The Distributional Dividend of Macroprudential Policy

Camilo Granados [*]
University of Texas at Dallas

Zhe (Jasmine) Jiang [†]
University of Sydney

September 15, 2026

Abstract

Prudential regulation is designed for financial stability, yet the credit cycles it leans against fall unevenly across households—leaving its distributional footprint an open and contested question. Tracing that footprint across advanced, emerging, and developing economies over 1999–2024, we find that tighter macroprudential policy lowers income inequality, gradually and most clearly through the instruments that bear on banks rather than borrowers, and more so for inequality measured after taxes and transfers. To understand why, we build a closed-economy model with financial frictions and capital-skill complementarity in which prudential policy taxes the returns to intermediation. A tightening reduces inequality through three channels: it rebates revenue to households, cools the credit boom feeding financial rents, and compresses the skill premium accruing to high-income agents. Inequality moderation thus arises as a by-product of stability-oriented regulation—regulators tempering the distributional consequences of the credit cycle even when they only pursue financial stability.

JEL Codes: G28, D63, E44, E25, G21

Key words: Macroprudential policy, Income inequality, Financial frictions, Capital-skill complementarity, Banking intermediation

[*]School of Economic, Political and Policy Sciences, University of Texas at Dallas. Richardson, TX, USA. Email: camilo.granados@utdallas.edu.

[†]School of Economics, the University of Sydney. Email: jasmine.jiang@sydney.edu.au. URL: www.jasminejiang.net.

1 Introduction

Macroprudential regulation has become a standard component of the policy toolkit since the global financial crisis (GFC), as frameworks such as Basel III and the IMF's Integrated Policy Framework have consolidated a set of instruments that are deployed routinely to contain financial vulnerabilities. Their effectiveness on the intended targets has been evaluated extensively, along with their macroeconomic costs and cross-border leakages.[1] Their consequences for the distribution of income, by contrast, remain comparatively under-explored, and the evidence that exists is sparse: depending on the sample, the instruments, and the prevailing economic conditions, prudential measures have been linked to higher, lower, or state-contingent inequality, and only rarely to an explicit account of why regulation and inequality should comove at all. It seems relevant, then, to determine whether macroprudential regulations systematically shape the income distribution, and—most importantly—through which mechanisms.

We explore these questions in this paper, and organize the analysis around three of them. Does a tightening of macroprudential regulation raise or lower income inequality? Which segments of the prudential toolkit drive the relationship? And does it survive the fiscal redistribution that separates market from disposable income? Crucially, unveiling a mechanism behind these responses is central to our analysis, as it allows us to gauge whether a distributional effect is a by-product of prudential policy or a lever that regulators could, and should, in principle, account for deliberately. These questions have gained relevance as inequality has moved to the center of policy conversations, while remaining largely unaccounted for by financial regulators, whose mandate is primarily concerned with financial stability. There is, moreover, a latent tension between the intermediation that fuels growth and the stability that regulation secures; whether restraining the former also carries a distributional dividend is, we argue, an open and consequential question.

We proceed on two fronts, empirical and theoretical. On the empirical side, we estimate lag-augmented local projections (Jordà, 2005) on an annual panel of advanced, emerging, and developing economies over 1999–2024, combining the IMF's Integrated Macroprudential Policy database (iMaPP; Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang, 2025) with market and disposable-income Gini coefficients from the Standardized World Income Inequality Database (Solt, 2020). Local projections suit this setting: they are robust to dynamic misspecification (Montiel-Olea and Plagborg-Moller, 2021) and, more importantly, recover the

[1] See Richter, Schularick, and Shim (2019); Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang (2025); Chari, Dilts-Stedman, and Forbes (2022), among others.

long-horizon dynamics that slow-moving inequality measures display. Beyond an aggregate net-tightening index, we exploit the granularity of iMaPP to separate tightenings from loosenings and to disaggregate the toolkit by the type of risk addressed, by policy objective, and by the agent targeted (Claessens et al., 2013; Cabral et al., 2019; BIS, 2012), which locates the effect within the toolkit rather than attributing it to macroprudential policy in the aggregate.

Our empirical results indicate a negative relationship. A macroprudential tightening tends to lower income inequality, with the effect building gradually over the horizon rather than on impact. It is present for both the market and the disposable Gini, and stronger and more precisely estimated for the latter, consistent with fiscal redistribution reinforcing—rather than offsetting—the inequality-reducing channel of prudential policy, in line with Guerello (2018) for unconventional monetary policy. The response is driven by active tightenings and, across instrument classifications, by lender-targeted, capital-based, resilience, and cycle-management tools—those that most directly constrain the scale, leverage, and profitability of banking intermediation—whereas borrower-targeted caps on loan-to-value and debt-service-to-income ratios are close to zero and less precisely estimated. The pattern holds across advanced, emerging, and developing economies, materializing earlier in the former, and survives restricting the sample to the post-crisis period.

To rationalize this evidence, we develop a closed-economy general equilibrium model with two types of agents, capital-owning entrepreneurs who supply skilled labor, and households who supply unskilled labor and save through banks. A banking sector intermediates funds subject to agency frictions à la Gertler and Karadi (2011); production features capital-skill complementarity in the nested-CES form of Krusell et al. (2000); and macroprudential policy is modeled as a tax on the returns to banking intermediation —a general enough setup to stand in for a range of prudential instruments. The environment is in the spirit of Liu et al. (2023a), who study capital-flow regulation, and of Dolado et al. (2021), whose capital-skill-complementarity production side we adapt; we turn this framework toward domestic prudential regulation and characterize its distributional implications analytically. The model admits a transparent inequality statistic: at the steady state the two-agent Gini reduces to the gap between the entrepreneurs' income share (Λ_e) and their population share ($1 - \mu$), so that any intervention that compresses the entrepreneurial income share lowers measured inequality one-for-one.

Within this framework, a permanent tightening of the policy instrument unambiguously reduces steady-state inequality, through three reinforcing channels. A *redistribution channel* rebates prudential revenue to households; a *credit-contraction channel* compresses the capital income of entrepreneurs and bank owners as intermediation cools down; and a *skill-premium channel* operates through capital-skill complementarity, whereby the policy-induced fall in the capital stock lowers the return to skilled relative to unskilled labor. The first echoes the distributive-conflict logic of Korinek and Kreamer (2014), in which regulation reallocates rents away from a financial sector that captures a disproportionate share of the surplus from risk-taking; and the other two tie the incidence of prudential policy to the same complementarity that renders intermediation booms skill-biased in Liu et al. (2023a) and Dolado et al. (2021). The channels are partly offset by policy-induced deleveraging, which mechanically raises entrepreneurial income net of debt service; at our calibration this offset is dominated, but it delivers a testable prediction, that the inequality reduction from a tightening tends to be attenuated in highly leveraged economies.

Comparing policy schemes that respond to lending, output, inequality, or bank leverage (Angelini et al., 2014; Hecker et al., 2024), we further find that policies leaning against the business cycle yield a distributional dividend that exceeds that of setups targeting more complex financial quantities with weaker countercyclical properties, or implementing equality explicitly as a secondary target. In the case of a leverage-based rule, for example, a tightening policy may turn into a de-facto subsidization scheme and thereby raise inequality. On the other hand, explicit inequality objectives may reduce and even forfeit the equality-inducing features of policies tempering financial intermediation if these require strong interventions that imply wide equality swings—thereby limiting both the distributional gains and the effectiveness of regulation on its direct targets. Taken together, these results point to the moderation of inequality as a by-product of prudential policy under standard rules that smooth the credit cycle: in curbing an intermediation boom, regulators can also temper the distributional consequences of heightened banking activity, and thus financial-stability and inequality objectives need not be in conflict.

Related literature. Our paper connects to several strands of work. The first is the empirical literature on macroprudential policy and inequality, which has not settled on a sign. Frost and van Stralen (2018) report a positive association between the use of several prudential instruments and income inequality; their measures, however, predate iMaPP—largely use dummies, without a tightening-loosening distinction—and their estimates are static, and thus are limited to study inequality given the slow moving characteristic of Gini measures. Georgescu and Vila Martin (2021) and Carpantier et al. (2018) narrow the lens to borrower-based tools and reach state-contingent conclusions, in which caps on loan-to-value and debt-service-to-income ratios can raise inequality at introduction yet dampen its rise under adverse conditions. We differ on the sign of the aggregate relationship, on the breadth and directionality of the measures—our updated iMaPP sample shows the effect is driven by the lender-targeted instruments these studies largely abstract from—and in recovering dynamic responses through local projections.

A second strand supplies the structural mechanisms our theory builds on. Korinek and Kreamer (2014) place distributive conflict at the center of financial regulation, whereby deregulation shifts surplus toward a financial sector that opts for more risk-taking than is socially optimal—an inequality-increasing force that regulation offsets—while Rubio and Unsal (2020) show that a well-calibrated active prudential rule is equalizing whereas overly conservative policies in the presence of noisy information are not. The distributional bite of our mechanism also runs through capital-skill complementarity, following Krusell et al. (2000), Dolado et al. (2021), and Liu et al. (2023a), who establish that capital deepening is skill-biased in monetary and capital-flow settings; we carry the same channel into a prudential one, where it is the scale of banking intermediation that moves the skill premium. A related literature runs the arrow in reverse, from inequality to financial fragility and bank risk (Mitkov, 2020; Mitkov and Schüwer, 2025), implying that the distribution is jointly determined with stability, consistent with the complementarity our results suggest. Relative to this strand, our contribution is to make that mechanism explicit and tractable—a two-agent economy in which the macroprudential tax compresses both financial rents and the skill premium—uniting the distributive-conflict view of regulation with the capital-skill-complementarity channel.

Finally, our work also relates to the longer standing literature on monetary policy and inequality, pertinent because post-crisis unconventional monetary policy—operating through bank balance sheets—can be read as a de facto macroprudential intervention. The evidence there points, on balance, to an equalizing effect of monetary expansions: contractionary shocks raise inequality in the United States (Coibion et al., 2017), expansions reduce it across a large panel and asymmetrically (Furceri et al., 2018), and the euro-area effect is equalizing on average but heterogeneous and redistribution-dependent (Guerello, 2018); even non-standard easing need not raise inequality, as activity gains at the bottom offset opposing financial-income effects (Casiraghi et al., 2018), while Voinea et al. (2018) add the reverse-channel counterpart in which inequality shapes policy transmission. Monnin (2017) stresses how scarce the parallel evidence on macroprudential policy remains. Our results help close that gap, extending the equalizing reading from the monetary to the prudential toolkit and supplying a microfounded mechanism.

The remainder of the paper is organized as follows. Section 2 describes the data and the local-projection strategy and presents the empirical results. Section 3 develops the general equilibrium model and derives the model-implied Gini coefficient and its comparative statics with respect to the prudential instrument. Section 4 discusses the calibration, and Section 5 evaluates the dynamic implications of alternative macroprudential rules. Finally, Section 6 concludes.

2 Empirical Strategy and Stilized Facts

To motivate our research question and the subsequent conceptual analysis, we begin by examining the empirical relationship between macroprudential regulation and income inequality. Using a panel of countries over the period 1999–2024, we estimate local projection impulse responses of inequality measures to macroprudential policy interventions, conditioning on a set of domestic macroeconomic controls. In this section, we describe the data, outline the empirical methodology, and present the main results.

2.1 Data

We construct an annual panel dataset covering a broad set of advanced, emerging, and developing economies. The dataset merges several sources to obtain measures of income inequality, macroprudential policy stances, and macroeconomic controls. The sample period runs from 1999 to 2024, and we retain only country-year observations for which at least ten years of inequality data are available. Countries with no recorded macroprudential interventions during the sample period are excluded.[2]

Inequality Measures Our main dependent variables are two measures of income inequality from the Standardized World Income Inequality Database (SWIID) (Solt, 2020). The first is the Gini coefficient of market income (*Gini market*), which captures pre-tax and pre-transfer inequality. The second is the Gini coefficient of disposable income (*Gini disposable*), which measures inequality after taxes and government transfers. Using both measures allows us to assess whether macroprudential regulation affects inequality before or after the fiscal redistribution process.

[2]Specifically, we exclude Burundi, Saint Kitts and Nevis, Yemen, Zambia, Ethiopia, and Sudan.

Macroprudential Policy Indicators We obtain macroprudential policy data from the Integrated Macroprudential Policy Database (iMaPP) of the International Monetary Fund, as reported by Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang (2025). The database records tightenings and loosenings across 17 individual policy instruments. For each instrument j, country i, and period t, the indicator is defined as:

$$MaPP_{i,t}^{j} = \begin{cases} +1 & \text{if tightened} \\ 0 & \text{if unchanged} \\ -1 & \text{if loosened} \end{cases}.$$

We aggregate across all 17 instruments to obtain the overall macroprudential policy stance:

$$MaP_{i,t} = \sum_{j=1}^{17} MaPP_{i,t}^{j}.$$

This net tightening indicator can be interpreted as a measure of the overall macroprudential stance, with higher values indicating a stricter regulatory posture (Fernández, Rebucci, and Uribe, 2015; Richter, Schularick, and Shim, 2019). In addition to this aggregate index, we consider separate indicators for policy tightenings only ($MaP_{i,t}^{T}$) and loosenings only ($MaP_{i,t}^{L}$), which allow us to distinguish between the inequality effects of regulatory tightening and easing episodes.

Beyond the aggregate and direction-based indicators, we further disaggregate the macroprudential toolkit along three dimensions. The first classification, based on the type of risk addressed, follows Cabral et al. (2019) (ECB) and BIS (2012), and groups the instruments into: (i) *capital-based* tools (countercyclical capital buffer, conservation buffer, capital requirements, leverage ratio, loan loss provisions, and SIFI-specific rules); (ii) *asset-based* tools (limits on credit growth, loan restrictions, loan-to-value ratios, debt-service-to-income ratios, and tax-based instruments); and (iii) *liquidity and FX-based* tools (limits on foreign currency lending, liquidity requirements, loan-to-deposit ratios, limits on FX positions, and reserve requirements).

A second classification, following Claessens, Ghosh, and Mihet (2013), distinguishes instruments by policy objective: (i) *resilience tools* (countercyclical capital buffer, conservation buffer, capital requirements, leverage ratio, loan loss provisions, and liquidity requirements); (ii) *cycle-management tools* (limits on credit growth, loan restrictions, limits on foreign currency lending, LTV, DSTI, loan-to-deposit ratios, limits on FX positions, and reserve requirements);

and (iii) *tax-type and other instruments* (taxes, SIFI regulations, and other measures such as stress-testing requirements).

Finally, a third classification groups instruments by the type of agent targeted: (i) *borrower-targeted* tools (LTV and DSTI ratios); and (ii) *lender-targeted* tools (the remaining 15 instruments in the toolkit).

Control Variables The domestic control variables included in the baseline specification are as follows. A banking crisis dummy, sourced from the Global Macro Database (Müller et al., 2026), is extended to cover a five-year window following the onset of each crisis episode to capture the persistent effects of financial crises on inequality.[3] Real GDP growth is computed as the log-difference of real GDP, also obtained from the Global Macro Database. CPI inflation and the central bank policy rate are taken from the same source; notably, interest rates are allowed to take on negative values during zero-lower-bound episodes, making shadow-rate adjustments unnecessary.[4]

Capital inflows to GDP are constructed from the IMF International Financial Statistics (IFS) database, with the flows normalized by GDP using exchange rate and nominal GDP data from the Global Macro Database. Domestic credit to the private sector (as a share of GDP) is obtained from the World Development Indicators of the World Bank. A financial development index is sourced from the IMF Financial Development Database, and the nominal exchange rate depreciation (vis-à-vis the US dollar) is computed as the log-difference of the bilateral exchange rate from the Global Macro Database.

Variables that are already stationary or that represent rates—such as inflation, the central bank rate, capital inflows to GDP, and the macroprudential policy index—enter in levels. The banking crisis indicator is a dummy variable. Finally, a small number of countries with no recorded macroprudential interventions throughout th esample are excluded from the analysis. Table 2 in Appendix A summarizes the variables, their definitions, and data sources.

2.2 Empirical Methodology

We employ a lag-augmented local projection (LP) approach, building on Jordà (2005). LP methods are widely used in applied macroeconomics because they are generally less sensitive to dynamic misspecification than standard VAR-based impulse response estimators (Haug and

[3] This treatment follows common practice in the literature; see, for example, Laeven and Valencia (2013).

[4] The source of the central bank rates in the Global Macro Database is the Bank for International Settlements (BIS).

Smith, 2012; Montiel-Olea and Plagborg-Moller, 2021). They are also well suited to estimating medium- and long-horizon responses in persistent data, an important feature in our setting given the slow-moving nature of inequality measures such as the Gini coefficient.

Our baseline specification adopts the Cholesky (long-difference) approach, which allows for delayed effects of the policy variable on inequality.[5] Specifically, for horizons $h = 0, 1, \ldots, H$ (with $H = 12$), we estimate:

$$\text{Gini}_{i,t+h} - \text{Gini}_{i,t-1} = \alpha^{(h)} + \beta_1^{(h)}\text{MaP}_{i,t-1} + \sum_{k=0}^{K} \gamma_k^{(h)} X_{i,t-k} + FE_i^{(h)} + FE_t^{(h)} + \epsilon_{i,t+h}, \quad (1)$$

where $\text{Gini}_{i,t+h}$ is the Gini coefficient (market or disposable) of country i at horizon h; $\text{MaP}_{i,t-1}$ is the lagged macroprudential policy indicator; $X_{i,t-k}$ is a vector of domestic controls (banking crisis dummy, real GDP growth, inflation, central bank rate, capital inflows to GDP, domestic credit growth, financial development growth, and exchange rate depreciation); $FE_i^{(h)}$ and $FE_t^{(h)}$ are country and time fixed effects, respectively; and $\epsilon_{i,t+h}$ is the residual.

