WORKING paper

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Beyond Borders, Within Societies: Inequality and the Global Transmission of US Monetary Policy

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ABSTRACT

This paper provides novel evidence on how income inequality shapes the heterogeneity of US monetary policy spillovers to GDP across foreign economies. Using state-dependent local projections and exploiting variation in disposable income inequality across a panel of 87 countries over the period 1966-2020, we show that household heterogeneity influences how foreign GDP responds to a US monetary policy tightening. GDP contracts by up to one and a half times more when inequality is above average. However, while higher inequality amplifies negative spillovers in advanced economies, it mitigates them in emerging markets. To rationalise this finding, we use a three-country open economy Two-Agent New Keynesian (TANK) model, which suggests that this divergence is driven by differences in participation in international financial markets. Households in emerging market economies face greater barriers to international investment, limiting their ability to re-balance portfolios towards higher-return foreign bonds after the shock.

Keywords: US Monetary Policy, Spillovers, Income Inequality, Local Projections, State-Dependence

JEL classification: D31, E21, E52, E58, F42

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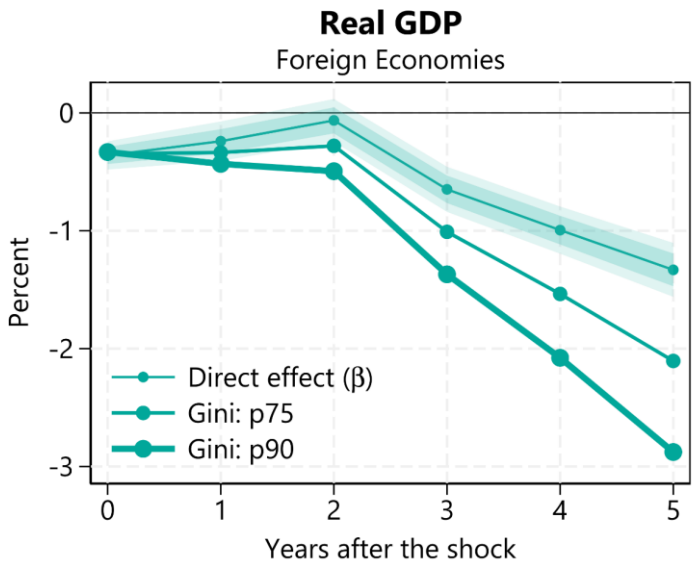
NON-TECHNICAL SUMMARY

Monetary policy decisions taken in the United States have long been known to affect economic conditions far beyond its borders. When the US central bank raises interest rates, borrowing costs tend to increase globally, financial conditions tighten, and economic activity often slows in other countries. While these international spillovers are well documented, less is known about why their strength varies across countries and over time. This paper shows that one important factor shaping these differences is income inequality within countries. In particular, it highlights that the distribution of income across households plays a key role in determining how strongly foreign economies respond to changes in US monetary policy.

Using data for a large sample of advanced and emerging economies over several decades, the paper finds that higher income inequality tends to amplify the negative impact of a US monetary policy tightening on economic activity. As shown in the Figure below, in countries where income is more unevenly distributed, output declines more sharply following an increase in US interest rates. Quantitatively, the contraction in output can be up to one and a half times larger in high-inequality environments than in more equal ones. However, this relationship is not uniform across countries. A key finding of the paper is that the role of inequality differs markedly between advanced economies and emerging market economies. In advanced economies, higher inequality consistently strengthens the contractionary effects of US monetary policy. By contrast, in emerging markets, higher inequality appears to mitigate these negative spillovers, resulting in smaller declines in economic activity.

Heterogeneous effects of US monetary policy on foreign economies' GDP



Notes: Impulse responses to a monetary policy shock that increases the federal funds rate (FFR) by 1 percentage point, estimated using local projections. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (*beta*) captures the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution.

To understand these contrasting patterns, the paper develops a multi-country model that distinguishes between different types of households. Some households have access to financial markets and can adjust their savings and investment decisions in response to changes in global interest rates, while others are financially constrained and rely on their disposable income. When US interest rates rise, financially unconstrained households shift their investments towards US assets, which now offer higher returns. This reallocation can trigger capital outflows from domestic economies, tighten financial conditions, and deepen the downturn. The strength of this mechanism

depends on both the level of inequality and households' ability to participate in international financial markets.

In advanced economies, where access to global financial markets is relatively widespread, higher inequality implies a larger share of households actively reallocating their portfolios in response to US monetary policy. This amplifies capital outflows and strengthens the negative impact on domestic economic activity. In emerging market economies, however, access to international financial markets is often more limited. Even when inequality is high, many households are unable to shift their investments abroad and instead direct them towards domestic assets and consumption. As a result, the channel through which capital flows out of the domestic economy is weaker. In this context, higher inequality can dampen the transmission of US monetary policy, as the mechanisms that would otherwise amplify the shock are less operative.

These findings suggest that both domestic income distribution and the structure of financial markets are crucial for understanding how global shocks propagate across countries. They also highlight that policies aimed at improving financial inclusion and market access can influence not only domestic economic outcomes but also a country's exposure to international financial conditions. Overall, the paper contributes to a better understanding of the interaction between global financial forces and domestic economic structures. It shows that inequality is not only a social concern but also a macroeconomic factor shaping how economies respond to international developments. By combining evidence from a large set of countries with a theoretical framework, the analysis provides new insights into the global transmission of monetary policy in an increasingly interconnected world.

Par-delà les frontières, au sein des sociétés : Inégalités et transmission globale de la politique monétaire des États-Unis

RÉSUMÉ

Cet article apporte de nouveaux éclairages sur la manière dont les inégalités de revenus façonnent l'hétérogénéité des retombées de la politique monétaire américaine sur le PIB des économies étrangères. En utilisant des projections locales dépendantes de l'état (*state-dependent local projections)* et en exploitant la variation des inégalités de revenu disponible dans un panel de 87 pays sur la période 1966-2020, nous montrons que l'hétérogénéité des ménages influence la réaction du PIB étranger à un resserrement de la politique monétaire américaine. Lorsque les inégalités sont supérieures à la moyenne, la contraction du PIB est jusqu'à une fois et demie plus importante. Toutefois, cette relation diffère selon le niveau de développement des pays. Si une plus forte inégalité amplifie les retombées négatives dans les économies avancées, elle les atténue dans les économies émergentes. Afin de rationaliser ce résultat, nous mobilisons un modèle TANK (*Two-Agent New Keynesian*) d'économie ouverte à trois pays, qui suggère que cette divergence s'explique par des différences de participation aux marchés financiers internationaux. Les ménages des économies émergentes font face à des obstacles plus importants à l'investissement international, ce qui limite leur capacité à rééquilibrer leurs portefeuilles vers des actifs étrangers à rendement plus élevé à la suite du choc.

Mots-clés : politique monétaire américaine, retombées de la politique monétaire, inégalités de revenus

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Some foreign policymakers were too willing, at least in public pronouncements, to accept the idea that countries other than the United States were the purely passive objects of the effects of Fed policy decisions, with little ability or responsibility to improve their own economic situations or to help make the international system work better.
– **Ben S. Bernanke** (Brookings Institution, 2015)

Central banks are fully aware of the growing prominence of inequality in the public debate. Inequality is part of the environment in which monetary policy is set, and central bankers have to reflect it in their decisions.
– **Agustín Carstens** (Bank for International Settlements, 2021)

1 Introduction

The Federal Reserve's (Fed) monetary policy actions transmit beyond the borders of the United States (US). This reflects the global role of the US in international finance, trade, and payments, as well as the increased co-movement of macro-financial variables on a global scale and the relevance of financial linkages (Rey, 2013, 2016; Bruno and Shin, 2015; Miranda-Agrippino and Rey, 2020b; Jiang et al., 2024). The existing literature suggests that, on average, a US monetary policy tightening contracts foreign economic activity (Dedola et al., 2017; Iacoviello and Navarro, 2019). In standard theory, this effect is attributed to the negative impact on domestic demand due to higher interest rates and the shift from domestic to foreign goods caused by the appreciation of the US dollar.[1] In this paper, we contribute to the discussion by studying whether household heterogeneity affects the transmission of monetary policy. Specifically, we investigate how income inequality within foreign countries influences the extent to which US monetary policy spills over to their economic activity (i.e., GDP).

Monetary policy affects and is affected by macroeconomic dynamics. Several contributions in the literature document that spillover effects are conditional on relevant country-specific characteristics, such as capital controls, bank lending, and exchange rate regimes. Economic inequality could complement these conditioning factors, by emphasising the role of within-country differentials in consumption-saving patterns (Ahn et al., 2018; McKay and Wolf, 2023). Inequality in disposable income displays significant variation, both across countries and over time. In particular, disposable income is more unequally distributed in emerging market economies (EMEs) than in advanced economies (AEs). On average, the Gini coefficient is around 10 percentage points higher in EMEs, with the standard deviation being almost twice that of advanced economies.[2] This is attributable to various factors, including the structure of

[1] Section 2 will offer a more detailed explanation of the relevant transmission channels through which monetary policy affects economic conditions in the rest of the world.

[2] These summary statistics are calculated for the sample of countries analysed in this paper, using data from the Standardized World Income Inequality Database for the period 1966-2020.

the economic environment, skill levels, labour market conditions, and the strength of institutions.

We first address the research question empirically. As changes in the interest rate are endogenous to domestic and global economic conditions, we identify a time series of US monetary policy shocks following the approach of Iacoviello and Navarro (2019). This methodology generates a variable that measures exogenous increases in the US policy rate that could not have been predicted by domestic and global developments. Then, we estimate the effects of a US monetary policy tightening on real foreign economic activity (GDP) for a panel of 87 countries using state-dependent local projections as in Cloyne et al. (2023).[3] Once we have assessed traditional monetary policy spillovers, we introduce income inequality into the framework.

We find that higher income inequality amplifies the negative effect of US monetary tightening on the real economy. At its trough, GDP growth contracts between one-half and oneandahalf times more when inequality is at the 75th and 90th percentiles compared to when it is at its average level. Second, we consider country heterogeneity and show that the finding is driven by advanced economies while it is reversed for emerging markets, where higher inequality mitigates the negative spillovers on real output. These results are robust to different local projection specifications, such as binary state-dependence or comparative approaches by group.

To rationalise the transmission channels behind these results and to understand why there is heterogeneity in the direction of the relationship between AEs and EMEs, we turn to a theoretical model. We build on the three-country open-economy model of Eichenbaum et al. (2021) and Ferrari Minesso and Pagliari (2023) that includes household heterogeneity (Campbell and Mankiw, 1989; Galí et al., 2007; Bilbiie, 2008). Each economy features two types of households: financially constrained (savers) and unconstrained (hand-to-mouth). The former have labour income as their only source of income and consume all of it as they do not have access to financial markets. The latter receive labour income and decide their consumption–savings pattern as they can invest in domestic and international financial markets.[4] Other than households, each economy includes competitive producers, retailers, a government, and the central bank. We use the model to study how the real economy and household behaviour in the two foreign countries is affected by a monetary policy shock originating in the United States.[5]

There are two key takeaways. First, the theoretical model produces responses to

[3]This methodology, which exploits the Kitagawa-Blinder-Oaxaca decomposition, allows for conditioning the effect of the shock on the outcome based on the level of a state variable. In the case of this paper, the latter is disposable income inequality within each country, measured by the Gini index.

[4]In interpreting the model, constrained households are assumed to represent poor households, as they rely on a single source of income and do not save, while unconstrained households serve as proxies for rich households, given their access to multiple income sources.

[5]The choice of a Two-Agent New Keynesian (TANK) model over a Heterogeneous Agents New Keynesian (HANK) is justified by the focus of this paper being to study the dynamics of the aggregate distribution rather than those of the distribution within agents, for which the latter would be more appropriate.

the shock that qualitatively replicate the empirical findings. Second, it suggests that the one key factor shaping the direction in which inequality affects the transmission of US monetary policy to foreign economies is their level of participation in international financial markets. This determines how much unconstrained households lose or gain from holding foreign bonds, specifically US ones, after the shock. In general, higher inequality contributes to strengthening the negative effects of US monetary policy. When the shock hits, unconstrained households invest in US bonds rather than domestic ones or consumption, generating a capital outflow and negatively impacting the domestic economy. However, when accounting for the higher cost of foreign bond holding in EMEs, we find that higher inequality reduces the negative spillovers to the real economy. This is because, even in the presence of high household heterogeneity, if unconstrained households do not have easy access to foreign markets, it is not possible for them to re-balance their portfolio from domestic to foreign bonds. As a consequence, the negative effect on domestic financial conditions that would be generated by this capital outflow is reduced. We test the interaction between inequality and financial openness empirically and provide confirmation of this mechanism in the data.

Related literature. The contribution of this paper is threefold. First, we contribute to the extensive literature on the global transmission of US monetary policy. A non-exhaustive list of recent relevant studies includes Passari and Rey (2015), Ammer et al. (2016), Georgiadis (2016), Dedola et al. (2017), Gerko and Rey (2017), Dées and Galesi (2021), Iacoviello and Navarro (2019), Miranda-Agrippino and Rey (2020b), Degasperi et al. (2023), Miranda-Agrippino and Ricco (2021), Ca' Zorzi et al. (2023), Kalemli-Özcan and Unsal (2023), and Georgiadis and Jarociński (2025). The key general takeaway is that, given the global role of the US, the Fed's monetary policy significantly affects real and financial conditions in the rest of the world. Among the channels identified behind this result, the existence of a global financial cycle, global financial conditions, and the financial channel in general are the main ones.[6] Moreover, the international transmission of monetary policy depends on country-specific characteristics, including capital controls, exchange rate regimes, trade exposure, and levels of economic development.[7] While the findings are generally consistent, there is het-

Moreover, TANK models are more parsimonious and provide a simpler interpretation of the aggregate distribution. Debortoli and Galí (2024) show that TANK models distinguishing between two types of households, *hand-to-mouth* and unconstrained, effectively capture the overall effects of household heterogeneity and related mechanisms.

