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DOES BANK REGULATION AND SUPERVISION IMPACT INCOME INEQUALITY? CROSS-COUNTRY EVIDENCE

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Does Bank Regulation and Supervision Impact Income Inequality? Cross-Country Evidence

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Abstract:
This paper examines how microprudential policy affects income inequality, and whether and how the effect of macroprudential policy on income inequality depends on the stance of microprudential policy. The dataset covers 70 countries over the period 1996–2013. Applying the system GMM estimation method, the analysis provides evidence that tighter microprudential policy leads to a reduction in income inequality as measured by the Gini coefficient. Nonetheless, the effect of an overall tightening of microprudential policy disappears in countries with low levels of economic development. Among the inspected individual microprudential policies, the power and independence of supervisory authorities have the greatest effect on income inequality. In addition, the results suggest that macroprudential policy tightening is effective in reducing income inequality under a strong microprudential policy framework, while the effect is reversed under a weak microprudential policy scheme. Moreover, the effects of macroprudential policy tightening on income inequality are amplified when implemented within a strict microprudential policy environment. This paper contributes to the growing literature on the spillover effects of banking regulation and supervision and on the relationship between financial sector policies and income inequality.

JEL: G21, G28, O15, O16
Keywords: Income Inequality, Microprudential Policy, Macroprudential Policy, Crisis Prevention, Interaction of Policies

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1 Introduction

In the wake of the Global Financial Crisis (GFC) of 2008/2009, there has been much debate about the benefits and harms of financial sector policies for society. Financial sector policies, including microprudential bank regulation and supervision, have evolved significantly over the last 30 years. These policies started to be globally used with the Basel I Accord in the early 1990s as a response to the increasing concern about internationally active banks (White, 2013). Since then, the Basel regulatory framework has improved from the relatively simple Basel I to the more complex Basel II in 2000s and finally to the Basel III in 2010. This refinement has occurred in combination with the development of macroprudential policy to complement the traditional microprudential focus of bank regulation. The worldwide introduction of macroprudential policy in Basel III was one of the responses to GFC to mitigate systemic risk and its adverse consequences on the economy in case it materializes. In addition, there have been many improvements and changes in terms of the supervision of banks in the same years, with most countries moving from compliance-based to more risk-based supervision, which is in line with the idea of Pillar II within Basel II of deepening the supervisory dialogue between the regulator and banks.

However, despite the acknowledged benefits of protecting depositors, creditors and borrowers, as well as enhancing the stability of individual institutions and the financial system, the implementation of microprudential supervisory and regulatory policies may have unintended consequences in terms of negative short-term costs to the real economy, both in terms of the level of income inequality and overall economic growth (Malovaná *et al.,* 2023; Frost & van Stralen, 2018). Income inequality remains at the centre of the global economic policy debate as it can have significant social and political consequences as well as adverse effects on economic growth (IMF, 2022; Stiglitz, 2016). A growing body of research suggests that policies related to monetary policy, macroprudential regulation, and financial liberalization have implications for income distribution (Auclert, 2019; Malovaná *et al.,* 2023; Delis *et al*., 2014). However, there is a lack of consistent and reliable research on the impact of microprudential regulation and supervision policies on income inequality.

The aim of this paper is therefore to contribute to existing research on the relationship between financial sector policies and income inequality by assessing the impact of microprudential policy and its regulatory and supervisory instruments on income inequality. Additionally, the effects of macroprudential policies conditional on the setting of microprudential policy are also assessed. Our research thus adds to at least two strands of literature. First, the role of microprudential policy has not been explicitly considered in the finance-inequality literature. Second, we contribute to research on the effects of macroprudential policy on income inequality by assessing how it affects income inequality conditional on the stringency of microprudential policy, rather than focusing on its unconditional effect which is the common practice in the existing literature.

Consistent with existing research on the finance-inequality nexus, the effects are estimated using non-overlapping three-year averages of data from a panel of 70 countries over the period 1996−2013. The dependent variable in the baseline analysis is the market Gini coefficient. The data on microprudential policies is based on the Financial Reform Database

constructed by Omori (2022), while the data on macroprudential policy is based on Alam et al. (2019). The control variables are selected in line with the literature on the determinants of income inequality and include factors such as gross domestic product (GDP) per capita and its square, unemployment rate, trade openness, human capital, and financial development, among others. In addition, differences between advanced economies (AE) and emerging markets and developing economies (EMDE) are assessed, as the effects of financial sector policies on income inequality may vary based on the development of countries (Malovaná *et al.,* 2023). All models are estimated using a two-step system generalized method of moments (GMM).

We provide evidence that tighter microprudential policies lead to lower levels of income inequality. This result is mainly driven by the effects of greater supervisory power and independence of supervisory authorities. Although in AE, both tighter microprudential policy as a whole and greater supervisory power reduce income inequality, in EMDE, only greater supervisory independence contributes to the reduction in income inequality. Furthermore, based on our results, within a strong microprudential policy framework, tightening of macroprudential policy especially through capital-based measures mitigates financial imbalances and subsequent financial crises, thereby reduces income inequality. The crisis prevention channel is more pronounced in EMDE. Moreover, the effects of macroprudential policy interventions on income inequality are reinforced when implemented in a framework of strong microprudential regulation and supervision. However, some of the findings are not fully robust to alternative model specifications, making them suitable for further work in this area.

2 Literature Review

Our paper relates to two main streams of existing literature. First, it contributes to the studies on the relationship between microprudential bank regulatory and supervisory policies and income inequality. In the literature to date, the relationship between income inequality and microprudential bank regulation and supervision in line with the Basel Accords has received little attention. Recent studies rather consider the nexus between income inequality and financial liberalization and rely primarily on the financial reform database by Abiad et al. (2010) based on graded scores covering seven pillars of financial liberalization policies.

Financial liberalization policies, such as the elimination of interest rate controls and liberalization of the capital account, can develop financial intermediation services, increase the efficiency of the banking sector, and in turn allow individuals at the bottom of the income distribution to access loans and capital more easily so they can invest more efficiently and at a lower cost (Delis *et al.,* 2014). In contrast, since financial liberalization promotes standard procedures and criterion-based lending, banks may create barriers for individuals or companies with little credit history and insufficient collateral. To add to this, opening a capital account may induce capital flow into high-skilled industries and thus increase wages for high-skilled workers relative to low-skilled workers, and can also distort the relative access to financial resources (Furceri & Loungani, 2015). Moreover, higher capital requirements may reduce the likelihood of financial crises that hurt primarily the poor (Gomado, 2023).

Employing the dataset created by Abiad et al. (2010), de Haan and Sturm (2017) provide empirical evidence that greater financial liberalization leads to an increase in income inequality. Using the same data set, Manish and O'Reilly (2020) conclude that primarily the credit market liberalization is associated with a rise in income inequality, and they suggest that the reregulation of the financial sector shows a more robust correlation with income inequality in comparison with measures of deregulation and liberalization of the financial sector. Their results are consistent with the study by Johansson and Wang (2014) which shows that financial repression decreases income inequality, while the effects of more stringent interest rate controls, capital account controls, and concentration in the banking sector are the most prominent. Analogously, Ang (2010) concludes that among financial sector policies, liberalization of reserve and liquidity requirements, directed credit programs, and interest rate constraints most contribute to the rise in income inequality in India. Other authors highlight the effect of capital account liberalization on income inequality. Bumann and Lensink (2016), Li and Su (2020), and Furceri and Loungani (2015) show that capital account liberalization increases income inequality, while Bumann and Lensink (2016) add that inward capital account liberalization has a greater effect on income inequality increase than outward capital account liberalization. Moreover, in their later study, Furceri and Loungani (2018) provide evidence that, when followed by a financial crisis, capital account liberalization leads to a greater increase in income inequality. They also demonstrate that capital account liberalization lowers the labour share of income by altering the relative bargaining power of companies and employees.

Contrarily, other authors suggest that greater financial liberalization, mainly liberalizing credit controls and security markets, leads to a decrease in income inequality (Agnello *et al.,* 2012; Christopoulos & McAdam; 2017; Delis *et al.,* 2014; Gomado, 2023; Li & Yu, 2014; Liu &Ni, 2019). The findings of the study conducted by Agnello et al. (2012), Hsieh et al. (2019), Li and Yu (2014) provide evidence that financial reforms toward promoting stock market development are associated with a more equitable income distribution. Regarding other types of financial reforms, Delis et al. (2014) find that liberalizing interest and credit control decreases both individual and household income inequality most significantly, Agnello et al. (2012) indicate that a more equitable income distribution can be achieved by eliminating subsidized direct credit and excessive reserve requirements, and the analysis by Li and Yu (2014) highlights the lowering effect of liberalizing credit controls on income inequality. The findings of a meta-analysis by Liu and Ni (2019) reviewing 23 cross-country studies on the relationship between financial liberalization and income inequality suggests that greater financial liberalization is linked to a decrease in income inequality.

Furthermore, based on the reviewed papers, the effects of financial liberalization policies on income inequality may be conditioned by the level of financial and economic development (Bumann & Lensink, 2016; de Haan *et al.,* 2018; Gründler *et al.,* 2020; Li & Su, 2020), human capital (Li & Yu, 2014), monetary conditions (Koudalo & Wu, 2022), phase of the business cycle (Koudalo & Wu, 2022) and quality of political and financial institutions (Furceri and Loungani, 2015; Koudalo & Wu, 2022). The effect of financial liberalization on income inequality is mostly suggested to be greater in magnitude in countries with high financial development (de Haan *et al.,* 2018), bank-based economies (Delis *et al.,* 2014), countries with higher human capital (Li & Yu, 2014), and countries with strong financial

institutions (Furceri & Loungani, 2015). Nevertheless, Li and Su (2020), and Bumann and Lensink (2016) provide empirical evidence that the liberalization of capital accounts is significantly related to higher income inequality only in developing economies.

The main channel through which microprudential bank regulation within the Basel Accords may affect income distribution is the access to credit. Since holding capital is expensive for banks, more stringent capital requirements may incentivize banks to lend to relatively richer and thus safer individuals who can then generate further income with the obtained capital (Furceri & Loungani, 2015). Improved access to credit fosters human and physical capital accumulation and, subsequently, may decrease income equality (Baiardi & Morana, 2018). On the contrary, tighter capital requirements can reduce income inequality by minimizing the likelihood of occurrence of financial crises that hurt primarily the poor (Gomado, 2023), and by decreasing financial income of richer households, which are more exposed to financial markets (Eickmeier *et al.,* 2018).

The literature on banking sector microprudential supervision mostly deals with the impact of the criteria and rigor of assessors when evaluating a bank's loan portfolio and its overall safety and stability, on the bank lending supply. These studies show that increased supervisory stringency is related to a reduction in loan origination and slower loan growth (Beck *et al.,* 2006; Curry *et al.,* 2008). According to Passalacqua et al. (2021), the contraction in credit is mainly attributed to decreased lending to underperforming firms as banks tend to optimize their loan portfolio by investing more in healthy and new companies. A rising number of papers have also shown that bank supervision has led to reductions in bank risks (Hirtle & Kovner, 2022). To inspect the effect of bank supervision on income inequality, researchers mostly employ the banking supervision index presented by Abiad et al. (2010), however, since this index aggregates several dimensions, the impact of individual supervisory practices on income inequality is not yet estimated. Delis et al. (2014), Johansson and Wang (2014), Christopoulos and McAdam (2017), and Li and Yu (2014) all provide evidence that enhanced banking sector supervision contributes to more equal income distribution. They suggest that these findings indicate that enhanced screening and monitoring of investment projects directs capital towards more promising projects, offering equitable chances to the poor. Li and Yu (2014) further propose that greater independence of banking supervision may significantly decrease lending that favours entities associated with political influence or power and consequently reduce income inequality. Contrarily, Manish and O'Reilly's (2020) analysis shows a positive relationship between supervisory rigour and income inequality.

Second stream of literature to which our analysis contributes deals with the effect of macroprudential policy on income inequality conditional on the level of stringency of microprudential policy. Ekinci and Özcan (2021) and Mirzarei and Samet (2022) provide empirical evidence that macroprudential policy measures are more effective in limiting credit growth in an environment of strong microprudential supervisory power as well as increased monitoring. Ekinci and Özcan (2021) conclude that especially greater supervisory power complements the conduct of macroprudential policy.

There are several channels through which macroprudential policy may affect income inequality. Malovaná et al. (2023) identify the credit redistribution channel and the crisis mitigation and prevention channel. The credit redistribution channel of tightening borrower-based measures impacts access to credit and the borrower's future income, including investment income, which increases income or wealth inequality. On the contrary, income or wealth inequality may decline via the crisis prevention channel through which macroprudential policy can mitigate the redistributive effects of financial crises, which affect the poor disproportionally more by capital-based, liquidity-based and other measures. According to Malovaná et al. (2023) and Texeira (2023), the credit distribution channel dominates in AE while the crisis prevention and mitigation channel prevails in EMDE. Konstantinou et al. (2022) adds that whereas in an environment with a low level of globalization and an undeveloped financial system, tightening of macroprudential policy can lead to an increase in income inequality, in countries with a high degree of openness and financial development the effect reverses.

Stringent borrower-based macroprudential policy tools are generally considered to increase both income and wealth inequality. The presence of spillovers to inequality from applying and tightening loan-to-value (LTV), debt-to-income (DTI) and debt-service-to-income (DTSI) limits appears to be confirmed in most studies, especially in the case of wealth inequality (Frost & Van Stralen, 2018; Oliveira, 2021; Zhai *et al*., 2023; Park & Kim, 2023; Carpantier *et al.,* 2018; Texeira, 2023; Malovaná *et al*., 2023). Tarne et al. (2022) adds that restricting the LTV cap on buy-to-let agents leads to a decrease in total net wealth inequality, but on the contrary, wealth inequality rises when imposing restrictions on access to credit on first-time buyers. Nevertheless, analysis by Georescu and Martin (2021) suggests that borrower-based measures such as LTV and DTSI limits have a negligible impact on income inequality unless introduced under adverse macroeconomic scenarios. Nonetheless, there is little consensus on the effect of other macroprudential tools, either in combination or individually. To illustrate, Frost and Van Stralen (2018) conclude that while interbank exposure limits, concentration limits, and reserve requirements increase both the market, and the net Gini coefficient, leverage ratios and limits on foreign currency lending lead to a decrease in income inequality.

3 Data

The dataset contains data annual in frequency and covers 70 countries[1], specifically 41 EMDE and 29 AE based on the IMF country classification. The list of countries is presented in Table A. 2 in the Annex. The panel in the dataset is unbalanced and spans the years 1996–2013. The dataset's end year is the last year for which data on bank regulation and supervision are available, and the dataset's commencement year is determined by the availability of data on the governance indicators used as control variables. In the econometric analysis, three-year non-overlapping averages of the data presented are used.

[1] The models on the effect of bank regulation and supervision on income shares are based on data from 67 countries due to the absence of the data on income shares for Albania, Chile, and Cote d'Ivoire.

The dependent variable used in the baseline analysis to represent income inequality is the market Gini index, in which 0 represents perfect equality and 1 perfect inequality, which was retrieved from the Standardized World Income Inequality Database (SWIID) compiled by Solt (2016). The SWIID database maximizes the comparability of available data on income inequality. It gets beyond national variations in the definitions of income inequality as well as in the sampling and frequency of data collection on income inequality. Solt (2016) employs a Bayesian methodology to standardize data gathered from diverse sources. Because of its cross-country comparability, researchers have recently favoured the SWIID over alternative data sources on income inequality (e.g., Alexiou *et al*., 2022; Malovaná *et al.,* 2023; Manish & O'Reilly, 2020). Moreover, the Gini index based on market income is more appropriate than the Gini index based on net income in empirical research on the impact of bank regulation on income disparity. The effects of fiscal redistributive policy incorporated in the Gini coefficient based on net income may contaminate the estimates of the relationship between income inequality and bank regulation and supervision due to the strong correlation between fiscal redistributive policies and income inequality (Anderson *et al.,* 2017).

Figure 1 presents the evolution of the unweighted average Gini coefficient over the period 1975–2021. The solid line in the figure represents the observed sample; the dashed line shows the unweighted average Gini index development outside of it. Based on the unweighted average Gini index, within-country income inequality has been steadily rising in AE while income inequality is relatively stable or even slightly declining in EMDE. Since 2001, AE have experienced higher levels of income inequality than EMDE.

Figure 2 shows the year-by-year heterogeneity of the market Gini coefficients for the sample period 1996–2013, with each point denoting the market Gini index for a particular nation for that year. It is evident that the Gini index's heterogeneity has been rising over time. This is mostly due to three nations, South Africa, Botswana, and Belarus, whose Gini indices differ significantly from those of other nations. The income disparity as indicated by the Gini index is lowest in Belarus, while it is extremely high in the first two mentioned countries. As many people in South Africa were excluded from economic opportunities during the policy of apartheid, there was already a significant amount of income inequality in the country as measured by the Gini coefficient in the 1990s. Furthermore, the unemployment rate is significantly higher in South Africa than in other emerging markets (IMF, 2020). In Belarus, rapid economic growth was attributed to convenient energy pricing from Russia and high levels of employment (The World Bank, 2017).