The policy variable enters with one lag to mitigate potential simultaneity bias, as macroprudential decisions are typically predetermined relative to contemporaneous inequality outcomes. The lag-augmented structure includes additional lags of the controls ($K = 2$), of the policy variable (one additional lag beyond the main regressor), and of the dependent variable in differences (two lags), following the ARDL-style augmentation recommended by Coman and Lloyd (2022) and Richter et al. (2019). The inclusion of lagged dependent variables in differences preserves the long-difference interpretation of the left-hand side while accounting for serial correlation in the inequality dynamics.[6] Standard errors are computed using the panel-corrected standard errors of Beck and Katz (1995), which account for cross-sectional dependence and heteroskedasticity. The resulting impulse response functions report the cumulative change in the Gini coefficient at each horizon in response to a one-unit increase in the macroprudential policy indicator, along with 68% (one-standard-deviation) and 95% confidence intervals.

The quantity of interest is the impulse responses $\beta_1^{(h)}$, which traces out the dynamic response of the Gini coefficient to a macroprudential intervention over the 12-year horizo and

[5]Under this format, the dependent variable is the cumulative change in the Gini coefficient from period $t-1$ to $t+h$, and the policy variable enters at date t. This approach nests the Cholesky specification (which restricts contemporaneous effects to zero) as a special case when $h \geq 1$. See Jordà, Singh, and Taylor (2024) for a discussion of both approaches and evidence that the results are typically analogous.

[6]See Piger and Stockwell (2025) for a discussion of the long-difference approach and its advantages in bias reduction and confidence interval coverage.

are expressed in Gini points per one-unit net macroprudential intervention. A negative estimate means inequality is lower h years after a tightening relative ot the period before the intervention.

2.3 Results

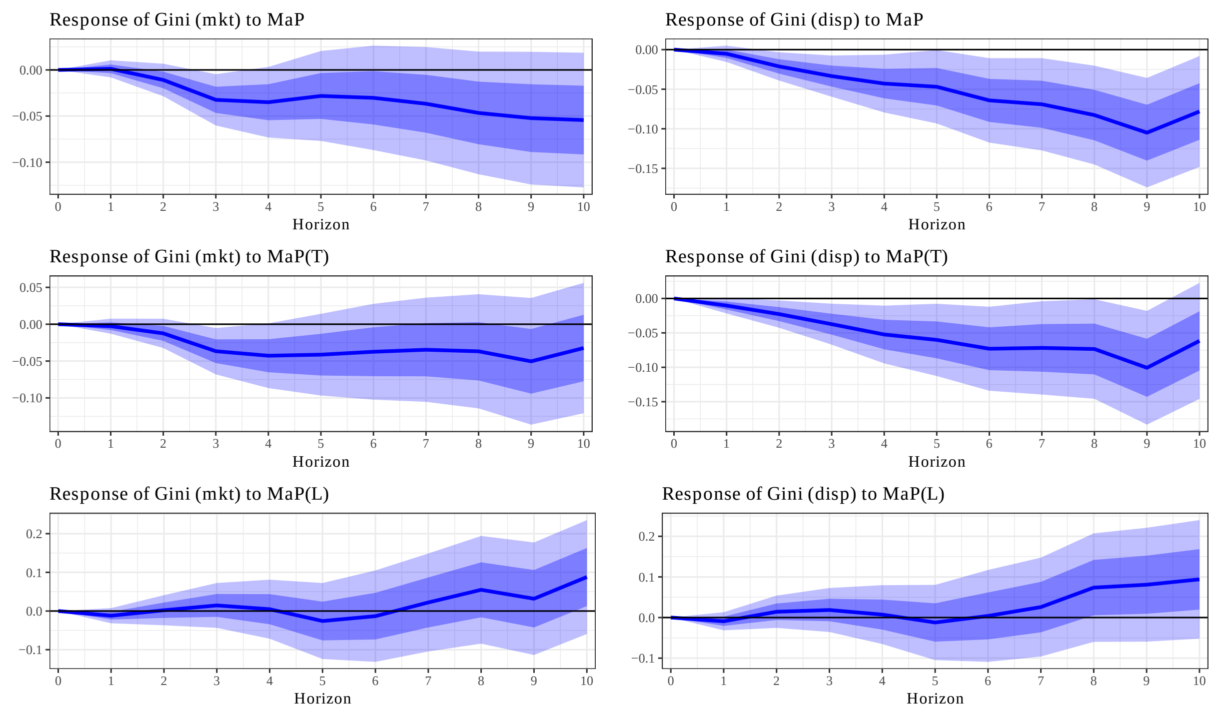
We present the results in a sequence that moves from the most aggregated policy measure to progressively finer disaggregations. Throughout, we report impulse responses for both the market Gini and the disposable Gini. The impulse responses display the cumulative change in the Gini coefficient over a 12-year horizon, with darker shaded areas representing 68% (one-standard-deviation) confidence intervals and lighter areas the 95% confidence intervals.

Aggregate Macroprudential Policy Index Figure 1 reports the impulse response functions of the Gini coefficients to a one-unit increase in the aggregate macroprudential policy index (which considers all 17 instruments and nets tightenings against loosenings). The left column shows the response of the market Gini and the right column that of the disposable Gini.

Both Gini measures respond negatively to a macroprudential tightening, with the effect building gradually over time. For the market Gini (top-left panel), the point estimate declines steadily from zero, reaching approximately -0.07 Gini points around horizon 11 before partially reverting at longer horizons. The 68% confidence interval lies below zero all horizons, and the 95% band becomes significant three years ahead and includes zero afterwards, indicating, indicating that the effect is estimated with some uncertainty. For the disposable Gini (top-right panel), the response is notably stronger and more precisely estimated: the point estimate declines to approximately -0.10 by horizons 8–9, with the 68% and 95% confidence inverval clearly below zero for all horizons. The stronger and more significant response of the disposable Gini may reflect the fact that redistributive policies amplify the inequality-reducing channel of macroprudential regulation, a result consistent with the findings of Guerello (2018) for the case of unconventional monetary policy.

This finding of a negative relationship between macroprudential tightening and inequality is noteworthy. It contrasts with the positive association reported in recent work (e.g., Frost and van Stralen 2018), which finds that stricter regulation is associated with higher inequality for the majority of the prudential policy toolkit , and reinforces the findings of Rubio and Unsal (2020) and Carpantier et al. (2018) suggesting a potential negative feedback between financial regulations and equality. Our result, would align with a plausible interpretation, also alluded by Liu et al. (2023a) in the case of capital flows and controls: higher-income higher-income agents and bank shareholders benefit disproportionately from elevated financial intermediation during normal economic expansions. As the economy grows and financial activity expands, inequality tends to increase because the gains from banking activities accrue asymmetrically to wealthier agents. Macroprudential tightening curtails this process by reducing the scope and profitability of banking intermediation, thereby slowing the mechanism through which financial development widens inequality. In this sense, regulators pursuing financial stability inadvertently moderate the distributional consequences of the credit cycle.

Figure 1: Impulse Responses of the Gini Coefficients to Macroprudential Policy: Aggregate Index, Tightenings, and Loosenings



Notes: Each panel reports the impulse response of the Gini coefficient to a one-unit increase in the respective macroprudential policy index. The solid line is the point estimate; the darker shaded area represents the 68% confidence interval (one standard deviation); the lighter shaded area represents the 95% confidence interval. Standard errors are Beck–Katz panel-corrected standard errors. Top row: aggregate net policy index (MaP). Middle row: tightenings-only index (MaP^T). Bottom row: loosenings-only index (MaP^L). Unlike all the other categories, the loosening index increases (+1) with softenings in the instruments across the macroprudential toolkit (17 instruments). Left column: market Gini. Right column: disposable Gini.

2.3.1 Tightenings versus Loosenings

To investigate whether the direction of the policy change matters, we re-estimate the model replacing the aggregate net index with the tightening-only index (MaP^T) and the loosening-only index (MaP^L), separately. The impulse responses are reported in the middle and bottom rows of Figure 1. The tightening-only index (middle row) yields negative impulse responses that closely resemble those from the aggregate index, suggesting that the baseline results are primarily driven by tightening interventions. For the market Gini, the point estimate declines by approximately -0.05 to -0.07 at horizons 5–10, with the 68% confidence band below zero over much of this range. For the disposable Gini, the response is again stronger: the point estimate reaches approximately -0.08 to -0.10 at horizons 8–10, and achieving significance consistently for most horizons.

The loosening-only index, when included in isolation, is transformed as a standard dummy by changing the sign of the loosenings entering the aggregate index and zeroing any other interventions. With this format, the loosening index increases with less stringent interventions and thus has the reverse interpretation as all other policy indexes: A positive IRF would indicate a negative relationship between stricter prudential regulations and inequality (an increase in the Gini index). The IRFs for this index are positive, in line with the other results in Figure 1 and in most exercises. However, the responses are not significant even at the 68% confidence level in most horizons. The contrasting significance in this latter case is consistent with the fact that loosening interventions are less frequent and tend to cluster during crisis episodes, which reduces the effective sample for identification. It also suggests that the inequality-reducing effects of macroprudential regulation are driven by active tightenings rather than by a reversal of loosening interventions.

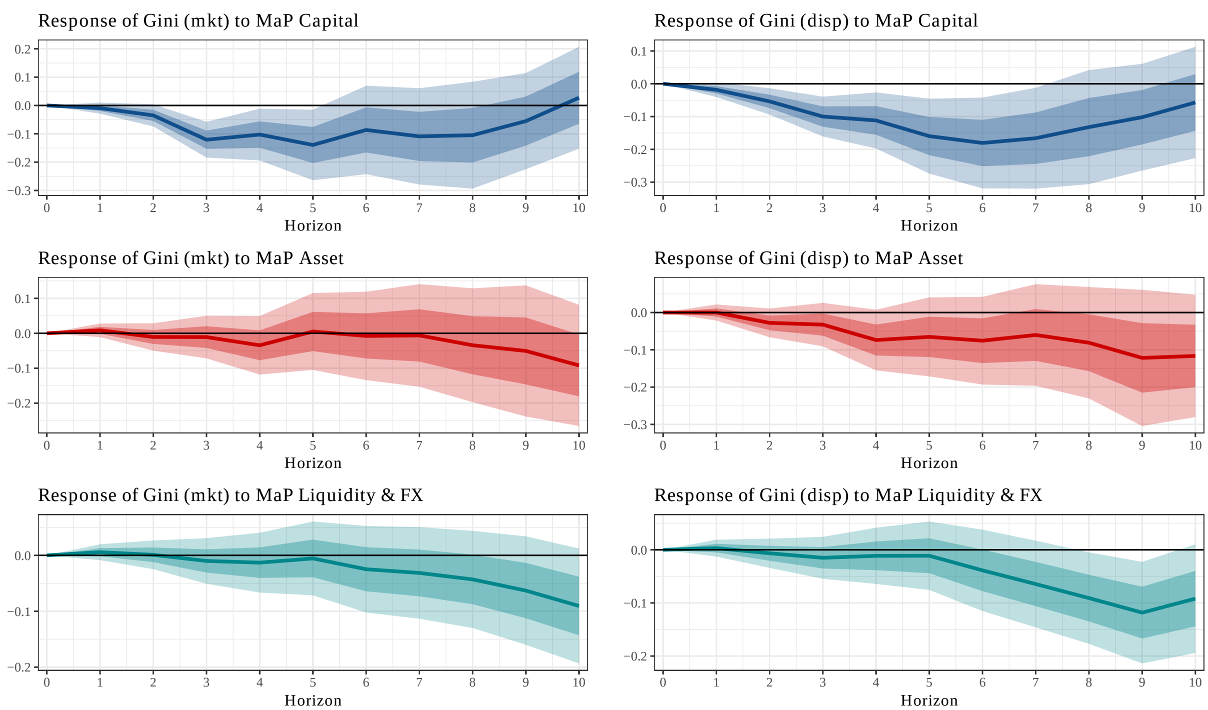
2.3.2 Results by Type of Instrument: Risk-Based Classification

We next disaggregate the macroprudential toolkit by the type of risk targeted, following the classification of Cabral, Detken, Fell, Henry, Hiebert, Kapadia, Pires, Salleo, Constâncio, and Nicoletti Altimari (2019) and BIS (2012). Figure 2 reports the impulse responses for capital-based, asset-based, and liquidity and FX-based instruments, separately for each Gini measure.

Capital-based instruments (top row)—which include countercyclical capital buffers, conservation buffers, general capital requirements, leverage ratios, loan loss provisions, and SIFI-specific rules—produce the largest negative responses among the three categories. For the market Gini, the point estimate declines sharply to approximately -0.15 at horizons 4–5, before reverting partially at later horizons. For the disposable Gini, the response is persistently negative, reaching -0.15 to -0.20 at horizons 5–7. Both of these responses are significant. The strength of this response is consistent with the view that capital requirements directly constrain bank leverage and profitability, which is potentially central to the mechanism through which the level of banking intermediation comoves with inequality.

Asset-based instruments (middle row)—comprising limits on credit growth, loan restrictions, LTV caps, DSTI limits, and tax-based tools—yield negative point estimates steadily for both Gini measures. However, the confidence intervals are wider than for capital-based tools, and the 95% bands include zero at most horizons. The effects on disposable Gini are subject to less uncertainty and are significant at one standard deviation for most horizons and near significant for some periods at two. These tools operate primarily by restricting the volume and terms of credit extension, which can moderate the accumulation of financial wealth among higher-income borrowers and intermediaries, but their effects seem less precisely identified in the data.

Figure 2: Impulse Responses by Type of Instrument: Risk-Based Classification



Notes: Top row: Capital-based (CCB, Conservation, Capital, LVR, LLP, SIFI). Middle row: Asset-based (LCG, LoanR, LTV, DSTI, Tax). Bottom row: Liquidity and FX (LFC, Liquidity, LTD, LFX, RR). Left column: market Gini. Right column: disposable Gini. The classification follows Cabral et al. (2019) and BIS (2012).

Liquidity and FX-based instruments (bottom row)—including limits on foreign currency lending, liquidity requirements, loan-to-deposit ratios, limits on FX positions, and reserve requirements—produce negative responses for both Gini measures. The market Gini declines to approximately -0.10 at horizon 10, with the 68% confidence band below zero from around horizon 7 onward. The disposable Gini shows a similar pattern, declining for later horizons and achieving significance around horizon 9. The response is more gradual than that of capital-based instruments but more precisely estimated than asset-based tools. This gradual accumulation is consistent with the broader finding that regulations targeting specific risk exposures—such as capital requirements—tend to produce sharper initial effects than more generalized prudential measures (Chari, Dilts-Stedman, and Forbes, 2022).

2.3.3 Results by Policy Objective

A complementary classification, following Claessens, Ghosh, and Mihet (2013), groups instruments by the structural and cyclical features of the financial system they are designed to address. Figure 3 reports the impulse responses for resilience tools, cycle-management tools, and tax-type and other instruments.

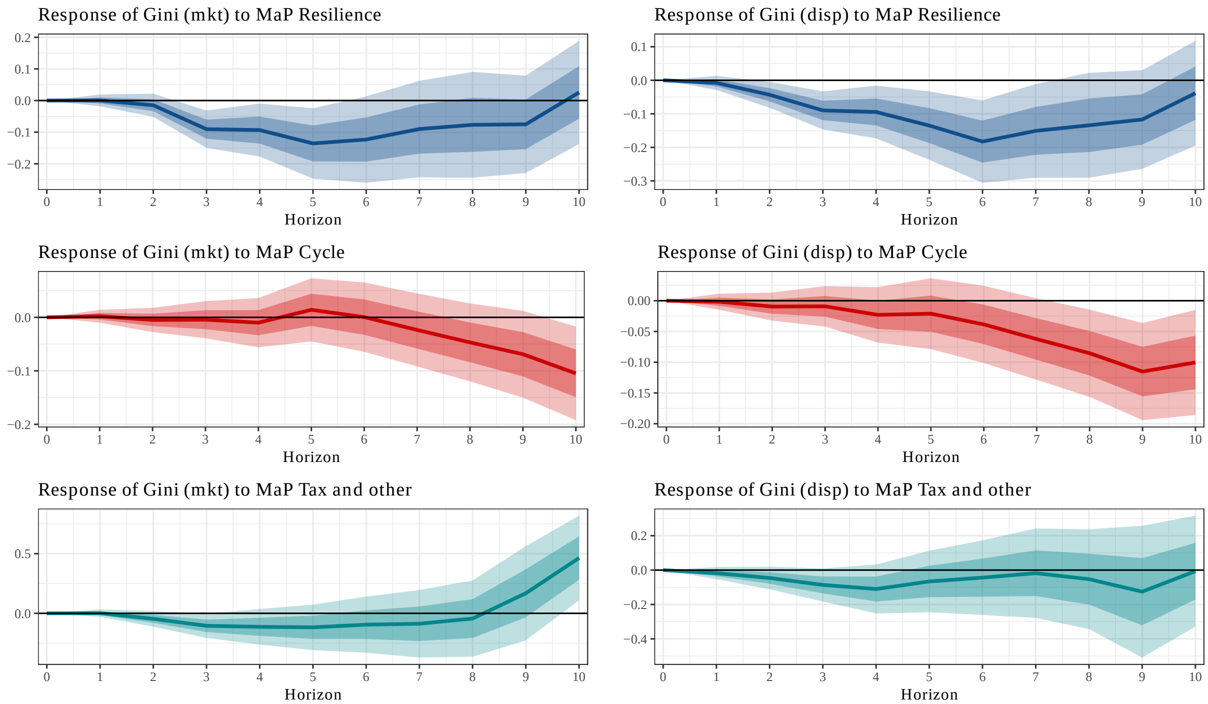
Resilience tools (top row)—those designed to build structural buffers that can be drawn down in times of stress—produce a negative response for both Gini measures that materializes relatively fast. For the market Gini, the point estimate declines to approximately -0.10 to -0.15 at horizons 3–5, with the confidence bands below zero over this range, before reverting toward zero at later horizons. For the disposable Gini, the response is stronger and more persistent, reaching approximately -0.15 to -0.20 at horizons 3–6 with the bands clearly below zero for most of the horizons. The relatively rapid onset of this effect is consistent with the nature of resilience instruments—capital buffers, leverage limits, and provisioning rules—which directly constrain intermediation capacity upon implementation.

