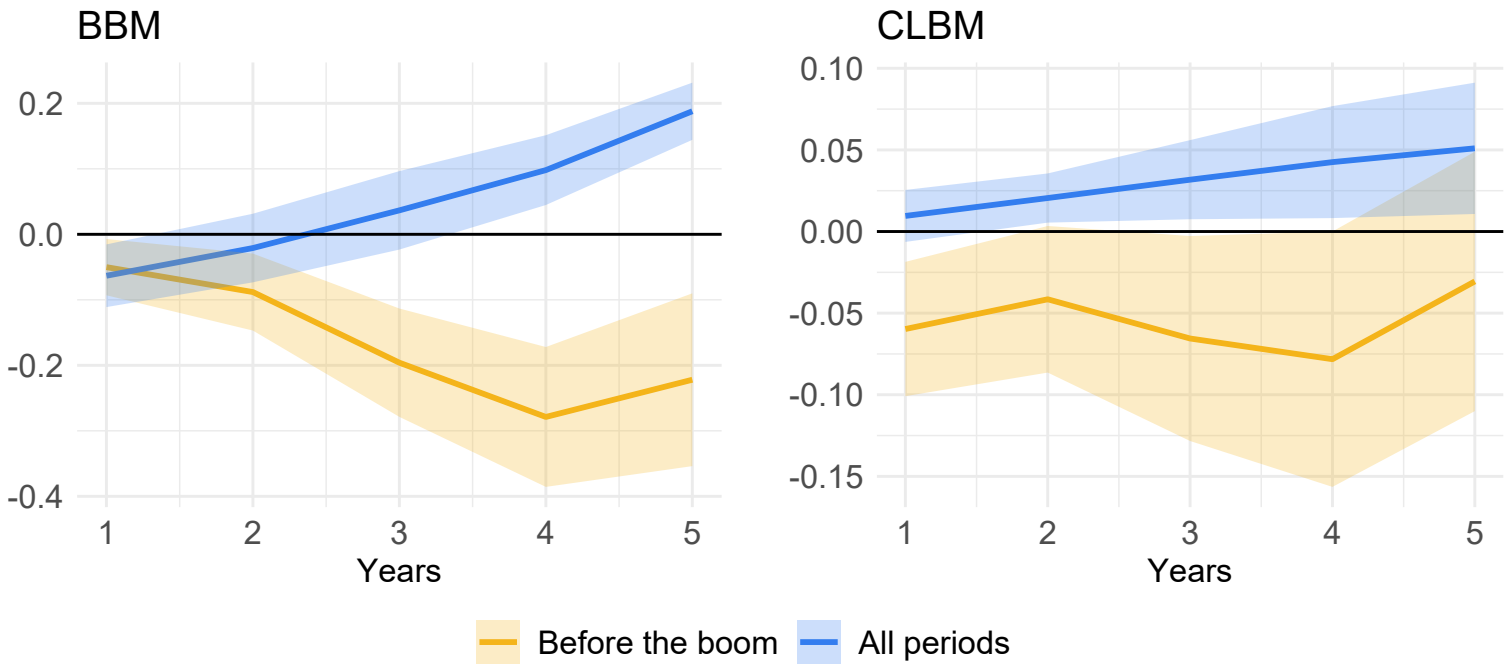
Crises *Prevention* Channel – Setup

- What if macroprudential policy prevented a financial crisis (i.e. we do not observe it)?
- Hence, we identify periods with a high probability of crisis but no recorded crisis
  - Boom1: excessive credit growth (difference between credit and output growth higher than 2 pp over at least three years)
  - Boom2: excessive credit growth and house price growth (difference between house price and output growth higher than 2 pp over at least three years)
- We compare the impact of MaPP tightening before the boom period with "non-boom" periods

Table: The Misalignment of Credit and House Price Growth with Output Growth

	3Y before crisis			Crisis			All other periods		
	Mean	25%	75%	Mean	25%	75%	Mean	25%	75%
Credit growth - GDP growth	6.94	2.87	10.15	-1.36	-7.83	4.28	2.79	-2.51	7.43
House price - GDP growth	5.02	-1.21	8.78	-2.02	-4.74	1.62	1.58	-2.43	5.46

Crises *Prevention* Channel – Results



- Results confirm the crisis prevention & mitigation channel
- MaPP reduces income inequality when tightened before the boom → works preemptively