Figure 1: Gini Coefficient Development

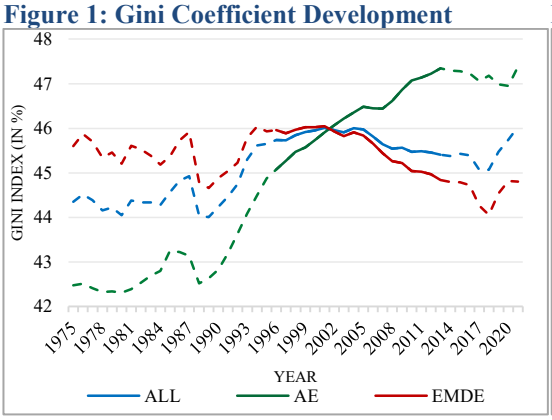
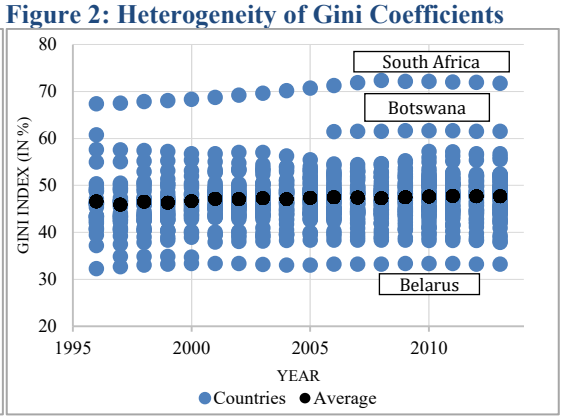


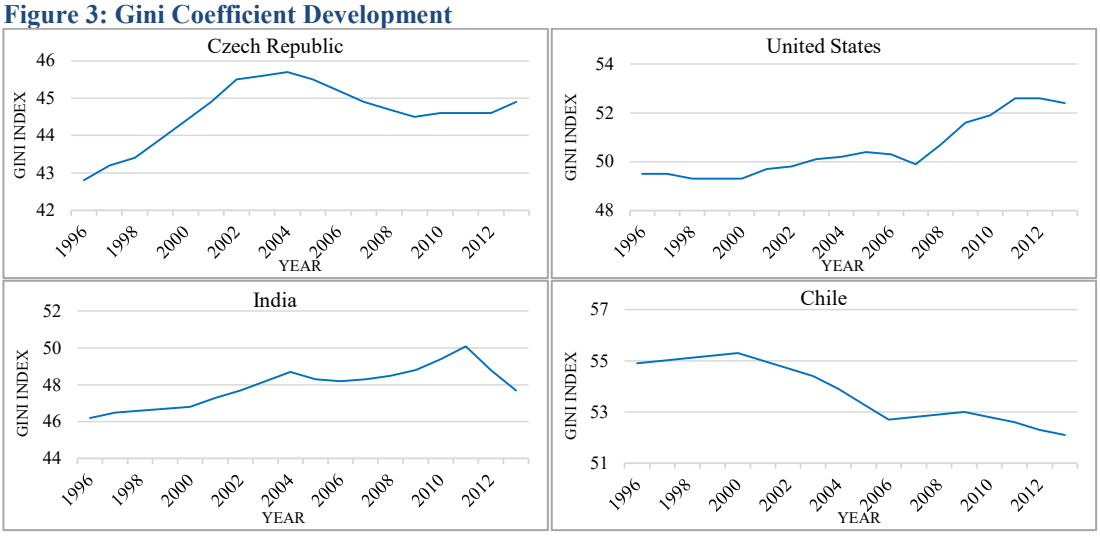
Figure 2: Heterogeneity of Gini Coefficients



Source: Solt (2016), authors' calculations
Note: Figure 1 shows the evolution of the unweighted average market Gini coefficient. The dashed line represents the Gini coefficient in years outside the sample period. The solid line represents the Gini coefficient during the sample period. Figure 2 shows the market Gini coefficient for each country for the respective years. The heterogeneity of the Gini coefficient among countries is accompanied by the unweighted average of market Gini coefficients across all countries for the respective year.

Figure 3 shows the evolution of the market Gini indices in four selected countries: the Czech Republic (AE), the United States (AE), India (EMDE), and Chile (EMDE). The GFC began in the United States, where between 2007 and 2008 there was a noticeable increase in income inequality. Income inequality in the Czech Republic increased until 2004, at which point it started to decline until 2009 and has rising since then. But compared to the United States, the rise in income inequality in the Czech Republic during the post-crisis period has been far more subdued. In fact, the Czech Republic has the lowest income inequality among the four chosen nations, as indicated by the Gini coefficient. Furthermore, all the years under observation show an increase in income inequality in India, except for 2005 and 2012. In contrast, income inequality in Chile has been declining, apart from the period 2005–2006.

Figure 3: Gini Coefficient Development

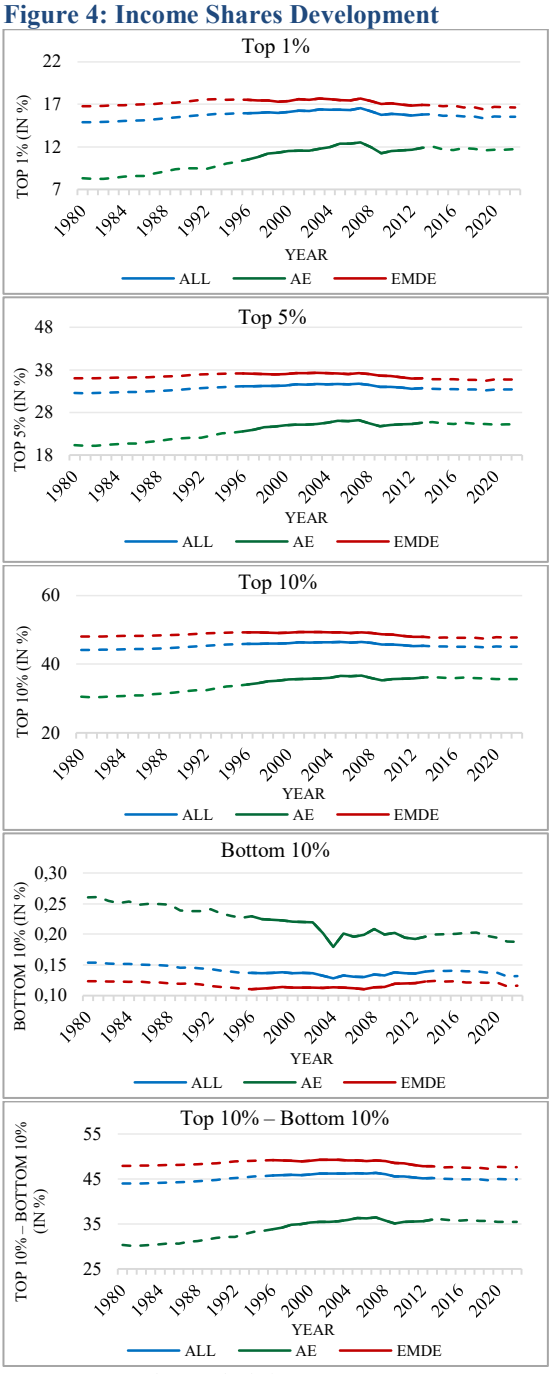


Source: Solt (2016), authors' calculations

Income shares of the population retrieved from World Inequality Database (WID) were used as an alternative measure of income inequality presented as a part of the robustness check. Income shares are apart the Gini coefficient the most frequently used measures of income inequality (Dabla-Norris *et al.*, 2015). As well the Gini coefficient, the income shares are

based on market income. Data used are the income shares of the top 1% of the population, the top 5%, the top 10%, and the bottom 10% of the income distribution. In most of the sample countries, the income shares of the bottom 1% and bottom 5% of the income distribution are rounded to zero. They are therefore not informative, and these income shares are thus not used in our analysis. We also implement the difference between the income share held by the top 10% and the bottom 10% of the income distribution. The developments of the unweighted average income shares of the respective income groups during the period 1990−2022 are presented in Figure 4.

Figure 4: Income Shares Development



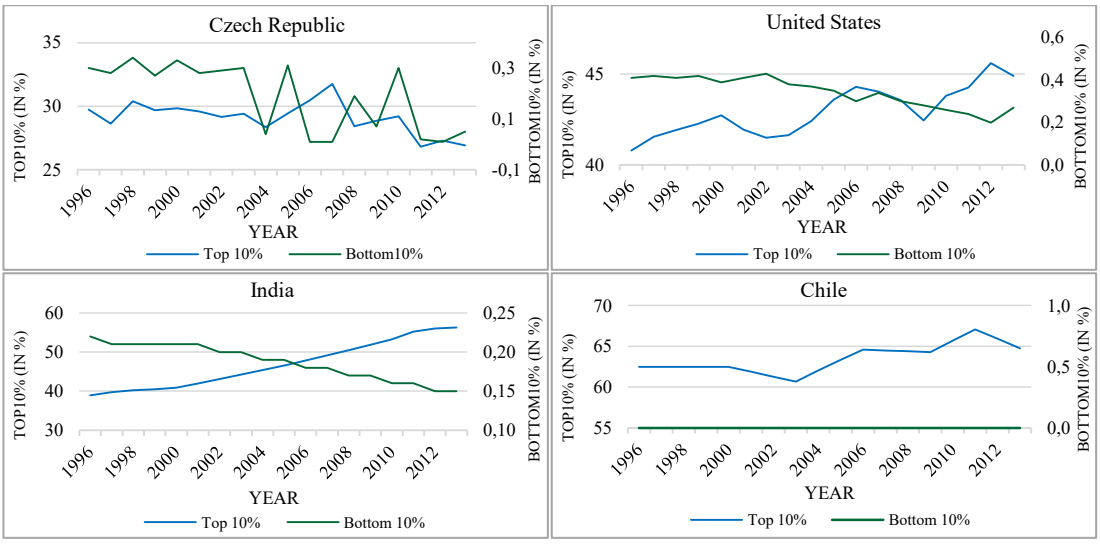
Source: WID, authors' calculations

Note: The dashed line represents the variable in years outside the sample period. The solid line represents the variable during the sample period.

The possible limitations of the Gini coefficient are illustrated by the analysis of income shares. EMDE experience greater income accumulation at the extreme tails of the income distribution than AE, even though the Gini index suggests higher income inequality in AE. The average income share of the top 1% varies between 14.9% and 16.5% during the monitored period. The top 1% share of income in AE ranges from 8.3% to 12.5% and is gradually increasing except for declines in 2008 and 2009. The top 1% share of income in EMDE is higher than that of AE, while remaining relatively stable at 17.0%. The average income share of the top 5% shows a similar trend, increasing from 20.1% in 1980 to 25.2% in 2022. Similarly, the average income share of the top 10% is still relatively constant at 45.0%, with EMDE having higher values than AE. In addition, the average income share of the bottom 10% is very low, declining slightly from about 0.15% in 1980 to 0.13% in 2022. The average income share of the bottom 10% is even lower in EMDE. In AE, there is a more noticeable trend in the average income share of the bottom 10%, decreasing over time from 0.26% in 1980 to 0.19% in 2022. Due to persistently low levels of the income share held by the bottom 10%, the development of the difference between the average income share of the top 10% and the bottom 10% reflects the trends observed in the average income share of the top 10%.

As Figure 5 shows, there are significant differences when examining the dynamics of income shares across countries in time. The income share of the top 10% indicates a relatively stable setting in the Czech Republic. On the other hand, the income share of the top 10% has an upward trend in other countries, indicating an increase in income inequality. Compared to other countries, Chile shows the largest percentage of income held by the top 10%, in line with the highest market Gini coefficient. In addition, the income share of the bottom 10% has declined in both India and the United States. A thorough examination of the income trajectory of the bottom 10% in Chile is impossible due to the near-zero income share of this group, which is rounded to zero in the source data set. To conclude, Chile is the most unequal of the four countries, while the Czech Republic shows the most equitable distribution of income.

Figure 5: Income Shares Development



Source: WID, authors' calculations

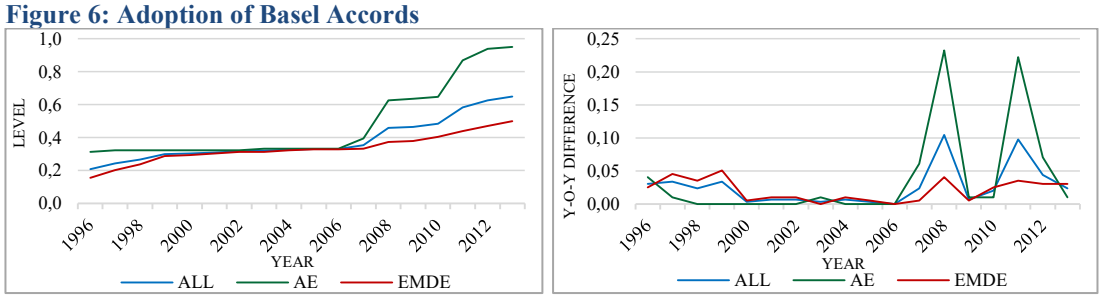
Our data on microprudential bank regulation and supervision are based on the revisited and updated Financial Reform Database constructed by Omori (2022). Unlike the original dataset by Abiad et al. (2010), in the update conducted by Omori (2022), the aggregate bank regulation and supervision index is further divided into five sub-indices. Furthermore, Omori (2022) extends the period covered from 1973−2005 to 1973−2013 and the country coverage from 91 to 100 countries. We thus have at our disposal a larger dataset that also contains information on bank regulation and supervision during the GFC and encodes bank regulation and supervision in detail from several perspectives. Unfortunately, as of the date of the publication of this paper, no further updates with more recent data are available.

The data capture the intensity and stringency of bank regulation and supervision by ordinal variables that take the value 0, which corresponds to the minimum degree of intensity and stringency of bank regulation and supervision, up to a maximum integer value, which corresponds to the highest degree of intensity and stringency. The aggregate bank regulation and supervision index is further divided into five subdimensions. The coding rule for each variable is based on a set of criteria for policy actions. The concrete coding rules for the five subdimensions of bank regulation and supervision are presented in Table A. 3 in the Annex. The aggregate bank regulation and supervision index is the sum of the five subindices. The ordinal sub-indices were normalized into an interval of 0 to 1 by dividing the value of each variable in a respective year and country by the maximum value of the corresponding sub-index. This simplification by employing indices rather than a specific value of the Basel capital or supervisory requirements is used due to the availability of the data for a country-level analysis.

The first variable *Basel* is based on the adoption of Basel I, Basel II, and Basel II.5. Throughout the observed period 1996−2013, 69 out of 70 countries have adopted at least Basel I, 66 countries have also introduced Basel II, and 65 countries have implemented Basel II.5. Figure 6 presents the development of the unweighted average of the normalized index of Basel Accords adoption and the unweighted average of first differences of the normalized index. The first differences are used to display year-on-year changes in more detail. The

figure demonstrates the gradual implementation of Basel I at the beginning of the observed period up to 2000, since when most of the countries had at least Basel I implemented. The significant change in the normalized index in 2008 was caused by a more stringent microprudential regulation upon the implementation of Basel II in 2008 in major economies. The rise in 2011 demonstrates the adoption and implementation of Basel II.5, especially in AE. In European Union banks, an agreed-upon phased implementation of Basel II began in 2006, while Basel II.5 had a clearly defined start date of December 31, 2011.

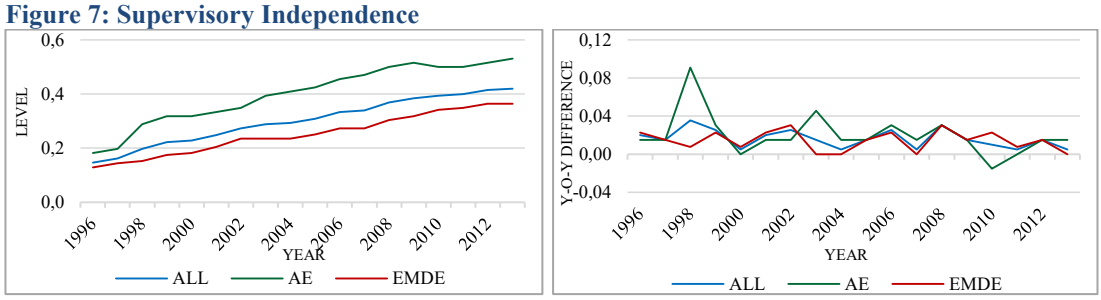
Figure 6: Adoption of Basel Accords



Source: Omori (2022), authors' calculations

The development of bank supervision is not as straightforward as the development of microprudential bank regulation captured by the adoption of the Basel Accords. The variable *Independence* assesses whether the banking supervisory authority is independent from the government executive and the interests of the financial sector. Specifically, it assesses the structure of the board of directors and the criteria for dismissing the head of banking supervisory authority. As shown in Figure 7, the unweighted average of the normalized index of supervisory independence has been gradually increasing in both EMDE and AE, with volatile changes that are, however, very small in scale. The largest increase in the average intensity of supervisory independence occurred in 1998 in AE. For illustrative purposes, as stated in Omori (2022), in the Netherlands, under the Bank Act of 1998, the President and the Executive Directors of the Governing Board may be suspended or removed from office only if they no longer fulfil the conditions required for the performance of their duties or if they have been found guilty of serious misconduct.

Figure 7: Supervisory Independence

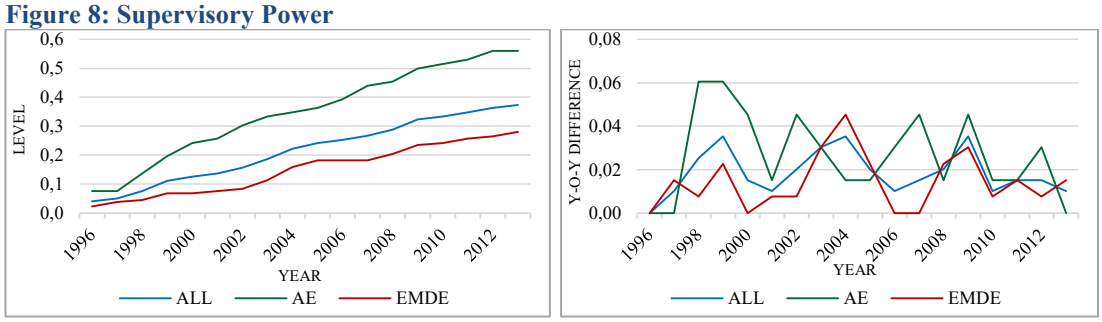


Source: Omori (2022), authors' calculations

The third variable *Power*, the development of which is presented in Figure 8, represents the power of supervision. An authority with intense supervisory power can exercise its main tools, including licensing, sanctioning, off-site monitoring, and on-site inspections without inference. Concretely, the third variable evaluates whether the supervisory authority has legally defined remedial and sectional measures, whether the supervisory authority can proactively intervene and whether supervisory measures can be exercised without

interference. The increase in the unweighted average supervisory power index in 1996−2000 demonstrated in Figure 8 is primarily attributed to the establishment of independent superior supervisory authorities and by defining their legal rights.