[6]Numerous studies have explored the effects of US monetary policy transmitted via the global financial cycle, financial markets, and risk taking. Examples are Craine and Martin (2008), Ehrmann and Fratzscher (2009), Wongswan (2009), Hausman and Wongswan (2011), Bekaert et al. (2013), Rogers et al. (2014), Rey (2013), Chen et al. (2016), Banerjee et al. (2016), Fratzscher et al. (2018), Gilchrist et al. (2019), Vicondoa (2019), Albagli et al. (2019), Ha (2021), and Kearns et al. (2023). Global financial conditions, through the effect on the US dollar, are identified as relevant for example in Rey (2016), Gourinchas et al. (2019), Obstfeld (2020), and Miranda-Agrippino and Rey (2022).

[7]The literature studying the transmission through country-specific characteristics finds that relevant dimensions which affect monetary policy spillovers are the exchange rate regime (Frankel et al., 2004; Shambaugh, 2004), the currency of trade invoicing (Zhang, 2022), capital controls and their interac-

erogeneity in the spillover effects between conventional and unconventional monetary policies.[8]

This study contributes to this literature by validating existing findings regarding monetary spillovers for a wide panel of advanced and emerging market economies and assessing how these effects vary when responses are conditioned on different levels of inequality.

This paper also contributes to the literature examining how economic inequality influences the transmission of monetary policy. Although this is a relatively new and smaller area of research, primarily focused on domestic transmission rather than international effects, it is fascinating and highly relevant. It sheds light on how inequality shapes the effectiveness of monetary policy and how monetary and fiscal policies can internalise this indirect effect. McKay and Wolf (2023) provide a comprehensive discussion of the role of household heterogeneity in monetary policy transmission, emphasising interest rate refinancing and differential consumption responses as key channels.

Theoretical papers establish a direct link between inequality and the effectiveness of monetary policy.[9] Higher inequality weakens monetary policy transmission and reduces welfare (Areosa and Areosa, 2016; Ma, 2023). Auclert (2019) finds that redistribution channels, namely earnings heterogeneity, unexpected inflation, and interest rate exposure, amplify the effect of monetary policy. Acharya and Pesenti (2024) and Acharya and Challe (2025) emphasise the role of household heterogeneity in shaping optimal monetary policy and spillovers, showing that heterogeneous consumption behaviours amplify monetary policy trade-offs and spillover effects compared to representative-agent models. Empirical contributions vary by methodology, country sample, type of monetary policy, and measures of economic inequality (e.g., income, wealth, debt). For instance, da Silva et al. (2022) and Matusche and Wacks (2023) employ state-dependent local projections, similar to this paper. The former concludes that higher income inequality obstructs the transmission of monetary policy. This is in line with find-

tion with domestic monetary policy responses to foreign shocks (Miniane and Rogers, 2007; Chang et al., 2015; Liu and Spiegel, 2015; Wu et al., 2024), domestic and cross-border bank lending as well as non-bank lending (Obstfeld et al., 2019; Lindner et al., 2019; Lopez et al., 2020; Albrizio et al., 2020; Spiegel, 2022; Elliott et al., 2024), the state of the business cycle (Arbatli-Saxegaard et al., 2024), international trade, trade integration, exchange rate pass-through (Bluedorn and Bowdler, 2011; Iacoviello and Navarro, 2019; Boeck and Mori, 2025), and international coordination in the conduct of monetary policy (Caldara et al., 2024).

[8] Initially, the literature has focused on the effects of conventional monetary policy by implementing two-country VAR models. Relevant papers include Kim and Roubini (2000), Kim (2001), Faust et al. (2003), Canova (2005), and Maćkowiak (2007). While the focus remained on conventional policy measures, at a later stage, more complex empirical specifications that featured identified monetary policy shocks were employed. Within this wave belong many of the papers discussed previously. Additional relevant contributions include Miranda-Agrippino et al. (2020), Cesa-Bianchi and Sokol (2022), Jarociński (2022), and Pinchetti and Szczepaniak (2023). At the same time, unconventional monetary policy and its spillover effects started attracting the attention of the literature (Tillmann, 2016; Rogers et al., 2018; Miranda-Agrippino and Rey, 2020a; Bhattarai et al., 2021; Miranda-Agrippino and Nenova, 2022).

[9] For more details on the papers discussed in this paragraph and a comparison of results, see Table A.1 in Appendix A.

ings in Domonkos et al. (2023), derived from a panel data model. The latter shows that in regimes of higher wealth inequality, the real effects of monetary policy are stronger. Ampudia et al. (2018), using data from the Household Finance and Consumption Survey (HFCS), demonstrate that the direct effects of policy rate changes differ between *hand-to-mouth* and other households. This finding is particularly relevant to the dynamics of the theoretical model in this paper. Voinea et al. (2018) show that lower inequality enhances the effectiveness of monetary policy transmission. In summary, the key finding across these papers is that inequality significantly influences the domestic transmission of monetary policy, with high inequality weakening this transmission and translating to stronger real effects.

With the exception of two theoretical studies, the papers discussed above focus on the domestic transmission of monetary policy. The novelty of my contribution is to explore how income inequality influences the transmission of US monetary policy to the rest of the world. This paper is, to the best of my knowledge, the first to examine how income inequality affects US monetary policy spillovers.

Third, this paper contributes to the literature that models distributional channels within theoretical frameworks. This is a fast growing area of research that departs from the concept of a representative agent to highlight the differential dynamics of consumption and savings at the household level. Key advancements from the Representative Agent New Keynesian (RANK) model include simpler tractable models like the Two-Agent New Keynesian (TANK – Campbell and Mankiw, 1989; Galí et al., 2007; Bilbiie, 2008; Broer et al., 2020), as well as more sophisticated ones such as the Heterogeneous Agent New Keynesian model (HANK – Kaplan et al., 2018; Auclert et al., 2020; Alves et al., 2020; Auclert et al., 2025; Acharya and Pesenti, 2024). Boehnert et al. (2025) consider instead the role of inequality in the transmission of monetary policy through differences in consumption of tradable and non-tradable goods between households. In this paper, we integrate features of a TANK model into an open-economy framework to analyse how monetary policy decisions in one country affect consumption and savings decisions differently for constrained and unconstrained households in other countries.

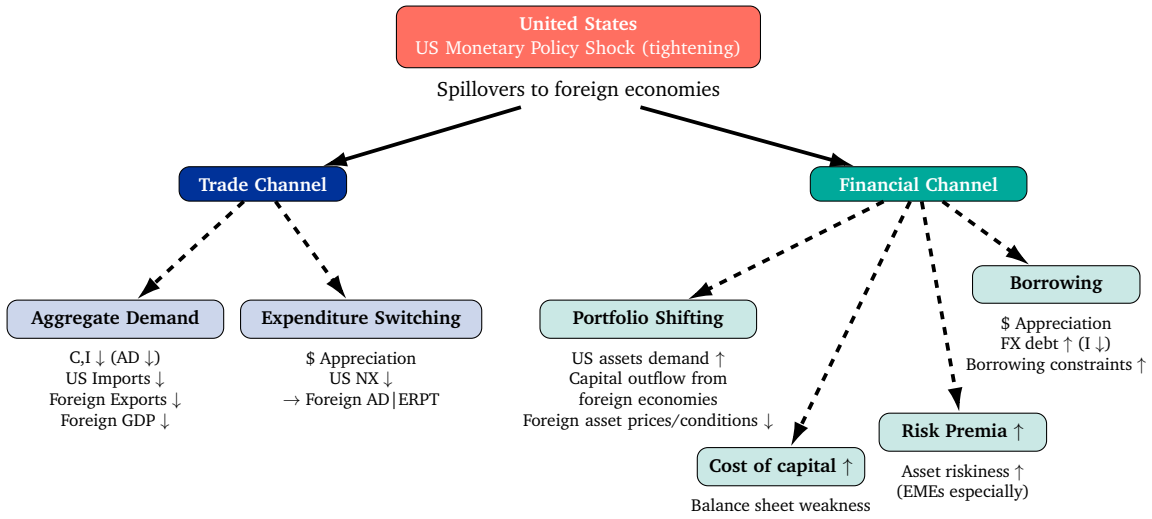
The remainder of the paper is organised as follows. Section 2 details the framework of the paper. Section 3 presents the data. Section 4 outlines the empirical methodology and discusses the results. Section 5 presents the theoretical model and its predictions. Section 6 integrates the empirical and theoretical findings, examining responses on consumption and the non-linear relationship between inequality and financial openness. Section 7 concludes and discusses policy implications.

2 Framework

2.1 Traditional monetary policy transmission

Before introducing the concept and role of inequality, we review the common transmission channels through which monetary policy tightening in the United States (the *origin* country) propagates to foreign economies (the *recipient* countries). The empirical and theoretical literature on this topic identifies two main channels, which are visually summarised in Figure 1.

Figure 1: Transmission of US monetary policy to foreign economies



Trade channel. The effects coming from this channel can be divided into two components. First, the *aggregate demand* channel: a contractionary monetary policy in the origin country (United States) reduces consumption and investments domestically, i.e. it reduces domestic aggregate demand. As a consequence, the demand for imported goods falls, depressing the exports of recipient countries that trade with the US. This drags down output in the foreign economy. However, the effect on US net exports and aggregate demand in recipient countries is not clear-cut, as imports decline in both the US and its trading partners (Georgiadis and Jarociński, 2025). Second, the *expenditure-switching* channel: as a result of the monetary policy tightening in the US, the dollar appreciates against foreign currencies. This translates into a change in the relative price of imported over domestically produced goods and a switch from US imports to domestic goods, i.e. a reduction in net exports for the origin country (United States). This affects aggregate demand in the recipient economies. However, the extent to which net exports fall depends on the level of the exchange rate pass through (ERPT) which in turns depends on the currency of pricing regime, i.e. producer-currency pricing (PCP), local-currency pricing (LCP), dominant-currency pricing (DCP). The latter has become

particularly common, with the dollar being the dominant currency of trade invoicing (Boz et al., 2022).

Financial channel. The financial channel has several facets. First, what we can call a *portfolio shifting* channel: a monetary policy tightening affects financial conditions and translate into US assets becoming more attractive as they offer a higher return. As a consequence, the demand for financial assets issued by the US increases and international investors shifts their portfolios, i.e. capital outflow in the recipient country, capital inflow in the US. This negatively affects asset prices and domestic conditions in the recipient country. Second, a *borrowing* channel: if households and firms in the recipient country hold debt in US dollars, the appreciation of the dollars makes the cost of funding onerous and tightens borrowing constraints. This is particularly relevant for emerging markets, which own a non-negligible part of their debt in US dollars (Bénétrix et al., 2019). Overall, as summarised by Kalemli-Özcan and Unsal (2023), the transmission via the financial channel works through a combination of an increase in the *cost of capital* (higher safe rates globally) and an increase in *risk premia* (on riskier assets, such as EMEs).

Alongside trade and financial channels, country-specific characteristics play a significant role in amplifying or reducing monetary policy spillovers. This serves as a background for examining inequality as one of these conditioning factors, given its substantial variation across countries.

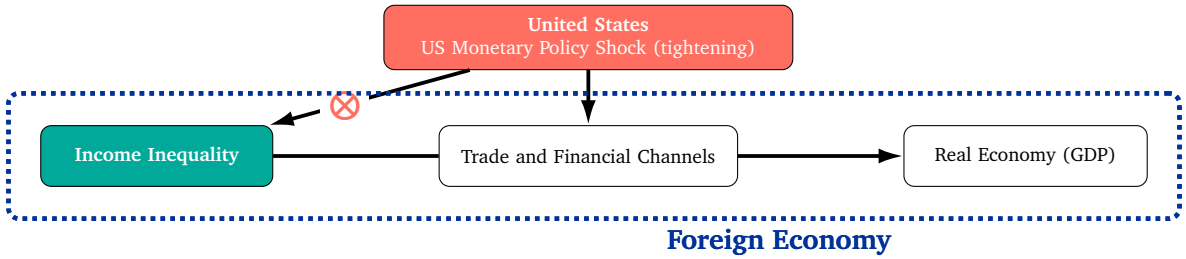
2.2 Household heterogeneity and monetary policy spillovers

The framework of this paper builds upon the described mechanism and incorporates the element of household heterogeneity. Specifically, within-country disposable income inequality.[10] Figure 2 provides a visual illustration. Different levels of income inequality in the recipient country will influence the intensity with which the channels (financial, trade, and so on) transmit the effects of US monetary policy to that country's real economy. The empirical framework is presented in Section 4 while a theoretical model in Section 5 will rationalise these results in line with the stylised framework highlighted in this Section.

Many of the theoretical models featuring heterogeneous agents incorporate strong changes in consumption following income gains (Kaplan et al., 2018). This means that a monetary policy tightening reduces consumption through the income channel (but also wealth and credit channels), further reducing demand. The higher the inequality, the more the transmission relies on households that are not liquidity constrained. These households generally have a high income, hold financial assets, and have a lower

[10] As a distinction used throughout this paper, within-country inequality refers to differences among households within a single country, while between-country inequality refers to differences among households across different countries.

Figure 2: This paper – Inequality and US monetary policy spillovers



marginal propensity to consume compared to the rest of the distribution. As a consequence, the drop in consumption is expected to be stronger in countries with higher inequality levels. Another transmission channel that can be influenced by household heterogeneity is the financial one, especially in relation to financial participation and financial asset holdings. Richer agents are more active in international financial markets and, as a result, tend to hold assets in foreign currencies as well. Following a monetary policy tightening in the US, these agents outside the US will tend to buy US bonds and equities, and sell domestic ones. The more polarised the income distribution abroad is, the stronger this mechanism becomes. As highlighted in Figure 2, the assumption in the framework is that the US monetary policy shock does not affect the level of inequality in foreign economies. In Section 4 we will test and validate this assumption.

3 Data

We collect data from several sources covering the period from 1966 to 2020 for an unbalanced panel of 87 countries.[11] Of these, 34 are advanced economies and 53 are emerging market economies.[12] Tables B.1 and B.2 in Appendix B provide further details on the sources, country sample, and time span of data availability.