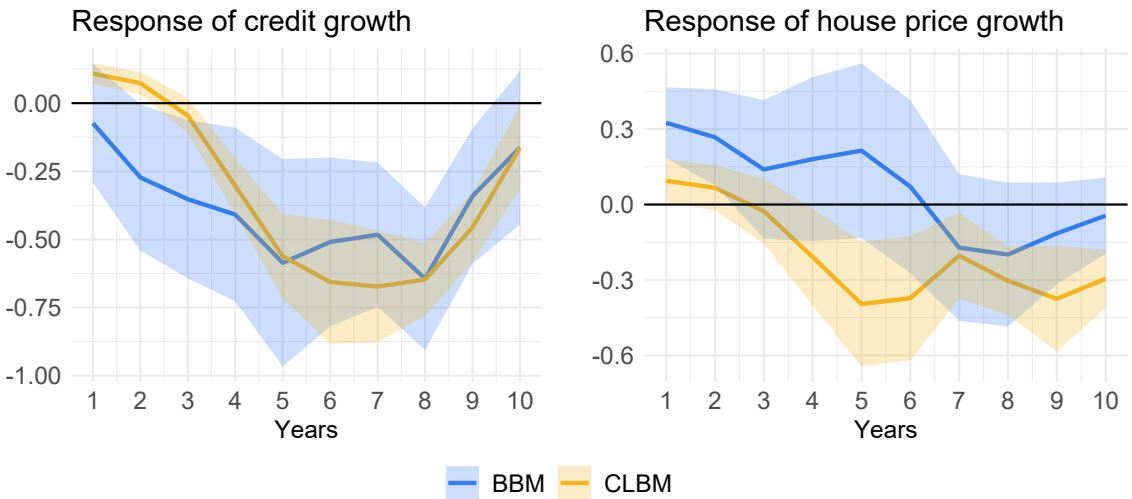
Credit Redistribution Channel – Setup

- Access to credit influences borrowers future income (Delis *et al.*, 2020; Agnello *et al.*, 2012; Mookerjee & Kalipioni, 2010)
- Hard to estimate distributional effects using macro-data

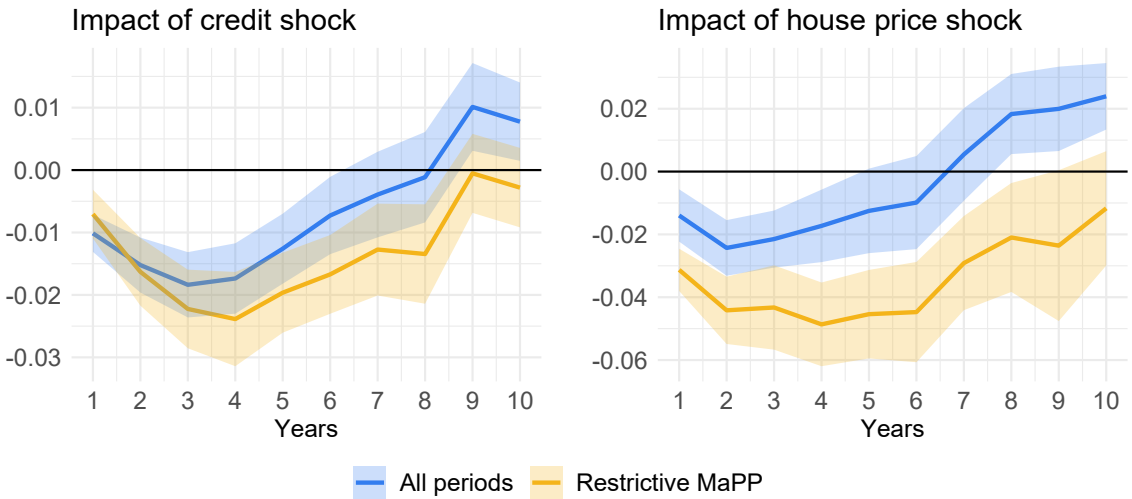
- MaPP affects credit growth (Malovaná *et al.*, 2021, 2022) and house price growth (Akinci & Olmstead-Rumsey, 2018)
- Hence, we estimate system of two equations:
  - How MaPP affects credit growth and house price growth
  - How credit growth and house price growth affect income inequality