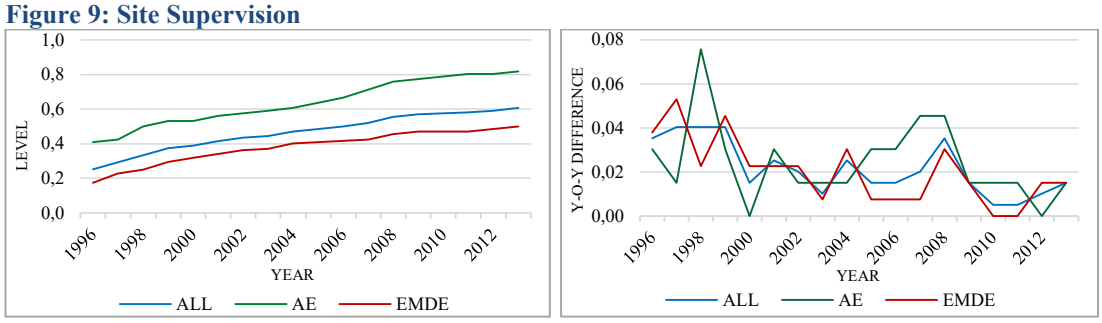
Figure 8: Supervisory Power



Source: Omori (2022), authors' calculations

Whether on-site and off-site examinations are risk-based and of high quality is coded in the fourth variable *SiteSup*. As Figure 9 shows, the unweighted average site supervision index increased at the beginning of the sample period because of enhanced on-site supervision as opposed to only relying on external audits and off-site monitoring, integration of off-site and examinations, and implementing risk-oriented approaches to bank supervision. To illustrate, since 2001 the Financial Supervisory Authority of Iceland has carried out targeted on-site inspections of risk management, information technology, collateral valuation and loan loss provisioning standards used in Icelandic banks (Omori, 2022).

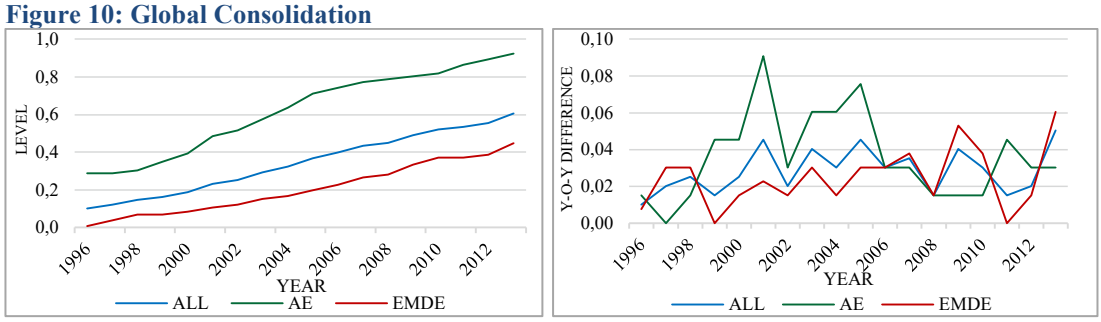
Figure 9: Site Supervision



Source: Omori (2022), authors' calculations

Finally, the fifth variable *Global Consolidation* expresses whether the supervisory agent supervises the banking sector without any exceptions and whether it strengthens cross-border supervisory cooperation. As depicted in Figure 10, large changes in the unweighted average index occurred in AE in the period 2003–2005. This period is characterized by the signing of Memoranda of Understanding between individual countries to achieve international cooperation in the field of surveillance. For example, Germany signed a Memorandum of Understanding with the Federal Reserve Bank in 2003 and with Canada in 2004 (Omori, 2022).

Figure 10: Global Consolidation

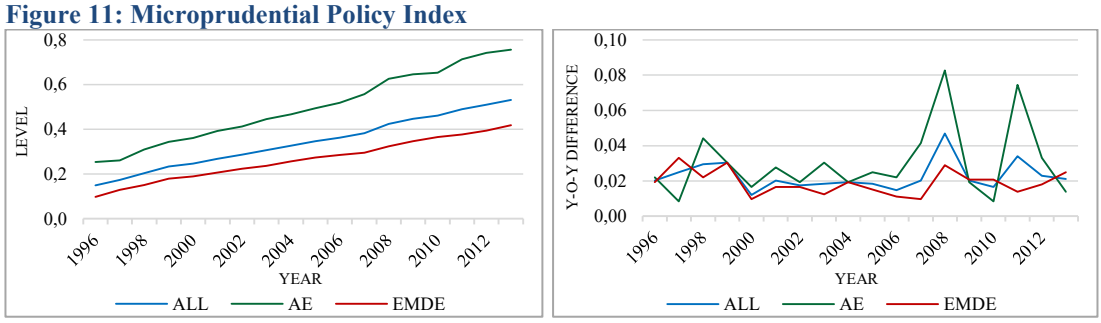


Source: Omori (2022), authors' calculations

With respect to the aggregate microprudential bank regulation and supervision index, constructed as an unweighted average of the normalized five sub-indices, Figure 11 shows its development over the period 1996−2013. Although microprudential policy tightened over time in both AE and EMDE, throughout the period microprudential policy was more intense in AE.

The high point in the development of the unweighted average of the first differences of the index in 1998 was mainly caused by increased supervisory power and site supervision. The intensified supervisory power during this period is characterized by the establishment of independent supervisory authorities, such as the Federal Office for Banking Supervision in Germany, the Financial Supervision Agency in Japan and the Australian Banking Regulation Authority in Australia, and their statutory rights, including specific sanctions for non-compliance with the legislation. In addition, more countries have launched on-site inspections of bank loans and their market risk systems, consolidated supervision through a combination of on-site supervision and on-site supervision, further in line with international standards. The peaks in 2008 and 2012 are primarily the result of the adoption of the Basel II and Basel II.5 Accords.

Figure 11: Microprudential Policy Index

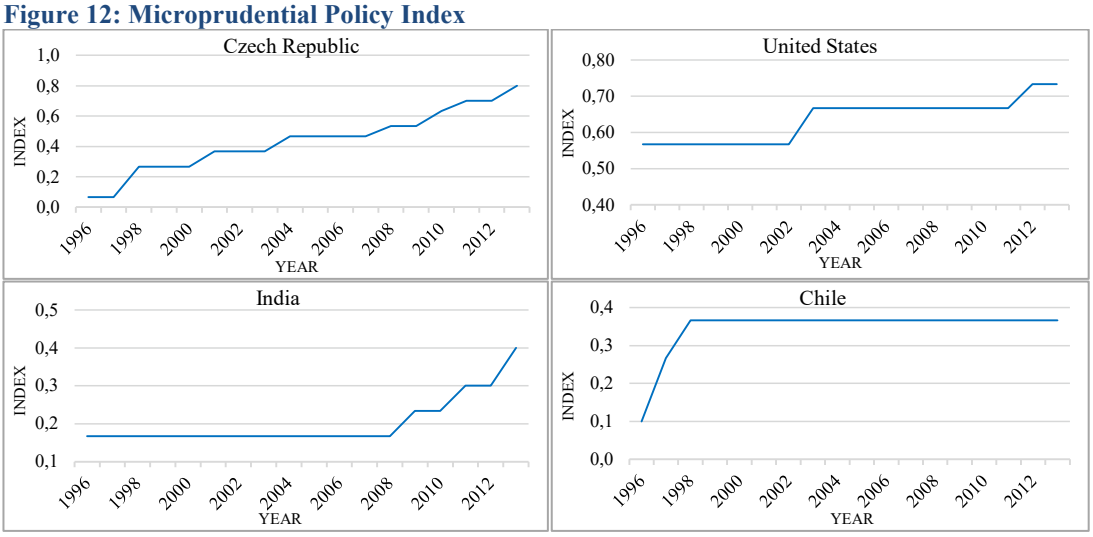


Source: Omori (2022), authors' calculations

Figure 12 illustrates the evolving dynamics of the microprudential policy index in the four selected countries. In the sample period, an intensification of microprudential policy is evident across all countries. In the Czech Republic in particular, the microprudential policy reaches a maximum value from the four countries of 0.8 at the end of the period, which indicates the strictest banking regulation and supervision, while the changes take place very gradually. While microprudential policy remains tight in the United States, changes are less frequent but more pronounced when they occur. Conversely, in India, microprudential policy has seen a rapid intensification since 2008, having previously maintained persistently low

levels. In Chile, microprudential policy has remained stable since 1988, consistent with the country's non-adoption of Basel II.

Figure 12: Microprudential Policy Index



Source: Omori (2022), authors' calculations

Part of the analysis focuses on the effects of the interaction between microprudential and macroprudential policies on income inequality. Macroprudential policy control variables are based on dummy indicators from the IMF's Integrated Macroprudential Policy (iMaPP) Database originally developed by Alam et al. (2019). The database combines information from five existing databases and the IMF Macroprudential Policy Survey. The iMaPP database contains monthly data on 17 dummy variables representing the application of macroprudential instruments for 134 countries over the period 1990–2021.2 Each tightening event is coded as +1, each loosening action is coded as −1, and the neutral action is coded as 0. The indices capture the action as of the effective date. Simplification by introducing indices rather than specific values of the change in macroprudential policy measures is used due to the availability of data for country-level analysis.

Figure 13 captures the number of countries implementing macroprudential policy measures (both tightening and easing are considered as one use of macroprudential policy instruments) during the period under review by country. Both EMDE and AE began to implement these tools with greater intensity after the GFC. In addition, AE increased the frequency of macroprudential policy instruments used in the 2000s in response to the Dot-com bubble. In addition, we decided to consider different groups of macroprudential policy instruments based on their objectives, as they can affect income inequality through different channels (Malovaná *et al.,* 2013). Concretely, three groups of macroprudential policy tools were created – borrower-based measures, capital-based measures, and other measures. Table A. 5 in the Annex shows the division of individual macroprudential policy instruments into these three groups. Figure 14 illustrates the number of countries using borrower-based measures, capital-based measures, and other measures on a country-year basis. Although all three

[2] The 17 types of macroprudential policy tools are in detail presented in Table A. 4.

groups of instruments were used in more countries after the GFC, the increase is more pronounced in the use of capital-based and other measures. This is in line with the introduction of liquidity measures and minimum reserve requirements, which are considered other measures under Basel III.

Figure 13: Macroprudential Policy Tools

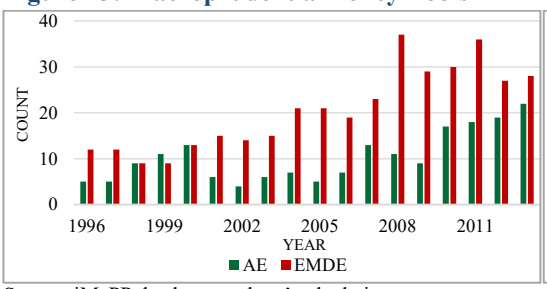
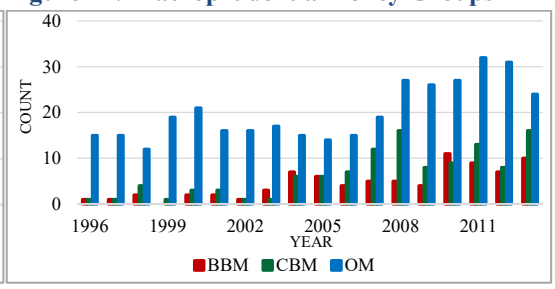


Figure 14: Macroprudential Policy Groups

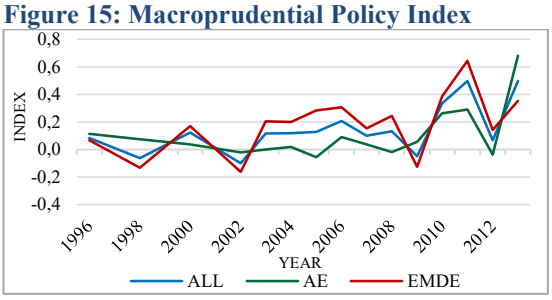


Source: iMaPP database, authors' calculations

The original database contains monthly data, that has been aggregated into yearly data and normalized by the dividing the annual sum of loosening and tightening actions by the count of all instruments and the number of months to create a macroprudential policy index ranging from –1 to +1. The minimum value –1 thus represents loosening of all macroprudential policy tools in all 12 months of a year, while the maximum +1 value represents the situation of tightening all macroprudential policy tools in every month of a year. Similarly, indices for specific groups of microprudential policy tools have been created. We are aware of the limitation that the addition of negative and positive monthly dummy indicators can result in the easing and tightening actions cancelling each other out. However, the macroprudential policy index still captures if overall net progress tightens or eases over the year and country.

Figure 15 depicts the dynamics of the unweighted average of the macroprudential policy index over the sample period 1996–2013. The average macroprudential policy index is positive for most years, implying more frequent overall tightening than easing. In addition, the index is higher in EMDE than in AE for most of the observed period, even though after the GFC, AE started to implement macroprudential policy instruments with greater frequency. The overall macroprudential policy index peaked in 2011 and 2013 and declined in 2002 and 2009.

Figure 15: Macroprudential Policy Index



Source: iMaPP database, authors' calculations, macroprudential index is multiplied by 100 for clarity

To control for other variables other than financial sector policies, we included standard determinants of income inequality. The list of control variables and their sources and constructs are presented in Table A. 1 in the Annex.

Firstly, to control for business cycle fluctuations, we choose to include the natural logarithm of GDP per capita, as done by Delis et al. (2014), Manish and O'Reilly (2020) and Hailemariam (2022). Similar to Manish and O'Reilly (2020), we also include the squared variable in the model to trace the non-linear relationship between economic growth and income inequality based on the Kuznets curve. Malovaná et al. (2023) use a GDP per capita gap constructed based on a Hamiltonian filter.

Secondly, we control for demographic and structural factors. Education is commonly controlled for by including the average years of schooling or the human capital index. The human capital index from the Penn World Table is a metric based both on the average years of schooling and assumed rate of return to education. While Malovaná et al. (2023), Manish and O'Reilly (2020), and Frost and Van Stralen (2018) implement the human capital index, Delis et al. (2014) use the average years of schooling. Since most papers opt for the human capital index, we use this variable in the analysis. The unemployment rate is included based on the analyses by Frost and Van Stralen (2018), Furceri and Ostry (2019), Alexiou et al. (2019), and Gomado (2023), who conclude that rising unemployment is associated with greater income inequality. The human capital index and the unemployment rate are expected to be strong determinants of wage gaps, leading to income inequality. Furthermore, researchers, including Malovaná et al. (2023) and Delis et al. (2014), also filter out changes in income inequality, which may be driven by changes in population size. Thus, as done by Delis et al. (2014), we include the natural logarithm of the population size in the model. In addition, we account for trade and fiscal policy variables. To express the effect of trade on income inequality, we use the sum of imports and exports relative to the GDP. This metric is widely used in empirical literature even though its effect on income inequality remains inconclusive (e.g., Alexiou *et al.,* 2019; Delis *et al*., 2014; Malovaná *et al.,* 2023; Manish & O'Reilly, 2020). To control for the impact of redistributive policies on income inequality through transfers and taxes, we further include central government consumption as a percentage of total GDP, as done by Malovaná et al. (2023), Manish and O'Reilly (2020), and Delis et al. (2014).

Third, we control for political and institutional characteristics by using the regulatory quality variables from the Worldwide Governance Indicators (WGI) database. All indicators from WGI are highly positively correlated and thus only regulatory quality is selected for the analysis to filter out other than bank regulations. Missing years 1997, 1999, and 2001 are linearly interpolated. High-quality institutions are expected to reduce income inequality (Delis et al., 2014). Moreover, Gorus and Ben Ali (2023) report that governance quality can be an important predictor of income inequality in EMDE.

Lastly, since the analysis inspects the finance-inequality relationship, we include the level of financial development proxied by the domestic credit to the private sector by banks as a share of GDP, as in Malovaná et al. (2023) and Manish and O'Reilly (2020). Additionally, we add the normalized aggregate financial liberalization index, which is created from the remaining indicators from the dataset created by Omori (2022) that are not taken into consideration as variables related to bank regulation and supervision to filter out the overall process of financial liberalization as mentioned in Delis et al. (2014).

Table A. 6 in the Annex presents the summary statistics of the variables for the main regressions. The summary statistics for AE and EMDE are presented in Table A. 7 and Table A. 8 in the Annex, respectively. The mean and median values of the Gini coefficient are very similar, indicating that the Gini index data are not significantly skewed. The analogy applies to income shares. Specifically, the Gini index ranges between 32.2% and 72.3% with a standard deviation of 5.9%. The average share of income held by the top 1% is 15.0%, while the share of income held by the top 5% varies between 16.8% and 57.8% with a mean value of 31.4%. The average share of income held by the top 10% of the income distribution is 42.7% with a standard deviation of 10.0%. The income share of the bottom 10% varies between 0.0% and 0.43%, with an average value of 0.16%.

In addition, the analysis is also conducted separately for the AE and EMDE subsamples of the original sample to assess whether banking regulation and supervision affect income inequality differently depending on the country's economic development. The mean value of the Gini index is 47.03% in EMDE and 47.17% in AE. However, the variation of the Gini indices is greater in EMDE than in AE, as the standard deviations are 7.29% and 3.76%, respectively. Aggregate statistics also confirm a more disproportionate accumulation of income in the extreme tails of the income distribution in EMDE.

Table A. 6 also shows the microprudential indices of banking regulation and supervision, which all vary between 0 and 1 due to the standardization procedure. The mean of the microprudential policy index is 0.39 and the standard deviation is 0.23. The subindex representing no exceptions and global consolidation is the most volatile, and on average, site supervision is the most strict and intense part of microprudential bank supervision, whereas supervisory power is the least strict on average. In AE, the mean of the microprudential policy index is 0.54, and in EMDE, it is 0.31, which signals that microprudential bank regulation and supervision is more intense in AE. The macroprudential policy index ranges from −0.034 to 0.049 with a mean of 0.001, indicating more frequent tightening than easing. Among the different groups of macroprudential policy instruments, borrower-based measures tightened with the highest frequency on average in the original sample and in both subsamples based on country developments. However, the average of the macroprudential policy index is higher in EMDE than in AE.