Cycle-management tools (middle row)—which aim to lean against the financial cycle by restricting credit growth, tightening lending standards, or adjusting reserve requirements—yield responses that are initially muted but grow steadily more negative over time. For the market Gini, the point estimate remains near zero through horizons 0–4, then declines to approximately -0.08 to -0.10 by horizon 10, with the 95% confidence interval excluding zero at the later horizons. For the disposable Gini, the decline is more precisely estimated, reaching approximately -0.10 by horizon 10, with the confidence intervals below zero from horizon 7 onward. Although the cycle-management tools ultimately reach a comparable magnitude to the resilience instruments, their transmission is notably more gradual. This pattern is consistent with the findings of Gambacorta and Murcia (2020), who show—using credit registry data across several economies—that cycle-dampening instruments such as reserve requirements propagate to credit conditions more slowly than resilience-oriented capital measures, the latter taking effect more rapidly given their direct impact on bank balance sheets.

Tax-type and other instruments (bottom row)—including financial sector taxes, SIFI-specific regulations, and other tools—produce impulse responses that are negative on average but estimated with substantial uncertainty. For the disposable Gini, the point estimates reach approximately -0.15 at horizons 5–7, but the 95% confidence bands include zero throughout. For the market Gini, the point estimates are slightly negative in the short run and turn positive at later horizons, again with wide confidence intervals. This imprecision is consistent with the relatively low frequency of tax-type prudential interventions in the sample and the heterogeneity of the "other" category, which groups together instruments with potentially diverse transmission mechanisms.[7]

[7] Given how contrasting this positive effect in the final period seems, even if partly related to residual and uncategorarized policies, we inspected its robustness and found that it disappears if we remove emerging economies from the sample, or if we focus on the post-2008 sample for all countries. At the same time, for this method the responses of earlier horizons, typically below the order of the local projection are deemed more reliable than effect reversals at the very last period (Baumeister, 2025).

Figure 3: Impulse Responses by Policy Objective



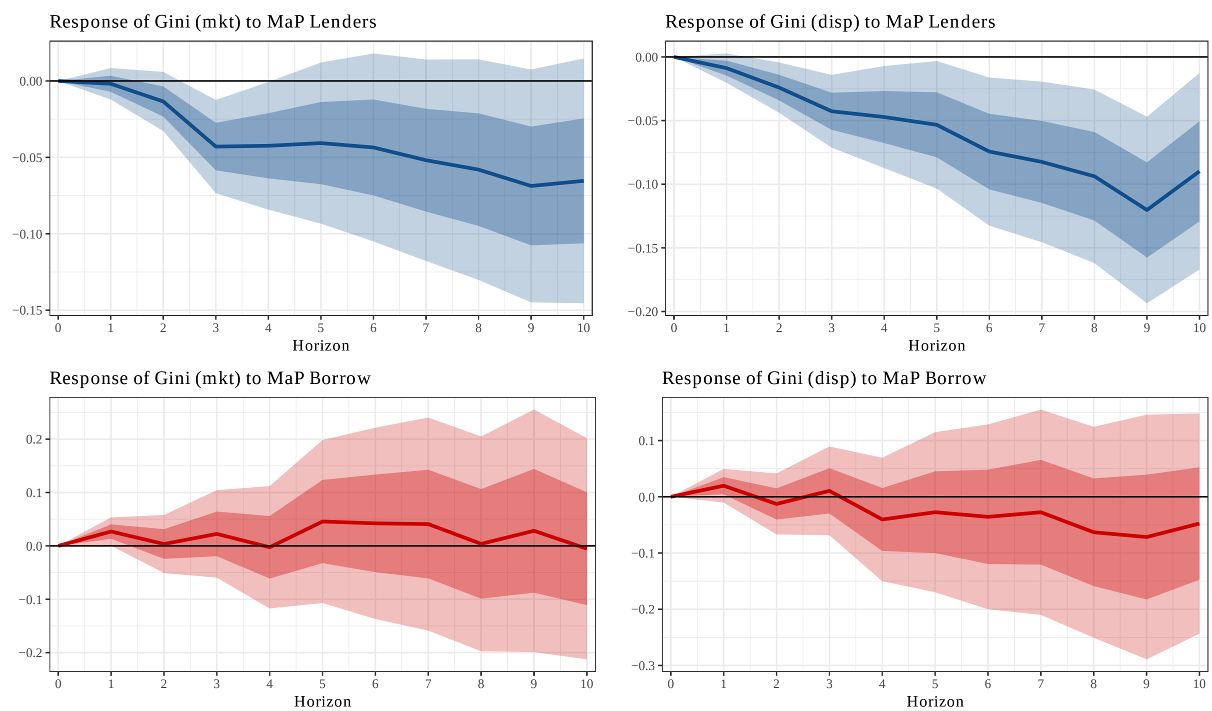
Notes: Top row: Resilience (CCB, Conservation, Capital, LVR, LLP, Liquidity). Middle row: Cycle management (LCG, LoanR, LFC, LTV, DSTI, LTD, LFX, RR). Bottom row: Tax-type and other (Tax, OT, SIFI). Left column: market Gini. Right column: disposable Gini. See the notes to Figure 1 for additional details on the specification. The classification follows Claessens et al. (2013).

2.3.4 Results by Targeted Agent

Finally, we disaggregate the toolkit by the type of agent targeted by the regulation: lender-targeted instruments (15 tools) versus borrower-targeted instruments (LTV and DSTI ratios). The impulse responses are reported in Figure 4.

Lender-targeted instruments (top row) produce a negative response. For the market Gini, the point estimate declines steadily from zero to approximately -0.08 to -0.10. For the disposable Gini, the effect is similarly negative, reaching a significant -0.08 to -0.12 at horizons 5–9. These results are expected, as lender-targeted tools directly constrain bank behavior—capital buffers, leverage limits, credit growth caps, reserve requirements—and thereby reduce the rents accruing to financial intermediaries and their stakeholders. It should be noted that although this result underscores the importance of the banking intermediaries in shaping the inequality effects of regulation, the response can also be intepreted as a filtered version of the aggregate toolkit as the policy stance indicator still comprehends most of the instruments in the toolkit.

Figure 4: Impulse Responses by Targeted Agent



Notes: Top row: Lender-targeted (CCB, Conservation, Capital, LVR, LLP, LCG, LoanR, LFC, Tax, Liquidity, LTD, LFX, RR, SIFI, OT). Bottom row: Borrower-targeted (LTV, DSTI). Left column: market Gini. Right column: disposable Gini.

Borrower-targeted instruments (bottom row), by contrast, yield responses that are close to zero and statistically insignificant for both Gini measures. For the market Gini, the point estimates are slightly positive at most horizons, while for the disposable Gini they are slightly negative in the short run but revert toward zero at longer horizons. In both cases, the confidence intervals are wide and include zero throughout. This result is consistent with the notion that borrower-targeted tools such as LTV and DSTI limits restrict credit access for households but do not directly curtail banking profitability or the financial rents that drive the inequality —we will focus on this mechanism in our theoretical framework. The weaker results and the higher uncertainty around these responses may also reflect the lower number of interventions on this category and the associated small sample limitations (two instruments only for borrower-targeted tools versus seventeen for lenders).

2.3.5 Robustness exercises

By level of economic development: We re-estimate the baseline specification separately for advanced economies (AEs), emerging market economies (EMs), and developing economies (DEs). The main negative response pattern is preserved across all three groups and instruments categories. The main difference is in timing. The decline in inequality appears earlier in AEs, whereas in EMs and DEs the response materializes at longer horizons. As in the baseline, responses of the disposable Gini are generally more precisely estimated than those of the market Gini, although the latter exhibit more statistically significant horizons in the country-group estimations than in the pooled sample.

Excluding developing economies: Given lower macroprudential interventionism in DEs, we also estimate the model on the sample that includes only AEs and EMs. The estimated impulse responses remain close to the baseline in sign and magnitude.

Post-2008 sample only: Restricting the sample to the post-global-financial-crisis period yields the same qualitative result—a negative response of inequality to macroprudential tightening—but with wider confidence intervals and fewer statistically significant horizons. This lower precision is consistent with the shorter timeframe. At the same time, precision improves when the post-2008 estimations are conducted by country group, suggesting a trade-off between gauging the heterogeneity of effects across country types and the information loss from reducing the sample size.

2.3.6 Discussion

Taken together, the results point to a robust negative relationship between macroprudential regulation and income inequality. The effect is present for both the market and disposable Gini measures, across the aggregate and disaggregated policy indices, and across different instrument classifications. Several patterns emerge consistently across the exercises.

First, the negative effect on inequality is primarily driven by tightening interventions. The tightening-only index yields effects that are quantitatively similar to, or slightly larger than, those of the net aggregate index. The loosening-only index, while not statistically significant, produces point estimates that are broadly consistent with the overall pattern: loosenings tend to be associated with positive (inequality-increasing) responses, as one would expect if relaxing financial regulation allows the intermediation-driven inequality channel to operate more freely.

Second, the disposable Gini tends to respond more strongly and with greater statistical precision than the market Gini. This suggests that fiscal redistribution complements the inequality-reducing effects of prudential regulation, allowing for a clearer delimitation of the distributional consequences of financial oversight. In other words, the unintended inequality-reducing side effects of macroprudential tightenings appear to be reinforced—rather than offset—by the existing tax-and-transfer system.

Third, among the instrument classifications, the effects are strongest and most precisely estimated for lender-targeted, capital-based, and cycle-management tools. These are the instruments that most directly constrain the scale, leverage, and profitability of banking intermediation. Borrower-targeted instruments and tax-type tools, by contrast, produce insignificant or imprecisely estimated responses.

It is worth noting that the estimated magnitudes should be interpreted as conservative. The impulse responses pool a large and heterogeneous set of economies—advanced, emerging, and developing—including countries with relatively low macroprudential activism, which attenuates the average effect. Moreover, the responses correspond to a single unit change in the policy index, that is, a one-instrument tightening in a given year. In practice, the macroprudential toolkit encompasses 17 instruments, and regulators frequently adjust several of them simultaneously, implying that the cumulative effect of a realistic policy package could be substantially larger.

These empirical findings suggest a plausible economic mechanism that we examine in later sections. The intuition is that during periods of elevated financial intermediation, the benefits of banking activities—including lending spreads, capital gains, and profit distributions—accrue disproportionately to wealthier agents, such as bank shareholders and high-income entrepreneurs with greater access to financial markets. Macroprudential tightening curtails the scale and profitability of intermediation, thereby slowing this process. Motivated by this evidence, the model developed in the following sections incorporates macroprudential policy as a tax on banking intermediation returns, and features a production structure with capital-skill complementarity that generates heterogeneous income sources across agent types.

3 Model

To understand how macroprudential policy impacts income inequality, we build closed economy model with two types of infinitely-lived agents: entrepreneurs and households. Entrepreneurs, who make up $1-\mu$ share of the population, accumulate capital by supplying skilled labor to competitive firms. This capital is funded through income and borrowing. Households, comprising the μ share of the population, supply unskilled labor and save through banks or foreign assets, but lack direct investment technology.

To simplify the notation, we will consider the individual decisions for households and agents in lowercase letters, and the rest of the variables for representative agents in uppercase letters.[8] We also indicate the relation between individual decisions and aggregate economic variables in the following subsections.

3.1 Households

The representative household solves,

$$\max_{\{c_{h,t},d_t,b_t\}} E_t \sum_{s=t}^{\infty} \beta^{s-t} \left[\frac{(c_{h,s})^{1-\gamma}}{1-\gamma} \right].$$

The budget constraint for the household is:

$$c_{h,t} + d_t + b_{h,t} + \frac{\eta_h}{2}(b_{h,t} - \bar{b}_h)^2 \leq w_{h,t} h_{h,t} + R_{b,t-1} b_{h,t-1} + R_{d,t-1} d_{t-1} + \pi_t, \tag{2}$$

where $\beta \in (0,1)$ is the subjective discount factor, $c_{j,t}$ is type j worker's consumption, $\gamma > 0$ is the inverse of the inter-temporal elasticity of substitution. and $d_{h,t}$ is the amount of deposits held in the domestic bank with a gross rate of return $R_{d,t}$. An endowment of low-skilled labor is supplied inelastically at a wage $w_{h,t}$, and π_t are the profits from the final good firm and banks ownership, net of lump-sum taxes.

The household's optimizing decisions imply the Euler equations:

$$1 = \beta \mathbb{E}_t \left[R_{d,t} \left(\frac{c_{h,t+1}}{c_{h,t}} \right)^{-\gamma} \right] \tag{3}$$

$$1 + \eta_h(b_{h,t} - \bar{b}_h) = \beta \mathbb{E}_t \left[R_{b,t} \left(\frac{c_{h,t+1}}{c_{h,t}} \right)^{-\gamma} \right] \tag{4}$$

[8] With the exception of gross interest rates that are also denoted with capital letters.

3.2 Entrepreneurs

The representative entrepreneur supplies high-skilled labor $h_{e,t}$ inelastically to firms at wage rate $w_{e,t}$. They own a technology that transforms final consumption goods into physical capital k_t, that they supply to final good firms. Thus, they determine capital dynamics and investments flows. Moreover, the labor they provide is skilled in the sense that it is complementary to the capital stock. These features will be reflected in the production function of the firms and in the sources of income of the entrepreneurs.

Their utility maximization problem is:

$$\max_{\{c_{e,t},d_{e,t},b_{e,t}\}} E_t \sum_{s=t}^{\infty} \beta^{s-t} \left[\frac{(c_{e,s})^{1-\gamma}}{1-\gamma} \right],$$

subject to the budget constraint,

The entrepreneur funds consumption using skilled labor income, deposit and bond returns, and the profits from capital goods production and banking intermediation. The budget constraint is:

$$c_{e,t} + d_{e,t} + b_{e,t} + \frac{\eta_e}{2}(b_{e,t} - \bar{b}_e)^2 \leq w_{e,t}h_{e,t} + R_{b,t-1}b_{e,t-1} + R_{d,t-1}d_{e,t-1} + \pi_{e,t} + (1-\mu)\pi_{\text{banking},t}$$

The Euler equations with respect to the entrepreneurs' choice variables, $c_{e,t}, i_t, k_{t+1}$, are given by:

$$1 = \beta \mathbb{E}_t \left[R_{d,t} \left(\frac{c_{e,t+1}}{c_{e,t}} \right)^{-\gamma} \right] \tag{5}$$

$$1 + \eta_e(b_{e,t} - \bar{b}_e) = \beta \mathbb{E}_t \left[R_{b,t} \left(\frac{c_{e,t+1}}{c_{e,t}} \right)^{-\gamma} \right] \tag{6}$$

For convenience, we categorize the investment decision problem for this agent as that of a capital goods producer.[9]

[9] The results are analog to those obtained when the investment decision is directly incorporated into the entrepreneur's utility maximization. However, the presentation is clearer due to the presence of adjustment costs in the investment goods units. For similar approaches involving this type of separation, see Gertler and Karadi (2011) and Banerjee et al. (2016), among others.

3.2.1 Capital producers

The entrepreneur also provides physical capital to the final goods firm. This implies that he determines the investment flows which are governed by the following dynamics:

$$k_t = i_t + (1-\delta)\xi_t k_{t-1}, \tag{7}$$

where k_t is the physical capital that is determined in t and used for production in $t+1$, ξ_t is a capital quality factor, and δ is the depreciation rate parameter.[10]

The investment, at the same time, is decided in a competitive fashion by optimizing the profits of its provision, subject to adjustment costs with a size governed by the parameter ζ,

$$\max_{\{i_t\}} \mathbb{E}_t \sum_{s=1}^{\infty} \Lambda_{e,t|t+s} \left\{ Q_{t+s} i_{t+s} - i_{t+s} \left(1 + \frac{\zeta}{2} \left(\frac{i_{t+s}}{i_{t+s-1}} - 1 \right)^2 \right) \right\},$$

where $\Lambda_{e,t|t+1} = \beta \left(\frac{c_{e,t+1}}{c_{e,t}} \right)^{-\gamma}$ is the stochastic discount factor of the entrepreneur.