Credit Redistribution Channel – Results

(A) Impact of MaPP tightening



(B) Response of Gini index



Economic Significance

Table: Back-of-the-envelope Calculations

	(1) Average global trend	(2) Average number of actions	(3) Average change in Gini Index in response to one action	(4)	(5) Average change in Gini index in response to the average number of actions	(6)
			5Y	10Y	5Y	10Y
BBM						
All countries	45.67	2.12	*0.074*	*0.084*	*0.156*	*0.179*
AE	46.41	3.49	*0.179*	*0.216*	*0.624*	*0.752*
EMDE	45.30	1.44	0.014	0.016	0.020	0.023
CLBM						
All countries	45.67	11.36	0.009	0.029	0.099	0.327
AE	46.41	14.46	*0.105*	0.013	*1.516*	0.188
EMDE	45.30	9.81	*-0.060*	0.009	*-0.591*	0.084

- The effects are economically significant
  - In advanced economies, the Gini index increases by an average of 0.624 (3.49×0.179) after 5Y in response to BBM

Robustness

- Continuous measure – changes to the LTV limit
  - Following a 5 pp increase in LTV translates into a 0.26 pp increase in the de-trended Gini index after five years
- Alternative measures of inequality – income shares of different income groups
  - The shifts in income shares in response to MaPP are consistent with changes in the Gini index
- Excluding low-income countries and liquidity-based measures – EME instead of EMDE and CBM instead of CLBM
  - Response for EME and EMDE almost identical
  - Response for a sample of countries excluding also switching LIDC is more pronounced but retains the same direction
  - Response to CLBM and CBM is similar (slightly weaker and decays more quickly in AE)
- Pseudo-placebo test – "fake" macroprudential actions
  - We show that the results are unique to the years in which macroprudential actions were taken

The Role of Country and Time Characteristics

- Do certain time or cross-sectional (country) characteristics influence the relative dominance of the two channels?
  - We interact MaPP and dummy variable that takes value one when certain characteristics cross a selected threshold and zero otherwise

- Monetary policy: in periods of low or declining interest rates, the effect is more positive/stronger (larger role of *the credit redistribution channel*) Results
- Banking sector capitalization: in less capitalized countries, the effect is less positive/more negative (larger role of *the crises prevention & mitigation channel*) Results
  - Less capitalized banking sector increases the risk of financial instability
- Banking sector concentration: in less competitive countries, the effect is less positive/more negative (larger role of *the crises prevention & mitigation channel*) Results
  - Less banking sector competition increases the risk of financial instability

Conclusions

- A panel of 105 countries between 1990–2019
- Macroprudential policy affects income inequality via two channels:
  - Crisis prevention & mitigation: MaPP tightening *decreases* income inequality
  - Credit redistribution channel: MaPP tightening *increases* income inequality (via credit growth and house price growth)

- Crisis prevention & mitigation channel is stronger in emerging market and developing economies, countries with less resilient and less competitive banking sectors
- Credit redistribution channel is stronger in advanced economies and during a period of highly accommodative monetary policy

- Borrower-based measures work mainly via credit redistribution channel (income inequality increases)
- Capital- and liquidity-based measures work mainly via crisis prevention & mitigation channel (income inequality decreases)