4 Methodology

In the analysis, we estimate the effect of bank regulation and supervision intensity on income inequality using a panel of 70 countries during the period 1996–2013. The baseline empirical model to be estimated takes the following form:

$$\boldsymbol{Y_{i,t}} = \boldsymbol{\beta_1} \times \boldsymbol{Y_{i,t-1}} + \boldsymbol{\beta_2} \times \boldsymbol{MicroPru_{i,t}} + \boldsymbol{\beta_3} \times \boldsymbol{X_{i,t}} + \boldsymbol{\alpha_i} + \boldsymbol{\varepsilon_{i,t}}, \quad (1)$$

In the equation, i denotes individual countries and t denotes time. Y represents the dependent variable, i.e., income inequality expressed as the Gini coefficient or income shares. Due to the persistence of income inequality (Beck *et al*., 2007), the model is dynamic which can be seen from the inclusion of the lagged dependent variable in the set of control variables.

$MicroPru$ is the aggregate index representing microprudential bank regulation and supervision, X is the vector of control variables,[3] α contains the country-effect, and ε is the stochastic term. Country-effect is included as due to the large number of countries in the sample it seems likely that there are omitted country-specific characteristics that are time-invariant such as religion or colonial history.

As the aggregate index of microprudential bank regulation and supervision is a combination of five subindices which evaluate different aspects of bank regulation and supervision (see Figure A. 1 in the Annex), this approach may not effectively capture how these measures affect income inequality. For this reason, by replacing the variable $MicroPru$ with specific subindices, the equation (1) was also estimated also for individual bank regulation and supervision policies.

The basis for the model specification is the work of Delis et al. (2014) and Brei et al. (2023). They included the lag of income inequality in the set of non-lagged control variables and the country-fixed effects. Using the square of GDP per capita based on the Kuznets theory, which is a common practice in most of the reviewed papers, we depart from the research by Delis et al. (2014). Furthermore, we used the human capital index in place of the average number of years of education, and we used the private credit to GDP as a measure of financial development to purify the relationship between finance and inequality instead of using bank liquidity as Delis et al. (2014) did. Human capital index from the Penn World Table used in our analysis is based both on the average years of schooling and assumed rate of return to education and is more common in research on income inequality. Financial development is preferred due to the extensive literature focused on the relationship between financial development and income inequality. Additionally, to characterize the quality of institutions, we decided to control for regulatory quality because it is inherently accounts for the effects of other than bank regulations.

In addition, we follow the literature and use averages of both the measure of income inequality and the independent variables representing its potential determinants (Delis *et al.,* 2014; Brei *et al.,* 2023; de Haan & Sturm, 2017). In their baseline model, Delis et al. (2014) implement five-year non-overlapping averages given annual macroeconomic data are noisy and subject to fluctuations. Moreover, the regulatory framework is unlikely to have an immediate impact on income inequality. In contrast with the literature, which generally applies non-overlapping five-year averages, we resorted to non-overlapping three-year averages. Owing to the panel's length, employing five-year averages yields four unique time periods, whereas three-year averages yield six unique time periods and thus provide more available observations and greater data variation. Nonetheless, we use non-overlapping five-

[3] In the baseline model, the control variable for macroprudential policy is the aggregate macroprudential policy index, and the control variable included from the World Governance Indicators is *RegulatoryQuality.* As the World Governance Indicators are highly correlated (correlation >0.85), only one variable is selected to be included in the model. *RegulatoryQuality* seems to be the most appropriate based on the Bayesian Information Criterion and on its nature to inherently control for the effects of regulations other than those of the banking sector.

year averages as a robustness check. As the results may differ conditioned by the country's development, we estimated equation (1) separately for AE and EMDE.

Finally, as both microprudential and macroprudential bank regulation and supervision may affect income inequality, we further assess their effect on income inequality when combined. Nevertheless, data on microprudential bank regulation and supervision are stock variables whereas data on macroprudential policy are flow variables representing tightening, loosening, or indicating no change. Transforming microprudential bank regulation and supervision data into changes would result in an excessive number of zeros. For this reason, we estimate whether and how the effect of macroprudential policies changes on income inequality depends on the level of microprudential policy stringency, instead of evaluating changes in the effects of microprudential policies on income inequality conditional on the loosening or tightening of macroprudential policy.

To do so, we add into the equation (1) both the macroprudential policy index and the interaction term between the macroprudential policy index and the aggregate index of microprudential policy. Regarding macroprudential policy, we also distinguish between different groups of its instruments, as shown in Table A. 5. In addition, the difference between AE and EMDE is inspected. Estimating the effect of macroprudential policy on credit and house price growth conditional on microprudential supervision stringency using interactions is a common practice (e.g., BIS, 2022; Ekinci & Özcan; 2021).

We estimated equation (1) by two-step system GMM as it mitigates endogeneity concerns which arise mainly due to the presence of lagged dependent variable, country-specific unobserved heterogeneity and potential simultaneity bias resulting from reverse causality which was identified by Delis et al. (2014). System GMM mitigates endogeneity issues by incorporating orthogonal deviations and uses as instruments; apart from lagged differences of the variables as difference GMM does, also lagged levels of the variables. Additionally, according to Soto (2009) system GMM estimator systematically outperforms the difference GMM estimator in terms of the small sample bias and precision.[4] System GMM is the preferred estimation method by Delis et al. (2014) and Jauch and Watzka (2016). Similarly, models with interactions are also estimated by system GMM which is applied in the analysis by Ekinci and Özcan (2021). Two-step system GMM is preferred to one-step GMM, because standard errors from one-step estimation may be asymptotically inefficient. In addition, due to the neglected sampling error in the optimal weighting matrix used in two-step estimator, the standard errors may be downward biased. Therefore, the finite-sample correction proposed by Windmeijer (2005) is applied. It appears adequate to use one lag for each variable in the model as an instrumental variable since we are using non-overlapping three-year averages of the data.

[4] Although GMM for dynamic panel data is designed for large cross-sections with few time periods (small T, large N panels), our data satisfies the condition that N > T (number of countries (70) and number of time periods (6)). Thus, we still consider GMM for dynamic panel data the most appropriate method.

Arellano and Bond test was applied to inspect the presence of first and second order serial correlation in the differenced error term. The null hypothesis that assumes no autocorrelation could not be rejected in any of the models in our analysis which suggests no presence of higher-order serial correlation. Moreover, Sargan-Hansen test was used to assess the joint validity of over-identifying restrictions. The null hypotheses of the overall validity[5] of the used instruments could not be rejected in any of the models. All tests were performed at 5% significance level.

5 Results

Regression results on the effect of microprudential policy on income inequality as measured by the Gini coefficient based on the sample of all 70 countries are provided in Table 1. The first column shows the results for the model including the aggregate microprudential policy index. Results for models with different microprudential regulatory instruments are presented in the remaining columns. The collective term for all microprudential policy variables is *Bank Regulation and Supervision*. The rest of this paper follows the same format for presenting the findings.

The aggregate effect of microprudential policy on income inequality is negative and statistically significant at the 1% level of significance. Since this index is present in the dataset of Abiad et al. (2010), this finding can be directly compared with previous literature. Our results are consistent with most of the research showing a negative correlation between income inequality and the stringency of microprudential policies (Christopoulos & McAdam, 2017; Delis *et al.,* 2014; Johansson & Wang, 2014; Li & Yu, 2014).

There may be several channels through which microprudential policy can contribute to the reduction in income inequality. Firstly, even though enhanced supervision and regulation of individual banks may not prevent the emergence of financial crisis, it can improve the stability and solvency of banks during the crisis and reduce the likelihood of bank failure. Consequently, the effect of financial crises on economy may be more subtle than in the absence of strong microprudential supervision, for example by reducing the volatility of unemployment (Hirtle & Kovner, 2022). To illustrate, under the less stringent Anglo-Saxon approach to bank regulation and supervision based on openness, stability, and consistency, Ireland and England have experienced more high-profile bank failures. On the contrary, under more stringent supervision and regulation emphasising stability and risk management, the Austrian banking system has maintained stability even during the GFC and experienced relatively fewer bank collapses.

Secondly, improved supervision and regulation promotes prudent and fair lending practices. Enhanced screening and monitoring of investment projects can direct capital towards more promising projects, offering more equitable chances to the poor (Delis *et al*., 2014).

[5] Valid instruments are correlated with the endogenous variable and uncorrelated with the error term.

Thirdly, stricter oversight may discourage banks from the connected party lending which refers to loans extended by a financial institution to individuals or entities that have a pre-existing relationship with the institutions. The preferential treatment can disproportionally benefit affluent individuals or influential entities connected to the financial institution. Consequently, the income gap between outsiders and insiders may widen by hindering economic opportunities for those without insider connections. The misallocation of resources can also divert resources away from productive investments that contribute to broader economic growth and job creation. Moreover, if the loans to connected parties are not adequately assessed for creditworthiness, it can undermine the stability of financial institutions and potentially lead to financial crises further widening the income gap.

The rationale behind the proposed channels through which microprudential policy can affect income inequality has been inspected by assessing the impact of individual regulatory policies on income inequality. However, these channels through which individual bank regulation and supervision can reduce income inequality has not yet been closed by empirical research. Therefore, the effect of individual policies cannot be directly compared to the findings in the peer-reviewed literature.

The effects of all individual microprudential policy instruments on income inequality are negative, i.e. stricter microprudential policy leads to lower levels of income inequality. Be that as it may, the effects of Basel Accords adoption, effective implementation of risk-based controls (site supervision) and cooperation with foreign bank supervisory agencies are not statistically different from zero. However, the effects of the independence of the supervisory authority and its power on income inequality are statistically significant.

Greater supervisory power, i.e. the ability to use a wide range of sanctioning and remedial tools and measures enabling proactive early intervention, can reduce income inequality through the channels of better bank stability and fair lending practices. Enhanced supervisory power enables enforcement of prudential regulations and ethical standards that encourage banks to adopt responsible lending and investment practices. Supervisors can thus incentivize banks to allocate resources in ways that promote economic stability and fair access to financial services, can intervene early to protect customers from predatory or abusive financial practices, and impose sanctions on banks that violate consumer protections. Furthermore, it can improve the stability and solvency of banks in times of crises and thus reduce the probability of bank failure by timely intervention and the application of corrective measures in the event of deficiencies in the bank's operation.

The statistical significance of the estimated coefficient of supervisory independence is in line with the rationale behind the channel of connected party lending. This finding is consistent with those of Li and Yu (2014), who report that greater independence of bank supervision can reduce lending in favour of entities that have a pre-existing relationship with the institutions, and consequently decrease income inequality. Increased supervisory independence may thus reduce the risk of regulatory capture. When supervisory agency is not controlled by influential parties that would benefit from the connected party lending, it rather makes decisions based on sound regulatory principles in line with broad public interest. Therefore, alleviated connected party lending and associated enhanced transparency and

credibility in the financial system, effective allocation of credit, and reduction of the likelihood of financials crises can all lead to a decrease in income inequality.

The effects of other control variables are in accordance with the reviewed literature. In all models, the effect of the lagged Gini coefficient on income inequality is positive and statistically significant, signalling the persistence in income inequality. This result is expected because the persistence in income inequality motivated the model construction (e.g., Delis *et al*., 2014; Rione *et al*., 2009). The signs of the estimated coefficients of both the logarithm of GDP per capita and its square are consistent with the Kuznets theory. The positive correlation between income inequality and the unemployment rate is also consistent with the findings of existing research. The effect of the population size on income inequality possesses similar level of statistical significance, sign, and magnitude as in Delis et al. (2014). Furthermore, there is positive and in half of the cases statistically significant effect of the normalized index of financial liberalization. As outlined in the peer-reviewed literature on the relationship between income inequality and financial liberalization, the sign of their correlation remains inconclusive. Our result aligns with the findings of Johansson and Wang (2014), de Haan and Sturm (2017), Manish and O'Reilly (2020), and Fouceri and Loungani (2018).

Table 1: Estimation Results for the Gini Coefficient for the Full Sample

	Dependent variable: Gini coefficient					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**−4.712*****	**−1.262**	**−2.494***	**−3.073**	**−2.695****	**−1.401**
and Supervision	**(1.522)**	**(1.500)**	**(1.292)**	**(1.904)**	**(1.314)**	**(1.164)**
Lagged Gini (−1)	0.738***	0.884***	0.780***	0.804***	0.683***	0.907***
	(0.151)	(0.170)	(0.149)	(0.199)	(0.176)	(0.162)
Population	0.721*	0.638	0.630*	0.550	0.541*	0.209
	(0.377)	(0.478)	(0.325)	(0.437)	(0.326)	(0.323)
GDP per Capita	15.880*	4.988	7.469	10.870	7.362	13.440
	(9.314)	(10.699)	(7.121)	(7.245)	(6.712)	(10.968)
GDP per Capita sq.	−30.021*	−9.794	−14.009	−20.026	−12.989	−25.758
	(17.923)	(20.834)	(13.503)	(13.803)	(13.039)	(20.928)
Unemployment	0.318***	0.252	0.293**	0.269**	0.352**	0.235
	(0.113)	(0.166)	(0.146)	(0.127)	(0.140)	(0.152)
Human Capital	−0.176	−0.476	−0.503	−0.490	−0.340	−0.183
	(0.528)	(0.865)	(0.518)	(0.558)	(0.518)	(0.678)
Trade Openness	0.011	0.011	0.005	−0.0004	−0.001	0.001
	(0.014)	(0.020)	(0.008)	(0.012)	(0.010)	(0.009)
Fiscal Policy	0.007	0.022	−0.010	0.036	−0.056	−0.003
	(0.068)	(0.090)	(0.068)	(0.053)	(0.074)	(0.070)
Financial	−0.001	−0.002	0.003	−0.010	−0.002	−0.010
Development	(0.009)	(0.015)	(0.012)	(0.011)	(0.013)	(0.015)
Regulatory Quality	−0.918	0.746	−0.038	−0.235	−0.216	−0.394
	(0.857)	(1.090)	(0.899)	(1.018)	(0.972)	(1.525)
Financial	12.535**	4.496	9.342*	7.570	12.032**	7.586
Liberalization	(4.998)	(6.978)	(5.093)	(6.186)	(5.154)	(6.041)
Observations	381	381	381	381	381	381
AR (2)	0.613	0.311	0.459	0.484	0.666	0.359

	Dependent variable: Gini coefficient					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Sargan-Hansen	0.645	0.221	0.163	0.199	0.385	0.163

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively.

In the literature on the effect of macroprudential policy on income inequality, it is a common practice to distinguish between countries based on their development. Nonetheless, in research on the effects of microprudential policy stringency on income inequality, differences between AE and EMDE are unrevealed. To assess whether the effect of bank microprudential regulation and supervision differ based on the development of countries, the baseline model (1) is estimated separately for AE and EMDE.

The relationship between income inequality and microprudential policy in AE is shown in Table 2. The findings regarding the relationship between income inequality and the power of the supervisory agency as well as the overall microprudential policy framework are comparable to those obtained for the entire sample of countries. Stated differently, AE with stricter microprudential policies have lower levels of income inequality, and the power of supervisory authority plays a major role in the effectiveness of these policies. Compared to the full sample of countries, the intensity of supervisory power has a larger effect on income inequality both in its magnitude and statistical significance. In AE, strict microprudential policy thus contributes to the reduction of income inequality by mitigating the negative effects of financial crises by strengthening the stability and solvency of banks, as well as by promoting responsible lending practices.

In comparison to the regression results for the entire sample of countries, the effect of supervisory independence on income inequality does not exhibit statistical significance. Thus, supervisors in AE do not prioritize the interests of influential persons and, on the contrary, exercise their powers responsibly to ensure the overall health of the banks and costumer protection. Moreover, compared to the full sample of countries, there is no statistically significant evidence which would support the Kuznets theory or the impact of the unemployment rate on income inequality in AE. Further, the effects of the financial liberalization index and the lagged Gini index on income inequality are similar to those obtained from the full sample.

Table 2: Estimation Results for the Gini Coefficient for Advanced Economies

	Dependent variable: Gini coefficient					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**−3.906****	**−1.410**	**−2.909*****	**−2.414**	**−1.492**	**−0.598**
and Supervision	**(1.667)**	**(1.207)**	**(1.089)**	**(1.749)**	**(1.125)**	**(1.080)**
Lagged Gini (−1)	0.995***	0.859***	0.942***	0.836***	0.740***	0.870***
	(0.220)	(0.177)	(0.215)	(0.164)	(0.281)	(0.167)
Population	0.426	0.232	0.579***	0.340	0.712	0.278
	(0.408)	(0.494)	(0.214)	(0.326)	(0.608)	(0.275)
GDP per Capita	9.465	15.569	7.507	5.449	6.994	11.497
	(9.442)	(12.041)	(7.661)	(9.469)	(8.494)	(8.337)
GDP per Capita sq.	−22.082	−32.582	−16.152	−12.853	−15.295	−23.761
	(19.479)	(24.784)	(15.811)	(18.325)	(16.832)	(17.117)
Unemployment	0.128	0.256	0.224	0.304	0.146	0.118
	(0.203)	(0.208)	(0.266)	(0.193)	(0.249)	(0.182)
Human Capital	2.154	0.288	0.037	0.525	−0.520	−0.428
	(2.035)	(2.152)	(0.888)	(1.821)	(2.216)	(1.361)
Trade Openness	0.012	0.013	0.005	0.004	0.013	0.006
	(0.010)	(0.017)	(0.006)	(0.007)	(0.017)	(0.007)
Fiscal Policy	0.091	0.129**	0.001	0.056	0.114	0.089*
	(0.074)	(0.055)	(0.099)	(0.083)	(0.114)	(0.053)
Financial	0.006	−0.006	0.012	0.001	−0.004	−0.002
Development	(0.009)	(0.010)	(0.013)	(0.012)	(0.010)	(0.007)
Regulatory Quality	2.433	3.145	0.448	3.655*	2.662	0.395
	(2.400)	(2.280)	(2.091)	(1.993)	(3.066)	(2.675)
Financial	8.569	12.275	9.739*	11.929	15.599**	13.970***
Liberalization	(9.197)	(8.840)	(5.415)	(8.090)	(7.681)	(4.146)
Observations	147	147	147	147	147	147
AR (2)	0.772	0.683	0.913	0.646	0.895	0.911
Sargan-Hansen	0.503	0.506	0.814	0.468	0.208	0.261

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively.