The FONC from this problem allows us to pin down the relative price of physical capital,

$$Q_t = 1 + \frac{\zeta}{2} \left(\frac{i_t}{i_{t-1}} - 1 \right)^2 + \zeta \left(\frac{i_t}{i_{t-1}} - 1 \right) \frac{i_t}{i_{t-1}} - \mathbb{E}_t \Lambda_{e,t|t+1} \left(\frac{i_{t+1}}{i_t}^2 \right) \left(\frac{i_{t+1}}{i_t} - 1 \right) \tag{8}$$

Aggregate variables dynamics The relative population size of the entrepreneurs imply that aggregate capital and investment are given by $K_t \equiv (1-\mu)k_t$, $I_t \equiv (1-\mu)i_t$.

3.3 Firms

The model features a continuum (measure one) of identical, competitive firms producing a homogeneous good (Y_t) with capital (K_{t-1}), unskilled labor ($H_{h,t}$), and skilled labor ($H_{e,t}$). Capital-skill complementarity is modeled using a nested CES production function, following Krusell, Ohanian, Ríos-Rull, and Violante (2000). Here, we assume that the entreprenour not only facilitates capital goods but also the specific labor to operate it.

$$Y_t = A_t \left[(\alpha_u)^{\frac{1}{\sigma}} \left(H_{h,t} \right)^{\frac{\sigma-1}{\sigma}} + (1-\alpha_u)^{\frac{1}{\sigma}} \left[V_t \right]^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}, \tag{9}$$

[10]Note that the actual depreciation rate in this setup is not only δ but instead depends positively on the capital utilization or quality ξ_t.

where

$$V_t = \left[(\alpha_k)^{\frac{1}{\rho}} \left(\xi_t K_{t-1}\right)^{\frac{\rho-1}{\rho}} + (1-\alpha_k)^{\frac{1}{\rho}} \left(H_{e,t}\right)^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}}. \tag{10}$$

In the above production structure, the parameters α_u and α_k determine the relative weight of low-skill labor and capital in the production process. The parameter $\rho > 0$ represents the elasticity of substitution between capital and high-skill labor, while the parameter $\sigma > 0$ indicates the elasticity of substitution between the capital-high-skill labor composite V_t and low-skill labor. Production exhibits capital-skill complementarity if $\sigma > \rho$. A_t is the aggregate productivity shock and ξ_t is a capital-quality or utilization term.

Firms maximize the following profit function given by the revenues from final goods production and undepreciated capital goods resales after production, minus the cost of labor inputs and the banking loans used for funding physical capital:

$$\max_{\{K_{t-1}, H_{h,t}, H_{e,t}\}} Y_t + (1-\delta)\xi_t Q_t K_{t-1} - w_{e,t} H_{e,t} - w_{h,t} H_{h,t} - R_{k,t} Q_{t-1} K_{t-1},$$

Profit maximization implies the following factor demand functions for low-skill labor, high-skill labor, and capital:

$$w_{h,t} H_{h,t}^{\frac{1}{\sigma}} = A_t^{\frac{\sigma-1}{\sigma}} (\alpha_u Y_t)^{\frac{1}{\sigma}}, \tag{11}$$

$$w_{e,t} H_{e,t}^{\frac{1}{\rho}} = (1-\alpha_k)^{\frac{1}{\rho}} A_t^{\frac{\sigma-1}{\sigma}} ((1-\alpha_u) Y_t)^{\frac{1}{\sigma}} V_t^{\frac{\sigma-\rho}{\sigma\rho}}, \tag{12}$$

$$R_{k,t} = \frac{r_t + (1-\delta)\xi_t Q_t}{Q_{t-1}}, \tag{13}$$

where the marginal product of capital in the last expression is given by,

$$r_t = A_t^{\frac{\sigma-1}{\sigma}} \xi_t^{\frac{\rho-1}{\rho}} \left[(1-\alpha_u)(\alpha_k) \frac{Y_t}{K_{t-1}} \right]^{\frac{1}{\sigma}} V_t^{\frac{\sigma-\rho}{\sigma\rho}}. \tag{14}$$

Here, we assume that the capital is funded by selling company securities to banks in a one-to-one relationship. This implies that the marginal product of capital r_t can also be interpreted as the return from firms' securities.

The skill premium is calculated as:

$$\frac{w_{e,t}}{w_{h,t}} = \left(\frac{1-\alpha_u}{\alpha_u} \right)^{\frac{1}{\sigma}} \frac{H_{h,t}^{\frac{1}{\sigma}}}{H_{e,t}^{\frac{1}{\rho}}} (1-\alpha_k)^{\frac{1}{\rho}} \left[(\alpha_k)^{\frac{1}{\rho}} \left(\xi_t K_{t-1}\right)^{\frac{\rho-1}{\rho}} + (1-\alpha_k)^{\frac{1}{\rho}} \left(H_{e,t}\right)^{\frac{\rho-1}{\rho}} \right]^{\frac{\sigma-\rho}{\sigma\rho}}$$

The skill premium expression makes clear that $w_{e,t}/w_{h,t}$ rises whenever capital deepens or capital quality improves ($\xi_t K_{t-1}$ increases), since the composite V_t enters with exponent $(\sigma-\rho)/(\sigma\rho) > 0$ under capital-skill complementarity ($\sigma > \rho$). This channel is central to the distributional consequences of macroprudential policy in the model. Since entrepreneurs supply high-skill labor and households supply low-skill labor, any policy that affects capital accumulation — by tightening or loosening credit intermediation — alters the skill premium and thereby shifts the relative labor incomes of the two groups. The Gini coefficient derived in Section 3.7 aggregates precisely this wage dispersion: a tighter macroprudential stance that curtails capital growth compresses the premium and reduces inequality, while a credit boom widens it. The quantitative strength of this link depends on the degree of capital-skill complementarity, which our calibration ($\sigma = 2.2 > \rho = 1.26$) places firmly in the range estimated for recent U.S. data.

3.4 Banks

The intermediation sector is modeled along the lines of Gertler and Karadi (2011), Agénor et al. (2021b), among others, with some modifications to account for the presence of entrepreneurs and the associated financial flows. A continuous range of competitive banks, with a total measure of one, exists. The typical bank accepts deposits from households (D_t) and entrepreneurs ($D_{e,t}$) at the deposit interest rate $R_{d,t}$. Here, $D_{e,t} \equiv (1-\mu)d_{e,t}$ is the total entrepreneurial deposits, and $D_t \equiv \mu d_t$ represents the total deposits held by households.

The representative bank maximizes its value function of financial intermediation:

$$J_{j,t}(N_{j,t}) = \max_{\{N_{j,t},Z_{j,t},L_{e,t},D_t,D_{e,t}\}} \mathbb{E}_t \tilde{\Lambda}_{t|t+1} \left[(1-\theta)\, N_{j,t+1} + \theta J_{j,t+1}\left(N_{j,t+1}\right)\right],$$

where the stochastic discount factor is defined as an average of the analog quantities for the household and entrepreneurs, weighted by their population shares: $\tilde{\Lambda}_{t|t+1} = \mu\Lambda_{t|t+1} + (1-\mu)\Lambda_{e,t|t+1}$ with $\Lambda_{t|t+1} = \beta\left(\frac{c_{h,t+1}}{c_{h,t}}\right)^{-\gamma}$ and an analogousquantity for the entrepreneurs. $N_{j,t}$ is the net-worth of surviving banks.[11] With probability $1-\theta$, the bank will fail and pay back its profits to the household, and with probability θ the bank will be able to continue its business and pursue future profits.

The bank maximizes its value subject to the net worth dynamics, the incentive compatibility

[11]We assume that the banks are owned by the household. Therefore, the bank's problem takes into account the household's stochastic discount factor.

constraint, and the balance sheet constraint are satisfied:

$$
\begin{aligned}
N_{j,t+1} &= (1-\tau_{k,t+1})R_{k,t+1}Q_t Z_{j,t} - R_{d,t}(D_t + D_{e,t}),\\
J_{j,t} &\geq \kappa Q_t Z_{j,t},\\
Q_t Z_{j,t} &= N_{j,t} + D_t + D_{e,t}.
\end{aligned}
$$

The net worth dynamics considers the presence of potential macroprudential instruments charging the different revenue sources of the bank (lending to final good firms, and lending to entrepreneurs). The ICC states that bank's continuation value has to be greater than or equal to the potential value of defaulting as the bank can run away with a portion κ of the claims on company securities and a portion κ_B of the loans.

In the Balance sheet, D_t and $D_{e,t}$ are the total deposits, $Q_t Z_{j,t}$ are the claims on capital stock sold by firms to banks in a one-to-one relationship, with $Z_{j,t} = K_{j,t}$. The left hand side constitutes banks' assets whereas the right hand side is banks' liabilities.

The optimality conditions are:

$$[Z_{j,t}] : \mathbb{E}_t \Omega_{t+1|t} \left((1-\tau_{k,t+1})R_{k,t+1} - R_{d,t}\right) = \gamma_t \kappa, \tag{15}$$

$$[N_{j,t}] : j_t \left(1-\gamma_t\right) = \mathbb{E}_t \Omega_{t+1|t} R_{d,t}, \tag{16}$$

where γ_t is the Lagrange multiplier associated with the ICC and $\Omega_{t+1|t} = \Lambda_{t|t+1}\left(1-\theta+\theta J_{t+1}\right)$ is the effective stochastic discount factor of the bank. In this problem, we should also note that the bank is only concerned with the aggregate deposits rathern than with the distribution of these between types (households versus entrepreneurs). The remaining post-equilibrium conditions below will account for this as well as for the symmetry across banks, and thus yield a remaining number of sector-level conditions:

$$j_t N_t = \kappa Q_t K_t, \tag{17}$$

$$N_t = \theta\left[(1-\tau_{k,t})R_{k,t}Q_{t-1}K_{t-1} - R_{d,t-1}(D_{t-1} + D_{e,t-1})\right] + \delta_T Q_t K_{t-1}, \tag{18}$$

$$Q_t K_t = N_t + D_t + D_{e,t}, \tag{19}$$

where the ICC is assumed binding henceforth, and assume the value of the bank can be expressed as the product of the marginal value of the bank j times the net worth: $J_{j,t} = j_t N_t$.

Additionally, the second expression corresponds to the net worth of the entire financial system which is defined as θ times the net worth of individual surviving banks plus the start-up capital of new banks which is given by a small fraction δ_T times the value of the capital stock.[12]

3.5 Macroprudential Policy

The macroprudential policy considered in our model is a tax on the returns to banking intermediation.[13] In both cases, the taxes will be proportional to the gross returns times the value of intermediation for each specific source and period.

The macroprudential regulator will run a balanced budget and rebate their revenue to the households,

$$\tau_{k,t}Q_{t-1}R_{k,t}K_{t-1} + T_t = 0 \tag{20}$$

Policy setting We consider a baseline policy rule for the macroprudential tax rate that sets the prudential instrument as a function of the deviation of the capital stock from its steady state. In later sections we also compare the cases of rules that explicitly target a measure of inequality as well as a rule based on the intermediation to GDP ratio. Our baseline rule will also consider an inertia term:

$$\tau_{k,t} = \rho_\tau \tau_{k,t-1} + (1-\rho_\tau)\psi_\tau \left(\frac{K_t}{K^*} - 1\right) + \sigma_\tau \epsilon_{\tau,t}, \tag{21}$$

The parameter ρ_τ captures the inertia in the policy rule, ψ_τ is the response coefficient to the deviation of the capital stock from its steady state and are set in line with studies on macroprudential policy rules (e.g., Angelini, Neri, and Panetta, 2014; Hecker, Jang, Rubio, and Verona, 2024; Rubio and Carrasco-Gallego, 2015). Finally, we incorporate an i.i.d. policy shock $\epsilon_{\tau,t}$ with a standard deviation σ_τ.

3.6 Equilibrium

[12]Similarly, these expressions make explicit the one-to-one relationship between the stock of assets intermediated and the stock of capital at the aggregate level that was alluded to when outlining the firm's problem, i.e., $Z_t = K_t$, where Z_t is the stock of securities from the firms.

[13]This policy instrument is set as a tax for simplicity, but it has been shown to be general enough to comprehend the structure of a varied number of macroprudential policies (see for example Agénor et al., 2021a; Liu et al., 2023b; Aoki et al., 2016; Dennis and Ilbas, 2023). For a recent list of the types of instruments in the macroprudential toolkit, see Alam, Alter, Eiseman, Gelos, Kang, Narita, Nier, and Wang (2025)

3.6.1 Exogenous Processes

We allow for exogenous variation stemming from shocks to aggregate productivity and capital quality (or utilization), and thus these quantities are conventional autoregressive processes given by:

$$A_t = \rho_A A_{t-1} + \sigma_A \epsilon_{A,t}, \tag{22}$$

$$\xi_t = \rho_\xi \xi_{t-1} + \sigma_\xi \epsilon_{\xi,t}, \tag{23}$$

where a higher value of ξ implies a greater marginal return to physical capital, but also an increased depreciation rate; we note that here, as in the literature, we intepret the latter shock as having a financial nature, given the mapping between the stock of assets and physical capital and its close link with banking intermediation profits.

3.6.2 Market Clearing Conditions and Aggregation

Goods market: The goods market clearing condition takes into account the relative population sizes of the agents and the investment total cost (principal plus adjustment).

$$Y_t = \mu c_{h,t} + (1-\mu)c_{e,t} + (1-\mu)i_t \left(1 + \frac{\zeta}{2}\left(\frac{i_t}{i_{t-1}} - 1\right)^2\right). \tag{24}$$

Aggregation As we have two types of agents (households with relative population size μ and entrepreneurs representing the rest), we must consider the aggregation relationships, which map their individual decisions into economy-wide variables.[14]

$$K_t = (1-\mu)k_t, \quad I_t = (1-\mu)i_t,$$

$$D_{e,t} = (1-\mu)d_{e,t}, \quad D_t = \mu d_t,$$

$$H_{h,t} = \mu h_{h,t}, \quad H_{e,t} = (1-\mu)h_{e,t}.$$

At the same time, we are considering a fixed labor supply and thus it follows that $H_{h,t} = \mu$ and $H_{e,t} = (1-\mu)$.

[14]Some of these relationships are mentioned in the above agent's subsections for clarity

3.6.3 Model Equilibrium

Given a set of macroprudential policies $\{\tau_{k,t}\}$, the tax-distorted competitive equilibrium for this economy consists of allocations for households $\{c_{h,t}, d_t\}$, entrepreneurs $\{c_{e,t}, d_{e,t}, i_t, k_t\}$, firms $\{Y_t, K_t, H_{h,t}, H_{e,t}, V_t\}$, and banks $\{N_t, D_t, D_{e,t}\}$, along with prices $\{w_{h,t}, w_{e,t}, r_t, R_{d,t}, R_{k,t}, Q_t\}$, aggregate variables $\{I_t, T_t\}$, auxiliary variables $\{j_t, \gamma_t\}$, and exogenous state variables $\{A_t, \xi_t\}$, such that:

- Households maximize utility subject to their budget constraint.
- Entrepreneurs maximize utility (with budget constraint implicitly satisfied by Walras' Law).
- Capital producers maximize profits subject to adjustment costs.
- Firms maximize profits.
- Banks maximize value subject to ICC, balance sheet, and net worth dynamics.
- Government budget balances.
- All markets clear: goods, labor, loans, and deposits.
- Aggregation relationships hold.
- Exogenous state variables evolve according to their autoregressive processes.

The system consists of 27 equations determining 27 endogenous variables: equations (2)–(24), together with the aggregation relationships in Section 3.6.2.

3.7 Gini Coefficient implied by the model

To evaluate the distributional consequences of macroprudential policy, the model requires a measure of inequality that links the underlying income components to an aggregate statistic. This subsection derives the model-implied Gini coefficient and expresses it in terms of entrepreneurial and household incomes. The resulting expression provides the key object used in the quantitative policy analysis of Section 5.

3.8 Gini Coefficient

We measure inequality by the Gini coefficient over the total per-capita income of the two agent types. Entrepreneur and household per-capita incomes combine capital and labor earnings:

$$y_{e,t} = w^k_{e,t} + w^l_{e,t}, \qquad y_{h,t} = w^k_{h,t} + w^l_{h,t},$$

where $w^k_{e,t} = \pi_{e,t} + (1-\mu)\pi_{\text{banking},t}$ is the entrepreneur's net capital income, $w^k_{h,t} = (R_{d,t-1} - 1)d_{t-1} + \mu\pi_{\text{banking},t}$ is the household's capital income (deposit interest plus banking dividends from exiting banks), and $w^l_{i,t} = w_{i,t}h_{i,t}$ is labor income for $i \in \{h, e\}$.