Appendix

Detrended Gini Index

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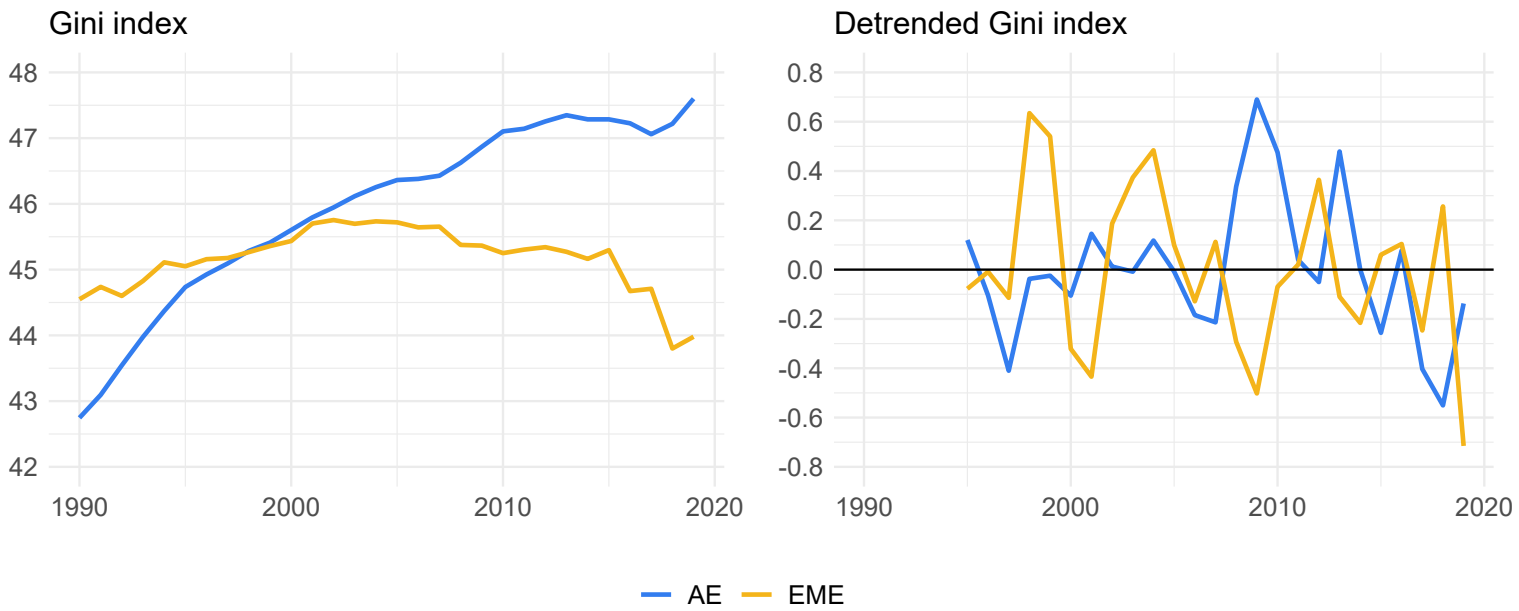
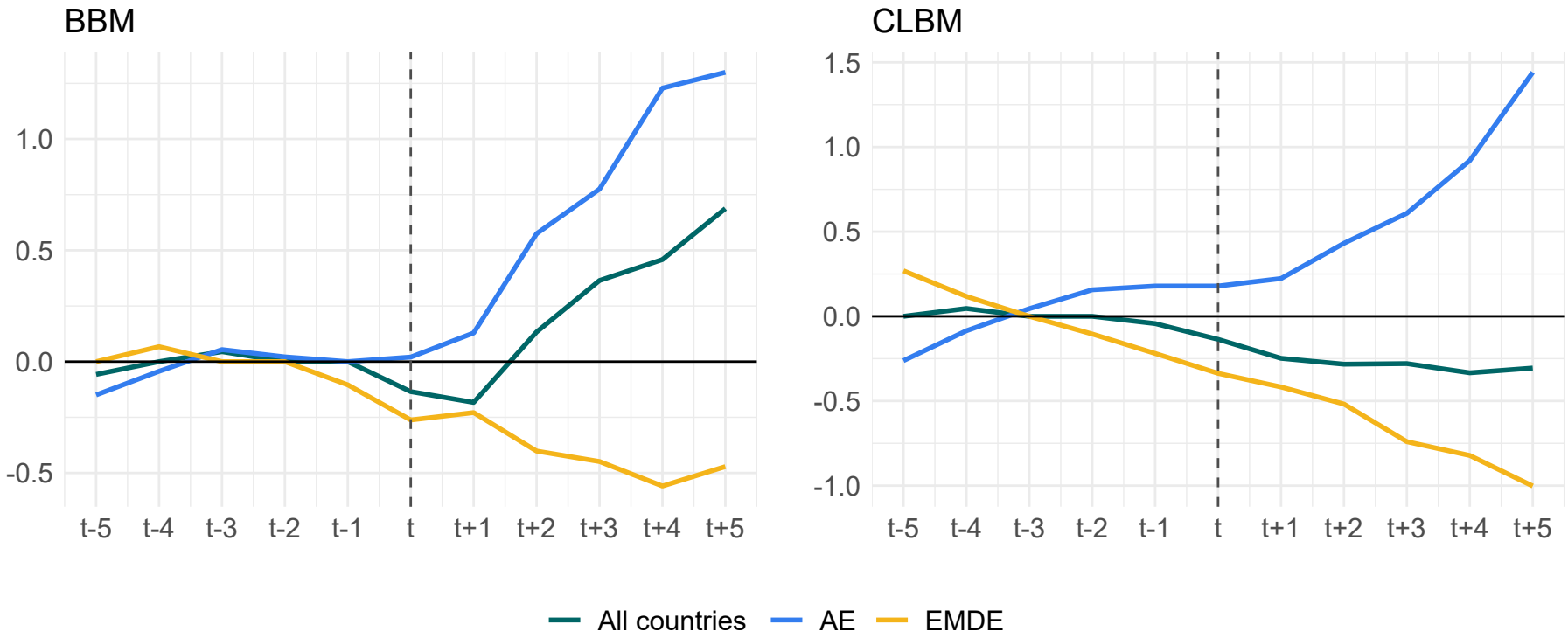