3.1 US monetary policy shock

The literature has produced several types of US monetary policy shocks. Each series differs according to the identification strategy, the angle of the monetary policy of interest, and the level of refinement.

Most of the early literature studying the effects of monetary policy surprises uses ei-

[11] Given that publication of inequality data is slow paced and that for emerging market economies time series are not regularly updated, the data sample stops in 2020. However, being the time span of the analysis particularly long this does not represent an empirical issue.

[12] Country classification is based on the IMF definition as outlined in the World Economic Outlook.

ther two-country VARs (Kim and Roubini, 2000; Kim, 2001; Faust et al., 2003; Canova, 2005; Maćkowiak, 2007), or construct monetary policy shocks using techniques such as the narrative approach by Romer and Romer (2004) or factors extraction from the Fed Funds futures (Barakchian and Crowe, 2013). More recently, the literature has proposed an identification based on high-frequency changes in financial assets within a narrow window around the Fed's monetary policy announcements (Kuttner, 2001; Cochrane and Piazzesi, 2002; Gürkaynak et al., 2005; Gertler and Karadi, 2015; Jarociński and Karadi, 2020; Swanson, 2021).[13] This approach leverages on the hypothesis of efficiency of financial markets, but requires high frequency data on traded assets which are typically not available before the 1990s. That is a limit when studying long-term slow-moving phenomenon like inequality.[14]

For this paper we need to leverage the cross-country heterogeneity in income inequality across a large panel of countries over an extended time span. Most of the shock series discussed above are either not available before the 1990s or are not updated to recent years. Therefore, we use an alternative methodology to recover US interest rate surprises that maximises the sample available to study the spillovers of US monetary policy.[15] Specifically, we follow the methodology by Iacoviello and Navarro (2019), which identifies shocks using the residual (u_t^{US}) of a regression of the federal funds rate (FFR_t) on a set of explanatory variables (X_t):

$$FFR_t = \alpha + \beta X_t + u_t^{US} \tag{1}$$

We estimate the model using quarterly data for the United States, as in the reference paper, for the time frame starting in 1966:Q1 and ending in 2020:Q1. The vector of variables X_t includes contemporaneous and lagged values of inflation, corporate spread, the log of real GDP, the foreign real GDP index, the federal funds rate, and linear and quadratic time trends.[16] To account for unconventional monetary policy and the zero lower bound, we substitute the federal funds rate with the shadow rate by Wu

[13] While the identification idea is common to all, high-frequency shock series differs in the level of advancement and in the definition of the "surprise" they are capturing. Among some of the major methodological refinements we find Nakamura and Steinsson (2018), Cieslak and Schrimpf (2019), Inoue and Rossi (2021), Miranda-Agrippino and Ricco (2021), Bauer and Swanson (2023), Lewis (2023), Jarociński (2024).

[14] More recently, with the rise of large language model applications in economics, new research proposes using natural language processing techniques to identify monetary policy shocks (Aruoba and Drechsel, 2024).

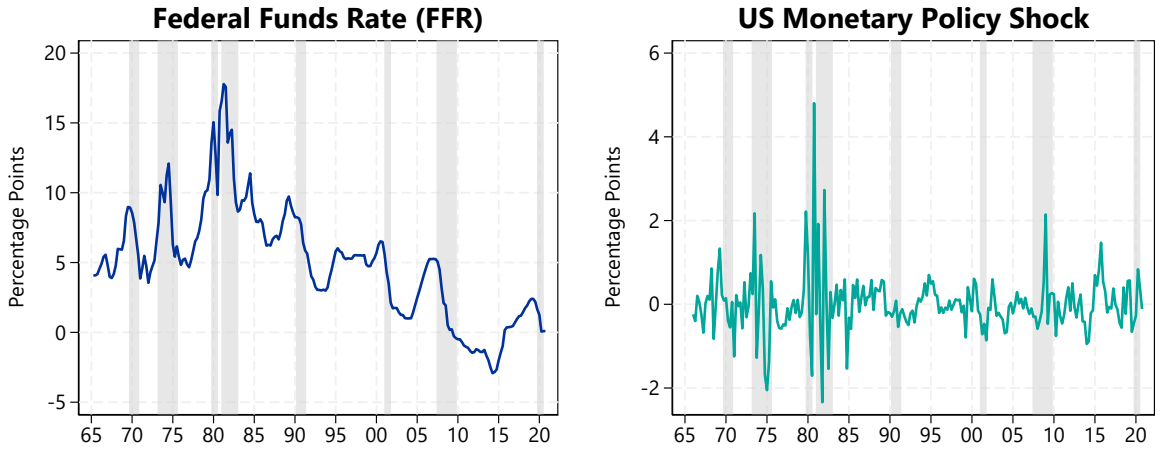
[15] Swanson (2024) finds that interest rate shocks have a stronger impact on the US economy than shocks from forward guidance or large-scale asset purchases (LSAPs).

[16] We follow the original data and source selection of Iacoviello and Navarro (2019) to closely replicate their measure. Inflation is proxied by the quarter-on-quarter change in the GDP deflator. US corporate spread is computed as the difference between the Moody's corporate bond yield and the 10 year government benchmark yield. As the Moody's series was discontinued in 2016:Q3, we chained it with Bank of America ICE BBB US Corporate Index starting from 2016:Q4 till the latest data point. The correlation between the two series is 98.6%. The foreign real GDP index is computed cumulating the average quarter-on-quarter GDP growth of foreign countries (excluding US) using real US$ GDP as aggregation weight.

and Xia (2016) for the period 2009–2015.

This approach allow us to interpret the estimated shock series as a measure of changes in US interest rates that are orthogonal to domestic and global economic conditions and unforecastable based on available data at the time. They can be interpreted as exogenous surprises to the FFR. Figure 3 compares the FFR with our identified monetary policy shock series. The correlation between the extended series we estimate and the original one by Iacoviello and Navarro (2019) is 97.7%.[17] The very small difference is likely due to the difference in the empirical samples considered.

Figure 3: FFR and US monetary policy shock



Notes. Shaded areas represent NBER recessions. For the period 2009–2015 we substitute the federal funds rate with the Wu-Xia shadow rate to account for unconventional monetary policy and the zero lower bound. The shocks are calculated as the residuals of a regression of the federal funds rate on contemporaneous and lagged values of inflation, log US GDP, corporate spreads, log foreign GDP, as well as lagged values of the federal funds rate, and linear and quadratic time trends. The sample covers 1966:Q1–2020:Q4. **Source.** Board of Governors of the Federal Reserve System (FFR) and author's calculations (shock).

3.2 Inequality

For the purposes of this paper, income, consumption, and wealth inequality are all relevant. Empirically, however, data on consumption inequality are available for only a few countries and a short time span. While there are estimates for income and wealth inequality, the choice depends on data availability and, most importantly, quality. Although notable efforts have been made to estimate wealth inequality time series over the past decade (e.g., Saez and Zucman, 2016; Kuhn et al., 2020; Smith et al., 2022; Chancel et al., 2021; Blanchet and Martínez-Toledano, 2023), cross-country data over time remain limited compared to income inequality. Moreover, the estimates are still prone to substantial uncertainty, as the wealth distribution is rarely observed directly

[17] Figure B.1 in Appendix B compares graphically our replication and the original series from Iacoviello and Navarro (2019).

in administrative tax data, and wealth survey coverage is more limited than that of income.

For these reasons, measures of income inequality provide a more reliable proxy for economic inequality, with broader space-time availability, while remaining highly relevant to the framework of this paper. In this paper, inequality data are sourced from the *Standardized World Income Inequality Database* (SWIID; Solt, 2020). The SWIID is widely used in economics research and provides standardised measures of income inequality by incorporating multiple data sources to minimise reliance on problematic assumptions by using as much information as possible from proximate years within the same country. These sources include the Luxembourg Income Study, the OECD Income Distribution Database, the CEDLAS/World Bank's Socio-Economic Database for Latin America, Eurostat, the World Banks PovcalNet, the UN Economic Commission for Latin America and the Caribbean, national statistical offices around the world, and academic studies. The standardisation of the data across countries is particularly helpful for this paper given that we exploit variation in inequality levels between countries. The SWIID provides estimates of the Gini coefficients for both market (i.e., pre-tax) and disposable (i.e., post-tax) income.[18] To account for redistribution policies, we use the latter as the benchmark measure of income inequality in my analyses.

To provide a snapshot of the data, Figure 4 compares the average Gini coefficient for the sample of countries in this paper. There is considerable variation in income inequality both between groups, as EMEs are generally more unequal than AEs, and within groups. For example, South-America is on average more unequal than Asia, and Western-Southern Europe is more unequal than Scandinavian countries.

4 The global transmission of US monetary policy

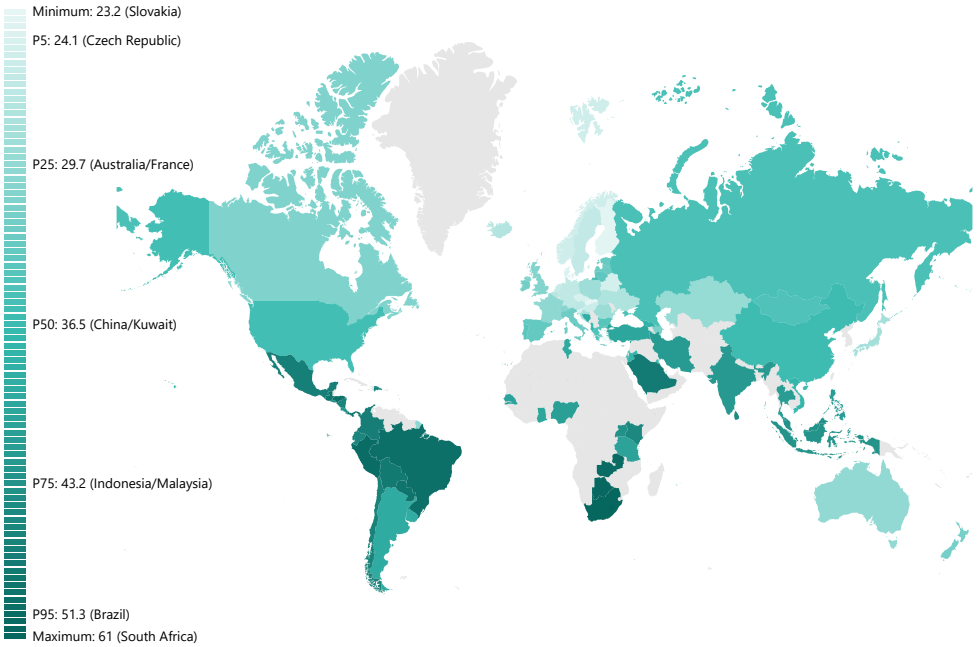
What are the effects of the Fed's monetary policy decisions on the economy in foreign countries? Are these effects amplified or mitigated according to the level of income inequality within the recipient countries? This section addresses these questions in an empirical framework. First, we explore the global transmission of US monetary policy in the traditional manner (i.e., without conditioning it to inequality). Second, we introduce household heterogeneity in the model and provide evidence of how it affects spillover effects to real output in foreign economies.

4.1 Traditional monetary policy transmission

We begin by estimating Impulse Response Functions (IRFs) of key macroeconomic and financial variables in the United States and foreign economies to a US monetary policy

[18] While it would be useful for testing mechanisms to have income shares by quantile, the SWIID does

Figure 4: Within-country inequality in disposable income



Notes. Average Gini for disposable income by country over the period 1966–2020. The map and related summary statistics are based on the sample of 88 countries (including the United States). Countries in grey are not included in the sample due to lack of data. Country classification is based on the IMF definition as outlined in the World Economic Outlook. For details on country coverage and AEs/EMEs classification see Table B.2. **Source.** Standardized World Income Inequality Database (SWIID).

shock (tightening). This exercise replicates and extends the results of Iacoviello and Navarro (2019) and aims to test whether the identified shock produces meaningful outcomes when examining domestic and international responses within the standard framework. The empirical specification employs local projection *à la* Jordà (2005). Local projections are flexible, easy to interpret, and yield meaningful causal responses when the shock series is correctly identified and exogenous. Moreover, recent research shows that local projections are substantially more robust to misspecification compared to Vector Autoregressive (VAR) models and allow to overcome empirical issues such as data that exhibits strong persistence and estimation over extended horizons (Montiel Olea and Plagborg-Møller, 2021; Montiel Olea et al., 2024). To assess the effects of the monetary policy shock we estimate the following model:

$$y_{i,t+h} - y_{i,t-1} = \mu_i^h + \beta^h u_t^{US} + \eta^h (x_{i,t-1} - \overline{x}) + \delta t + \phi t^2 + \varepsilon_{i,t+h} \qquad h = 0, ..., 5 \quad (2)$$

where y is the response variable of interest (e.g., log GDP), u_t^{US} is the US monetary policy shock, i is the country identifier, and t is the year. β^h is the coefficient of interest, reflecting the response of the outcome variable to the shock. When estimating the

not provide these, as the dataset prioritises the standardisation and harmonisation of sources. Only a handful of sources estimate shares, whereas all of them estimate Gini coefficients.

effect on the domestic economy (US) controls (x) include one lag of GDP (log), the Consumer Price Index (log), the interest rate on Treasury Bills, and linear and quadratic time trends. We estimate Equation 2 using a split-panel jackknife estimator to correct for the bias in panel regression coefficient estimate as suggested by Mei et al. (2026).[19] When examining spillovers to foreign economies instead, controls are one lag of GDP (log), the GDP deflator (log), the bilateral exchange rate with the US dollar (log), the exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, as well as linear and quadratic time trends.[20] Country fixed effects (μ_i^h) are included to capture time-invariant characteristics that are specific to single countries. Time trends control for long-term changes, such as global conditions or structural trends, and help address potential issues with stationarity by accounting for deterministic trends in the data. Standard errors are clustered at the country level.[21] In all empirical specifications, we estimate local projections at the annual frequency given that the Gini coefficient and most of the control variables are only available at the yearly level. Control variables are expressed in deviation from their average ($\overline{x}$) as suggested by Cloyne et al. (2023). The monetary policy shock is averaged over the quarters in each year.[22]

Figure 5 illustrates the responses of the federal funds rate, output, and other relevant variables to a one standard deviation monetary policy shock. This is equivalent to a shock that increases the federal funds rate by 1 percentage point. Following the shock, GDP in the United States declines, reaching a contraction peak of just below 1% after two years, before recovering. On the one hand, the increase in US interest rates contracts domestic demand, as consumption and investment decline, reducing demand for both domestic and foreign goods (aggregate demand channel). On the other hand, the dollar appreciates against foreign currencies (REER), making foreign goods cheaper than domestically produced ones. This leads to a shift in demand from domestic to foreign goods (expenditure switching channel). These two channels tend to offset each other. However, the aggregate demand channel appears to dominate the expenditure switching channel, resulting in a decline in imports from the rest of the world. As economic activity slows down, unemployment rises, share prices decrease, and financial

[19] Mei et al. (2026) identifies a key methodological problem in panel local projections: the estimator (fixed effects, FE) suffers from Nickell bias because of the dynamic structure of predictive models, even when no lagged dependent variables are included among the regressors. This bias undermines the validity of conventional inference based on the t-statistic. A split-panel jackknife (SPJ) estimator is suggested to correct the bias. Appendix Figure C.1 compares responses from FE and SPJ estimators.