With population shares μ (households) and $1-\mu$ (entrepreneurs), the standard two-group Gini formula yields:

$$\text{Gini}_t = \frac{\mu(1-\mu)\,|\,y_{e,t} - y_{h,t}\,|}{\mu\, y_{h,t} + (1-\mu)\, y_{e,t}}.$$

Appendix B shows that at the steady state this expression reduces to a particularly transparent form. Defining the entrepreneur income share $\Lambda_e \equiv \frac{(1-\mu)y_e}{\mu y_h + (1-\mu)y_e}$, the Gini satisfies the income-share identity (Lemma B.1):

$$G \;=\; \Lambda_e - (1-\mu). \tag{25}$$

The Gini therefore equals the gap between what entrepreneurs earn (their income share) and what they are (their population share). This representation makes the transmission of macroprudential policy transparent: any intervention that reduces Λ_e reduces G one-for-one. Appendix B further establishes that a permanent tightening of the macroprudential tax τ_k unambiguously reduces G in steady state (Proposition B.1), operating through three reinforcing channels: a direct redistribution of tax revenue toward households, a credit contraction that compresses entrepreneur capital income, and a compression of the skill premium through capital-skill complementarity that reduces entrepreneur labor income relative to household labor income. The comparative statics thus rationalize why active macroprudential rules moderate inequality in the dynamic simulations of Section 5.

4 Calibration

The model is calibrated at a quarterly frequency to match key moments of the U.S. economy. Table 3 in Appendix C summarises all parameter values; here we describe the main choices.

Standard parameters. We set $\beta = 0.99$, $\gamma = 2$, and $\delta = 0.025$ (10% annual depreciation), following standard practice in the quarterly DSGE literature. The population share of households $\mu = 0.55$ matches Li et al. (2023), who distinguish between skilled (entrepreneur) and unskilled (household) worker shares based on U.S. occupation data.

Production and capital-skill complementarity. The nested CES production structure follows Krusell et al. (2000). We set the outer substitution elasticity $\sigma = 2.2$ and the inner elasticity $\rho = 1.26$ based on the estimates of Duffy et al. (2004), which implies capital-skill complementarity since $\sigma > \rho$. Given these elasticities, the share parameters (α_u, α_k) are calibrated jointly to match two empirical targets: (i) a skill premium $w_e/w_h = 1.5$, consistent with Papageorgiou and Chmelarova (2005) and Bureau of Labor Statistics CPS data, and (ii) a capital income share $rK/Y = 0.33$, from Penn World Tables and Karabarbounis and Neiman (2014). The solution yields $\alpha_u = 0.6048$ and $\alpha_k = 0.2276$.

Banking sector. The banking block is calibrated following Gertler and Karadi (2011). The banker survival probability $\theta = 0.972$ corresponds to an average banker horizon of approximately 36 quarters (9 years), consistent their reported bank holding-company data. Given θ, we solve analytically for (κ, δ_T) to jointly target (i) a bank leverage ratio $K/N = 4$, taken from the Federal Reserve Financial Accounts (Flow of Funds Z.1 release), and (ii) an annual credit spread $(R_k - R_d) \times 400 = 100$ basis points, consistent with the Moody's Baa–10yr Treasury spread (FRED series BAA10Y) and the Gilchrist and Zakrajšek (2012) (GZ) spread. This gives $\kappa = 0.3847$ and $\delta_T = 0.00212$.

Other parameters. The TFP shock processes parameters ($\rho_A = 0.85$, $\sigma_A = 0.007$) are set as in Smets and Wouters (2007), and the capital quality ones ($\rho_\xi = 0.85$, $\sigma_\xi = 0.005$) follow Gertler and Karadi (2011). The policy-rule parameters (ρ_τ, ψ_τ, ψ_K, ψ_G) are design choices rather than structural targets; we set $\rho_\tau = 0.65$, $\psi_\tau = \psi_K = 0.75$, and $\psi_G = 0.25$, consistent with the moderate inertia used in studies of macroprudential rules with an active fundamental component (Angelini et al., 2014; Rubio and Carrasco-Gallego, 2015).

5 Simulation Results under Alternative Policy Frameworks

This section evaluates the dynamic implications of alternative macroprudential policy rules under three structural disturbances: a total factor productivity (TFP) shock, a capital quality shock, and an exogenous macroprudential policy shock. The objective is not only to compare the stabilisation properties of alternative rules, but also to identify the transmission channels through which macroprudential regulation affects both aggregate activity and the distribution of income.

The five policy specifications are summarised in Table 1. Specification 1 serves as a benchmark in which the macroprudential tax consists of a one-shot innovation without a rule-induced endogenous feedback. Specifications 2–4 are instrument-based rules that adjust the macroprudential tax in response to lending, output, or a combination of lending and inequality. Specification 5 differs conceptually by targeting an endogenous financial quantity—bank leverage—rather than macroeconomic outcomes directly. This distinction proves important for the propagation of shocks.

Table 1: Macroprudential Policy Specifications

Specification	Description	Policy Rule
1	One-shot (no rule)	$\tau_{k,t} = \sigma_\tau \epsilon_{\tau,t}$
2	Lending rule	$\tau_{k,t} = \rho_\tau \tau_{k,t-1} + (1-\rho_\tau)\psi_\tau(\frac{K_t}{K^*} - 1) + \sigma_\tau \epsilon_{\tau,t}$
3	GDP rule	$\tau_{k,t} = \rho_\tau \tau_{k,t-1} + (1-\rho_\tau)\psi_\tau(\frac{Y_t}{Y^*} - 1) + \sigma_\tau \epsilon_{\tau,t}$
4	Gini-augmented: Lending and Gini	$\tau_{k,t} = \rho_\tau \tau_{k,t-1} + (1-\rho_\tau)\left[\psi_K(\frac{K_t}{K^*} - 1) + \psi_G(\frac{G_t}{G^*} - 1)\right] + \sigma_\tau \epsilon_{\tau,t}$
5	Leverage rule	$\tau_{k,t} = \rho_\tau \tau_{k,t-1} + (1-\rho_\tau)\psi_\tau(j_t/j^* - 1) + \sigma_\tau \epsilon_{\tau,t}$

Notes: $\rho_\tau = 0.65$ for all active rules. Starred variables denote steady-state values. G denotes the Gini coefficient.

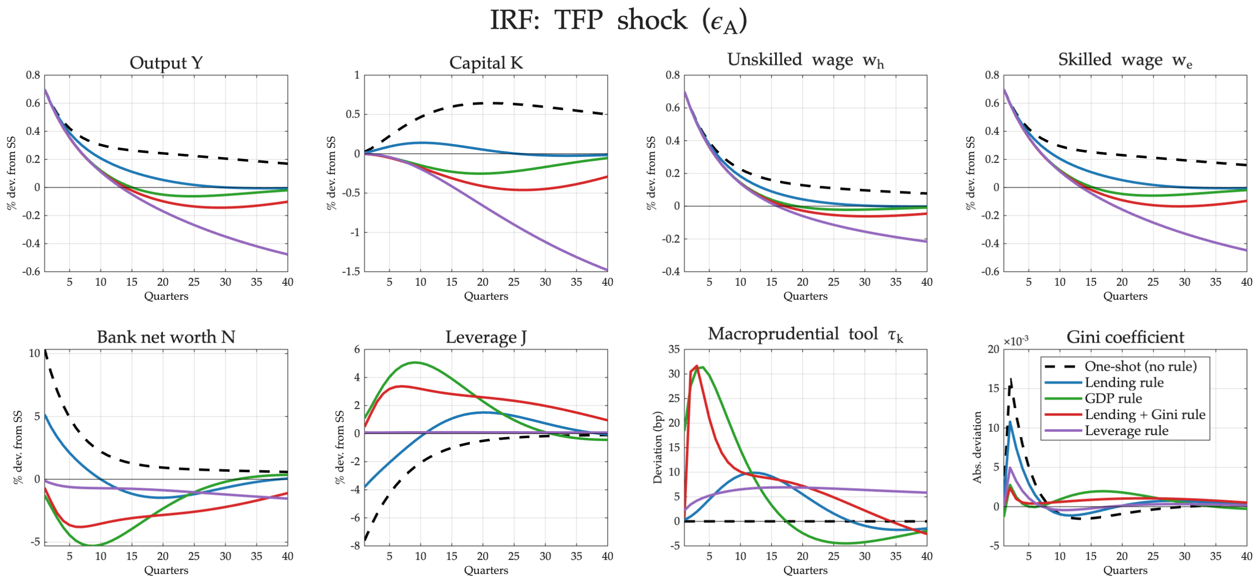
5.1 Responses to a TFP Shock

Figure 5 reports impulse responses to a one-standard-deviation positive TFP shock ($\sigma_A = 0.007$). The productivity improvement raises output, investment, and wages on impact across specifications. Because the disturbance originates on the production side of the economy rather than in the financial sector, the Gertler–Karadi amplification channel plays only a limited role in its propagation, so the aggregate responses are smaller and less persistent than those to the capital quality shock examined below. The endogenous feedback embodied in the active rules therefore has limited scope to reshape the transmission of the shock to output and wages. Its imprint is nonetheless visible in capital accumulation, where the specifications differ notably.

Some of the instrument-based rules (Specifications 2–3) dampen the investment and capital responses relative to the no-rule setup by tightening the macroprudential stance as activity expands: the lending rule preserves a smaller positive capital hump, while the GDP rule undershoots the capital steady state. A salient difference between these rules is that the lending rule can only respond with a delay, since the prudential tool is set as a function of the predetermined capital stock. By contrast, the GDP rule responds immediately. As a consequence, the GDP-based rule displays a markedly stronger countercyclicality while the lending-based rule tightening is delayed and more gradual. The other rules also differ in their implied capital accumulation dynamics. The Gini-augmented rule (Specification 4) generates a stronger contraction of capital by matching the short-run tightenings of other rules but retaining the stricter stance for longer, and the leverage rule (Specification 5) shows an even more persistent tightening pattern which ultimately leads to the strongest contraction of capital across all regime setups.

Higher productivity also affects the income distribution by raising the return to the capital–skill composite, temporarily widening the skilled–unskilled wage differential through capital–skill complementarity. As a result, the Gini coefficient rises under every specification. The increase is largest under the one-shot policy, where no countercyclical systematic feedback offsets it, and is progressively contained for rules leaning against the expansion. Notably, the rules without an explicit Gini target can still reduce the Gini increase non-trivially via their countercyclical effect on the business cycle, intermediation, and skill premium. Accordingly, the Gini-augmented rule (Specification 4) does not necessarily outperform the other rules leaning against the cycle in curbing the inequality increase.

Figure 5: Impulse Responses to a TFP Shock (ε_A)



Notes: Percentage deviation from steady state. Black dashed: One-shot (no rule). Blue: Lending rule. Green: GDP rule. Red: Lending + Gini rule. Purple: Leverage rule. One-standard-deviation shock ($\sigma_A = 0.007$).

5.2 Responses to a Capital Quality Shock

Figure 6 reports impulse responses to a positive capital quality shock ($\sigma_\xi = 0.005$). Unlike the TFP disturbance, this shock operates directly through banks' balance sheets and therefore it activates more strongly the financial amplification mechanism. Improvements in capital quality increase asset values, strengthen bank net worth, expand intermediation, and support a persistent increase in lending, investment and output. Consequently, the differences across policy rules become considerably more pronounced.

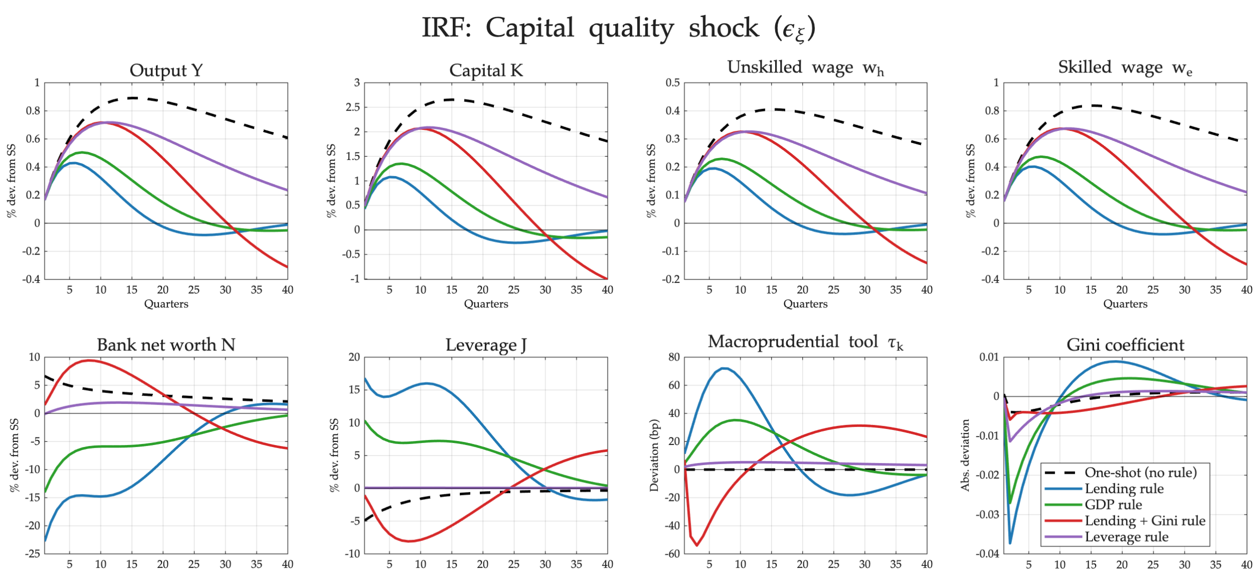
The one-shot (no systematic rule) specification exhibits the strongest expansion in credit and capital accumulation. The lending and GDP rules lean against the financial expansion by tightening the macroprudential tax as lending and output rise above their steady-state values, thereby moderating investment and reducing the persistence of the boom.

The greatest heterogeneity across specifications emerges in the distributional responses, and the pattern is more subtle than a usual ranking of the rules would suggest. Absent any rule, the capital quality shock lowers the Gini slightly on impact. The lending and GDP rules, by contrast, deepen the decline with further tightening interventions that compress the skill premium. The Gini-augmented rule penalizes the decrease in the Gini that would be otherwise dictated by the macroeconomic expansion, and leads to a de-facto intermediation subsidization that keeps the Gini close to its steady state. This rule then generates a more stable Gini path than other systematic rules, which in the case of inequality itself is not particularly noticeable—the Gini coefficient is already a relatively stable variable and its policy-related emphasis hinges on potential reductions in its level—and instead can be interpreted as a negation of the inequality-reducing effects from macroprudential oversight.

The leverage rule, by contrast, generates almost no policy response. This rule has limited countercyclical properties by construction, as it targets a ratio whose components move together: the capital quality shock raises the nominal value of assets and bank net worth simultaneously, thereby mitigating the implied extent of the intervention, keeping the economy closer to the no-rule regime, and leading to weaker equality gains than the lending and GDP rules. This illustrates how macroprudential policies do not align by default with the distributional objectives of an economy.

Finally, a further pattern emerges from a reverse reading of the productivity and financial shocks—i.e., during downturns. In the one-shot no-rule setup leverage rises with no correction mechanism, whereas the lending, GDP, and leverage rules would act to mitigate it, either by containing the increase or by inducing a deleveraging, or by holding leverage at a target. The exception is the Gini-augmented rule, which penalizes any movement in inequality, reductions included, casting further doubts on the desirability of such a setup.

Figure 6: Impulse Responses to a Capital Quality Shock (ε_ξ)



Notes: Percentage deviation from steady state. Black dashed: One-shot (no rule). Blue: Lending rule. Green: GDP rule. Red: Lending + Gini rule. Purple: Leverage rule. One-standard-deviation shock ($\sigma_\xi = 0.005$).

5.3 Responses to a Policy Shock

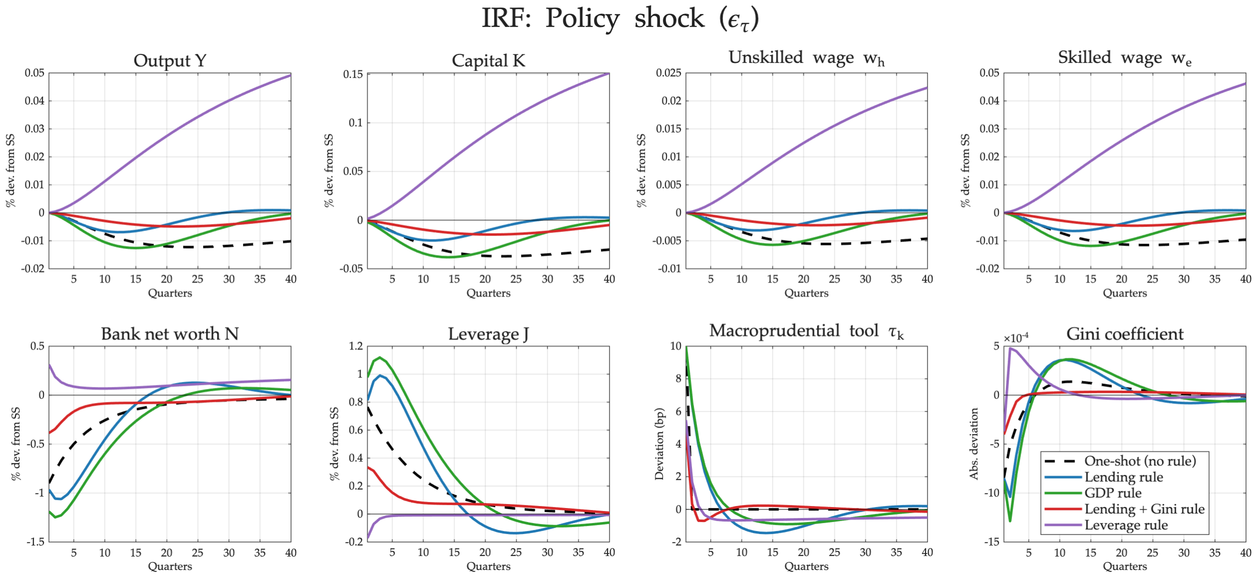
Figure 7 reports impulse responses to an exogenous macroprudential policy shock ($\sigma_\tau = 0.001$). Relative to the previous experiments, the quantitative effects are considerably smaller, reflecting that an unexpected policy tightening represents a weaker disturbance than either a productivity shock or a financial shock which by contrast are expected to be fundamental drivers of capital accumulation and thus financial intermediation. Accordingly, this experiment is best interpreted as illustrating the propagation properties of alternative policy rules rather than their contribution to business-cycle stabilisation.