Note: Average across countries

Unconditional Relationship

- The Gini index is expressed as a percentage change relative to its average level 5 years before the tightening



Summary Statistics of the Gini Index

	Level			First difference			Growth rate (%)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Entire period									
All countries	45.49	21.80	72.30	0.06	-2.00	3.20	0.13	-3.96	8.04
AE	45.94	28.70	56.30	0.14	-1.40	2.30	0.33	-3.07	6.35
EMDE	45.23	21.80	72.30	0.00	-2.00	3.20	0.02	-3.96	8.04
1990–1999									
All countries	44.75	23.10	68.40	0.21	-0.70	3.20	0.50	-1.58	8.04
AE	44.33	28.70	54.10	0.31	-0.70	2.30	0.71	-1.58	6.35
EMDE	45.00	23.10	68.40	0.15	-0.60	3.20	0.37	-1.30	8.04
2000–2009									
All countries	45.82	22.50	72.30	0.04	-1.20	2.10	0.08	-2.75	3.98
AE	46.24	30.80	55.10	0.15	-1.20	1.50	0.32	-2.75	3.28
EMDE	45.61	22.50	72.30	-0.02	-1.20	2.10	-0.05	-2.23	3.98
2010–2019									
All countries	45.86	21.80	72.10	-0.06	-2.00	1.60	-0.14	-3.96	2.86
AE	47.25	30.50	56.30	0.00	-1.40	1.20	-0.01	-3.07	2.47
EMDE	44.99	21.80	72.10	-0.10	-2.00	1.60	-0.22	-3.96	2.86

Note: The table shows summary statistics for the entire sample, different sub-groups and sub-periods. We track Gini in 35 advanced economies (AE) and 70 emerging economies (EMDE) over the 1990–2019 period.

Number of Macroprudential Policy Actions Over 1990–2019

	BBM		CLBM	
	No. of events	No. of countries	No. of events	No. of countries
All countries	285	61	1,296	105
Advanced economies	151	29	539	35
Emerging markets and developing economies	134	32	757	70
Africa	2	1	62	12
Asia and Pacific	103	14	267	21
Europe	136	31	664	41
Middle and South America	9	5	152	15
Middle East and Central Asia	20	8	120	14
North America	15	2	31	2
1990–1999	7	6	67	39
2000–2009	87	30	233	72
2010–2019	191	49	996	96

Note: The table shows the total number of macroprudential policy actions in our sample. We differentiate between borrower-based measures (BBM) and capital- and liquidity-based measures (CLBM). Total number of observations in our sample is 2,372 (105 countries over 30 years). Number of events is calculated as a sum of absolute value of the iMaPP indexes which can take both positive (macroprudential policy easing) and negative (macroprudential policy easing) values. For example, a value of 3 means that the policy was tightened three times that year.

Categorization of Macroprudential Policy Instruments in iMaPP

Capital- and liquidity-based measures	Leverage ratio, counter-cyclical capital buffer, capital conservation buffer, capital requirements, liquidity requirements, limits of FX positions, limits on credit growth, loan loss provisions, limits on loan-to-deposit ratio, limits on foreign currency loans
Borrower-based measures	Limits on loan-to-value ratio, limits on debt service-to-income, limits on loan-to-income ratio

Identification

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- Shocks to macroprudential policy should be:
  1. exogenous with respect to the current and lagged real variables,
  2. uncorrelated with other shocks,
  3. preferably unexpected.
- We rely on a narrative identification approach used to identify shocks to macroprudential policy
- We check whether the stated objectives of macroprudential policies reflect in any way the current state of the real economy
  - e.g. we do not consider changes of the reserve requirements as capital- and liquidity-based measures
  - Richter *et al.* (2019) show that a dominant share of borrower-based policy actions are not related to real economic developments
- Macroprudential policy, unlike monetary policy, does not respond to the real economy, which makes identification easier
- The reliance on the local projection method should be helpful in taking care of the endogeneity bias