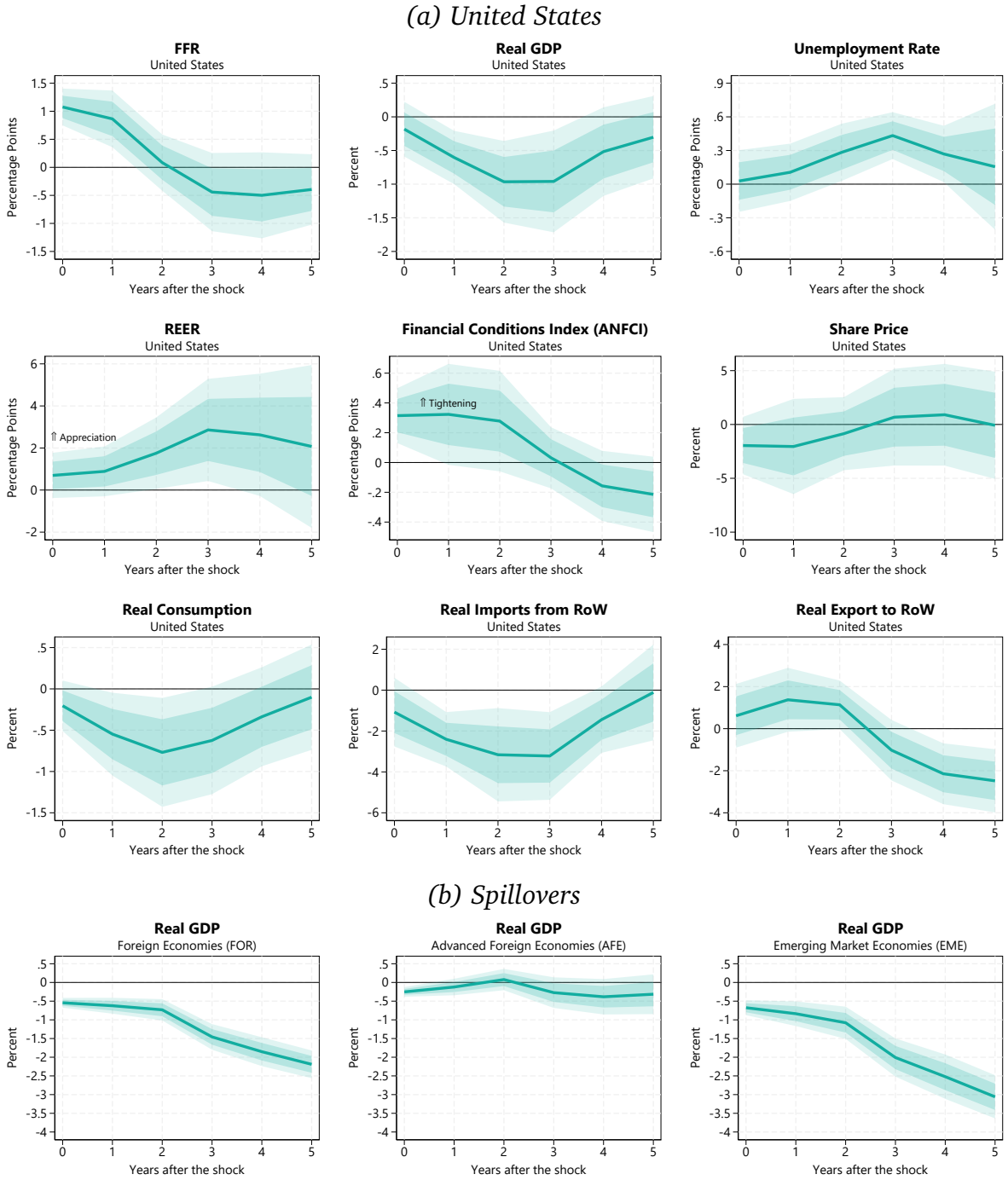
[20] For the panel local projections we use GDP deflator instead of CPI to ensure larger data coverage. Results are robust to using CPI inflation, although this reduces the country sample. Trade openness is computed as the sum of imports and exports scaled by national GDP. For the exchange rate regime, we use a dummy variable that equals 1 when the currency is pegged and 0 when it floats, following Corsetti et al. (2021). For more details on the definition of control variables, see Table B.1 in the Appendix.

[21] As the shock is a generated regressor, we alternatively bootstrap the standard errors, with 1000 replications. This does not lead to any substantial differences for the results reported in the paper.

[22] Alternatively the shock could be summed over the year. This does not make a major difference as we normalise responses to reflect a standard deviation of the monetary policy shock.

conditions tighten.

Figure 5: Effect of US monetary policy shock on US variables and foreign GDP



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. An increase in the REER in an appreciation. An increase in the ANFCI is a tightening. The empirical model is defined in Equation 2. For US specific local projection (IRFs 1-9) we control for one lag of GDP (log), CPI (log), the interest rate on Treasury Bills, and linear and quadratic time trends. For panel local projections (IRFs 10-12, bottom panel) we control for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

Economic activity contracts in the rest of the world as well, reaching a trough of similar magnitude in advanced foreign economies (AFEs) to that of the United States, but with a lag.[23] The magnitude of the effect is larger for emerging market economies. Moreover, the effect is more persistent in foreign economies compared to the United States, as evidenced by the lack of full recovery after 5 years. These results replicate, qualitatively and quantitatively, the findings in Iacoviello and Navarro (2019) and align broadly with the existing literature on US monetary policy spillovers.

4.2 Household heterogeneity and monetary policy spillovers

Following the assessment of the unconditional responses to the shock, we turn to the analysis of the role played by inequality. To isolate the specific role of disposable income inequality, we employ state-dependent local projections. In particular, the preferred empirical specification follows the one formalised in Cloyne et al. (2023). This is a parsimonious approach that augments the classic local projections *à la* Jordà (2005) with the Kitagawa-Blinder-Oaxaca decomposition (KBO – Kitagawa, 1955; Blinder, 1973; Oaxaca, 1973) in order to isolate a direct, an indirect, and a total effect of the shock. Building on Equation 2, the augmented version of the model where the US monetary policy shock interacts with the country-specific Gini index is as follows:

$$\begin{aligned} y_{i,t+h} - y_{i,t-1} = \mu_i^h + \beta^h u_t^{US} + \gamma^h u_t^{US}(gini_{i,t-1} - \overline{gini}) \\ + \theta^h(gini_{i,t-1} - \overline{gini}) + \eta^h(x_{i,t-1} - \overline{x}) \\ + \delta t + \phi t^2 + \varepsilon_{i,t+h} \qquad h = 0, ..., 5 \end{aligned} \tag{3}$$

where μ_i^h is a country fixed effect, u_t^{US} is the US monetary policy shock, and $gini_{i,t}$ is the Gini coefficient of disposable income. Control variables, time trends, and the clustering of standard errors are the same as for the previous specification. We focus on the spillover to real output, thus the outcome variable of interest y is now GDP (log). As highlighted in Cloyne et al. (2023) both the state variable and the controls enter the model in deviation from their sample mean.[24] As it is standard in the literature, the Gini and controls are lagged by one period to reduce endogeneity concerns. We estimate the model using OLS, as is conventional for local projections. The following are the coefficients of interest and their relevant combinations. β^h provides the average response of the outcome to the shock (*direct effect*). In other words, this is the standard effect of the monetary policy shock on output when inequality is at average (i.e., zero,

[23] Advanced foreign economies include advanced economies but exclude the United States.

[24] Demeaning on the sample mean allows interpretation of interactions as deviations around an average monetary policy effects, which should be comparable to those estimated in studies looking at similar shock impact abstracting from state dependence. This definition is commonly employed in papers in the literature using this type of state-dependent local projections (e.g., Kopecky, 2022; Cloyne et al., 2023; Alessandri et al., 2025).

given that all variables are demeaned). $\gamma^h(gini_{i,t-1} - \overline{gini})$ reflects the effect of income inequality to the transmission of the shock (*indirect effect*). $\beta^h + \gamma^h(gini_{i,t-1} - \overline{gini})$ is the *total effect*. The latter defines how the transmission of the shock differs when inequality diverges from its sample mean. More specifically, we examine the response of the variable of interest when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. Notice that while local projections can establish a causal link when the shock is exogenous, the KBO methodology does not provide an identification strategy that uncovers causality *per se*. The different responses are calculated using the same set of regression coefficients, while heterogeneity arises from conditioning on alternative inequality scenarios (i.e., different values of the Gini). Thus, results are to be interpreted as a decomposition of the empirical relationship between the US monetary policy shock and income inequality across all states within the control set.

Before moving to the analysis of the impulse response functions, there is a matter to be discussed. In a recent paper, Gonçalves et al. (2024) assess the validity of state-dependent local projections. They find that if the state variable is exogenous, the size of the shock is not relevant and the estimator can always recover the population response. Instead, in the case where the state variable is endogenous to the shock, the size of the shock matters. The estimator is able to recover the conditional response to an infinitesimal shock but not the one to a larger shock. Given that our framework conditions on inequality abroad, we do not expect a business cycle shocks like US monetary policy shock to be endogenous to a foreign long-term structural condition such as inequality, that is predominantly driven by domestic structural factors. However, to test the exogeneity of the shock to the inequality measure, we run the following regression for each country in the sample:

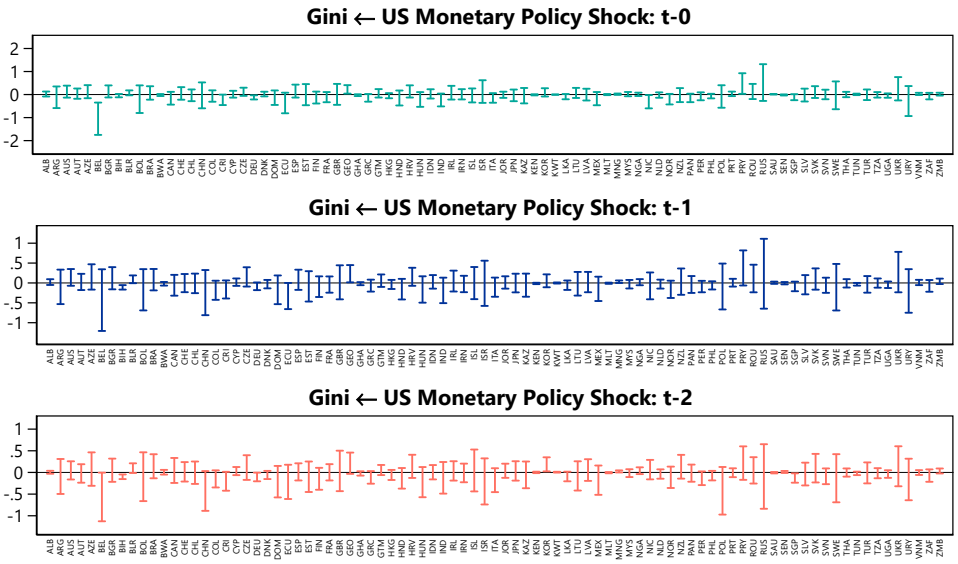
$$gini_t = \alpha + \sum_{p=0}^{2} \beta^p u_{t-p}^{US} + \delta t + \phi t^2 + \varepsilon_{i,t} \tag{4}$$

Figure 6 shows the 95% confidence interval around the estimates for β^0 (upper panel), β^1 (middle panel), and β^2 (lower panel) for each country. Except for very few cases, the estimate is generally insignificant and the sign of the relationship is not univocal. This exercise provides reassurance for the interpretation of the results.