Regression results for the subgroup of EMDE are presented in Table 3. In EMDE, the overall microprudential policy intensity does not have a statistically significant effect on income inequality. The only microprudential bank regulatory and supervisory measure that leads to lower income inequality is supervisory independence. Compared to supervisory practices in AE, where there is no statistically significant evidence of the relationship between income inequality and supervisory independence, supervisors in EMDE appear to favour the interests of influential parties or financial institutions over the general public interest which can lead to greater connected party lending. Biased supervisors may yield to the undue influence from competing interests by sacrificing their independence and objectivity. Investor confidence in the integrity of financial markets may decline if the transparency and credibility of the financial system is compromised. As a result, investment may be diverted, economic expansion will slow, unemployment will increase, and the likelihood of financial crises may increase. The effect of financial sector policies on income inequality is limited in EMDE. In particular, the effects of fiscal policy and financial liberalization are not statistically significant compared to AE. On the other hand, unemployment, and the level of income inequality in the previous period are the main determinants of income inequality in EMDE.

Table 3: Estimation Results for the Gini Coefficient for Emerging Markets and Developing Economies

	Dependent variable: Gini coefficient					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**−4.908**	**−2.336**	**−3.052**	**−1.280**	**−3.726***	**−0.143**
and Supervision	**(3.140)**	**(3.053)**	**(2.157)**	**(3.337)**	**(1.942)**	**(1.354)**
Lagged Gini (−1)	0.737***	0.628***	0.598***	0.843***	0.583***	0.805***
	(0.142)	(0.232)	(0.218)	(0.127)	(0.174)	(0.122)
Population	0.690**	1.236	1.125	0.566*	0.889	0.449
	(0.333)	(1.346)	(0.925)	(0.291)	(0.780)	(0.775)
GDP per Capita	17.447	−25.364	−30.518	6.677	−36.222	−15.642
	(17.086)	(23.975)	(26.309)	(15.147)	(24.949)	(26.458)
GDP per Capita sq.	−31.649	47.124	56.773	−11.808	68.098	29.580
	(31.457)	(44.534)	(48.945)	(28.345)	(45.778)	(47.795)
Unemployment	0.350***	0.590	0.562*	0.303**	0.546*	0.322
	(0.133)	(0.379)	(0.306)	(0.118)	(0.279)	(0.209)
Human Capital	0.217	2.323	1.798*	0.035	1.963	0.492
	(0.525)	(1.612)	(1.075)	(0.670)	(1.327)	(1.410)
Trade Openness	0.018	0.029	0.032	0.018	0.001	0.001
	(0.020)	(0.047)	(0.038)	(0.022)	(0.035)	(0.031)
Fiscal Policy	−0.068	−0.018	−0.025	−0.085	−0.002	−0.020
	(0.061)	(0.126)	(0.106)	(0.086)	(0.109)	(0.155)
Financial	−0.043	−0.025	−0.024	−0.042	−0.020	−0.029
Development	(0.037)	(0.057)	(0.042)	(0.031)	(0.053)	(0.084)
Regulatory Quality	0.735	1.159	1.355	1.137	1.210	0.601
	(1.191)	(1.886)	(1.354)	(1.331)	(1.444)	(1.396)
Financial	8.614	3.789	6.718	3.683	7.227	3.731
Liberalization	(5.679)	(9.296)	(7.619)	(5.387)	(7.106)	(7.105)
Observations	234	234	234	234	234	234
AR (2)	0.886	0.687	0.721	0.709	0.929	0.730
Sargan-Hansen	0.474	0.437	0.592	0.172	0.624	0.347

The table reports coefficient estimates and t−statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively.

Furthermore, none of the reviewed studies to date assess the impact of macroprudential policy on income inequality conditional on the stance of microprudential supervision and regulation. This section therefore analyses whether and how the effect of macroprudential policy on income inequality is conditioned by microprudential policy in the entire sample of countries and separately for AE and EMDE.

The results are interpreted primarily with regard to the findings of Malovaná et al. (2023) and Ekinci and Özcan (2021). In their study, Ekinci and Özcan (2021) show that stricter microprudential policy is associated with more effective macroprudential policy. Thus, strengthened microprudential supervision can improve the effectiveness of macroprudential policies in preventing systemic risks and financial imbalances that disproportionately affect the poor (Krishnamurti & Carol Lee, 2014). In addition, the study by Malovaná et al. (2023) is closely related to our analysis, as the authors distinguish the impact of different groups of macroprudential policy instruments on income inequality, estimate their effect separately for AE and EMDE, and identify two channels through which income inequality may be affected.

The regression results for the entire sample of countries are reported in Table 4. The first column serves as a benchmark model without estimating the effect of macroprudential policy on income inequality.[6] The remaining columns present results for models with different types of macroprudential policy measures included separately and in interaction with microprudential policy. Microprudential regulation and supervision is represented by the aggregate index of microprudential policy labelled in the tables as *Bank regulation and supervision*. The separate effect of macroprudential policy on income inequality is named *Macroprudential Policy*. The interaction term is labelled as *Interaction*. This form of presentation of regression results is common to all tables in this section. As the primary focus is on the interaction between microprudential and macroprudential policies, the effects of other control variables are not included in the results but are available upon request. The later mentioned calculated effects of average macroprudential policies tightening on income inequality conditional on different levels of microprudential policy stringency based on Table A. 9 are presented in Table 5 for the full sample, Table 7 for AE, and in Table 9 for EMDE.

Table 4: Interactions between Macroprudential Policy and Macroprudential Policy for the Full Sample

	Dependent variable: Gini Coefficient				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	−4.231***	−1.622	−3.077	−3.984***	−2.288
and Supervision	(1.571)	(1.543)	(1.982)	(1.422)	(1.511)
Macroprudential		234.286***	77.754	23.951	133.674***
Policy		(84.197)	(74.909)	(57.149)	(45.966)
Interaction		**−594.803*** **	**−338.652*** *	**−60.736**	**−343.882*** **
		(170.054)	**(181.390)**	**(113.581)**	**(83.043)**
Lagged Gini (−1)	0.756***	0.839***	0.645***	0.739***	0.846***
	(0.144)	(0.180)	(0.187)	(0.145)	(0.168)
…					
Observations	351	351	351	351	351
AR (2)	0.511	0.157	0.368	0.441	0.262
Sargan-Hansen	0.529	0.941	0.467	0.793	0.905

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, 10%, and 11% levels is indicated by the ***, **, *, and • symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variable are available upon request.

As can be seen from the results, the interaction effect of microprudential policy and macroprudential policy is statistically significant for the overall macroprudential policy as well as for the capital-based measures and other measures. The effect of overall macroprudential policy tightening on income inequality can be both upward and downward. In the presence of loose microprudential policy, tighter macroprudential policy leads to a rise in income inequality, while in an environment of stringent microprudential policy the effect

[6] The regression results in the first column may differ slightly from those presented in the previous sections due to a smaller sample of countries caused by the restricted availability of macroprudential policy data.

reverses. To illustrate, assuming macroprudential and microprudential policies get at their average values, the effect on income inequality is –0.003 Gini index points. When the rigor of microprudential policy increases to the level corresponding to the third quartile, the effect on income inequality changes to –0.144 Gini points. However, if the supervisory rigor decreases to its first quartile, income inequality rises by 0.134 Gini index points.

Therefore, the sign and the size of the effect of the implementation of macroprudential policies depends on the stance of microprudential policy. Under strong microprudential policy, macroprudential policy tightening reduces income inequality and the effect amplifies as the microprudential policy intensifies. However, when microprudential policy is loose, the effect reverses. These findings are in line with Ekinci and Özcan (2021), who show that in the presence of weak microprudential supervision and regulation, the preemptive application of more stringent macroprudential policy measures is less effective or even ineffective, as banks are not sufficiently incentivized to meet the ordained requirements.

The effect of the overall tightening of macroprudential policy is mainly driven by the application of stricter capital-based and other measures. Our results are consistent with Malovaná et al. (2023), who demonstrate that tighter capital-based policies as well as other measures may decrease income inequality by reducing systemic risks and financial imbalances that disproportionately affect the poor.

Tightening of capital-based measures reduces income inequality regardless of the degree of stringency of microprudential policy. Capital-based measures thus appear to be effective in preventing systemic crises. Be that as it may, the magnitude of the effect is again conditioned by the level of supervision and regulation of individual institutions ensuring the fulfilment of mandated requirements. Specifically, the effect of more stringent capital-based measures amplifies at higher levels of microprudential policy stringency. Under the average levels of capital-based measures tightening and microprudential policy stringency, income inequality reduces by 0.183 Gini index points while when the stringency increases to its third quartile, income inequality reduces by 0.261 Gini index points.

The effect of the tightening of other macroprudential policies, including measures in the area of liquidity and credit restrictions, to income inequality is similar to the effect of the overall tightening macroprudential policy. Specifically, the tightening of other measures leads to a reduction in income inequality at higher levels of microprudential policy stringency, and the effect is amplified as the stringency increases. As Table 5 shows, when other measures tightening and microprudential policy reach their averages, income inequality reduces by 0.004 Gini index points while when the stringency increases to its third quartile, income inequality reduces by 0.071 Gini index points. On the contrary, if the supervision and regulation gets loose to its first quartile level, income inequality rises by 0.063 Gini index points. Thus, if individual banks must follow respective macroprudential guidelines, liquidity limits and credit restrictions act as a preventive precaution against systemic problems. As loan restrictions do not directly target lending to individuals based on their level of income (DSTI) or purpose and collateral (LTV), banks are not mandated to differentiate between borrowers. Therefore, as long as banks comply with responsible and fair lending practices, the poor are not negatively affected by the tightening of other macroprudential measures, and

rather benefit from them as they prevent the accumulation of financial imbalances. Borrower-based measures tightening does not appear to affect income inequality by itself or in interaction with microprudential regulation and supervision.

In summary, our findings are consistent with those of Malovaná et al. (2023) in terms of the effects of tightening capital-based and other measures on income inequality, Ekinci and Özcan (2021) and Krishnamurti and Carol Lee (2014). Malovaná et al. (2023) conclude that the tightening of capital-based and liquidity-based measures reduces income inequality through the crisis mitigation and prevention channel, while tightening borrower-based instruments lead to a rise in income inequality through the credit redistribution channel. Our results confirm that the tightening of capital-based and liquidity-based instruments reduces income inequality. However, our findings do not provide evidence of the presence of the credit redistribution channel. Moreover, we show that in an environment of weak bank regulation and supervision, the effects of tighter macroprudential regulations on income inequality are reversed except for capital-based measures. Ekinci and Özcan (2021) emphasize the importance of enhanced microprudential supervision in the effectiveness of macroprudential regulation in preventing financial imbalances.

Table 5: Effects of Macroprudential Policies on Income Inequality Conditional on Microprudential Policy in the Full Sample

Condition	Effects of average levels on income inequality			
Microprudential Policy	**Macroprudential Policy**	**CBM**	**BBM**	**OM**
Q1	0.134	–0.107	0.000	0.063
Median	0.022	–0.169	0.000	0.010
Mean	–0.003	–0.183	0.000	–0.004
Q3	–0.144	–0.261	0.000	–0.072

Source: authors' calculations, only statistically significant effects are included in the calculations

Malovaná et al. (2023) provide empirical evidence that effects related to crisis mitigation and prevention channel are more persistent and pronounced in EMDE, while the credit redistribution channel is dominant in AE. For this reason, we reestimated the models with interactions between macroprudential and microprudential policy separately for AE and EMDE. The regression results for AE are presented in Table 6. Compared to results for the full sample of countries, there is no statistically significant evidence that tightening macroprudential policy as a whole affects income inequality in AE. The only group of macroprudential policy instruments whose tightening impacts income inequality in AE are capital-based measures. Concretely, their tightening leads to an increase in income inequality at almost all levels of microprudential policy stringency. However, as the supervisory and regulatory stringency increases, the positive effect diminishes and eventually reverses and becomes negative. In specific terms, as shown in Table 7, given both capital-based measures tightening and microprudential policy get at their average levels, income inequality rises by 0.030 Gini index points. When microprudential policy decreases to its first quartile, income inequality rises by 0.163 Gini index point while when it increases to its third quartile, income inequality decreases by 0.100 Gini index points. Therefore, tightening capital-based measures in AE rather restrict the funds banks can provide to public and thus increase inequality while the effect of crisis mitigation and prevention channel is limited and operates only in an environment of the highest levels of supervisory and regulatory stringency.

Since according to Malovaná et al. (2023), the crisis mitigation and prevention channel is typical of EMDE, the effect of tightening capital-based measures alters in AE probably precisely because of the exclusion of these countries. However, our findings do not align with the conclusion of Malovaná et al. (2023), that in AE the application of borrower-based instruments affects income inequality by influencing credit and house price growth through the credit redistribution channel.

Table 6: Interactions between Macroprudential Policy and Macroprudential Policy for Advanced Economies

	Dependent variable: Gini Coefficient				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	−3.717**	−3.938*	−3.158	−2.976	−2.548
and Supervision	(1.671)	(2.111)	(2.110)	(2.062)	(1.947)
Macroprudential		**482.880**	**478.893****	**89.146**	**76.777**
Policy Index		**(384.806)**	**(240.985)**	**(151.467)**	**(88.084)**
Interaction		**−670.870**	**−835.373***	**−127.419**	**−126.556**
		(584.556)	**(481.668)**	**(200.225)**	**(131.122)**
Lagged Gini (−1)	0.740***	0.873***	0.777***	0.760***	0.728***
	(0.219)	(0.206)	(0.164)	(0.215)	(0.197)
…					
Observations	147	147	147	147	147
AR (2)	0.440	0.632	0.768	0.599	0.586
Sargan-Hansen	0.711	0.769	0.672	0.402	0.440

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variable are available upon request.

Table 7: Effect of Macroprudential Policies Conditional on Microprudential Policy in Advanced Economies

Condition	**Effects of average levels on income inequality**			
Microprudential Policy	**Macroprudential Policy**	**CBM**	**BBM**	**OM**
Q1	0.000	0.163	0.000	0.000
Median	0.000	0.032	0.000	0.000
Mean	0.000	0.030	0.000	0.000
Q3	0.000	–0.100	0.000	0.000

Source: authors' calculations, only statistically significant effects are included in the calculations

Similar to AE, we reestimated the models for the EMDE subsample. The regression results are presented in Table 8. The interaction terms for the overall macroprudential policy tightening as well as for the tightening of capital-based and other measures are statistically significant even at the 1% level of significance. Overall macroprudential policy tightening as well as tightening capital-based and other measures lead to a reduction in income inequality at all levels of microprudential policy stringency. Furthermore, their effects on income inequality are again amplified in an environment of intensive supervision and regulation. As for borrower-based measures, there is no significant evidence that they affect income inequality as measured by the Gini coefficient in EMDE.

As Table 9 presents, if microprudential policy and macroprudential policy indices increase to their average levels, income inequality decreases by 0.235 Gini index points whereas when microprudential policy rigor rises to its third quartile level, the effect on the income inequality reduction is 0.295 Gini index points. Tightening capital-based measures are the most prominent in contributing to income inequality decrease in EMDE. Given microprudential policy and capital-based tightening get at their average levels, income inequality decreases by 0.265 Gini index points. Under the same circumstances, for other measures, income inequality reduces by 0.131 Gini index points.

Our results are consistent with the findings of Malovaná et al. (2023) with respect to the predominance of the crisis mitigation and prevention channel in EMDE, through which tightening capital-based and other measures reduce income inequality, while the impact of borrower-based instruments is limited. Nonetheless, we provide evidence that macroprudential policy tightening leads to a greater reduction in income inequality when conducted under strong and thorough supervision and regulation aimed at proper compliance with mandated guidelines. Conversely, if implemented under weak supervision, the preventive effect of tightening capital-based and other measures may be limited.

Table 8: Interactions between Macroprudential Policy and Macroprudential Policy for Emerging Markets and Developing Economies

	Dependent variable: Gini Coefficient				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	−1.638	−1.303	0.300	−1.969	−2.049
and Supervision	(2.690)	(2.278)	(2.306)	(3.020)	(2.225)
Macroprudential		118.128	69.421	−29.911	82.407
Policy Index		(103.411)	(50.681)	(41.367)	(57.285)
Interaction		**−480.369****	**−535.629*****	**36.938**	**−297.408*****
		(189.961)	**(152.658)**	**(84.503)**	**(97.663)**
Lagged Gini (-1)	0.756***	0.632***	0.755***	0.772***	0.645***
	(0.137)	(0.112)	(0.099)	(0.142)	(0.094)
…					
Observations	204	204	204	204	204
AR (2)	0.885	0.116	0.880	0.792	0.176
Sargan-Hansen	0.529	0.928	0.804	0.623	0.933

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variable are available upon request.

Table 9: Effect of Macroprudential Policies Conditional on Microprudential Policy in Emerging Markets and Developing Economies

Condition	**Effects of average levels on income inequality**			
Microprudential Policy	**Macroprudential Policy**	**CBM**	**BBM**	**OM**
Q1	–0.131	–0.148	0.000	–0.074
Median	–0.210	–0.237	0.000	–0.118
Mean	–0.235	–0.265	0.000	–0.131
Q3	–0.295	–0.333	0.000	–0.165

Source: authors' calculations, only statistically significant effects are included in the calculations

6 Robustness Checks

To evaluate the robustness of the obtained results, models with different sets of control variables are estimated, alternative measures of income inequality are incorporated, macroprudential policy index is divided into loosening and tightening actions, and five-year averages instead of three-year averages are used.