Macroprudential Policy, Monetary Policy, and Income Inequality

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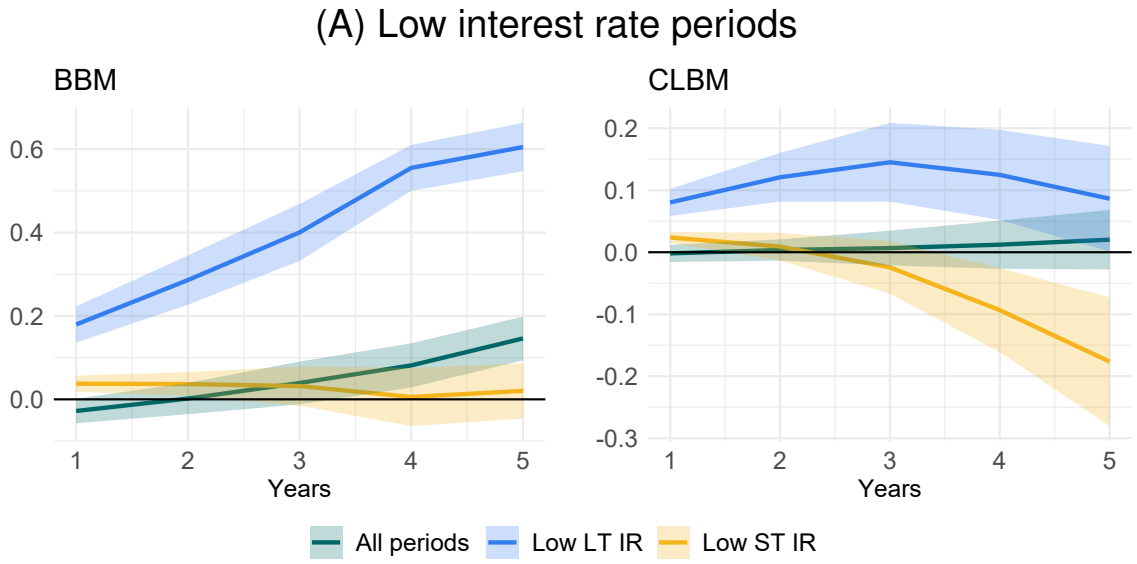