4.2.1 Results

Figure 7 plots the response of real GDP to a US monetary policy tightening, resulting from the estimation of model 3 on the whole sample of foreign economies. The direct effect (β, thinner teal green line with confidence bands), defined as the response in a state where inequality is average, depict a contraction in real GDP in the years following the shock. From a qualitative perspective, this is fully in line with evidence

Figure 6: Effect of US monetary policy on country level Gini coefficient



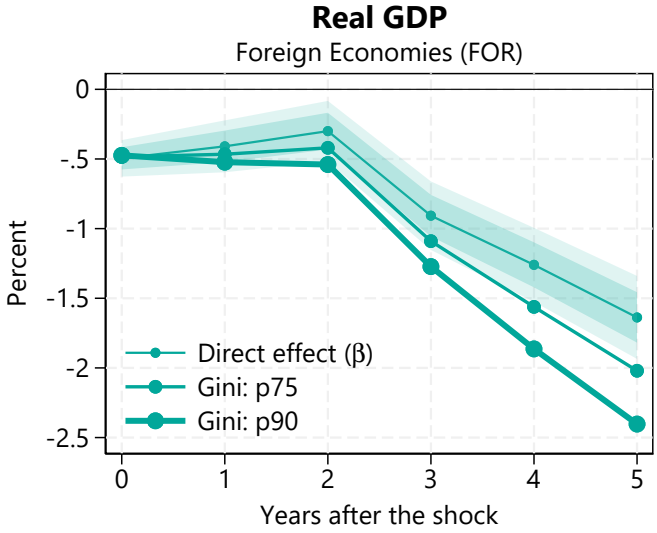
Notes. The figure reports the 95% confidence interval around the coefficients associated with lags of the US monetary policy estimated from a regression with the Gini index as dependent variable.

shown previously in Figure 5 and provides robustness that the framework is solid to the inclusion of the Gini coefficient of disposable income. Quantitatively, the model featuring inequality and the KBO decomposition produce responses that are slightly smaller in magnitude. The thicker lines in the plot illustrate the response of GDP to the shock in two cases in which inequality is higher than average. The two states are associate with the Gini being at the 75th and 90th percentile of the cross-country and time distribution, respectively. The figure shows that the impact of the shock on GDP is an increasing function of the inequality measure. In other words, the main message that emerges is that higher levels of inequality in the recipient country lead to a larger contraction in GDP following the US monetary policy shock.

Although financial linkages and macroeconomic variables tend to be globally interconnected in the current world, advanced economies and emerging market economies usually differ with respect to macroeconomic dynamics. Also, the analysis in this paper looks at a long time perspective. To check whether the main result is univocal, we run the model in Equation 3 for AFEs and EMEs separately. The results, shown in Figure 8, reveal a compelling pattern. For AFEs, the result aligns with what we find for the whole sample. Higher inequality levels deepen the contractionary effect of the shock on real GDP. However, for EMEs the relationship is reversed: with higher levels of inequality, the negative effect of the shock is mitigated.

There can be different reasons for this divergence in how heterogeneity in disposable income affects how the monetary policy shock is transmitted to AFEs and EMEs. We introduce a theoretical model in the next section, to better understand – and hence

Figure 7: Heterogeneous effects of US monetary policy on foreign economies' GDP



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. Different countries may fall around these inequality levels in different years. For easier interpretation, when averaging over the full period of analysis, the countries closest to the mean, 75th, and 90th percentiles are Vietnam/Albania, Malaysia, and Guatemala, respectively. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

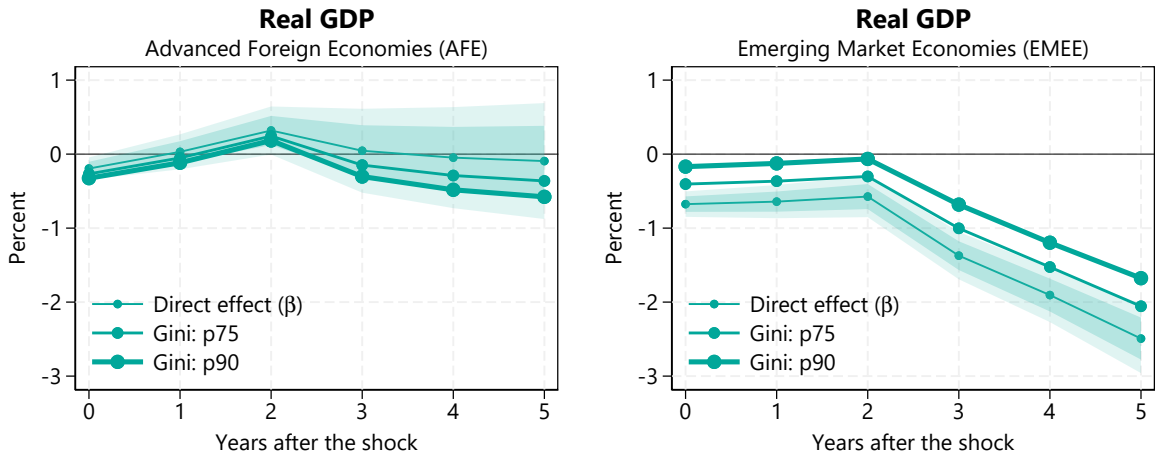
test empirically – the potential mechanisms behind this result.

4.2.2 Alternative specifications for the local projections and robustness

Although we showed that the state variable is exogenous to the shock, there could still be reverse causality between income inequality and GDP. To reduce this concern, inequality and controls are lagged in the specification of the local projection. However, as an additional robustness check, we present two alternative specifications to the preferred model. In the first, the level of income inequality does not directly enter the model but to defines states of low and high inequality. In the second, income inequality is used to categorise groups for separate estimations in a comparative approach.

Binary state-dependence. Before Cloyne et al. (2023) introduced the KBO decomposition within the local projections framework, binary dummies for different states of the economy were used to study response heterogeneity. In our case, consider H_t as being a state indicator which takes value 0 when inequality is low (e.g., below the median) and 1 when inequality is high (e.g., above the median). The state changes at the annual level. To complement the main approach in Equation 3, we estimate the

Figure 8: Heterogeneous effects of US monetary policy on AFEs and EMEs GDP



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. Different countries may fall around these inequality levels in different years. For easier interpretation, when averaging over the full period of analysis, the countries closest to the mean, 75th, and 90th percentiles are Australia/France, Latvia, and Greece, respectively, for AFEs, and Tanzania/Nigeria, Chile, and Honduras, respectively, for EMEs. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

following alternative form of local projection:

$$\begin{aligned} y_{i,t+h} - y_{i,t-1} = \mu_i^h &+ (1 - H_t)(\beta_{low}^h u_t^{US} + \gamma_{low}^h (x_{i,t-1} - \bar{x})) \\ &+ H_t(\beta_{high}^h u_t^{US} + \gamma_{high}^h (x_{i,t-1} - \bar{x})) \\ &+ \delta t + \phi t^2 + \varepsilon_{i,t+h} \qquad h = 0, ..., 5 \end{aligned} \tag{5}$$

Figure C.2 in Appendix C compares the impulse responses of real GDP to the US monetary policy shock for the two states. The teal green IRF depicts the reaction of real GDP when inequality is low, which at any horizon is given by $\beta_{low}^h + (\gamma_{low}^h * 0)$. Instead, the blue IRF shows the path of real GDP when inequality is high, plotting $\beta_{high}^h + (\gamma_{high}^h * 1)$. The results are consistent with those from the preferred specification.

Local projections by group. As a second alternative, to remove any potential endogeneity remaining from the previous two cases, we run local projections as in Equation 2 for different groups separately. The idea here is to depart from conditionality within the estimation, but define *ex-ante* heterogeneous groups of countries based on historical inequality. Figure C.3 in Appendix C shows the IRFs estimated for two groups of countries, one selected according to the country's historical average Gini being below the historical median of all countries and the other being above. Once again, results are

in line with estimations from the other methodologies and provide further robustness.

After demonstrating the robustness of various specifications of local projections, we will now provide further robustness checks by testing the results against different sets of controls, specifications, lag structures, and alternative samples.

Controls. To show that results are not driven by the selection of controls, Figure C.4 in Appendix C shows the impulse response function from model 3 estimated without including any control variable, except the lag of the independent variable. Results are in line with the main specification that controls for macro-financial dynamics.

Interaction of controls with inequality. In some empirical specifications in the literature the state variable (inequality in this case) is interacted with the set of control variables too. This is a non-standard element of the local projections that aim at accounting for potential dependence between household heterogeneity and the effect of the shock on the outcome variable. As a robustness, we estimate a version of the model in which controls enter both directly and interacted with the Gini coefficient. Figure C.5 in Appendix C shows that results are robust to this specification.

Lags. Local projections may be sensitive to the number of lags of explanatory variables included in the model. As a robustness check, we provide evidence that the results are not significantly affected by the number of lags included, both for the control variables (Appendix Figure C.6) and the shock (Appendix Figure C.7).

Alternative time samples. A closer look at the monetary policy shock series in Figure 3 permits to distinguish two major phases in US monetary policy. The 1970s were characterised by higher uncertainty, pronounced inflation, and lower credibility in the Federal Reserve. The early 1980s are notable for Paul Volcker's aggressive tightening, which led to a recession but significantly reduced inflation. The mid-1980s are commonly identified as the start of the Great Moderation, a period of relative macroeconomic stability marked by falling interest rates, lower volatility and inflation. For this reason, as a robustness, Figure C.8 in Appendix C presents the GDP responses estimated for the period 1986-2020. The results convey a message similar to that of the full sample, both quantitatively and qualitatively. The main difference is that GDP initially increases but then declines substantially after three years. Iacoviello and Navarro (2019) identify a similar pattern when estimating responses over the sample period 1986-2016. The Global Financial Crisis (GFC) is believed to have stopped the Great Moderation. To test the robustness of the results, we truncate the time sample to exclude the GFC and its aftermath period characterised by the zero lower bound.[25] Results in Appendix Figure C.9 are in line with the baseline ones.

Alternative country samples. Among emerging markets, the informal economy – defined as the set of activities that have market value but are not included in national

[25]Note that in the construction of the monetary policy shock we substitute the FFR with the shadow-rate (Wu and Xia, 2016) to account for the zero lower bound and unconventional monetary policy. Thus, the estimation on the full sample already takes this into account to a certain extent.

accounts – is widespread. Where this sector is particularly large, GDP and inequality estimates might not capture the full picture of what they aim to measure. A large informal sector is often associated with underdevelopment and higher income inequality (Deléchat and Medina, 2020). The sample of EMEs is substantial (53 countries), so the estimates are unlikely to be driven by data from individual countries. However, as a robustness check, we estimate a series of state-dependent local projections excluding countries where the informal economy constitutes a significant part of the labour market, based on data from the International Labour Organization (ILO).[26] Figure C.10 in Appendix C presents the IRFs for different country samples that cumulatively exclude these countries. The results are robust, suggesting that the main findings are not driven by potential mismeasurement of GDP and income inequality.

Alternative data for inequality. As discussed in Section 3, we use data from the SWIID because it is harmonised and standardised, it does not rely on a single estimation assumption, and it offers the widest country-time coverage. As a robustness check, we replicate our results using data from the World Inequality Database (WID), an alternative source that provides information on income Gini and income shares. The results, shown in Appendix Figure C.11, are qualitatively, and to some extent quantitatively, in line with the baseline findings.

5 Theoretical model

The empirical results show that the direction in which inequality affects the transmission of a US tightening to the real economy is qualitatively different between AEs and EMEs. While the pattern for AEs is more in line with the prior that more inequality strengthen the negative effects of the shock, the narrative for EMEs that inequality mitigates the contraction in GDP is somewhat more surprising. This is what motivates the need for a theoretical framework. As such, to rationalise the findings and understand how the transmission of the shock to foreign countries is affected by inequality, we provide a general equilibrium model.

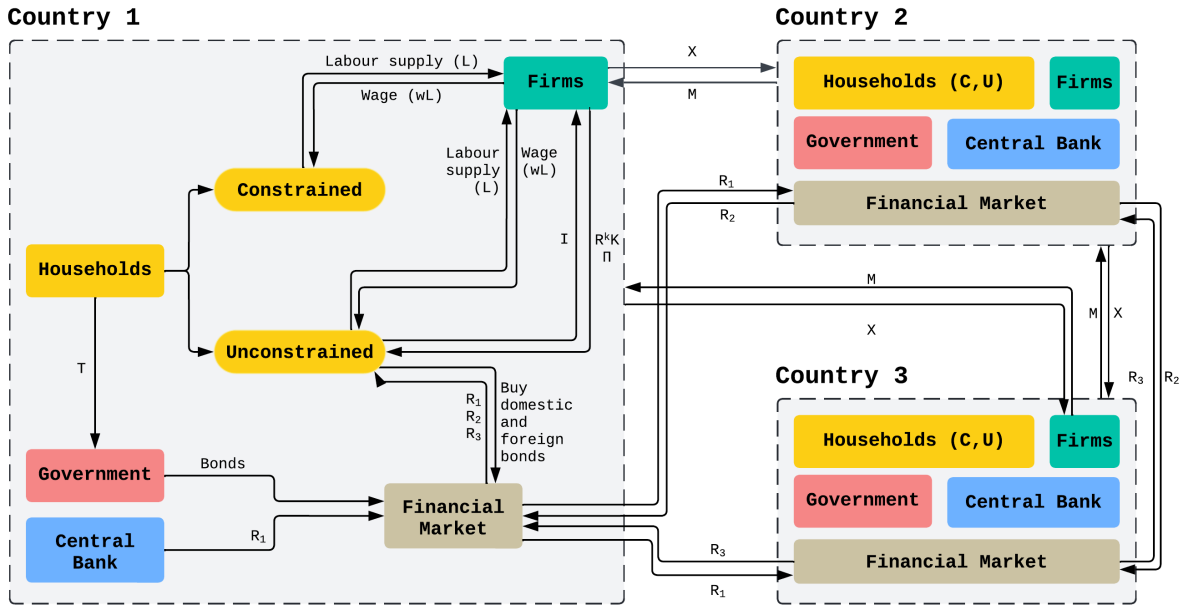
5.1 Model description

This section describes the main features of the model, while Appendix D reports the complete model with all derivations. For intuition purposes, Figure 9 provides a visual and stylised representation of the model.

We build on the open-economy model of Eichenbaum et al. (2021). There are three economies in the model, indexed by c, each with size n_c. Country 1 is the one in which the shock originates, i.e. the United States, while the other two countries are foreign

[26] The data and discussion are available here: https://ilostat.ilo.org/topics/informality.