To verify that alternative sets of control variables do not change the regression results, additional models are estimated as Table 10 presents. Firstly, control variables that were not statistically significant in the original regression are eliminated. Secondly, as the variable of regulatory quality was chosen rather arbitrarily, we replace it with another governance indicator – rule of law. Thirdly, as some literature suggests that inflation, banking crises and policy rate contribute to changes in income inequality, models with each variable individually and together are estimated. Higher inflation, occurrence of banking crisis, and decrease in interest rate may disproportionally more affect the poor (Albanesi *et al.,* 2007, Malovaná *et al.*, 2023). Table 10 presents the regression results for the aggregate index of microprudential policy for the full sample of countries. The effect of microprudential policy on income inequality remains negative and statistically significant in almost all model specifications. When policy rate is included in model (5), microprudential policy is statistically significant only at 11% level. The magnitude of the effect slightly changes but the difference is not inordinately large. Thus, the results on the effect of microprudential policy on income inequality are robust to different sets of control variables.

Table 10: Estimation Results with Different Control Variables

	Dependent variable: Gini coefficient					
	(1)	(2)	(3)	(4)	(5)	(6)
Bank Regulation	**−4.681*** **	**−5.535** **	**−4.503*** **	**−2.863** **	**−3.591**	**−4.562** **
and Supervision	**(1.319)**	**(2.645)**	**(1.391)**	**(1.221)**	**(2.201)**	**(2.265)**
Lagged Gini (−1)	0.795***	0.760***	0.760***	0.687*	0.625**	0.660***
	(0.168)	(0.139)	(0.139)	(0.411)	(0.283)	(0.212)
Financial	17.186***	10.428*	11.664***	10.510	9.956	12.173*
Liberalization	(6.627)	(5.658)	(4.292)	(7.195)	(8.956)	(6.984)
Population	0.777**	0.704*	0.620*	0.771	0.914	0.858***
	(0.329)	(0.384)	(0.322)	(1.122)	(0.718)	(0.325)
GDP per Capita	11.500**	22.996	15.136*	−4.787	−6.841	−5.346
	(4.718)	(19.319)	(9.152)	(21.245)	(17.163)	(15.043)
GDP per Capita sq.	−23.563**	−43.499	−28.602	9.587	13.998	10.808
	(10.033)	(36.600)	(17.685)	(43.130)	(34.212)	(29.943)
Unemployment	0.309*	0.324**	0.325***	0.299***	0.340***	0.337***
	(0.158)	(0.126)	(0.114)	(0.099)	(0.103)	(0.104)
Fiscal Policy	0.071	0.030	−0.005	0.016	0.018	0.012
	(0.083)	(0.069)	(0.072)	(0.086)	(0.091)	(0.044)
Human Capital		0.195	−0.082	−1.090	−1.098	−1.346
		(0.549)	(0.471)	(1.917)	(1.415)	(0.943)
Trade Openness		0.014	0.008	0.018	0.018	0.016
		(0.020)	(0.011)	(0.030)	(0.029)	(0.013)
Financial		0.002	0.0002	0.011	0.013	0.011
Development		(0.011)	(0.008)	(0.012)	(0.010)	(0.007)
Regulatory Quality			−0.904	0.322	0.470	0.709
			(0.860)	(2.876)	(2.730)	(2.716)
Rule of Law		−1.822				
		(2.034)				
Banking Crisis			0.031			0.333
			(0.769)			(0.833)
Inflation				−0.054		0.130
				(0.223)		(0.266)
Policy Rate					−0.069	−0.197
					(0.186)	(0.130)
Observations	381	381	381	209	209	209
AR (2)	0.577	0.551	0.579	0.637	0.544	0.602
Sargan-Hansen	0.963	0.587	0.688	0.623	0.486	0.388

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively.

In addition to assessing the impact of microprudential bank regulation and supervision on income inequality as measured by the Gini index, we also resorted to an alternative measure of income inequality as demonstrated in Chapter 3 – income shares. Specifically, the share of income held by the top 1%, top 5%, top 10%, and bottom 10% of the income distribution as well as the difference between the top 10% and bottom 10% were used as alternative dependent variables. The bottom 1% and bottom 5% of the income distribution were not used due to the insufficiency of non-zero values in the data. Delis et al. (2014) in their paper

suggest using the incomes of individuals at the top and bottom of the income distribution as one potential extension of their work.

The estimation results for the income share held by the top 10% of the income distribution without a difference between EMDE and AE are shown in Table 11. Compared to using the Gini index as the dependent variable, microprudential policy measures do not exhibit any statistically significant relationship with the income share held by the top 10%. One interesting finding emerges in the case of AE as presented in Table A. 10 in the Annex. Although the overall index of microprudential policy does not have a statistically significant effect on income inequality, separate adoption of Basel Accords does. Specifically, the adoption of the improved (new) version of the Basel Accords results in an increase in the share of income of the top 10% and this effect is statistically significant even at the 1% significance level.[7] Regression results for the subset of EMDE are presented in Table A. 11. Analogously to the findings for the full sample of countries, none of the individual microprudential policy measures or the overall microprudential policy index affect the income share of the top 10% of the income distribution in a statistically significant way.

The models were also reestimated for the top 1% and top 5% of the income distribution. Due to the redundancy of the analysis, the results are only available upon request. When top 10% is replaced by the income share of the top 5%, the results remain practically unchanged. In AE, the magnitude of the effect of Basel Accords adoption decreases although it remains statistically significant. Using the share of income of the top 1% of the income distribution as the dependent variable, none of the microprudential policies significantly affect income inequality even when distinguishing between AE and EMDE.

[7] One possible rationale may be that Basel Accords impose stricter capital adequacy and risk management requirements on banks, which may act as barriers to entry for smaller financial institutions due to increased compliance costs such as investment in risk management systems, regulatory reporting, and compliance personnel. Larger banks may then consolidate their market share and increase their profitability. The income generated by these big banks may disproportionally benefit top executives and shareholders and contribute to a higher income share of the top 10%.

Table 11: Estimation Results for the Top 10% for the Full Sample

	Dependent variable: Top 10%					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**−3.600**	**1.327**	**−3.127**	**3.549**	**−5.772**	**1.117**
and Supervision	**(6.126)**	**(2.607)**	**(3.328)**	**(2.275)**	**(3.708)**	**(1.830)**
Lagged Top 10%	0.436	0.716**	0.499*	0.788***	0.375*	0.593***
(−1)	(0.315)	(0.312)	(0.265)	(0.255)	(0.214)	(0.220)
Population	2.371	0.185	2.253*	0.162	2.775**	0.993
	(1.968)	(1.870)	(1.351)	(1.348)	(1.207)	(1.282)
GDP per Capita	−65.930**	−55.651	−77.679***	−42.878	−79.921***	−69.660**
	(28.494)	(37.332)	(27.122)	(32.508)	(23.950)	(28.952)
GDP per Capita sq.	122.256**	107.072	143.926***	81.647	147.176***	131.998**
	(54.278)	(69.906)	(50.600)	(61.236)	(44.561)	(55.687)
Unemployment	0.145	0.265	0.058	0.283	0.066	0.265
	(0.348)	(0.250)	(0.295)	(0.233)	(0.287)	(0.238)
Human Capital	5.627	2.525	6.575*	2.280	6.299*	3.570*
	(4.053)	(3.364)	(3.699)	(1.947)	(3.391)	(1.987)
Trade Openness	0.067	−0.003	0.054	−0.005	0.080*	0.008
	(0.077)	(0.049)	(0.044)	(0.035)	(0.047)	(0.033)
Fiscal Policy	−0.151	−0.364**	−0.122	−0.213	−0.073	−0.217
	(0.236)	(0.167)	(0.198)	(0.182)	(0.186)	(0.201)
Financial	0.037	0.034	0.041	0.027	0.034	0.031
Development	(0.027)	(0.030)	(0.028)	(0.026)	(0.024)	(0.026)
Regulatory Quality	3.457	3.212	4.517	2.106	4.413	3.702
	(3.613)	(2.799)	(3.802)	(2.425)	(3.296)	(2.683)
Financial	4.046	−4.873	−0.298	−4.569	8.350	−2.827
Liberalization	(14.458)	(10.562)	(13.044)	(11.866)	(11.220)	(12.688)
Observations	369	369	369	369	369	369
AR (2)	0.719	0.696	0.721	0.764	0.483	0.834
Sargan-Hansen	0.128	0.051	0.070	0.072	0.156	0.121

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively.

Whether and how the stringency of microprudential policy affects the incomes of individuals at the lower extreme end of the income distribution is examined using the income share of the bottom 10% of the income distribution as the dependent variable. Regression results for the full sample of countries are shown in Table 12. Similar to the findings for the top 10% of the income distribution, microprudential policy does not have a statistically significant effect on the income share of the bottom 10% as a whole, and the same is true for its individual instruments.[8] With respect to the income share of the bottom 10% of the income distribution in AE, the situation begins to show a different pattern. Although microprudential policy is shown to reduce income inequality when assessing its impact on the middle of the income distribution, it reduces the income share of low-income individuals. As can be seen in Table

[8] One potential reason for this finding is that low-income individuals rarely apply for loans for investment opportunities and rather use them for everyday needs such as housing. Furthermore, it is likely that they have a small surplus of funds that can be deposited in a bank. In conclusion, microprudential policy may not have a proper transmission channel to influence the income of the bottom 10%.

A. 12, the overall intensification of microprudential policy as well as better site supervision and greater supervisory power result in a reduction of the income share of the bottom 10%. Table A. 13 illustrates that microprudential policy in EMDE has no discernible impact on low-income people.

Table 12: Estimation Results for the Bottom 10% for the Full Sample

	Dependent variable: Bottom 10%					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**−0.009**	**−0.004**	**−0.040**	**−0.025**	**−0.009**	**−0.003**
and Supervision	**(0.050)**	**(0.030)**	**(0.050)**	**(0.049)**	**(0.028)**	**(0.025)**
Lagged Bottom	0.627**	0.668**	0.562**	0.660***	0.627**	0.550*
10% (−1)	(0.276)	(0.269)	(0.281)	(0.255)	(0.273)	(0.328)
Population	0.010	0.008	0.025	0.014	0.019	0.017
	(0.022)	(0.019)	(0.023)	(0.024)	(0.021)	(0.019)
GDP per Capita	0.427	0.475	0.682*	0.364	0.563	0.419
	(0.377)	(0.364)	(0.378)	(0.336)	(0.383)	(0.382)
GDP per Capita sq.	−0.737	−0.820	−1.214*	−0.647	−1.003	−0.725
	(0.707)	(0.672)	(0.706)	(0.618)	(0.700)	(0.709)
Unemployment	−0.0001	−0.001	−0.002	−0.001	−0.002	−0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Human Capital	−0.040	−0.044	−0.056	−0.026	−0.050	−0.048
	(0.044)	(0.041)	(0.039)	(0.041)	(0.052)	(0.049)
Trade Openness	−0.0004	−0.0005	−0.0003	−0.0002	−0.0003	−0.0004
	(0.0004)	(0.0005)	(0.001)	(0.0004)	(0.001)	(0.001)
Fiscal Policy	−0.0002	−0.0003	0.001	0.0003	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Financial	−0.0003	−0.0003	−0.0003	−0.0002	−0.0002	−0.0002
Development	(0.0004)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Regulatory Quality	−0.017	−0.029	−0.035	−0.014	−0.033	−0.017
	(0.031)	(0.035)	(0.034)	(0.029)	(0.031)	(0.029)
Financial	−0.112	−0.123	−0.122	−0.040	−0.073	−0.115
Liberalization	(0.140)	(0.133)	(0.154)	(0.132)	(0.150)	(0.143)
Observations	369	369	369	369	369	369
AR (2)	0.848	0.874	0.723	0.857	0.857	0.861
Sargan-Hansen	0.235	0.417	0.328	0.231	0.431	0.155

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively.

To account for factors that directly contribute to the widening of the income gap between high- and low-income individuals, we also reestimated the baseline model (1) with the dependent variable being the difference between the income shares of the top 10% and bottom 10%. Regression results on the effect of microprudential policy stringency are analogous to those found in the models with the income share of the top 10%, according to Table A. 14 through Table A. 16 in the Annex. In AE, the very adoption of the Basel Accords causes the gap between high- and low-income groups to widen.

Income shares of the top 10% and bottom 10% are also used to inspect the interaction effect between macroprudential and microprudential policies on income inequality. Regression results for the full sample of countries using the income share of the top 10% as a dependent

variable are presented in Table 13. Results using the income share of the bottom 10% are provided in Table 14. As evident, both the separate and interaction effects of macroprudential policies are statistically insignificant in all models. Analogously, there is no statistically significant evidence that macroprudential policies both alone and in interaction with microprudential policy affect the share of income of the top 10% and bottom 10% when distinguishing between AE and EMDE. Regressions results for AE and EMDE are presented in Table A. 17–Table A. 20 in the Annex.

To conclude, analyses based on income shares do not fully support our findings based on the Gini coefficient. Thus, the baseline results may not be considered very robust to changes in dependent variables. However, income shares capture income inequality from a different perspective than the Gini coefficient as they focus on specific quantiles of income distribution. Moreover, the coverage of countries and years and the comparability between countries is superior for the Gini coefficient.

Table 13: Interactions using Top 10% for the Full Sample

	Dependent variable: Top 10%				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	−0.321	0.394	−0.105	−0.954	0.391
and Supervision	(2.203)	(2.482)	(3.928)	(2.089)	(2.409)
Macroprudential		8.476	−65.616	−89.755	14.494
Policy Index		(156.267)	(219.819)	(73.584)	(96.423)
Interaction		**−83.081**	**126.734**	**153.506**	**−85.021**
		(290.015)	**(687.512)**	**(127.176)**	**(159.771)**
Lagged Top 10%	0.768***	0.796***	0.777***	0.755***	0.784***
(−1)	(0.263)	(0.264)	(0.293)	(0.254)	(0.257)
…					
Observations	339	339	339	339	339
AR (2)	0.735	0.602	0.601	0.936	0.556
Sargan-Hansen	0.113	0.132	0.118	0.131	0.140

The table reports coefficient estimates and t−statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital−based measures, BBM for borrower−based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Table 14: Interactions using Bottom 10% for the Full Sample

	Dependent variable: Bottom 10%				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	−0.012	0.002	0.018	−0.016	0.000
and Supervision	(0.028)	(0.033)	(0.032)	(0.038)	(0.029)
Macroprudential		−2.377	0.0002	0.509	−1.949
Policy Index		(3.718)	(3.309)	(0.760)	(1.940)
Interaction		**2.410**	**−2.489**	**−0.779**	**1.985**
		(5.697)	**(7.006)**	**(1.386)**	**(3.362)**
Lagged Bottom	0.845***	0.689**	0.854***	0.853***	0.728***
10% (−1)	(0.247)	(0.286)	(0.260)	(0.254)	(0.268)
…					
Observations	339	339	339	339	339
AR (2)	0.735	0.602	0.601	0.936	0.556
Sargan-Hansen	0.113	0.132	0.118	0.131	0.140

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Although research to date focuses primarily on the effect of macroprudential policy tightening, we also assessed the interactions both with macroprudential policy tightening and its loosening. According to BIS (2022), the effects of macroprudential policy on the credit growth are asymmetric. In concrete terms, macroprudential policy easing has a weaker effect on credit growth than a tightening. We thus transformed the three-year averages of the macroprudential policy index into two dummy variables, one for its tightening and one for loosening. The dummy variable on tightening takes value 1 when the three-year average of the index is positive and 0 else, and the dummy variable on loosening takes value 1 if the three-year average of the index is negative and 0 else. The interaction term between macroprudential and microprudential policy, and the macroprudential policy dummy variable were added into the equation separately for macroprudential policy loosening and tightening.

Regression results for the full sample of countries and Gini coefficient being the dependent variables are presented in Table 15 for macroprudential policy tightening and in Table 16 for its loosening. Interaction effects of the overall macroprudential policy tightening as well as of the tightening of capital-based and other measures on income inequality are negative and statistically significant. Moreover, the effects of the overall macroprudential policy tightening and the tightening of other measures on income inequality can be both upward and downward depending on the stance of microprudential policy rigor; while stringent, macroprudential policy tightening reduces income inequality. Tightening of capital-based measures leads to a reduction in income inequality irrespective of microprudential policy. However, in all instances, more stringent microprudential policy reinforces the effect of macroprudential policy tightening on income inequality. Similar to the baseline results, borrower-based measures tightening does not significantly affect income inequality. Nonetheless, loosening borrower-based measures lead to a reduction in income inequality if supervision and regulation is robust and intensive. On the contrary, if individual banks are poorly regulated and supervised in the course of their easing, borrower-based policies lead to an increase in the Gini coefficient. The effect is again reinforced by microprudential policy

stringency. Therefore, the baseline results on the effect of the interaction between macroprudential and microprudential policies on income inequality are robust to the definition of the index of macroprudential policy tightening. The effect of borrower-based measures loosening is not however supported by the baseline results.