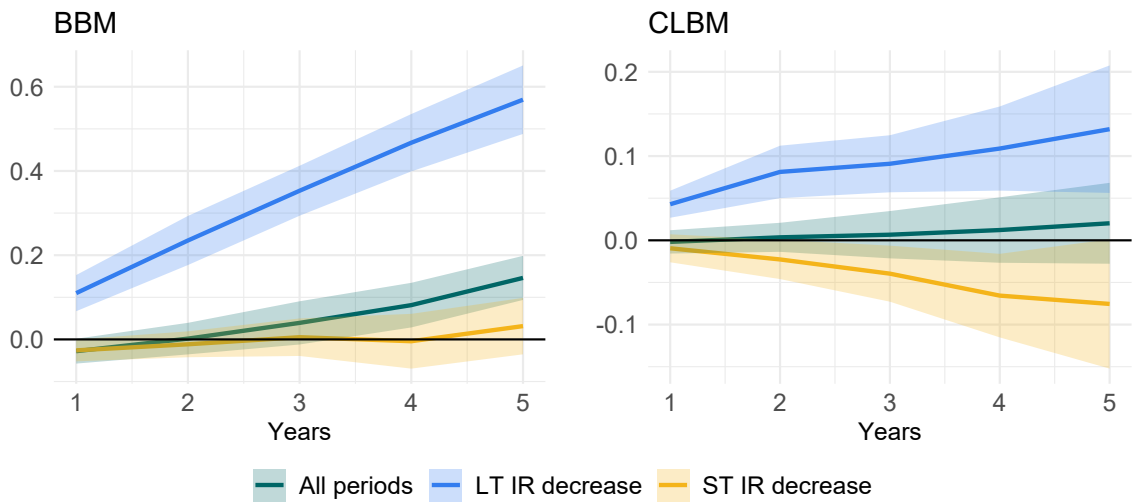

Regulatory Capital, Macroprudential Policy and Income Inequality

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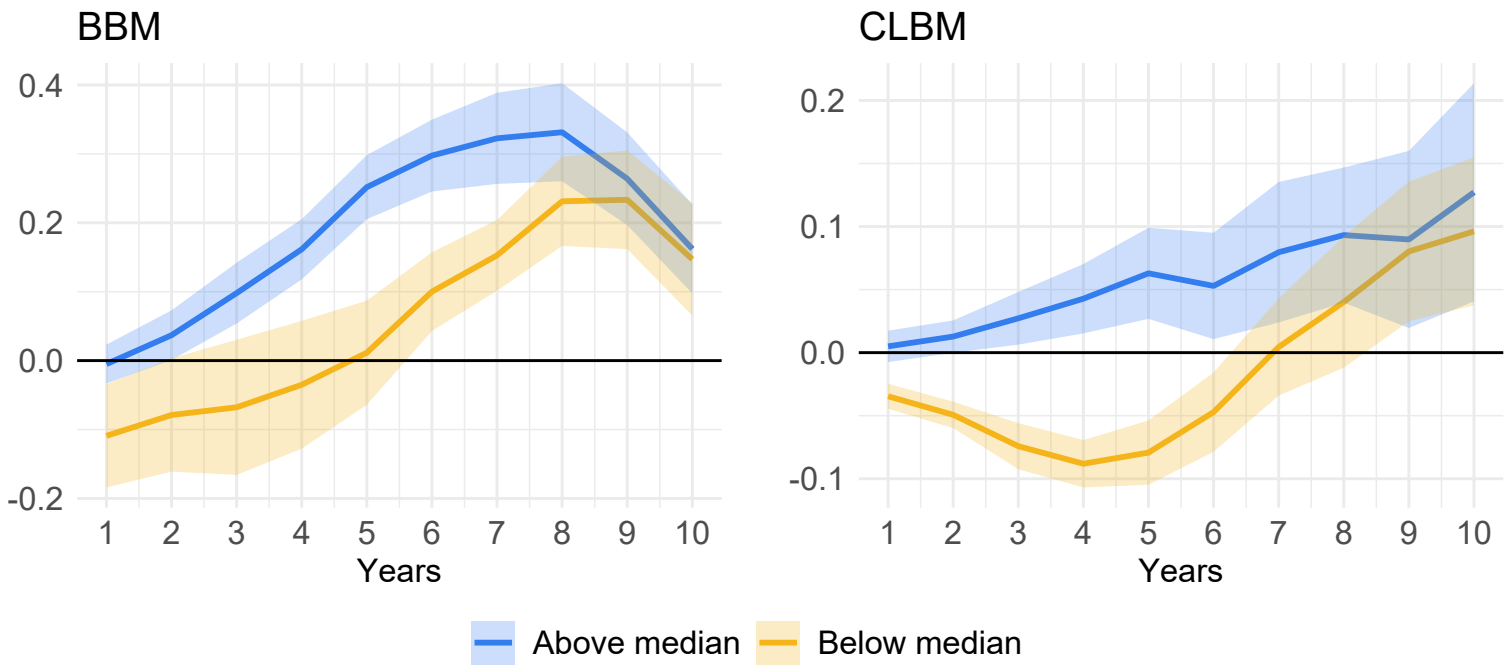

Banking Sector Concentration, Macroprudential Policy and Income Inequality

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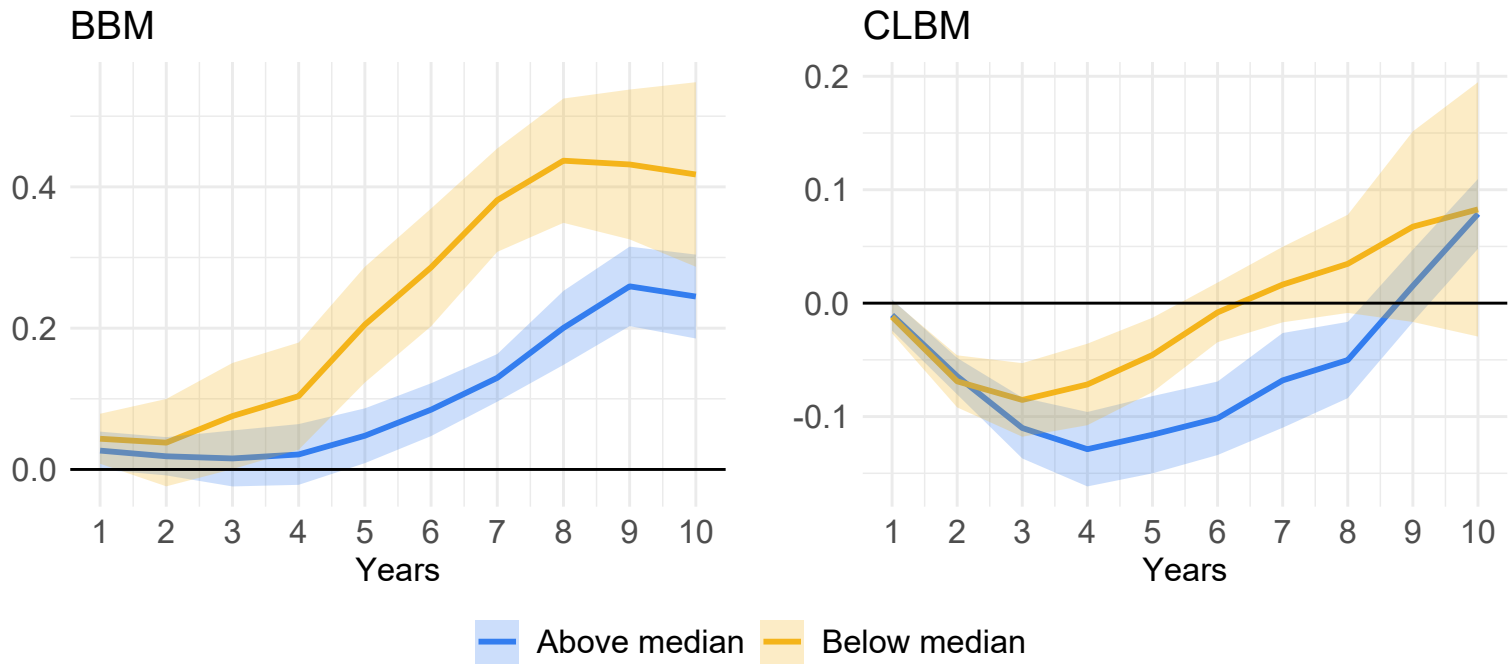