Figure 9: Visual representation of the model



Notes. This figures provide a stylised description of the model, while full details and derivations are provided in Appendix D. The environment within each country is identical. R_1, R_2, R_3 are the interest rates on bond holdings of country 1, 2, and 3 bonds respectively. M are imports, while X denote exports. I stands for investment, Π for profits, K for capital, R^k for return on capital, T for taxes. **Source.** Author's own elaboration.

economies that receive the shock. To model household heterogeneity, the framework is augmented to include two types of households within each economy as in Campbell and Mankiw (1989), Galí et al. (2007), and Bilbiie (2008): constrained and unconstrained. As such, this is a Two-Agent New Keynesian (TANK) model. To reiterate the discussion in the Introduction, as the focus is on the dynamics of the aggregate distribution, a TANK model is better suited to the needs of this paper. Furthermore, recent research reassures that TANK models can indeed effectively capture the aggregate effects of household heterogeneity and produce results consistent with those obtained from HANK models in this context (Debortoli and Galí, 2024). In addition to households, economies are populated with competitive producers, retailers, a government, and a central bank. The model is calibrated as in Eichenbaum et al. (2021) and Ferrari Minesso and Pagliari (2023).[27]

Households. Within each country, there are two types of households:

- *Constrained households* (*ch*). They do not have access to financial markets and consume their labour income (i.e., *hand-to-mouth*);

[27]Due to the baseline model being calibrated quarterly in the reference models (Eichenbaum et al., 2021; Ferrari Minesso and Pagliari, 2023), we retain the quarterly frequency. While the empirical specifications are at the annual frequency, they are still consistent with the theoretical model given that the goal is to look at the medium run dynamics. Details on calibration of parameters are in Table D.1 in Appendix D.

- *Unconstrained households* (uh). They work and own domestic firms, consume part or all of their labour income and can save by investing in domestic and foreign bonds.

The share of each group in the total population is n_j, where $j \in \{ch, uh\}$. Each household maximises their utility choosing the optimal amount of consumption and labour.

The Gini coefficients for each country ($GINI_c$), which are highly relevant for the model applications, are generated through differences in total household income as follows:

$$GINI_{c,t} = \frac{\sum_{i=ch,uh} \sum_{j=ch,uh} |x_i - x_j|}{2 \sum_{i=ch,uh} n_i x_i} \tag{6}$$

where x_i is the income of household group $i \in \{ch, uh\}$. While constrained households only earn wages, unconstrained ones have financial income and profits as well.[28]

Firms. In each country there is a *continuum* of perfectly competitive firms. Firms produce undifferentiated final goods which are bundled together by retailers and sold on final markets with monopoly power. Under the Calvo formalism, retailers can update prices only with probability ξ_c and final prices are sticky.

Public sector. The central bank manages its own balance sheet and sets the policy rate following a Taylor-type rule. The government sets public consumption exogenously and balances its budget each period through lump-sum taxes. Bond markets are cleared in each period, with zero net supply in each country.

Trade and financial markets. Goods and bonds are traded across countries and determine the exchange rate. We assume that bond markets are incomplete and the Uncovered Interest Rate Parity (UIP) condition does not hold across countries. Households face a cost of investing in foreign bonds (ϕ_c^B).

Calibration. Parameters are set following the estimated three country model by Ferrari Minesso and Pagliari (2023). Country weights are defined to proxy for the share of the US, the euro area and the RoW in the global economy. The discount factor is set to 0.9926, the habit parameter to 0.75 and the labour supply elasticity to 3. We use log-utility and Calvo pricing, with the Calvo parameter taking the estimated values in Ferrari Minesso and Pagliari (2023). The capital depreciation rate is set to 0.0025.

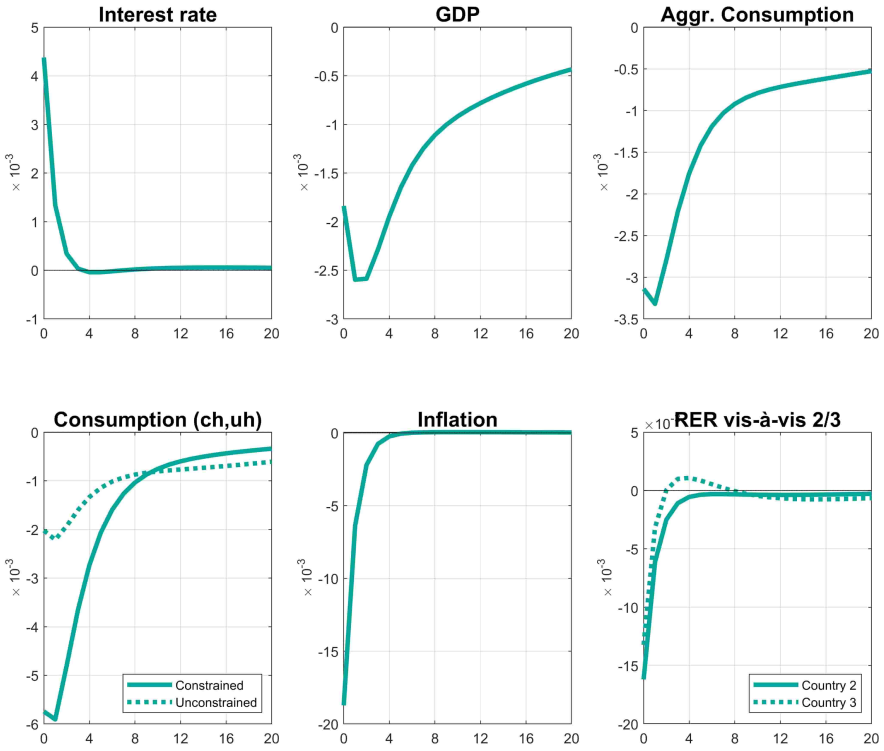
5.2 Simulations

Domestic transmission. Figure 10 shows the impulse responses of the main variables to a monetary policy shock (tightening) generated by the model for the United States,

[28] This is how the model relates to the empirical setup. While some household differences are connected to wealth inequality (i.e., investing in bonds and owning firms), inequality in the model arises from income components. Constrained households have only labour income, whereas unconstrained

i.e. the country in which the shock originates. Figure E.1 in Appendix E reports additional responses. At a glance, the results are consistent with findings from the literature and responses obtained from the local projections (Figure 5).

Figure 10: Effect of US monetary policy on US variables



Notes. Impulse responses depict deviations from the steady state following a shock to the interest rate (tightening) in country 1 (United States). A decrease in the exchange rate (RER) denotes an appreciation of the currency of country 1 (US dollar). The horizontal axes display quarters after the shock has hit.

Results are standard. Following the shock, GDP contracts sharply. As the interest rate increases, consumption and investment fall due to the higher borrowing cost. As constrained households consume all of their income and cannot invest, they reduce their consumption substantially more because their expenditure decisions are closely tied to the state of the economy. The local currency appreciates vis-à-vis foreign currencies, leading to an increase in imports. However, domestic demand contracts and outweighs the effects of the appreciation, ultimately resulting in a reduction in imports. The lower demand and the fall in consumption curb the inflationary pressures.

Spillovers to foreign economies. We now turn to examine how monetary policy spillovers to countries 2 and 3 are affected by their level of inequality. To achieve this, we define two different scenarios, as highlighted in Table 1 below. *Baseline* is the scenario with the Gini resulting from the original calibration. To simulate the alternative

households receive profits from the firms they own, can smooth consumption, save between periods, and benefit from returns on safe assets. Although labour income is not differentiated among groups, the

scenario, we change the share of constrained and unconstrained households. Once the model is estimated, the *higher inequality* scenario generates a Gini index that is 20% higher than the baseline.

Table 1: Model scenarios

	Baseline	**Higher inequality**
Shares:		
Constrained (*ch*)	0.3	0.4
Unconstrained (*uh*)	0.7	0.6
Inequality:		
Gini coefficient	0.10	0.12
Change from baseline	–	+20%

Before looking at the role of inequality, we look at responses in the baseline scenario. This is the thinner line in Figure 11.[29] The shock has a contractionary effect on GDP in both foreign countries. The dollar appreciates due to higher demand for US assets, driven by increased interest rates. This appreciation makes foreign goods cheaper for the US while making exports more convenient for foreign countries. However, overall demand declines as a result of the economic slowdown, leading to a decrease in exports to the US, which negatively impacts foreign GDP. To contrast this economic downturn, central banks in foreign countries reduce their policy rates. As a consequence, domestic demand, which initially decreased, recovers and partially internalises the negative effects of the recession. Inflation falls reflecting the economic slowdown and the decrease in labour supply.

Constrained households (teal green) face a loss in real wages and thus initially decrease their consumption. However, to counteract this negative income effect they increase their labour supply, which sustains the recovery of their consumption levels. Instead, unconstrained households (blue) have a positive wealth effect implied by financial markets following the monetary policy tightening in the US. US bond returns are higher and their value increases due to the appreciation of the dollar. As a consequence, households with access to financial markets re-balance their portfolio towards US bonds and away from domestic ones to enjoy a boost in financial income. Moreover, as per the Euler equation, with lower domestic rates, unconstrained households consume more of their income instead of buying domestic bonds. As unconstrained households are the largest share in the economy, aggregate consumption increases.

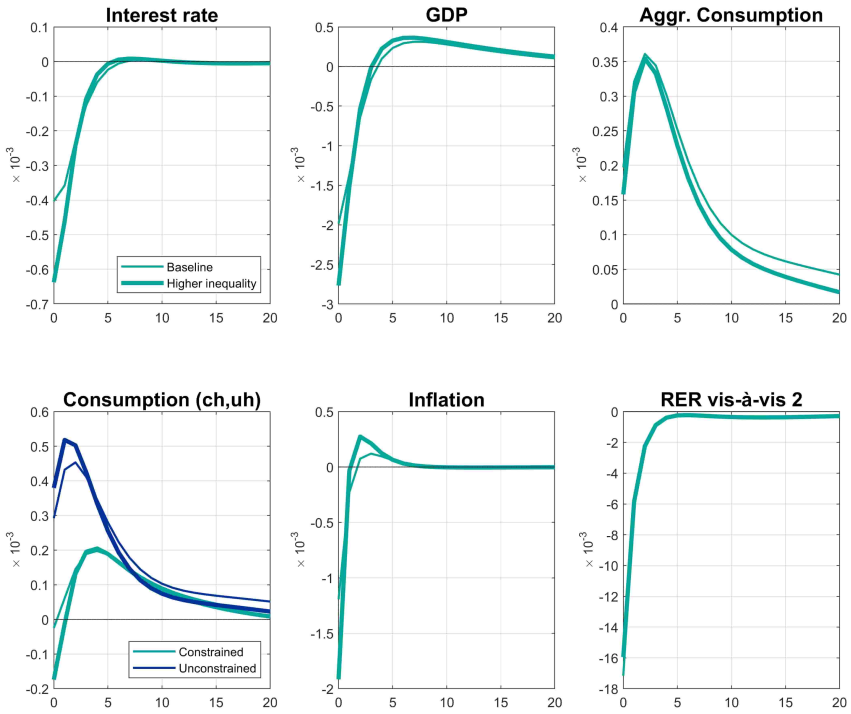
What happens with higher inequality? In this scenario, represented by the thicker

sources of income are, resulting in income disparities.

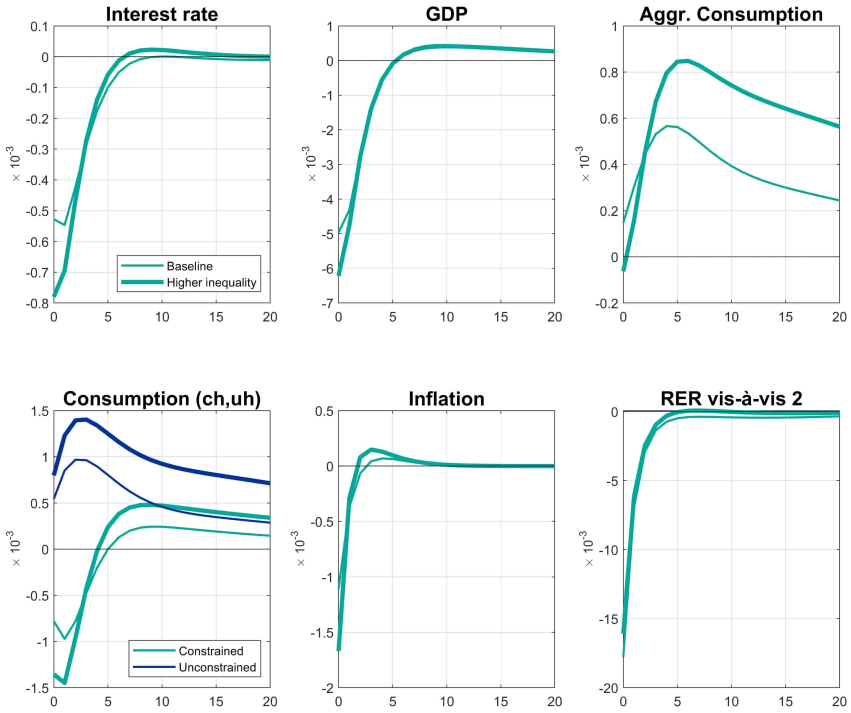
[29] Responses for additional variables are reported in Figure E.2 in Appendix E.

Figure 11: Effect of US monetary policy on foreign economies – Different levels of inequality

(a) Country 2



(b) Country 3



Notes. Impulse responses depict deviations from the steady state following a shock to the interest rate (tightening) in country 1 (United States). *'Baseline'* refers to the original calibration, while *'Higher inequality'* is a scenario where the Gini is 20% higher. A decrease in the exchange rate (RER) denotes an appreciation of the currency of country 1 (US dollar). The horizontal axes display quarters after the shock has hit.

line in Figure 11, the share of constrained households increases, while the share of unconstrained households decreases within each economy. In other words, a larger share of *hand-to-mouth* agents translates into higher inequality. In this case higher inequality is associated with stronger spillovers of US policy to both countries. With a higher share of constrained households, there are less capital gains from the appreciation of US assets and therefore domestic consumption consumption, in aggregate, increases by less falls by less leading to a sharper contraction of output and stronger fall in inflation. Because of that, the central bank needs to cut interest rates by more.