Under the benchmark specification (no systematic rule), the higher macroprudential tax reduces lending, investment and output through tighter financial conditions. The instrument-based rules partially offset this contraction in subsequent periods because weaker lending and output automatically induce a relaxation of the policy instrument. Consequently, the active rules generate smoother adjustment paths than the one-shot benchmark.

The leverage-based rule is the exception to this pattern, and the contrast can be instructive. Under this specification the tightening shock becomes expansionary. Output, capital, and wages rise. The reason is that leverage falls, prompting the rule to relax the instrument and subsidize intermediation. The mechanism in this case works through the balance sheet of the banks: as the capital stock is predetermined, higher anticipated prices of capital lead to an increase in net worth, which in turn lowers the leverage ratio—the capital revaluation here raises net worth proportionally more than the value of the bank assets and therefore dominates the response of leverage, in accordance with the amplification mechanism mentioned in Gertler and Karadi (2011), whose framework we adapt. As a result, intermediation expands, and together with the economic expansion, the Gini coefficient reverses its initial decline and overshoots its steady state from the second quarter onward. Once again, the leverage rule generates a distributional behavior contrary to that of the other standard rules with countercyclical properties, and acts in opposition to the bulk of our empirical evidence on a negative correlation between macroprudential policy and inequality.[15]

[15] That said, this can also explain why some studies in the literature, and even some of our results (for borrowers), may point to a positive feedback between regulation and inequality for some specific instruments. In our estimates, the negative result is captured by the capital-based classification, which does include a leverage requirement. the majority of the instruments in that category, however, are capital-adequacy tools with countercyclical properties. In contrast, borrower-targeting instruments include only ratio-based requirements—closer in nature to the leverage ratio—and do not display a negative correlation but a positive, albeit non-significant, one.

Figure 7: Impulse Responses to a Policy Shock (ε_τ)



Notes: Percentage deviation from steady state. Black dashed: One-shot (no rule). Blue: Lending rule. Green: GDP rule. Red: Lending + Gini rule. Purple: Leverage rule. One-standard-deviation shock ($\sigma_\tau = 0.001$).

5.4 Implications for Macroprudential Policy Design

Taking stock, several lessons emerge. The ranking of macroprudential rules depends on the transmission channel of the disturbance rather than on any intrinsic dominance of a particular alternative. First, following a TFP shock the differences across rules are limited for output and wages—because the expansion originates on the real side and financial amplification is secondary—though they remain visible in capital accumulation, where the lending rule, by virtue of its dependence on a predetermined variable, yields a delayed and more gradual countercyclical impact than an output-based rule, albeit with longer-lasting tightenings. Second, under the capital quality shock financial amplification becomes central and the rules separate more notably: the lending and GDP rules lean most forcefully against the credit and capital boom, while the leverage rule keeps bank net worth closest to its steady state.

Turning to the distributional implications, the results caution against the conventional intuition that could motivate the addition of explicit inequality objectives. Rules leaning against the cycle already reduce inequality as a by-product to a substantial extent. The Gini-augmented rule, by contrast, does not enhance the distributional benefits, and instead forfeits most of these because it prioritizes a stabilization of the Gini coefficient over its reduction, showing that explicit distributional objectives might not be necessary, nor even desirable. The policy shock, though smaller in magnitude, is informative about propagation: it isolates a feedback specific to the leverage rule, whereby a fall in leverage induces an automatic loosening of the instrument that even reverses the intended tightening—and the sign of the distributional response. This is a property worth bearing in mind when targeting endogenous financial quantities. Overall, standard instrument-based rules—with no explicit equality targeting—deliver the most consistent stabilization profile across the three shocks and, as a by-product, can reduce inequality in the short run.

6 Conclusion

The distributional impact of macroprudential regulations, and the mechanisms involved, remain a relatively unexplored area of research, next to the extensive work on the effectiveness and macroeconomic consequences of these policies. We explore this dimension on two fronts. First, we estimate lag-augmented local projections on a panel of advanced, emerging, and developing economies over 1999–2024, and find that macroprudential tightenings reduce income inequality gradually rather than on impact, for both market and disposable Gini coefficients, with a stronger effect on the latter. Our estimates, based on a recent and rich dataset of prudential interventions, are informative about the direction of the effects, and their location within the toolkit. The effect is concentrated in instruments targeting lenders—capital-based, resilience, and cycle-management tools—while borrower-targeting instruments do not display the same relationship.

To account for these patterns we then develop a model in which banks intermediate under agency frictions and production features a capital-skill complementarity. In our framework, macroprudential policies affect the distribution of income through three reinforcing channels: a redistribution of the tax revenue toward households, a credit contraction that compresses the capital income of entrepreneurs and bank owners as intermediation cools down, and a contraction of the skill premium as capital accumulation and economic activity moderate. These channels operate on the lender's balance sheet, which is where our estimates locate the inequality effects of the prudential interventions. We evaluate a set of alternative policy rules and find that setups leaning against the cycle can reduce inequality as a by-product, while rules that include explicit inequality targets do not necessarily improve the distributional dividends of the policies, and can even offset their equality-inducing effects—in the case that the financial stability mandate calls for a loosening of the instrument. Finally, we find that rules targeting more complex financial variables with a weaker countercyclical component can lead to unintended consequences, such as a de-facto reversal of an intended tightening intervention, which may lead to a simultaneous loss in financial stability and equality—a result that could reconcile conflicting signs in the literature on the distributional impact of macroprudential policies. Overall, our results suggest that financial stability and equality objectives need not be in conflict, although the choice of an appropriate policy target is relevant for an alignment between these two objectives.

Future research could explore the distributional effects of financial regulation in open economy setups as an extension. Liu, Spiegel, and Zhang (2023a) already indicate that capital inflows can worsen inequality. A natural question then is whether prudential interventions remain effective in reducing inequality in an environment in which external financial conditions also shape the income distribution.

References

AGÉNOR, P.-R., T. JACKSON, AND P. JIA (2021a): "Macroprudential policy coordination in a currency union," European Economic Review, 137, 103791.

AGÉNOR, P.-R., T. JACKSON, E. KHARROUBI, L. GAMBACORTA, G. LOMBARDO, AND L. A. P. D. SILVA (2021b): "Assessing the Gains from International Macroprudential Policy Cooperation," Journal of Money, Credit and Banking, 53, 1819–1866.

ALAM, Z., A. ALTER, J. EISEMAN, G. GELOS, H. KANG, M. NARITA, E. NIER, AND N. WANG (2025): "Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database," Journal of Money, Credit and Banking, 57, 1135–1166.

ANGELINI, P., S. NERI, AND F. PANETTA (2014): "The Interaction between Capital Requirements and Monetary Policy," Journal of Money, Credit and Banking, 46, 1073–1112.

AOKI, K., G. BENIGNO, AND N. KIYOTAKI (2016): "Monetary and Financial Policies in Emerging Markets," Working Papers 2016-4, Princeton University. Economics Department.

BANERJEE, R., M. B. DEVEREUX, AND G. LOMBARDO (2016): "Self-oriented monetary policy, global financial markets and excess volatility of international capital flows," Journal of International Money and Finance, 68, 275–297.

BAUMEISTER, C. (2025): "Discussion of "Local Projections or VARs? A Primer for Macroeconomists" by José Luis Montiel Olea, Mikkel Plagborg-Møller, Eric Qian, and Christian K. Wolf," Nber summer institute discussion, National Bureau of Economic Research.

BECK, N. AND J. KATZ (1995): "What To Do (and Not to Do) with Time-Series Cross-Section Data," American Political Science Review, 89, 634–647.

BIS (2012): Operationalising the selection and application of macroprudential instruments, Bank for International Settlements.

CABRAL, I., C. DETKEN, J. FELL, J. HENRY, P. HIEBERT, S. KAPADIA, F. PIRES, C. SALLEO, V. CONSTÂNCIO, AND S. NICOLETTI ALTIMARI (2019): "Macroprudential policy at the ECB: Institutional framework, strategy, analytical tools and policies," Occasional Paper Series 227, European Central Bank.

CARPANTIER, J.-F., J. OLIVERA, AND P. VAN KERM (2018): "Macroprudential policy and household wealth inequality," Journal of International Money and Finance, 85, 262–277.

CASIRAGHI, M., E. GAIOTTI, L. RODANO, AND A. SECCHI (2018): "A "reverse Robin Hood"? The distributional implications of non-standard monetary policy for Italian households," Journal of International Money and Finance, 85, 215–235.

CHARI, A., K. DILTS-STEDMAN, AND K. FORBES (2022): "Spillovers at the extremes: The macroprudential stance and vulnerability to the global financial cycle," Journal of International Economics, 136, None.

CLAESSENS, S., S. R. GHOSH, AND R. MIHET (2013): "Macro-prudential policies to mitigate financial system vulnerabilities," Journal of International Money and Finance, 39, 153–185.

COIBION, O., Y. GORODNICHENKO, L. KUENG, AND J. SILVIA (2017): "Innocent Bystanders? Monetary policy and inequality," Journal of Monetary Economics, 88, 70–89.

COMAN, A. AND S. P. LLOYD (2022): "In the face of spillovers: Prudential policies in emerging economies," Journal of International Money and Finance, 122, 102554.

DENNIS, R. AND P. ILBAS (2023): "Monetary and macroprudential policy interactions in a model of the euro area," Journal of Economic Dynamics and Control, 154, 104706.

DOLADO, J. J., G. MOTYOVSZKI, AND E. PAPPA (2021): "Monetary policy and inequality under labor market frictions and capital-skill complementarity," American economic journal: macroeconomics, 13, 292–332.

DUFFY, J., C. PAPAGEORGIOU, AND F. PEREZ-SEBASTIAN (2004): "Capital-Skill Complementarity? Evidence from a Panel of Countries," Review of Economics and Statistics, 86, 327–344.

FERNÁNDEZ, A., A. REBUCCI, AND M. URIBE (2015): "Are capital controls countercyclical?" Journal of Monetary Economics, 76, 1–14.

FROST, J. AND R. VAN STRALEN (2018): "Macroprudential policy and income inequality," Journal of International Money and Finance, 85, 278–290.

FURCERI, D., P. LOUNGANI, AND A. ZDZIENICKA (2018): "The effects of monetary policy shocks on inequality," Journal of International Money and Finance, 85, 168–186.

GAMBACORTA, L. AND A. MURCIA (2020): "The impact of macroprudential policies in Latin America: An empirical analysis using credit registry data," Journal of Financial Intermediation, 42, None.

GEORGESCU, O.-M. AND D. VILA MARTIN (2021): "Do macroprudential measures increase inequality? Evidence from the euro area household survey," Working Paper Series 2567, European Central Bank.

GERTLER, M. AND P. KARADI (2011): "A model of unconventional monetary policy," Journal of Monetary Economics, 58, 17–34.

GILCHRIST, S. AND E. ZAKRAJŠEK (2012): "Credit Spreads and Business Cycle Fluctuations," American Economic Review, 102, 1692–1720.

GUERELLO, C. (2018): "Conventional and unconventional monetary policy vs. households income distribution: An empirical analysis for the Euro Area," Journal of International Money and Finance, 85, 187–214.

HAUG, A. A. AND C. SMITH (2012): "Local Linear Impulse Responses for a Small Open Economy," Oxford Bulletin of Economics and Statistics, 74, 470–492.

HECKER, D., H. JANG, M. RUBIO, AND F. VERONA (2024): "Robust design of countercyclical capital buffer rules," Discussion Papers 2024/04, University of Nottingham, Centre for Finance, Credit and Macroeconomics (CFCM).

JORDÀ, O. (2005): "Estimation and Inference of Impulse Responses by Local Projections," American Economic Review, 95, 161–182.

JORDÀ, O., S. R. SINGH, AND A. M. TAYLOR (2024): "The Long-Run Effects of Monetary Policy," The Review of Economics and Statistics, 1–49.

KARABARBOUNIS, L. AND B. NEIMAN (2014): "The Global Decline of the Labor Share," Quarterly Journal of Economics, 129, 61–103.

KORINEK, A. AND J. KREAMER (2014): "The redistributive effects of financial deregulation," Journal of Monetary Economics, 68, S55–S67.

KRUSELL, P., L. E. OHANIAN, J.-V. RÍOS-RULL, AND G. L. VIOLANTE (2000): "Capital-skill complementarity and inequality: A macroeconomic analysis," Econometrica, 68, 1029–1053.

LAEVEN, L. AND F. VALENCIA (2013): "Systemic Banking Crises Database," IMF Economic Review, 61, 225–270.

LI, Z., N. SCHÜTTE, AND F. ZANETTI (2023): "Capital-Skill Complementarity and Inequality over the Business Cycle," Working Paper.

LIU, Z., M. M. SPIEGEL, AND J. ZHANG (2023a): "Capital flows and income inequality," Journal of International Economics, 144, 103776.

——— (2023b): "Targeted Reserve Requirements for Macroeconomic Stabilization," Working Paper Series 2023-13, Federal Reserve Bank of San Francisco.

MITKOV, Y. (2020): "Inequality and financial fragility," Journal of Monetary Economics, 115, 233–248.

MITKOV, Y. AND U. SCHÜWER (2025): "Unequal and Unstable: Income Inequality and Bank Risk," Journal of Money, Credit and Banking, forthcoming.

MONNIN, P. (2017): "Monetary Policy, Macroprudential Regulation and Inequality," CEP Discussion Note 2017/2, Council on Economic Policies.

MONTIEL-OLEA, J. L. AND M. PLAGBORG-MOLLER (2021): "Local Projection Inference Is Simpler and More Robust Than You Think," Econometrica, 89, 1789–1823.

MÜLLER, K., C. XU, M. LEHBIB, AND Z. CHEN (2026): "The Global Macro Database: A New International Macroeconomic Dataset (Version 2026-03)," Working Paper 33714, National Bureau of Economic Research.

PAPAGEORGIOU, C. AND V. CHMELAROVA (2005): "Nonlinearities in Capital-Skill Complementarity," Journal of Economic Growth, 10, 59–89.

PIGER, J. AND T. STOCKWELL (2025): "Differences From Differencing: Should Local Projections With Observed Shocks Be Estimated in Levels or Differences?" Journal of Applied Econometrics, 40, 759–787.

RICHTER, B., M. SCHULARICK, AND I. SHIM (2019): "The costs of macroprudential policy," Journal of International Economics, 118, 263–282.

RUBIO, M. AND J. A. CARRASCO-GALLEGO (2015): "Macroprudential and Monetary Policy Rules: a Welfare Analysis," The Manchester School, 83, 127–152.

RUBIO, M. AND D. F. UNSAL (2020): "Macroprudential policy under incomplete information," The European Journal of Finance, 26, 616–639.

SMETS, F. AND R. WOUTERS (2007): "Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach," American Economic Review, 97, 586–606.

SOLT, F. (2020): "Measuring Income Inequality Across Countries and Over Time: The Standardized World Income Inequality Database," Social Science Quarterly, 101, 1183–1199.

VOINEA, L., H. LOVIN, AND A. COJOCARU (2018): "The impact of inequality on the transmission of monetary policy," Journal of International Money and Finance, 85, 236–250.