Financial Development, Macroprudential Policy and Income Inequality

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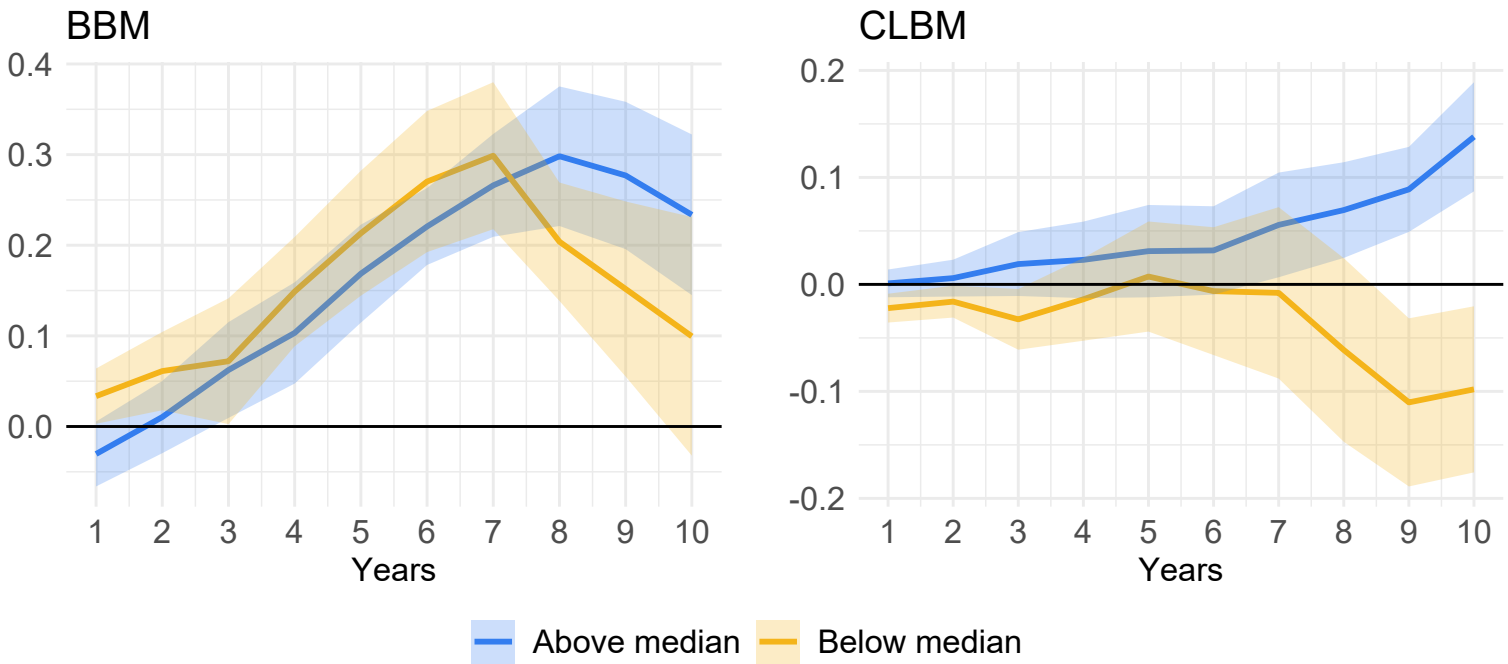

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