Table 15: Interaction between Macroprudential Tightening and Microprudential Policy for the Full Sample

	Dependent variable: Gini Coefficient				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	−4.231***	−0.877	−1.622	−3.233**	−1.438
and Supervision	(1.571)	(1.748)	(1.905)	(1.518)	(1.602)
Macroprudential		1.298*	0.790	1.854	0.887*
Tightening		(0.702)	(0.524)	(1.724)	(0.516)
Interaction		**−4.288****	**−3.700****	**−5.272**	**−3.589****
		(1.910)	**(1.729)**	**(4.346)**	**(1.432)**
Lagged Gini (−1)	0.756***	0.871***	0.799***	0.789***	0.911***
	(0.144)	(0.197)	(0.149)	(0.134)	(0.151)
…					
Observations	351	351	351	351	351
AR (2)	0.511	0.198	0.416	0.204	0.169
Sargan-Hansen	0.529	0.782	0.767	0.786	0.789

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Table 16: Interaction between Macroprudential Loosening and Microprudential Policy for the Full Sample

	Dependent variable: Gini Coefficient				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	–4.231***	–4.370***	–3.612**	–4.347***	–4.619***
and Supervision	(1.571)	(1.486)	(1.623)	(1.584)	(1.581)
Macroprudential		–1.726	–3.274	2.541*	–1.812
Loosening		(1.212)	(2.266)	(1.457)	(1.399)
Interaction		**3.119**	**6.090**	**–5.147***	**4.129**
		(2.626)	**(5.015)**	**(2.751)**	**(3.478)**
Lagged Gini (–1)	0.756***	0.760***	0.832***	0.712***	0.730***
	(0.144)	(0.160)	(0.201)	(0.134)	(0.157)
…					
Observations	351	351	351	351	351
AR (2)	0.511	0.641	0.414	0.442	0.543
Sargan-Hansen	0.529	0.650	0.539	0.511	0.908

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Additionally, models on the effect of microprudential policy and the effect of the interaction between microprudential and macroprudential policies on income inequality were estimated using five-year non-overlapping averages. Using five-year averages instead of three-year

averages is a common practice in research on the determinants of income inequality (Delis *et al.,* 2014; Brei *et al.,* 2023; de Haan & Sturm, 2017). In our baseline analysis, three-year averages were used due to the short panel's length.

Regression results on the effect of microprudential policies on income inequality as measured by the Gini index for the full sample of countries are presented in Table 17. Compared to three-year averages, the effect of the aggregate microprudential policy index gets negligibly smaller in magnitude and remains statistically significant. The effect of greater independence of a supervisory authority remains statistically significant and is even larger in magnitude. The effect of supervisory power is larger in magnitude compared to results using three-year averages but becomes insignificant. It would become significant at 14% level of significance which is not far from the reported threshold of 10%.

Furthermore, Table 18 shows the results on the interaction effects for the full sample of countries. Similar to the results based on three-year averages, the effects of a greater macroprudential policy index as well as of the tightening of capital-based and other measures are reinforced by strong individual bank regulation and supervision. In comparison to the baseline results, the sign of the effect of capital-based measures tightening depends on the supervisory and regulatory rigor whereas the effect of overall macroprudential policy tightening does not. Both the individual and interaction effects of borrower-based measures tightening remain statistically insignificant.

In conclusion, the effects of microprudential policies are robust to the change of the interval over which the data are averaged except for the effect of supervisory power, which is considered less robust. Furthermore, the results on the reinforced effect of macroprudential policy tightening on income inequality under more stringent microprudential policy are robust to intervals used for averages. The same applies to the tightening of capital-based measures and other instruments.

Table 17: Estimation Results using 5-year Averages for the Full Sample

	Dependent variable: Gini coefficient					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**−3.810****	**−1.062**	**−3.068**	**−2.574**	**−3.643****	**−1.522**
and Supervision	**(1.570)**	**(0.751)**	**(2.090)**	**(2.546)**	**(1.430)**	**(1.226)**
Lagged Gini (−1)	0.646***	0.632***	0.545**	0.634***	0.510***	0.581**
	(0.227)	(0.222)	(0.213)	(0.214)	(0.171)	(0.275)
Population	0.982*	0.919**	1.268***	0.934	0.782	0.873
	(0.536)	(0.442)	(0.464)	(0.580)	(0.478)	(0.561)
GDP per Capita	28.049**	19.483	26.399**	26.190**	21.602**	23.997
	(11.510)	(14.111)	(13.373)	(12.624)	(10.749)	(15.993)
GDP per Capita sq.	−52.808**	−36.787	−50.569**	−49.112**	−39.985*	−44.194
	(21.945)	(27.262)	(25.644)	(23.902)	(20.654)	(30.157)
Unemployment	0.271	0.262	0.198	0.192	0.427**	0.096
	(0.205)	(0.276)	(0.237)	(0.244)	(0.208)	(0.233)
Human Capital	−0.814	−1.025	−1.149	−1.096	−0.673	−1.273
	(0.822)	(0.876)	(0.813)	(0.877)	(0.679)	(0.974)
Trade Openness	0.009	0.005	0.011	0.006	−0.007	0.006
	(0.011)	(0.014)	(0.009)	(0.012)	(0.013)	(0.012)
Fiscal Policy	−0.012	0.024	0.054	0.035	−0.174	0.063
	(0.149)	(0.186)	(0.159)	(0.165)	(0.156)	(0.169)
Financial	−0.017	−0.010	−0.008	−0.024	0.005	−0.029
Development	(0.014)	(0.025)	(0.023)	(0.019)	(0.027)	(0.021)
Regulatory Quality	−1.666	−1.517	−2.359	−1.800	−1.532	−1.815
	(1.408)	(2.478)	(1.781)	(1.549)	(1.504)	(2.207)
Financial	21.125	20.254	28.712**	21.264	27.860**	20.137
Liberalization	(13.140)	(17.905)	(11.979)	(15.517)	(13.736)	(16.500)
Observations	261	261	261	261	261	261
AR (2)	0.936	0.737	0.401	0.965	0.814	0.632
Sargan-Hansen	0.620	0.237	0.546	0.221	0.715	0.278

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively.

Table 18: Interaction between Macroprudential and Microprudential Policy on 5-year Averages for the Full Sample

	Dependent variable: Gini Coefficient				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	−3.542**	0.691	0.029	−3.483**	−0.506
and Supervision	(1.579)	(2.005)	(2.125)	(1.767)	(1.704)
Macroprudential		154.720	453.450*	−28.078	97.956*
Policy Index		(122.971)	(231.974)	(39.854)	(58.666)
Interaction		**−558.465****	**−1,061.646****	**42.158**	**−359.693****
		(260.442)	**(418.922)**	**(60.076)**	**(147.623)**
Lagged Gini (−1)	0.751***	0.693**	0.603*	0.829***	0.747***
	(0.283)	(0.280)	(0.356)	(0.225)	(0.224)
…					
Observations	239	239	239	239	239
AR (2)	0.659	0.395	0.489	0.559	0.529
Sargan−Hansen	0.313	0.519	0.293	0.339	0.612

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variable are available upon request.

7 Conclusions

This paper, for the first time, evaluates the link between microprudential regulatory and supervisory policies and income inequality. The aim of this paper is to assess the impact of microprudential policy on income inequality and to evaluate the effect of different groups of macroprudential policies on income inequality depending on the microprudential policy settings. Previous research has focused only on the unconditional impact of macroprudential policies on income inequality. In addition, this analysis estimates the effects of numerous different regulatory instruments of microprudential policy, i.e. supervisory power, supervisory independence, site supervision, adoption of the Basel Accords, and global consolidation and cooperation, on income inequality. Differences between AE and EMDE are also controlled for. Three-year averages of data on 70 countries over the period 1996−2013 were employed, using the market Gini coefficient as the dependent variable. The robustness of the results was tested by changing the set of control variables, using income shares as an alternative dependent variable, employing alternative measure of macroprudential policy tightening and loosening, and changing the time interval over which the data were averaged.

The results of the analyses are as follows: (1) Tighter microprudential policies lead to lower levels of income inequality as measured by the market Gini coefficient. This result also holds for individual regulatory and supervisory policies, namely greater supervisory power and supervisory independence. In AE, the combined effect of microprudential policies leads to a reduction in income inequality, in contrast to EMDE, where the effect is insignificant. (2) The effects of individual microprudential policies differ and vary between AE and EMDE. Supervisory authority power and its independence significantly reduce income inequality across the entire sample of countries. In AE, supervisory power is the only instrument

leading to a reduction in income inequality, while in EMDE, the independence of the supervisor prevails. Thus, microprudential policy in AE reduces income inequality through the channel of mitigating individual bank risks and enhancing financial system stability, while in EMDE the channel of eliminating related party lending contributes to lower levels of income inequality. (3) The effects of macroprudential policy instruments on income inequality are enhanced when they are implemented within a strong microprudential policy framework. In addition, the objective of macroprudential policy to prevent financial imbalances and crises and thereby reduce income inequality may be limited or even eliminated in an environment of weak regulation and supervision of individual banks. These results are mainly affected by capital-based and other measures, which are prominent in the full sample and in EMDE, while the impact of other measures is limited in AE. In our analysis, there is no evidence of either an independent or an interaction effect of the tightening of borrower-based measures on income inequality.

Policy implications are as follows. First, a strict microprudential policy can incentivize banks to increase regulatory discipline to prevent banking risks through increased transparency and bank creditworthiness without harming the relatively poor. However, policymakers should take into account differences between countries based on their economic development. In AE, greater supervisory powers can mitigate the negative effects of financial imbalances and prevent bank failures. However, in EMDE, income distribution can be more evenly distributed by limiting the control of influential parties with pre-existing relationships to banks. Second, countries can benefit from the stabilising effect of tighter macroprudential policy if it is implemented within a framework of strong individual bank regulation and supervision that ensures that banks comply with prescribed requirements. Moreover, microprudential policy reinforces the effect of macroprudential tightening on income inequality. Therefore, it is essential to take the microprudential policy stance into account when introducing macroprudential policy instruments.

Given the lack of research on the relationship between income inequality and microprudential policies, further research is needed. One possible extension may be the use of alternative measures of income inequality that have not been used in this analysis, such as the Theil or Hoover indices. Further, the interaction between monetary policy and microprudential regulation can be assessed, since, as in the case of macroprudential regulation, the research focuses mainly on the unconditional effect of monetary policy on income inequality. In addition, as the database on financial sector policies grows, data over longer time periods can be used if available. Similarly, more precise measures of microprudential policy can be used to better capture its impact on income inequality.

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Annex

Table A. 1: List of Variables and Their Sources

Variable	Description	Source
Gini index	Gini index as a measure of market income inequality (%)	Standardized World Inequality Database (Solt, 2016)
Microprudential Index	Aggregate index of the bank regulation and supervision constructed as the unweighted average of the five normalized subdimensions	Financial Reform Database (Omori, 2022)
Basel	Index representing adoption of Basel standards	Financial Reform Database (Omori, 2022)
Independence	Index representing independence of the banking supervisory agency	Financial Reform Database (Omori, 2022)
Power	Index representing supervisory power of the banking supervisory agency	Financial Reform Database (Omori, 2022)
SiteSup	Index representing site supervision	Financial Reform Database (Omori, 2022)
Global Consolidation	Index representing no exceptions and global consolidation of supervision	Financial Reform Database (Omori, 2022)
GDP per Capita	Gross Domestic Product per capita (constant 2015 U.S. dollars)	World Development Indicators
Human Capital Index	Human capital index based on average years of schooling and returns on education	Penn World Table 10.01
Population	Country population in millions	Penn World Table 10.01
Trade Openness	Sum of exports and imports as a share of GDP (%)	Our World in Data
Government Expenditures	Central Government Spending as a share of GDP (%)	Our World in Data
Financial Development	Domestic credit to private sector by banks as share of GDP (%)	World Development Indicators
Unemployment Rate	Unemployment as a share of total labour force (%)	World Development Indicators
Top 1%	Pre-tax income shares of households in the top 1% of income distribution (%)	World Inequality Database
Top 5%	Pre-tax income shares of households in the top 5% of income distribution (%)	World Inequality Database
Top 10%	Pre-tax income shares of households in the top 10% of income distribution (%)	World Inequality Database
Bottom 10%	Pre-tax income shares of households in the bottom 10% of income distribution (%)	World Inequality Database
Macroprudential Index	Aggregate normalized index the use of macroprudential policy tools	iMaPP Database
Borrower-based measures	Normalized index of the use of borrower-based macroprudential policy tools	iMaPP Database
Capital-based measures	Normalized index of the use of capital-based macroprudential policy tools	iMaPP Database
Other measures	Normalized index of the use of other macroprudential policy tools	iMaPP Database
Regulatory Quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development; ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance	Worldwide Governance Indicators
Financial Liberalization	Normalized aggregate index of financial liberalization	Financial Reform Database (Omori, 2022)

Note: The definition of the variable Regulatory Quality is taken from Worldwide Governance Indicators database.

Table A. 2: List of Countries

Advanced Economies	Emerging Markets and Developing Economies
Australia	Albania
Austria	Armenia
Belgium	Azerbaijan
Canada	Bangladesh

Advanced Economies	Emerging Markets and Developing Economies
Czech Republic	Belarus
Denmark	Botswana
Estonia	Brazil
Finland	Bulgaria
France	Burkina Faso
Germany	Colombia
Greece	Costa Rica
Iceland	Cote d'Ivoire
Ireland	Croatia
Israel	El Salvador
Italy	Georgia
Japan	Ghana
Latvia	Hungary
Lithuania	Chile
Netherlands	India
New Zealand	Indonesia
Norway	Jamaica
Portugal	Jordan
Singapore	Malaysia
Slovak Republic	Mexico
Slovenia	Morocco
Sweden	Mozambique
Switzerland	Nepal
United Kingdom	Pakistan
United States	Paraguay
	Peru
	Philippines
	Poland
	Romania
	Russia
	South Africa
	Sri Lanka
	Thailand
	Tunisia
	Ukraine
	Uruguay
	Zambia

Note: The classification of Advanced Economies and Emerging and Developing Economies is based on IMF's World Economic Outlook 2018.

Table A. 3: Definitions and Coding Rules of Microprudential Policy Indicators

Indicator	Description
Adoption of the Basel Standards	Coded as 0 if Basel I is not implemented. Coded as 1 if Basel I is implemented. Coded as 2 if Basel II is implemented. Coded as 3 if Basel II.5 is implemented.
Independence of the Banking Supervisory Agency	Based on the addition of two conditions: (i) *Composition of the board of directors:* if the jurisdiction of banking supervision is under the ministry of finance or if the board of directors includes a member of government agency or a member of a financial institutions, it is coded as 0. Else, it is coded as1. (ii) *Removal conditions:* if the conditions on the removal of the head of a banking supervision is not clearly stated and/or specific circumstances under which the head of the banking supervision agency can be dismissed are not stated, it is coded as 0. Else, it is coded as1. Coded as 0 if the sum of (i) and (ii) is 0. Coded as 1 if the sum of (i) and (ii) is 1. Coded as 2 if the sum of (i) and (ii) is 2.
Supervisory Power of the Banking Supervisory Agency	Based on the addition of three conditions: (i) A wide range of sanction and remedial measures for the bank

Indicator	Description
	supervisory agency is legally given. (ii) Banking supervisory agency has measures enabling proactive early intervention. (iii) Banking supervisory agency is able to use its tools without major problems such as asking for approval from the government. Coded as 0 if none or one of the conditions is met. Coded as 1 if two of the conditions are met. Coded as 2 if all three conditions are met.
Site Supervision	Coded as 0 if on-site and off-site examinations are not conducted or are conducted in a problematic manner. Coded as 1 if on-site and off-site examinations are conducted but there are still problems of supervision. Coded as 2 if effective risk-based examinations are conducted.
No Exceptions and Global Consolidation of Supervision	Based on the addition of two conditions: (i) Banking supervisory agency supervises banks and nonbank financial institutions on a consolidated basis with no exceptions. (ii) Banking supervisory agency cooperates with foreign banking supervisory agencies to establish effective cross-border supervision. Coded as 0 if no condition is met. Coded as 1 if one of the two conditions is met. Coded as 2 if both criteria are met.

Note: Definitions and Indicators are taken from the Financial Reform Database by Omori (2022).

Table A. 4: Definitions of Macroprudential Policy Tools

Tool	Definition
CCB	A requirement for banks to maintain a countercyclical capital buffer. Implementations at 0% are not considered as a tightening in dummy-type indicators.
Conservation	Requirements for banks to maintain a capital conservation buffer, including the one established under Basel III.
Capital	Capital requirements for banks, which include risk weights, systemic risk buffers, and minimum capital requirements. Countercyclical capital buffers and capital conservation buffers are captured in their sheets respectively and thus not included here.
LVR	A limit on leverage of banks, calculated by dividing a measure of capital by the bank's non-risk-weighted exposures (e.g., Basel III leverage ratio).
LLP	Loan loss provision requirements for macroprudential purposes, which include dynamic provisioning and sectoral provisions (e.g. housing loans).
LCG	Limits on growth or the volume of aggregate credit, the household-sector credit, or the corporate-sector credit, and penalties for high credit growth.
LoanR	Loan restrictions, that are more tailored than those captured in "LCG". They include loan limits and prohibitions, which may be conditioned on loan characteristics (e.g., the maturity, the size, the LTV ratio and the type of interest rate of loans), lender characteristics (e.g., mortgage banks), and other factors.
LFC	Limits on foreign currency (FC) lending, and rules or recommendations on FC loans.
LTV	Limits to the loan-to-value ratios, applied to residential and commercial mortgages but also applicable to other secured loans, such as for automobiles. Other aspects of the LTV regulation are also covered, such as "speed limits" (i.e., a regulation on the percent of new loans that can go above certain LTV limits).
DSTI	Limits to the debt-service-to-income ratio and the loan-to-

Tool	Definition
	income ratio, which restrict the size of debt service payments or the size of a loan relative to income (e.g., household income, net operating income of the company).
Tax	Taxes and levies applied to specified transactions, assets, or liabilities, which include stamp duties, and capital gain taxes.
Liquidity	Measures taken to mitigate systemic liquidity and funding risks, including minimum requirements for liquidity coverage ratios, liquid asset ratios, net stable funding ratios, core funding ratios and external debt restrictions that do not distinguish currencies.
LTD	Limits to the loan-to-deposit (LTD) ratio and penalties for high LTD ratios.
LFX	Limits on net or gross open foreign exchange (FX) positions, limits on FX exposures and FX funding, and currency mismatch regulations.
RR	Reserve requirements (domestic or foreign currency) for macroprudential purposes. Please note that this category may currently include those for monetary policy as distinguishing those for macroprudential or monetary policy purposes is often not clear-cut
SIFI	Measures taken to mitigate risks from global and domestic systemically important financial institutions (SIFIs), which includes capital and liquidity surcharges.
Other	Macroprudential measures not captured in the above categories—e.g., stress testing, restrictions on profit distribution, and structural measures (e.g., limits on exposures between financial institutions).