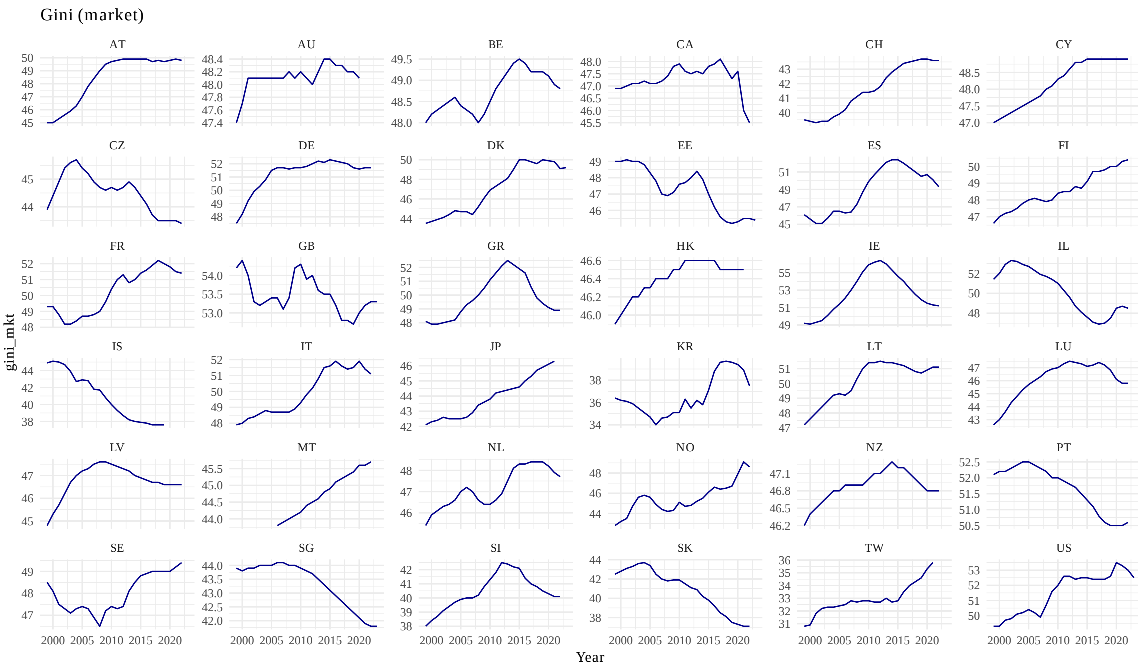
A Additional Information on the Data Sample

This appendix presents additional descriptive information on the main variables used in the empirical analysis. In particular, we display the time-series dynamics of the Gini coefficients and macroprudential policy stances by country.

Table 2: Data Description and Sources

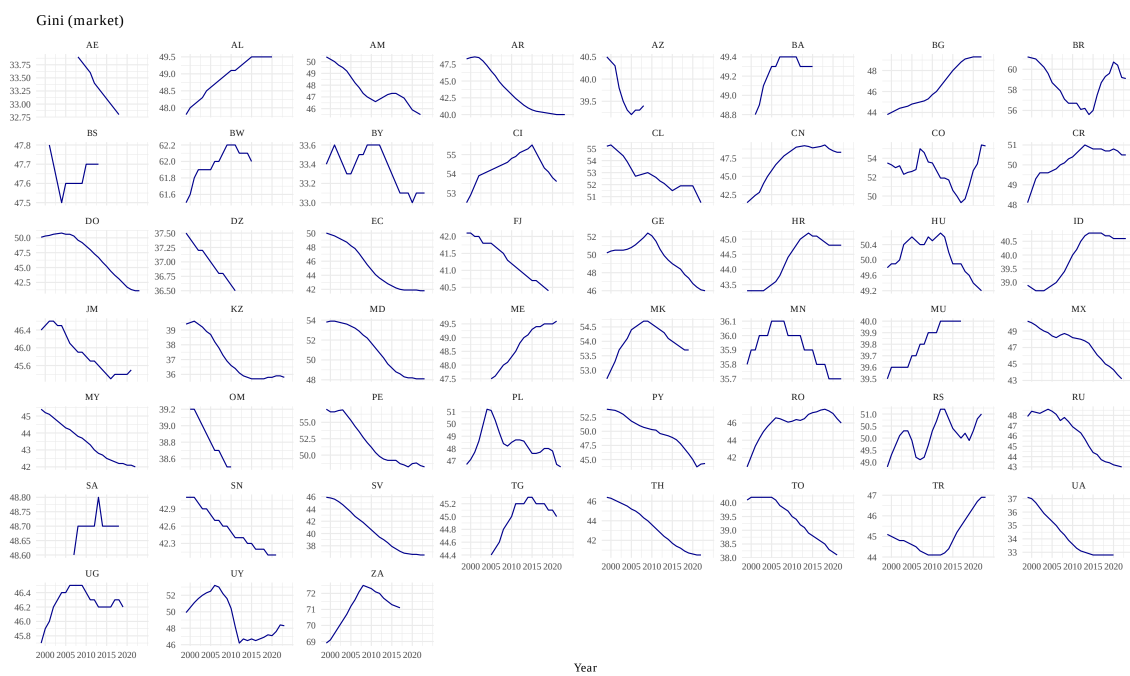
Variable	**Description**	**Source**
Dependent variables		
Gini (market)	Gini coefficient of market income	SWIID
Gini (disposable)	Gini coefficient of disposable income	SWIID
Macroprudential policy		
MaP (all)	Sum of tightenings and loosenings across 17 instruments	iMaPP–IMF
MaP (tightenings)	Sum of tightenings only	iMaPP–IMF
MaP (loosenings)	Sum of loosenings only	iMaPP–IMF
Control variables		
Banking crisis dummy	Indicator for banking crisis (5-year window)	Global Macro Database
Real GDP growth	Log-difference of real GDP	Global Macro Database
Inflation	CPI inflation rate	Global Macro Database
Central bank rate	Policy interest rate	Global Macro Database
Capital inflows/GDP	Gross capital inflows as share of GDP	IMF–IFS & GMD
Domestic credit/GDP	Private credit by deposit money banks (% GDP)	World Bank WDI
Financial development	IMF Financial Development Index (log-diff.)	IMF
Exchange rate depr.	Log-difference of nominal ER (vs. USD)	Global Macro Database

Figure 8: Market Gini Coefficient by Country - Advanced Economies



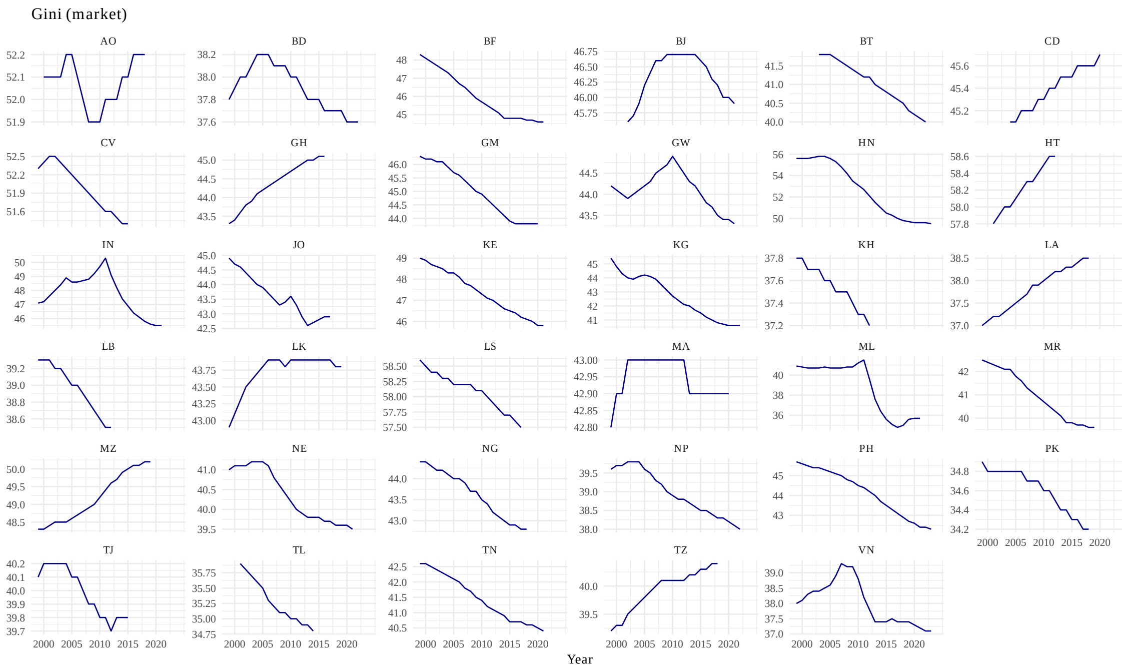
Notes: Data source: Standardized World Income Inequality Database (SWIID).

Figure 9: Market Gini Coefficient by Country - Emerging Markets



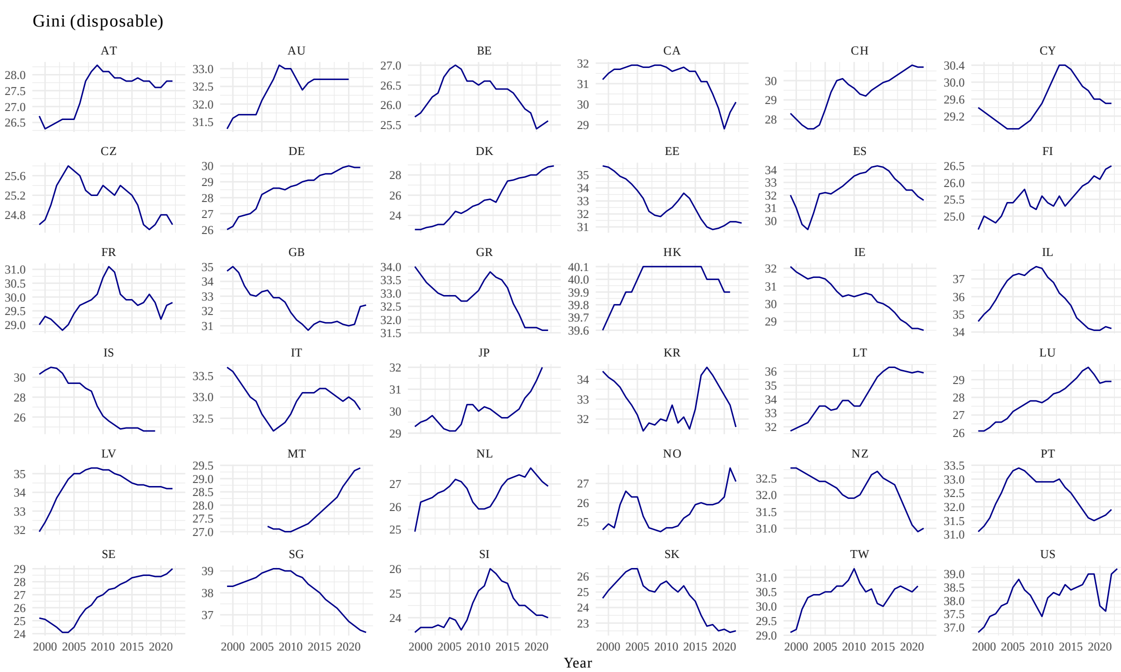
Notes: Data source: Standardized World Income Inequality Database (SWIID).

Figure 10: Market Gini Coefficient by Country - Developing Economies



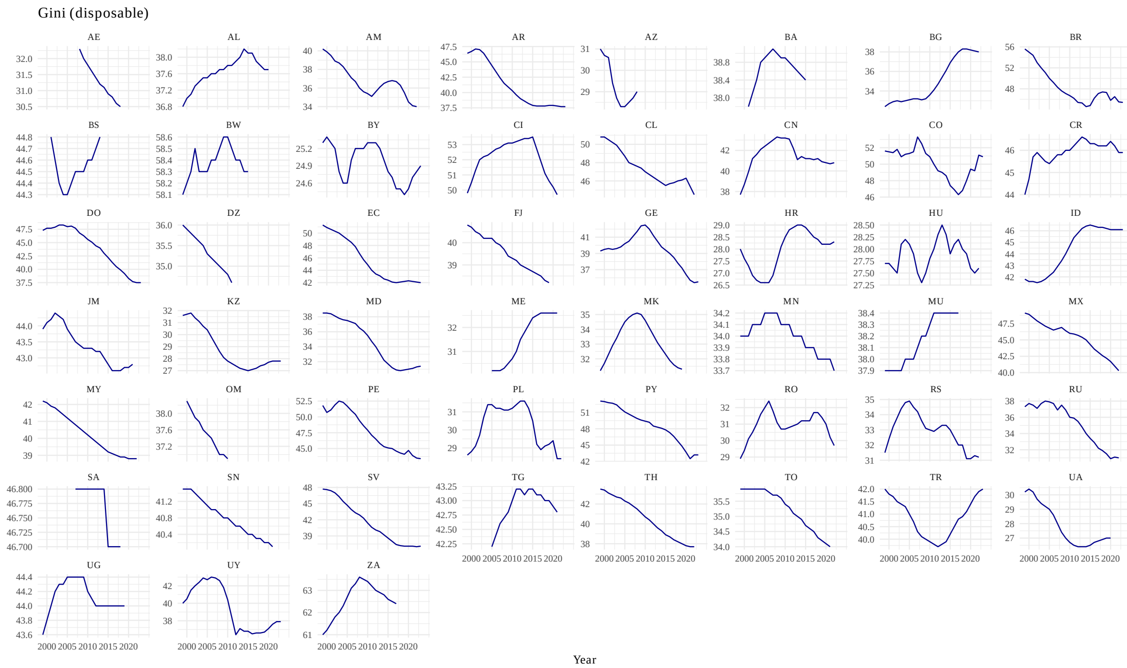
Notes: Data source: Standardized World Income Inequality Database (SWIID).

Figure 11: Disposable Gini Coefficient by Country - Advanced Economies



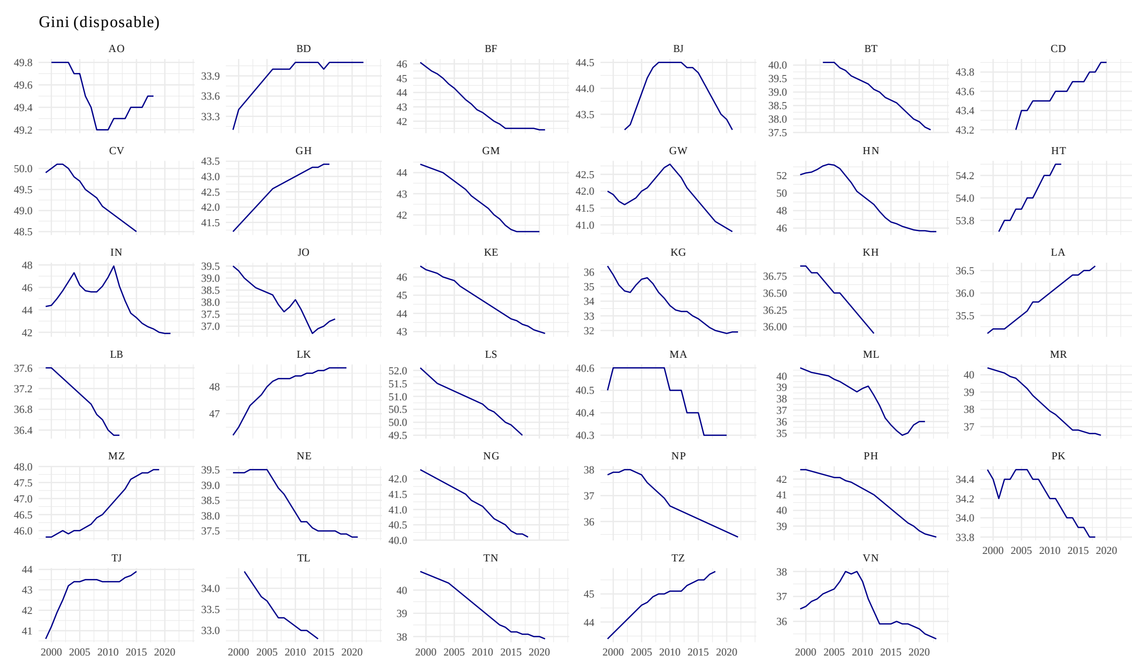
Notes: Data source: Standardized World Income Inequality Database (SWIID).

Figure 12: Disposable Gini Coefficient by Country - Emerging Markets



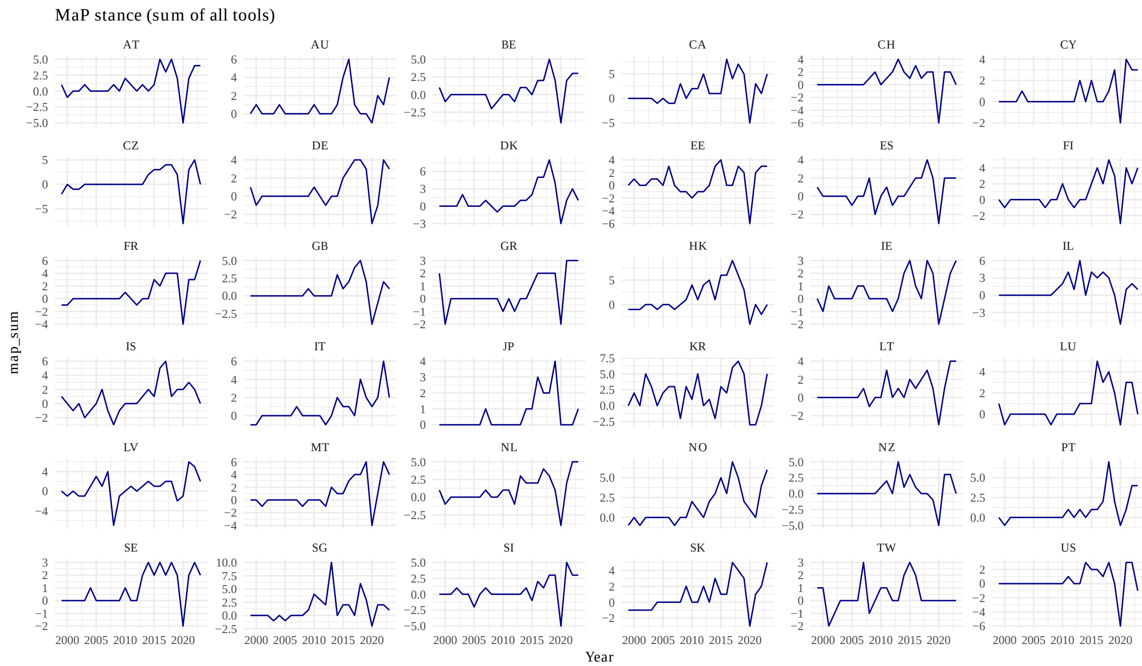
Notes: Data source: Standardized World Income Inequality Database (SWIID).