Remember that inequality in the model is generated by the differences in income between constrained and unconstrained households. Within country, the main difference between the two households is that the former do not have access to financial markets, while the latter do. However, unconstrained households across countries may differ in their ease of access to foreign financial markets. For example, there are empirical and theoretical evidence that home bias in emerging markets tends to be higher than in developed countries (Kim et al., 2014; Wallmeier and Iseli, 2022).[30] Moreover, costs associated with investment can differ between countries. In particular, investors in EMEs face higher costs of holding foreign bonds that include transaction fees, international brokerage fees, currency conversion fees, and information costs. Access to financial services is also heterogeneous. According to the *World Bank's Global Findex Database*, 96% of the adult population in high income countries own an account at a financial institution or a mobile-money-service provider.[31] This compares to 72% in middle income countries and 39% in low income countries. In addition, opportunities for hedging against currency and interest rate risk are lower and more expensive in EMEs, due to the instability of domestic currencies.

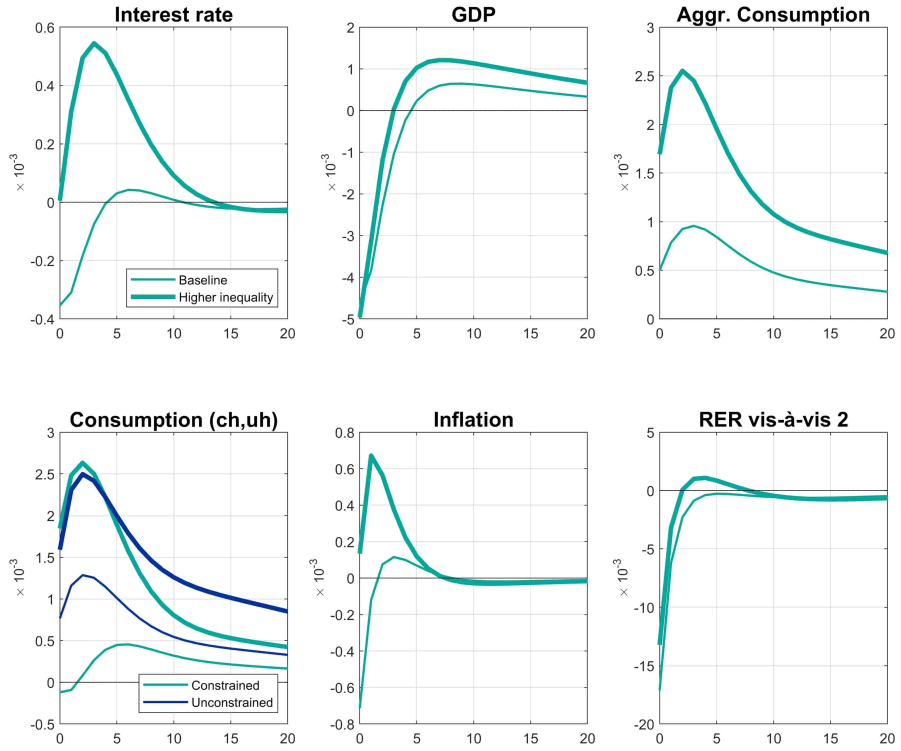
To incorporate this fact into the model, we increase the cost of holding foreign bonds (ϕ_c^B) for country 3 to represent an emerging market economy. Note that this also serves as a proxy for lower financial development and lower efficiency of financial markets. Responses are shown in Figure 12.[32] The main finding, which replicates the empirical result in Figure 8, is that the macroeconomic impact of the shock on country 3 is more contained in a scenario of higher inequality. Why is this the case? It relates to financial openness and access to foreign financial markets.

[30] However, the level of home bias and the currency denomination of domestically issued bonds are also influenced by macroeconomic events. For example, Hale and Spiegel (2012) show that the advent of the Economic and Monetary Union (EMU) increased the share of bonds issued by countries outside the euro area that are denominated in euro, at the expense of dollar-denominated ones. Moreover, the global financial crisis led to a significant increase in the issuer currency denomination of bonds placed in global markets (Hale et al., 2020).

[31] The full report is available here: https://www.worldbank.org/en/publication/globalfindex/Report. Percentage of population aged 15 and older.

[32] Responses for additional variables are reported in Figure E.4 in Appendix E, while responses for country 2 are shown in Figure E.3.

Figure 12: Effects of US monetary policy on country 3 – Different levels of inequality and higher cost of foreign bond holding ($\phi_2^B = 0.001, \phi_3^B = 0.1$)



Notes. Impulse responses depict deviations from the steady state following a shock to the interest rate (tightening) in country 1 (United States). *'Baseline'* refers to the original calibration, while *'Higher inequality'* is a scenario where the Gini is 20% higher. A decrease in the exchange rate (RER) denotes an appreciation of the currency of country 1 (US dollar). The horizontal axes display quarters after the shock has hit.

If inequality is higher but domestic unconstrained households do not hold or hold very little foreign debt (country 3, $\phi_3^B = 0.1$), they do not benefit from a dollar appreciation and cannot re-balance their portfolio from domestic to foreign bonds after the shock. This reduces the pressure on domestic financial conditions, through higher consumption and investment in domestic bonds, and reduces the negative effects of higher inequality.

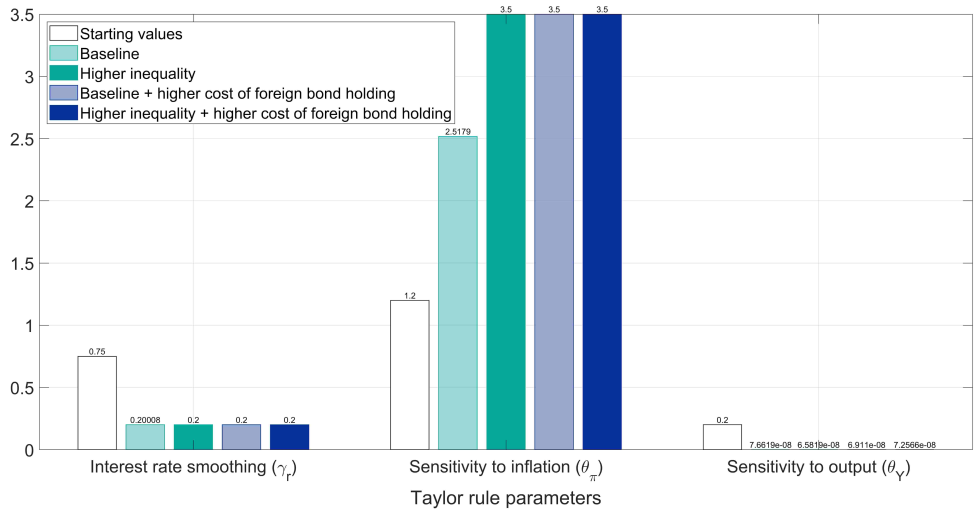
The model prediction is that the role of household heterogeneity in the transmission of external monetary policy shocks works mainly through the financial channels. Inequality matters in this model setting because it affects asset holdings decisions, which in turn depend on financial participation in international markets. But how these assets are held - in domestic or US currency - matters as much to determine the spillover of US policies. This findings is similar to the results by Boehnert et al. (2025) related to differences in consumption of tradable and non-tradable goods between households. As in our case, also Boehnert et al. (2025) highlights how specific characteristics between "unequal" households matter in determining the interplay between inequality

and aggregate shocks.

Optimal monetary policy. As shown above, the distribution of income and wealth shapes the strength of monetary policy transmission. Heterogeneous environments therefore call for corresponding adjustments in the optimal weights of the central banks reaction function. In this section, we characterise the optimal policy rule for each of the inequality scenarios discussed previously. We take the perspective of a social planner – the central bank in the domestic economy (i.e., the US) – who chooses optimal policy given the level of inequality. Specifically, for each inequality scenario we optimise the Taylor rule coefficients to maximise domestic total welfare.[33]

Figure 13 reports the resulting estimates. Unsurprisingly, optimising the reaction function yields to welfare gains across all cases (see Figure E.5). However, higher levels of inequality require a stronger response to inflation and a weaker response to output. The interest rate persistency is also lower in the optimised ruled compared to the baseline calibration. This result is independent on the assumptions on the functioning of the bond market or on the degree of international risk sharing. Intuitively, when a larger share of households is constrained, and asset-market participation becomes more concentrated, a given policy tightening induces a more uneven consumption adjustment. A stronger reaction is therefore required to deliver a comparable aggregate response.

Figure 13: US optimal monetary policy under different inequality scenarios



Notes. Welfare maximising optimal values of the Taylor rule parameters under different inequality scenarios. *'Baseline'* refers to the original calibration, while *'Higher inequality'* is a scenario where the Gini is 20% higher as defined in Table 1. In the *'higher cost of foreign bond holding'* scenario $\phi_3^B = 0.1$.

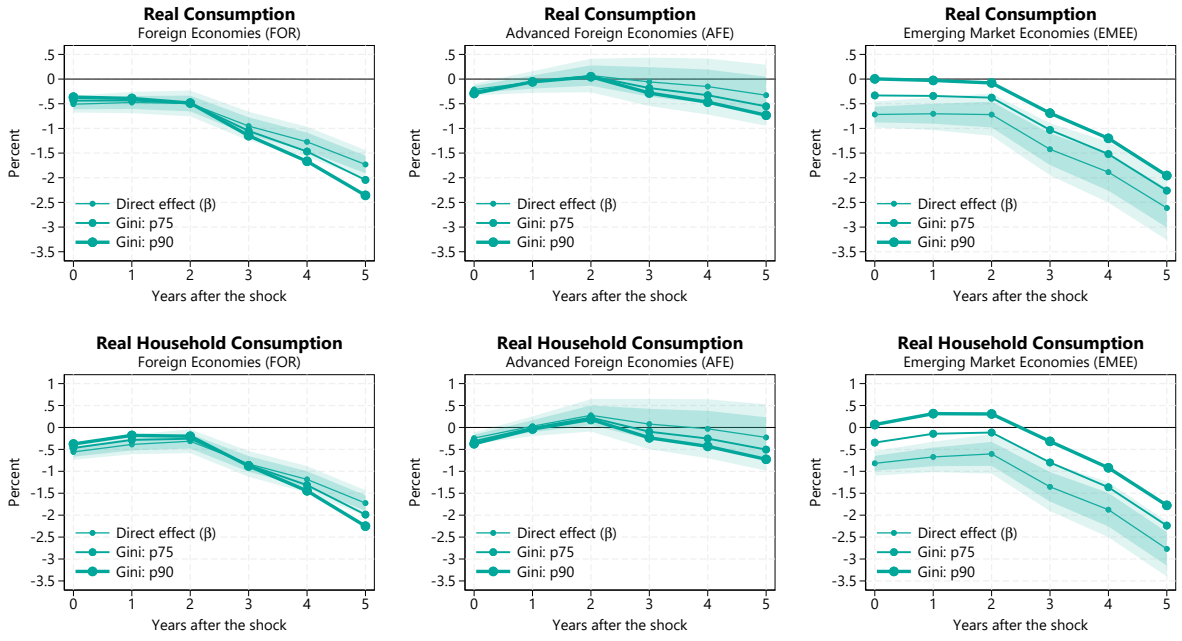
[33] The model is solved at the second order with pruning. Parameters in the Taylor rule (interest rate persistency, sensitivity to inflation, and sensitivity to output) are optimised to maximise the unconditional mean of welfare which is defined recursively as $\mathcal{W}_t = U_t + \beta E_t \mathcal{W}_{t+1}$, where U is the period utility function. Total welfare is the (weighted) average of welfare for constrained and unconstrained households.

6 Effects on consumption and nonlinearity

Before concluding, we test two of the model's predictions within the empirical framework. First, we look at the heterogeneous response of consumption. Second, we explore nonlinearity in the transmission of US monetary policy to foreign GDP, studying the interaction between income inequality and the degree of financial openness.

Consumption. Once differences in financial market access are accounted for, the model predicts that the effect of inequality on the transmission to consumption follows a dynamic similar to that of GDP. Specifically, higher inequality has an incremental effect on consumption in emerging market economies and a detrimental effect in advanced economies (Figures 12 and E.3). Looking at responses of consumption is relevant because of between-household differences in consumption-savings decisions. To test whether this pattern is confirmed in the data, we use state-dependent local projections as in model 3 with household consumption as response variable. Estimated IRFs in Figure 14 shows that results align with the dichotomy between AEs and EMEs identified in the theoretical model.

Figure 14: Effect of US monetary policy on total and household consumption



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. *Real Consumption* refers to total consumption, while *Real household consumption* to household final consumption expenditures only. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends. Due to data availability, the sample for emerging market economies includes 47 countries.

Inequality and financial openness. The key determinant of the difference in the way inequality influences monetary policy effects between AEs and EMEs in the theoretical model is the differential access to foreign financial markets. For this reason, we will now analyse nonlinearities in the empirical framework. Specifically, we assess the interaction between income inequality and financial openness. The second dimension proxies for different costs in accessing foreign markets, as featured in the theoretical model. Higher financial openness reflects lower foreign asset-holding costs. Ideally, that should be measured by financial market participation rates at the household level. However, this measure is hardly available, even for advanced economies. Thus, we use the Chinn-Ito index of capital account openness as the benchmark for financial openness.[34] Compared to *de facto* measures, *de jure* measures of financial liberalisation, such as the Chinn-Ito index, are less likely to be endogenous to various economic dimensions (Furceri et al., 2019).[35]

We estimate the following local projection, identical to the one in Equation 3, but now including a triple interaction term between the shock, inequality, and financial openness ($kaopen$):

$$\begin{aligned} y_{i,t+h} - y_{i,t-1} = {} & \mu_i^h + \beta^h u_t^{US} + \gamma^h u_t^{US}(gini_{i,t-1} - \overline{gini}) \\ & + \theta^h(gini_{i,t-1} - \overline{gini}) + \tau^h(kaopen_{i,t-1} - \overline{kaopen}) \\ & + \lambda^h(gini_{i,t-1} - \overline{gini})(kaopen_{i,t-1} - \overline{kaopen}) \\ & + \rho^h u_t^{US}(gini_{i,t-1} - \overline{gini}) + \chi^h u_t^{US}(kaopen_{i,t-1} - \overline{kaopen}) \\ & + \zeta^h u_t^{US}(gini_{i,t-1} - \overline{gini})(kaopen_{i,t-1} - \overline{kaopen}) \\ & + \eta^h(x_{i,t-1} - \bar{x}) + \delta t + \phi t^2 + \varepsilon_{i,t+h} \qquad h = 0, ..., 5 \end{aligned} \tag{7}$$

As we are interested in studying how the impact of the shock on GDP differs according to the level on inequality and the degree of financial openness, we compute marginal effects following the estimation of local projections for each horizon of interest.