Note: Definitions and Indicators are taken from iMaPP database by Alam et al. (2019).

Table A. 5: Grouping of Macroprudential Policy Tools

Group	Abbreviation	Type of Tools
Borrower-based measures	*BBM*	LTV, DSTI
Capital-based measures	*CBM*	CCB, Conservation, Capital, LVR, LLP, SIFI
Other measures	*OM*	LCG, LoanR, LFC, Tax, Liquidity, LTD, LFX, RR, Other

Note: Categorization of macroprudential policy tools is based on Arakelyan et al. (2023). LLP is added to Capital-based measures as it includes dynamic (countercyclical) provisioning element on basis of which banks set aside reserves from profits in good times to cover realized losses from borrower defaults in bad times which can be understood as increasing capital.

Table A. 6: Summary Statistics for the Full Sample

Variable	Mean	Median	Min	Max	StD
Gini Index	47.290	47.200	32.200	72.300	5.896
Top 1%	15.039	14.030	5.840	33.830	5.032
Top 5%	31.437	29.970	16.840	57.820	8.790
Top 10%	42.694	41.940	25.900	69.440	9.980
Bottom 10%	0.162	0.160	0.000	0.430	0.096
Top 10% – Bottom 10%	42.530	41.720	25.560	69.390	10.056
Microprudential Index	0.391	0.367	0.000	1.000	0.231
Basel Adoption	0.422	0.333	0.000	1.000	0.220
Supervisory Independence	0.340	0.500	0.000	1.000	0.378
Supervisory Power	0.259	0.000	0.000	1.000	0.343
Site Supervision	0.528	0.500	0.000	1.000	0.296
Global Consolidation	0.404	0.500	0.000	1.000	0.398
Macroprudential Index	0.001	0.000	–0.034	0.049	0.006
Borrower-based Measures	0.002	0.000	–0.083	0.167	0.015
Capital-Based Measures	0.001	0.000	–0.014	0.056	0.006
Other Measures	0.001	0.000	–0.056	0.065	Mean
Log GDP per Capita	9.035	9.003	6.092	11.320	1.359
Human Capital Index	2.656	2.834	0.000	3.726	0.813
Log Population	2.740	2.415	−1.309	7.155	1.434

Variable	Mean	Median	Min	Max	StD
Trade Openness	83.970	71.650	18.349	437.327	52.245
Government Expenditures	26.872	26.119	7.605	62.360	10.614
Financial Development	61.194	50.305	0.186	304.575	43.779
Unemployment Rate	7.798	6.980	0.250	27.470	4.351
Regulatory Quality	0.556	0.568	–2.002	2.178	0.855
Financial Liberalization	0.854	0.875	0.375	1.000	0.137

Table A. 7: Summary Statistics for Advanced Economies

Variable	Mean	Median	Min	Max	StD
Gini Index	47.355	47.500	37.800	56.400	3.761
Top 1%	11.583	11.070	5.840	19.580	2.741
Top 5%	24.841	23.805	16.840	38.760	4.424
Top 10%	35.327	34.035	25.900	51.490	5.524
Bottom 10%	0.213	0.220	0.000	0.430	0.080
Top 10% – Bottom 10%	35.110	33.850	25.560	51.380	5.554
Microprudential Index	0.540	0.533	0.067	1.000	0.223
Basel Adoption	0.516	0.333	0.333	1.000	0.254
Supervisory Independence	0.425	0.500	0.000	1.000	0.412
Supervisory Power	0.406	0.500	0.000	1.000	0.386
Site Supervision	0.681	0.500	0.000	1.000	0.293
Global Consolidation	0.672	0.500	0.000	1.000	0.342
Macroprudential Index	0.001	0.000	–0.015	0.049	0.005
Borrower-based Measures	0.002	0.000	–0.042	0.167	0.016
Capital-Based Measures	0.001	0.000	–0.014	0.056	0.005
Other Measures	0.001	0.000	–0.019	0.046	0.005
Log GDP per Capita	10.488	10.592	9.302	11.320	0.453
Human Capital Index	3.274	3.329	2.230	3.726	0.318
Log Population	2.426	2.199	−1.309	5.757	1.501
Trade Openness	95.601	75.355	18.349	437.327	70.689
Government Expenditures	33.378	34.841	12.149	62.360	10.036
Financial Development	97.370	93.957	0.186	304.575	40.474
Unemployment Rate	6.931	6.190	1.870	27.470	3.328
Regulatory Quality	1.400	1.489	0.492	2.177	0.354
Financial Liberalization	0.953	0.958	0.667	1.000	0.064

Table A. 8: Summary Statistics for Emerging Countries and Developing Economies

Variable	Mean	Median	Min	Max	StD
Gini Index	47.026	46.300	32.200	72.300	7.293
Top 1%	17.606	17.700	7.240	33.830	4.806
Top 5%	36.337	36.780	19.680	57.820	7.987
Top 10%	48.168	48.800	28.180	69.440	8.981
Bottom 10%	0.124	0.130	0.000	0.420	0.090
Top 10% – Bottom 10%	48.040	48.680	27.760	69.390	9.060
Microprudential Index	0.305	0.267	0.000	0.900	0.183
Basel Adoption	0.367	0.333	0.000	1.000	0.178
Supervisory Independence	0.304	0.000	0.000	1.000	0.352
Supervisory Power	0.158	0.000	0.000	1.000	0.268
Site Supervision	0.440	0.500	0.000	1.000	0.252
Global Consolidation	0.256	0.000	0.000	1.000	0.339
Macroprudential Index	0.002	0.000	–0.034	0.039	0.007
Borrower-based Measures	0.002	0.000	–0.083	0.167	0.015
Capital-Based Measures	0.002	0.000	–0.014	0.042	0.006
Other Measures	0.002	0.000	–0.056	0.065	0.011
Log GDP per Capita	8.120	8.164	6.092	9.709	0.845
Human Capital Index	2.295	2.520	0.000	3.349	0.821
Log Population	2.937	2.850	0.409	7.155	1.354
Trade Openness	78.191	71.760	21.929	220.407	34.865
Government Expenditures	23.448	22.752	7.605	47.758	8.585

Variable	Mean	Median	Min	Max	StD
Financial Development	39.249	31.948	1.166	166.504	27.558
Unemployment Rate	8.799	7.670	0.250	24.400	4.844
Regulatory Quality	0.072	0.121	–1.596	1.543	0.605
Financial Liberalization	0.783	0.833	0.375	0.958	0.131

Table A. 9: Summary Statistics for 3-year Averages of Prudential Policies

Variable	Q1	Mean	Median	Q3
All countries				
Microprudential Index	0.233000	0.398000	0.367000	0.567000
Macroprudential Index	0.000000	0.001399	0.000000	0.001634
Borrower-based Measures	0.000000	0.002513	0.000000	0.000000
Capital-Based Measures	0.000000	0.001359	0.000000	0.000000
Other Measures	0.000000	0.001178	0.000000	0.003086
Advanced Economies				
Microprudential Index	0.366670	0.535680	0.533330	0.700000
Macroprudential Index	0.000000	0.001067	0.000000	0.001634
Borrower-based Measures	0.000000	0.002834	0.000000	0.000000
Capital-Based Measures	0.000000	0.000945	0.000000	0.000000
Other Measures	0.000000	0.007559	0.000000	0.000000
Emerging Markets and Developing Economies				
Microprudential Index	0.166670	0.298100	0.266700	0.375000
Macroprudential Index	0.000000	0.001638	0.000000	0.001838
Borrower-based Measures	0.000000	0.002281	0.000000	0.000000
Capital-Based Measures	0.000000	0.001657	0.000000	0.000000
Other Measures	0.000000	0.001483	0.000000	0.003086

Table A. 10: Estimation Results for the Top 10% for Advanced Economies

	Dependent variable: Top 10%					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**0.631**	**6.500*****	**–2.282**	**0.647**	**–3.797**	**–0.299**
and Supervision	**(3.642)**	**(2.364)**	**(2.755)**	**(2.715)**	**(2.956)**	**(2.190)**
Lagged Top 10%	0.508***	0.545***	0.481***	0.435**	0.469***	0.465***
(–1)	(0.170)	(0.126)	(0.178)	(0.176)	(0.158)	(0.154)
…						
Observations	143	143	143	143	143	143
AR (2)	0.668	0.09	0.596	0.616	0.504	0.642
Sargan-Hansen	0.072	0.603	0.208	0.084	0.135	0.127

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. Results for remaining control variables are available upon request.

Table A. 11: Estimation Results for the Top 10% for Emerging Markets and Developing Economies

	Dependent variable: Top 10%					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**–3.488**	**–7.165**	**–2.248**	**–0.372**	**–4.169**	**0.664**
and Supervision	**(4.124)**	**(6.166)**	**(4.272)**	**(3.998)**	**(2.878)**	**(3.193)**
Lagged Top 10%	0.890***	0.539***	0.600**	0.941***	0.654***	0.584***
(–1)	(0.101)	(0.196)	(0.242)	(0.113)	(0.165)	(0.220)
…						
Observations	226	226	226	226	226	226
AR (2)	0.474	0.912	0.988	0.47	0.991	0.976
Sargan-Hansen	0.159	0.916	0.790	0.199	0.697	0.761

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. Results for remaining control variables are available upon request.

Table A. 12: Estimation Results for the Bottom 10% for Advanced Economies

	Dependent variable: Bottom 10%					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**–0.125***	**–0.027**	**–0.084***	**–0.079***	**–0.036**	**–0.015**
and Supervision	**(0.065)**	**(0.044)**	**(0.045)**	**(0.041)**	**(0.042)**	**(0.051)**
Lagged Bottom	0.573**	0.680*	0.590***	0.479	0.634**	0.682**
10% (–1)	(0.256)	(0.366)	(0.183)	(0.355)	(0.289)	(0.290)
…						
Observations	143	143	143	143	143	143
AR (2)	0.481	0.122	0.452	0.350	0.364	0.375
Sargan-Hansen	0.129	0.508	0.325	0.183	0.066	0.199

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. Results for remaining control variables are available upon request.

Table A. 13: Estimation Results for the Bottom 10% for Emerging Markets and Developing Economies

	Dependent variable: Bottom 10%					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**0.032**	**0.001**	**0.038**	**0.033**	**0.016**	**0.017**
and Supervision	**(0.033)**	**(0.066)**	**(0.042)**	**(0.039)**	**(0.028)**	**(0.026)**
Lagged Bottom	0.898***	0.584***	0.580***	0.883***	0.535***	0.563**
10% (–1)	(0.141)	(0.211)	(0.223)	(0.189)	(0.167)	(0.234)
…						
Observations	226	226	226	226	226	226
AR (2)	0.097	0.122	0.105	0.105	0.111	0.099
Sargan-Hansen	0.613	0.508	0.581	0.686	0.679	0.586

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. Results for remaining control variables are available upon request.

Table A. 14: Estimation Results for the Top 10%−Bottom 10% for the Full Sample

	Dependent variable: Top 10% − Bottom %					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**–3.816**	**1.205**	**–3.133**	**3.539**	**–5.810**	**1.143**
and Supervision	**(6.253)**	**(2.685)**	**(3.366)**	**(2.309)**	**(3.724)**	**(1.840)**
Lagged Top 10% −	0.421	0.703**	0.492*	0.784***	0.370*	0.588***
Bottom % (–1)	(0.316)	(0.315)	(0.263)	(0.258)	(0.213)	(0.220)
…						
Observations	369	369	369	369	369	369
AR (2)	0.719	0.719	0.728	0.770	0.491	0.843
Sargan-Hansen	0.138	0.142	0.072	0.124	0.162	0.121

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. Results for remaining control variables are available upon request.

Table A. 15: Estimation Results for the Top 10%−Bottom 10% for Advanced Economies

	Dependent variable: Top 10% − Bottom %					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**0.518**	**6.585****	**–2.319**	**0.617**	**–3.789**	**–0.338**
and Supervision	**(3.732)**	**(2.389)**	**(2.691)**	**(2.768)**	**(2.922)**	**(2.222)**
Lagged Top 10% −	0.506***	0.550***	0.482***	0.434**	0.469***	0.467***
Bottom % (–1)	(0.168)	(0.127)	(0.178)	(0.177)	(0.159)	(0.154)
…						
Observations	143	143	143	143	143	143
AR (2)	0.666	0.087	0.599	0.611	0.505	0.603
Sargan-Hansen	0.069	0.603	0.204	0.080	0.137	0.123

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. Results for remaining control variables are available upon request.

Table A. 16: Estimation Results for the Top 10%−Bottom 10% for Emerging Markets and Developing Economies

	Dependent variable: Top 10% − Bottom %					
	MicroPru	Basel	Power	SiteSup	Independence	Global Cons.
Bank Regulation	**–3.530**	**–7.207**	**–2.280**	**–0.457**	**–4.131**	**0.621**
and Supervision	**(4.188)**	**(6.164)**	**(4.227)**	**(4.080)**	**(2.885)**	**(3.218)**
Lagged Top 10% −	0.890***	0.537***	0.601**	0.940***	0.656***	0.582***
Bottom % (–1)	(0.101)	(0.196)	(0.239)	(0.113)	(0.165)	(0.218)
…						
Observations	226	226	226	226	226	226
AR (2)	0.480	0.815	0.987	0.475	0.991	0.974
Sargan-Hansen	0.159	0.911	0.793	0.199	0.659	0.760

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. Results for remaining control variables are available upon request.

Table A. 17: Interactions using Top 10% for Advanced Economies

	Dependent variable: Top 10%				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	0.785	–3.992	–3.873	0.450	–1.734
and Supervision	(2.327)	(5.582)	(4.962)	(4.383)	(4.521)
Macroprudential		458.119	698.858	76.131	155.264
Policy Index		(474.635)	(638.370)	(57.333)	(296.411)
Interaction		**–388.121**	**–516.610**	**–34.040**	**–64.425**
		(626.080)	**(1,096.934)**	**(110.001)**	**(372.201)**
Lagged Top 10%	0.551***	0.488**	0.435*	0.511*	0.503**
(–1)	(0.195)	(0.215)	(0.242)	(0.284)	(0.211)
…					
Observations	143	143	143	143	143
AR (2)	0.714	0.347	0.651	0.980	0.627
Sargan-Hansen	0.145	0.281	0.891	0.184	0.226

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Table A. 18: Interactions using Top 10% for Emerging Markets and Developing Economies

	Dependent variable: Top 10%				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	–0.908	–0.104	1.327	–0.170	–1.156
and Supervision	(3.710)	(3.875)	(5.661)	(3.903)	(3.680)
Macroprudential		138.611	–38.087	8.344	96.683
Policy Index		(174.874)	(131.878)	(62.687)	(119.398)
Interaction		**–448.775**	**–326.077**	**–57.006**	**–296.335**
		(328.416)	**(435.476)**	**(141.194)**	**(195.830)**
Lagged Top 10%	0.841***	0.819***	0.824***	0.826***	0.838***
(–1)	(0.125)	(0.121)	(0.120)	(0.111)	(0.126)
…					
Observations	196	196	196	196	196
AR (2)	0.665	0.374	0.250	0.553	0.295
Sargan-Hansen	0.215	0.291	0.429	0.208	0.304

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Table A. 19: Interactions using Bottom 10% for Advanced Economies

	Dependent variable: Bottom 10%				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	–0.081	–0.149	–0.180	–0.097	–0.074
and Supervision	(0.082)	(0.124)	(0.181)	(0.085)	(0.109)
Macroprudential		3.298	2.251	–0.820	–2.444
Policy Index		(6.968)	(6.849)	(3.697)	(8.122)
Interaction		**–3.369**	**–1.621**	**0.692**	**2.191**
		(7.952)	**(10.323)**	**(3.779)**	**(8.820)**
Lagged Bottom	0.561*	0.555	0.414*	0.535**	0.685*
10% (–1)	(0.296)	(0.407)	(0.248)	(0.267)	(0.398)
…					
Observations	143	143	143	143	143
AR (2)	0.487	0.503	0.587	0.701	0.547
Sargan-Hansen	0.924	0.998	0.998	0.998	0.996

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Table A. 20: Interactions using Bottom 10% for Emerging Markets and Developing Economies

	Dependent variable: Bottom 10%				
	No Macropru	Macropru	CBM	BBM	OM
Bank Regulation	0.016	0.017	0.022	0.028	0.007
and Supervision	(0.037)	(0.049)	(0.038)	(0.056)	(0.043)
Macroprudential		–2.099	0.314	1.117	–2.212
Policy Index		(3.162)	(2.132)	(1.371)	(1.685)
Interaction		**2.842**	**1.091**	**–4.083**	**3.216**
		(5.958)	**(5.394)**	**(4.597)**	**(3.062)**
Lagged Bottom	0.799***	0.751***	0.886***	0.773***	0.765***
10% (–1)	(0.180)	(0.161)	(0.150)	(0.252)	(0.171)
…					
Observations	196	196	196	196	196
AR (2)	0.103	0.103	0.088	0.069	0.146
Sargan-Hansen	0.717	0.703	0.725	0.205	0.749

The table reports coefficient estimates and t-statistics (in parentheses). The explanatory variables are defined in Table A.1. Statistical significance at the 1%, 5%, and 10% levels is indicated by the ***, **, and * symbols, respectively. The column Macropru refers to aggregate macroprudential policy, CBM stands for capital-based measures, BBM for borrower-based measures, and OM for other measures. Instruments included in each group are enlisted in Table A. 5. Results for remaining control variables are available upon request.

Figure A. 1: Correlation of Bank Regulatory and Supervisory Tools

	Basel	Independence	Sup. Power	Site Sup.	Global Cons.
Basel	1,00	0,24	0,25	0,33	0,44
Independence		1,00	0,24	0,23	0,24
Sup. Power			1,00	0,33	0,24
Site Sup.				1,00	0,35
Global Cons.					1,00

Source: Omori (2022), authors' calculations

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