Figure 13: Disposable Gini Coefficient by Country - Developing Economies



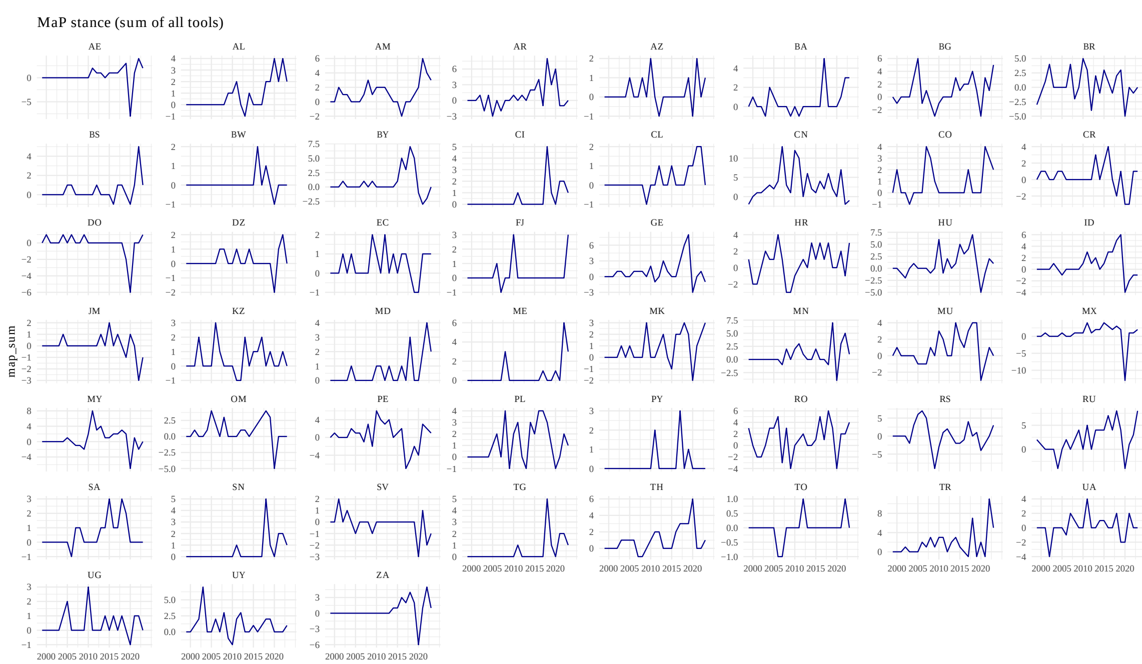
Notes: Data source: Standardized World Income Inequality Database (SWIID).

Figure 14: Macroprudential Policy Stance by Country - Advanced Economies



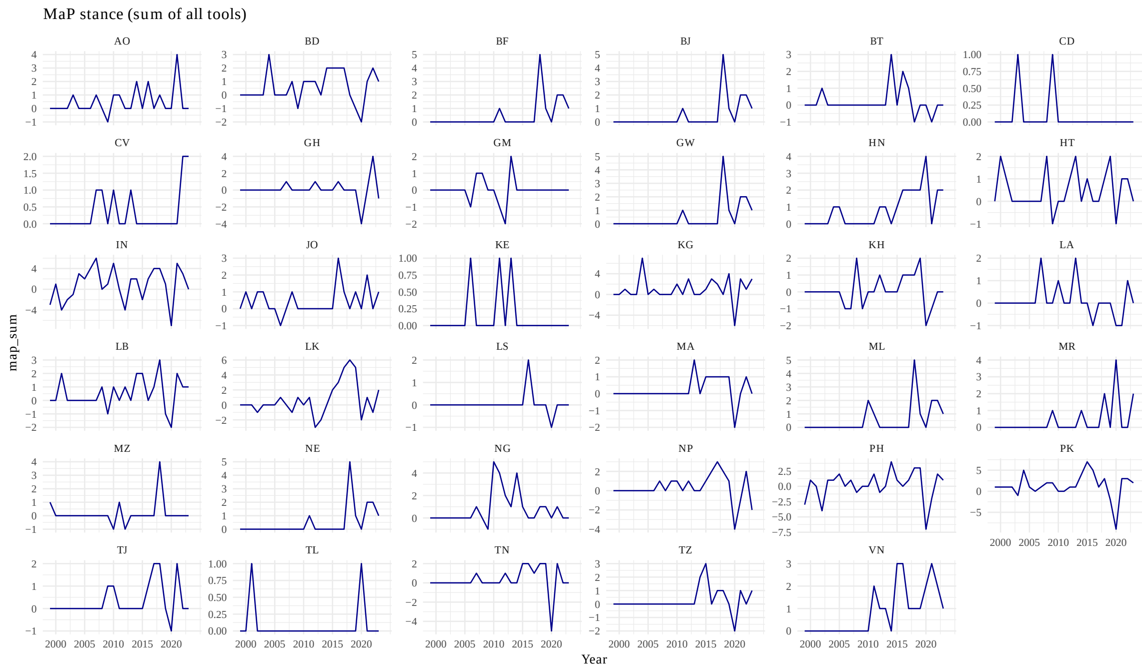
Notes: Data source: iMaPP–IMF (Alam et al., 2025). Each subplot displays the annual aggregate macroprudential policy index (sum of tightenings and loosenings across 17 instruments) for a single country.

Figure 15: Macroprudential Policy Stance by Country - Emerging Economies



Notes: Data source: iMaPP–IMF (Alam et al., 2025). Each subplot displays the annual aggregate macroprudential policy index (sum of tightenings and loosenings across 17 instruments) for a single country.

Figure 16: Macroprudential Policy Stance by Country - Developing Economies



Notes: Data source: iMaPP–IMF (Alam et al., 2025). Each subplot displays the annual aggregate macroprudential policy index (sum of tightenings and loosenings across 17 instruments) for a single country.

B Gini Coefficient

This appendix derives a closed-form expression for the Gini coefficient implied by the model's two-agent structure, establishes an income-share representation that makes the transmission mechanism of macroprudential policy transparent, and proves that a permanent tightening reduces steady-state inequality.

B.1 Steady-State Gini Coefficient

Assumptions. We normalize individual labor supplies to $h_h = h_e = 1$, so that aggregate household and entrepreneur labor are $H_h = \mu$ and $H_e = 1 - \mu$, respectively. Budget constraints hold with equality at the steady state; loan, deposit, and bond stocks are at their stationary values with zero net change. We maintain the empirically motivated assumption that the entrepreneur's income exceeds the household's income, $y_e > y_h$, verified at the calibrated steady state (Appendix C).

Entrepreneur income. The entrepreneur's capital and labor earnings are, respectively,

$$w^k_{e,t} = \pi_{e,t} + (1-\mu)\pi_{\text{banking},t}, \qquad w^l_{e,t} = w_{e,t} h_e.$$

Applying the entrepreneur's budget constraint with $h_e = 1$ (so that $\mu/H_e = 1$) and using stationarity at the steady state (all asset positions have zero net change, interest flows net out):

$$w^k_e + w^l_e = \Big[\pi_e + (1-\mu)\pi_{\text{banking}}\Big] + w_e \; = \; c_e.$$

The last equality follows directly from the entrepreneur's budget constraint evaluated at the steady state. We obtain the entrepreneur's per-capita steady-state income:

$$y_e \;\equiv\; w^k_e + w^l_e \;=\; c_e. \tag{26}$$

Household income. The household's capital and labor earnings are, respectively,

$$w^k_{h,t} = (R_{D,t-1} - 1) d_{t-1} + \mu\, \pi_{\text{banking},t}, \qquad w^l_{h,t} = w_{h,t} h_h.$$

Applying the household budget constraint with $h_h = 1$ (so that $\mu/H_h = 1$) and using the fact that all asset positions are stationary at the steady state:

$$w^k_h + w^l_h = (R_D - 1)d + \mu\, \pi_{\text{banking}} + w_h \; = \; c_h.$$

Setting $\mu/H_h = 1$ yields:

$$y_h \;\equiv\; w^k_h + w^l_h \;=\; c_h. \tag{27}$$

Lemma B.1 (Closed-Form Gini Coefficient)**.** *Let $\omega \equiv c_e/c_h > 1$ be the ratio of entrepreneur to household per-capita income at the steady state. Then:*

$$G \;=\; \frac{\mu(1-\mu)\,(\omega-1)}{\mu + (1-\mu)\,\omega}. \tag{28}$$

Equivalently, defining the entrepreneur income share $\Lambda_e \equiv \frac{(1-\mu)c_e}{\mu c_h + (1-\mu)c_e}$, the Gini satisfies the income-share identity:

$$\boxed{G \;=\; \Lambda_e - (1-\mu).} \tag{29}$$

Proof. With population shares μ (households) and $1-\mu$ (entrepreneurs), and per-capita incomes

$y_h = c_h < y_e = c_e$, the standard two-group Gini formula gives:

$$G = \frac{\mu(1-\mu)\big|c_e - c_h\big|}{\mu c_h + (1-\mu)c_e} = \frac{\mu(1-\mu)(\omega-1)}{\mu + (1-\mu)\omega},$$

establishing (28). For the income-share identity, write $G = \mu - \mu c_h/[\mu c_h + (1-\mu)c_e]$. Since $1 - \Lambda_e = \mu c_h/[\mu c_h + (1-\mu)c_e]$, it follows that $G = \mu - (1-\Lambda_e) = \Lambda_e - (1-\mu)$, establishing (29). □

Equation (29) shows that the Gini coefficient equals the gap between the entrepreneur income share and the entrepreneur population share. Macroprudential policy affects inequality entirely through its effect on Λ_e: any intervention that reduces the entrepreneur income share below its laissez-faire level reduces G one-for-one. Note also that $G > 0$ if and only if entrepreneurs receive a disproportionately large share of aggregate income, i.e., $\Lambda_e > 1 - \mu$, which is verified at the calibrated parametrization.

The income ratio ω can be expressed in terms of aggregate output, consumption, and investment. From goods-market clearing at the steady state (where the investment adjustment-cost term vanishes since $i_t/i_{t-1} = 1$):

$$Y = \mu c_h + (1-\mu)c_e + (1-\mu)i.$$

Since $y_e = c_e$, solving for c_e gives directly:

$$\omega \;=\; \frac{Y - \mu c_h - (1-\mu)i}{(1-\mu)\,c_h}. \tag{30}$$

Three steady-state conditions further simplify the objects in (30):

$$Q = 1, \quad R_k = r + 1 - \delta, \quad R_D = \beta^{-1}, \quad k = \frac{i}{\delta}. \tag{31}$$

The first follows from the investment first-order condition when $i_t = i_{t-1}$; the second from the capital return equation (13); the third from the household and entrepreneur Euler equations for deposits (equations (3) and (5)); the fourth from the capital evolution equation (7) with $\xi = 1$.

Substituting $i = \delta k$ from (31) into (30) yields the structural expression for ω:

$$\omega \;=\; \frac{Y - \mu c_h}{(1-\mu)c_h} - \frac{\delta k}{c_h}, \tag{32}$$

where Y, r, and k are all functions of the steady-state capital stock $k(\tau_k)$ through the production function (9)–(10) and the bank's balance sheet. The Gini is therefore implicitly defined as a function of τ_k alone through the steady-state system; the calibrated solution in Appendix C pins down the quantitative values.

B.2 Comparative Statics with Respect to τ_k

Proposition B.1 (Macroprudential Tightening Reduces Steady-State Inequality)**.** *A permanent increase in the macroprudential tax rate τ_k reduces the steady-state Gini coefficient: $\partial G/\partial \tau_k < 0$.*

Proof. By Lemma B.1, G is strictly increasing in ω:

$$\frac{\partial G}{\partial \omega} = \frac{\mu(1-\mu)}{\left[\mu + (1-\mu)\omega\right]^2} > 0.$$

It therefore suffices to show $\partial \omega/\partial \tau_k < 0$. We establish this through three channels, each of which strictly reduces the income ratio $\omega = (c_e - l_e)/c_h$.

(i) Redistribution channel. From the government budget $T = -\tau_k R_k K$, a marginal increase in τ_k raises the per-household rebate by $R_k K/\mu > 0$, increasing $y_h = c_h$ through the household budget constraint without any direct effect on $y_e = c_e - l_e$. This channel strictly reduces ω holding the capital stock constant.

(ii) Credit-contraction channel. The bank's optimality condition for capital-claim holdings (equation (15)) implies that the expected after-tax excess return on financial intermediation must be large enough to discourage banks from diverting assets:

$$\mathbb{E}_t\Big[\Omega_{t+1|t}((1-\tau_k)R_k - R_D)\Big] = \gamma_t \kappa.$$

A higher τ_k compresses the after-tax spread $(1-\tau_k)R_k - R_D$, tightening the incentive-compatibility constraint. Since the binding ICC implies $Q_t K_t = j_t N_t/\kappa$, the equilibrium capital stock k falls. Lower k reduces output Y and the marginal product of capital r, contracting entrepreneur capital income w_e^k and hence y_e. Because the tax also directly erodes banking returns, the fall in y_e exceeds the fall in y_h, so this channel reduces ω.

(iii) Skill-premium channel. With fixed labor supplies $H_h = \mu$ and $H_e = 1 - \mu$, the ratio of factor demand conditions (11) and (12) implies that the skill premium w_e/w_h is increasing in the capital-skill composite V_t in equation (10). Since $\rho > 1$, the exponent $(\rho - 1)/\rho \in (0, 1)$ is positive, so V_t is strictly increasing in K. Moreover, capital-skill complementarity ($\sigma > \rho$) implies that the skill premium satisfies $\partial(w_e/w_h)/\partial V_t > 0$ — higher capital disproportionately raises the return to skilled relative to unskilled labor. The contraction in k from channel (ii) therefore reduces V_t and compresses the skill premium, lowering entrepreneur labor income $w_e^l = w_e h_e$ relative to household labor income $w_h^l = w_h h_h$. This reinforces the fall in ω.

Since all three channels deliver $\partial\omega/\partial\tau_k < 0$ and $\partial G/\partial\omega > 0$, it follows that $\partial G/\partial\tau_k < 0$. □

Note on the deleveraging offset. The proof is robust to a potential offsetting force: because l_e enters $y_e = c_e - l_e$ negatively, policy-induced deleveraging (a fall in l_e) mechanically raises y_e, partially counteracting channels (ii) and (iii). This offset is dominated by the income compression from channels (ii) and (iii), as confirmed numerically at the calibrated parametrization. We flag this as a testable quantitative prediction: in economies with very high leverage (l_e large relative to c_e), the deleveraging offset is stronger and the Gini reduction from tightening is attenuated.

C Additional information of the model

C.1 Parameters

Table 3: Baseline Parameter Values

Parameter	Value	Description	Target / Source
Preferences and technology			
β	0.99	Discount factor	Standard quarterly
γ	2	Risk aversion	Standard
μ	0.55	Household population share	Li et al. (2023)
δ	0.025	Capital depreciation rate	Standard (10% annual)
ζ	3.456	Investment adjustment cost	Standard range
η_h, η_e	0.0025	Bond portfolio cost	Standard
Production — calibrated to match $w_e/w_h = 1.5$ *and* $rK/Y = 0.33$			
σ	2.2	Outer CES elasticity (unskilled vs. bundle)	Duffy et al. (2004)
ρ	1.26	Inner CES elasticity (capital vs. skilled)	Duffy et al. (2004)
α_u	0.6048	Low-skill labor weight	Skill premium $w_e/w_h = 1.5$
α_k	0.2276	Capital weight in skilled-capital nest	Capital income share $rK/Y = 0.33$
Banking — calibrated to match $K/N = 4$ *and annual credit spread* $= 100$ *bps*			
θ	0.9720	Banker survival probability	Gertler and Karadi (2011) Table 1
κ	0.3847	Bank diversion parameter	Implied by θ, K/N, and spread
δ_T	0.00212	Startup transfer to newborn bankers	Implied by K/N and spread
Shock processes			
ρ_A, σ_A	0.85, 0.007	TFP persistence and std. dev.	Smets and Wouters (2007)
ρ_ξ, σ_ξ	0.85, 0.005	Capital quality persistence and std. dev.	Gertler and Karadi (2011)
Policy rules			
ρ_τ	0.65	Policy rule inertia	
$\psi_\tau = \psi_K$	0.75	Feedback from primary target or capital	
ψ_G	0.25	Feedback from Gini secondary target	
σ_τ	0.001	Policy shock std. dev.	

Notes: Bond targets $\bar{b}_e = \bar{b}_h = 0$. All parameters held fixed across the policy specifications in Section 5. Production elasticities σ and ρ imply capital-skill complementarity ($\sigma > \rho$) in the sense of Krusell et al. (2000).