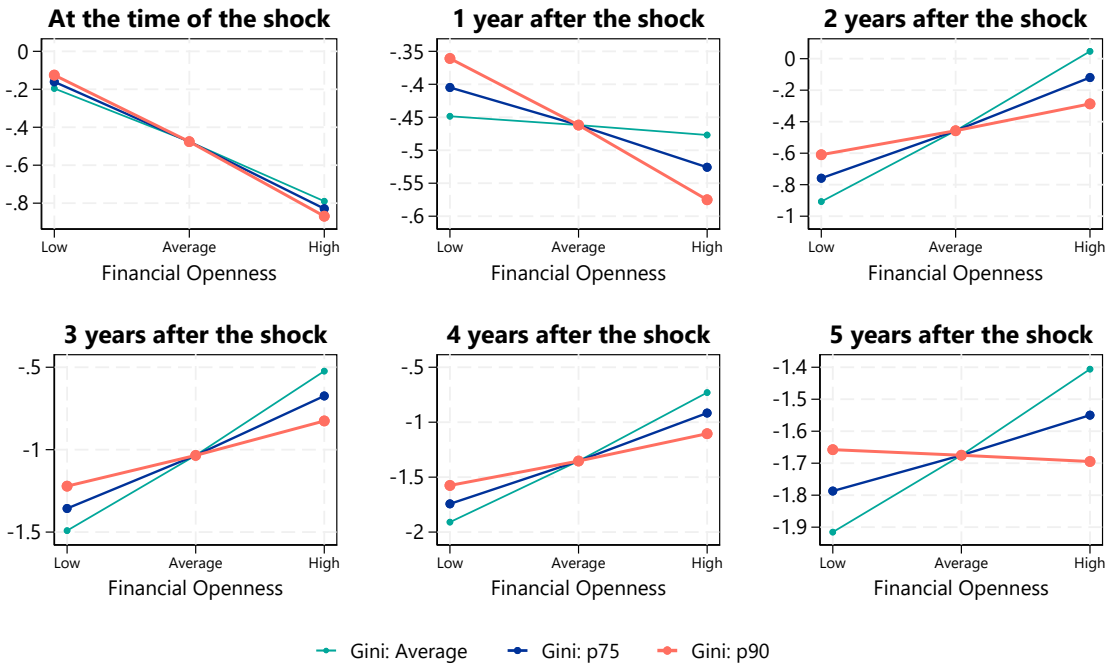
From the results reported in Figure 15, three messages emerge. First, the effect of the shock on GDP remains negative across all degrees of financial openness and inequality. Second, for the first two periods at least, higher degrees of financial openness are associated with higher spillovers of US monetary policy, for the same level of inequality. This is consistent with findings in the literature (Faia and Iliopulos, 2011; Georgiadis, 2016; Wu et al., 2024). Third, and most important for the interpretation of results of this paper, the effect of financial openness differs according to the level of inequality. When financial openness is low, higher inequality reduces the negative

[34] Note that the Chinn-Ito index is already included as a control variable in all empirical specifications in this paper, as financial openness is an important dimension for monetary policy spillovers.

[35] This is important for the context of this exercise, in which financial openness and inequality are assessed before the shock occurs and their interaction determines the heterogeneity in the spillover effect.

effect of the shock on GDP. When financial openness is high, higher inequality is associated with larger spillovers to GDP. If a country is more financially closed, unconstrained households invest less in foreign assets and use their extra income to either buy domestic bonds or consume, reducing the negative effect of the shock. On the other hand, if a country is more open, unconstrained households would invest a substantial part of their income in foreign bonds, generating capital outflows that amplify the negative effects of the shock. Moreover, the wealth effect from the appreciation of the dollar is greater (smaller) for countries that are more (less) financially and commercially exposed to the United States (Rose and Spiegel, 2012). This is reflected in the impulse responses of the exchange rate, with the dollar appreciating less in the case of high foreign bond-holding costs than in the original case.

Figure 15: Marginal effects of US monetary policy on foreign economies' GDP – Nonlinearity: inequality and financial openness



Notes. The figure reports the predicted marginal effects, i.e. changes in real GDP following a monetary policy shock that increases the FFR by 1 percentage point, at different levels of financial openness and disposable income inequality. The x axis defines low, average, and high levels of financial openness, measured with the Chinn-Ito index. *Low* and *High* are defined as the 25th and 75th percentile of its cross-country distribution, respectively. The lines and markers identify how the effect on real GDP differs according to the level of income inequality (average, 75th, and 90th percentiles) for each level of financial openness. The thicker the line and larger the marker, the higher the inequality level. The estimation includes the whole sample of 87 countries. To preserve readability of the chart, confidence bands around the estimates are not reported. While the difference between estimates is not always statistically significant, the goal of this exercise is primarily to show the direction of the interaction between financial openness and inequality.

Our result suggest that while inequality determines the *magnitude* of the effect of a US monetary policy shock on foreign GDP, financial openness provides the *direction* of the relationship between inequality and the impact of the shock on GDP.

While it is beyond the scope of this paper to assess the direct relationship between financial openness and inequality, the findings discussed above resonate with existing literature on the subject. For instance, Avdjiev and Spasova (2022) show that the relationships between financial openness and inequality is stronger in EMEs compared to AEs. This might explain the broader heterogeneity of spillover effects observed in EMEs. Liu et al. (2023) find that capital inflows contribute to increasing income inequality, while capital outflows make the distribution of income more equal. This dynamic could further explain the interaction between inequality and financial openness identified in this paper. In countries characterised by high levels of financial openness, capital inflows can amplify the spillover mechanism by increasing inequality. Inequality increases vulnerabilities, as wealthier individuals are more exposed to fluctuations in global financial markets. Conversely, in economies that are less open, capital flows generally have a more limited impact, especially when outflows are constrained by elevated costs of foreign bond holdings. When resources are concentrated in the hands of those that are in a better position to absorb shocks, the aggregate effect on the real economy is more contained.

7 Conclusion

This paper investigates how income inequality in foreign economies affects the transmission of US monetary policy to their real economic activity. Specifically, we employ state-dependent local projections and exploit variation in within-country disposable income inequality across a large panel of 87 countries to estimate the heterogeneous response of GDP to a monetary policy tightening in the United States. We then rationalise these responses and the related mechanisms within a theoretical framework.

While reaffirming traditional results from the spillover literature, this paper presents novel findings with two main takeaways. First, inequality affects how real activity in foreign economies responds to US monetary policy shocks. Specifically, in advanced economies, greater household heterogeneity amplifies the contractionary effect of the shock on GDP. In contrast, in emerging market economies, higher inequality is associated with a reduction in spillovers to the real economy. Second, this divergence is determined by the level of participation in international financial markets. Using a Two-Agent New Keynesian (TANK) model, we show that when inequality is high but domestic households hold little to no foreign bonds, they are unable to re-balance their portfolios towards foreign assets after the shock impacts their economy. This mechanism mitigates the negative effects on domestic financial conditions, thereby reducing the macroeconomic consequences of high inequality. This dynamic is validated by the data when tested using the empirical framework.

These results carry relevant policy implications. As central banks increasingly fo-

cus on the distributional effects of their policies, they might also consider, within the scope of their mandates, how household heterogeneity influences the spillover effects on foreign economies. For example, Mishra and Rajan (2016) suggested that *the next step would be an agreement to discuss policies and their international spillover effects at meetings such as those of the IMF Board, the IMFC, the BIS, and the G-20*. The findings of this paper can inform discussions on how foreign economies might optimally design public policies to mitigate negative spillover effects from foreign monetary policy.

The paper identifies several potential avenues for future research. First, the focus on the US in this paper is motivated by research showing that US monetary policy has a greater impact on economic and financial conditions in the rest of the world compared to that of the European Central Bank (Ca' Zorzi et al., 2023). However, examining the role of inequality for spillovers from other central banks remains an unexplored area that warrants further investigation. Second, future research could explore the differences in the transmission channels identified in this paper between conventional and unconventional monetary policies (e.g., quantitative easing).

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A Literature overview

Table A.1: Literature on the role of inequality for the transmission of monetary policy

Paper	Methodology	Country	Main finding
Areosa and Areosa (2016) *Journal of Macroeconomics*	New Keynesian DSGE with inequality curve. Skilled and unskilled agents.	–	Higher inequality weakens the transmission of monetary policy and reduce welfare when there is a scarcity of skilled agents.
Voinea et al. (2018) *Journal of International Money and Finance*	Cross sectional estimation using household data (HBS). Monetary policy: debt service-to-income.	Romania.	Lower inequality improves the effectiveness of monetary policy transmission.
Ampudia et al. (2018) *ECB Working Paper*	Decomposition of change in consumption between direct and indirect effect of monetary policy, exploiting MPC heterogeneity. Household data (HFCS).	Euro area.	Direct effects of changes in monetargy policy rates differ between *hand-to-mouth* and other households.
Auclert (2019) *American Economic Review*	Theoretical model. Decomposition of consumption effect of monetary policy into three channels: earnings heterogeneity, unexpected inflation, interest rate exposure. Empirical validation using household data for US (PSID) and Italy (SHIW).	US, Italy.	Redistribution channels amplify the effects of monetary policy.
da Silva et al. (2022) *BIS Working Paper*	State-dependent local projections (consumption). country-specific MP shocks estimated using a PVAR 1999-2019.	20 AEs + US states.	Higher inequality reduced the power of monetary policy effects.
Ma (2023) *International Economic Review*	HANK model. Empirical validation using state-dependent local projection (GDP). MP shock from Romer and Romer (2004). 1969-2006.	US states.	The more equal the country, the more effective the monetary policy.
Domonkos et al. (2023) *Economic Modelling*	Panel data model using household level data (EU SILC). Monetary policy: EONIA, credit easing, QE, shadow rate. 20082016.	Euro area.	Higher inequality limits the monetary transmission to consumer and housing loans, but it improves the transmission to small firm loan rates.
Matusche and Wacks (2023) *Journal of Macroeconomics*	State-dependent local projections. Monetary policy: change in policy rate.	US, UK, euro area + US states.	Higher wealth inequality translates in stronger real effects of monetary policy.
Acharya and Pesenti (2024) *NBER Working Paper*	Tractable two-country TANK model, with precautionary savings and real income channels.	–	Both channels amplify the size of spillovers and spillbacks. Larger spillovers in countries with higher shares of households with high MPC and more income risk.
Acharya and Challe (2025) *Journal of International Economics*	Small Open Economy (SOE) HANK model, household heterogeneity due to uninsured idiosyncratic risk and unequal bond market access.	–	Central bank optimally stabilises output/exchange rate more in SOE-HANK than in SOE-RANK.

B Data

Table B.1: Data sources and description

Variable	*Description*	*Source*
Estimation of the monetary policy shock and other United States specific variables		
FFR	Effective federal funds rate, percent (average, not seasonally adjusted)	Federal Reserve Board, retrieved from FRED
Shadow rate	United States shadow federal funds rate	Wu and Xia (2016)
Inflation	US Gross Domestic Product Implicit Price Deflator (SA, 2012=100)	BEA, retrieved from Haver
Corporate bond yield	Moodys seasoned Baa corporate bond yield, ICE BofA BBB US Corporate Index from 2016:Q4 (correlation 98.6%)	Moody's and Bank of America, retrieved from Bloomberg
Long term yield	10-year government bond yield	OECD, retrieved from FRED
Real GDP	GDP at constant 2010 US$	Haver (G10+ and EMERGE)
Treasury Bill rate	Interest rate on government securities (Treasury bills), percent	IMF IFS
REER	Real Effective Exchange Rate	BIS
ANFCI	Adjusted National Financial Conditions Index	Chicago Fed
Share price	Share Prices for United States, index	OECD MEI
Estimation of local projections (all countries)		
Real GDP	GDP at constant 2010 US$	World Bank WDI
Gini, disposable income	Gini coefficient of post-tax national income	SWIID
Consumption	Household (private consumption) and total final consumption expenditure, constant 2015 US$	World Bank WDI
Unemployment rate	Unemployment rate, percent	IMF IFS
Exchange rate	Bilateral exchange rate vis-à-vis the US Dollar	EWN
CPI	Consumer Price Index	World Bank WDI
GDP Deflator	Ratio of GDP in current local currency to GDP in constant local currency	World Bank WDI
Capital account openness	Country's degree of capital account openness based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)	Chinn and Ito (2008), retrieved from https://web.pdx.edu/~ito/Chinn-Ito_website.htm
Imports, Exports, Trade openness	Imports and exports of goods and services. Trade openness is computed as the sum of imports and exports, as a percentage of national GDP	World Bank
Exchange rate regime	Dummy variable constructed as in Corsetti et al. (2021): floating exchange rate (peg=0) for categories 9 through 15 in the fine classification of Ilzetzki et al. (2019, 2022), fixed exchange rate (peg=1) elsewhere	Ilzetzki et al. (2019, 2022), retrieved from https://www.ilzetzki.com/irr-data
Rule of law	Index that captures the extent to which the government complies with the law, courts are independent, laws transparent, justice accessible, corruption absent, and the bureaucracy is impartial. Central estimate. It ranges from 0 (least rule-based) to 1 (most rule-based)	V-Dem Dataset v15 (2025), retrieved from https://ourworldindata.org/grapher/rule-of-law-index

Table B.2: Data availability and country coverage

Advanced Foreign Economies (AFEs) - 34

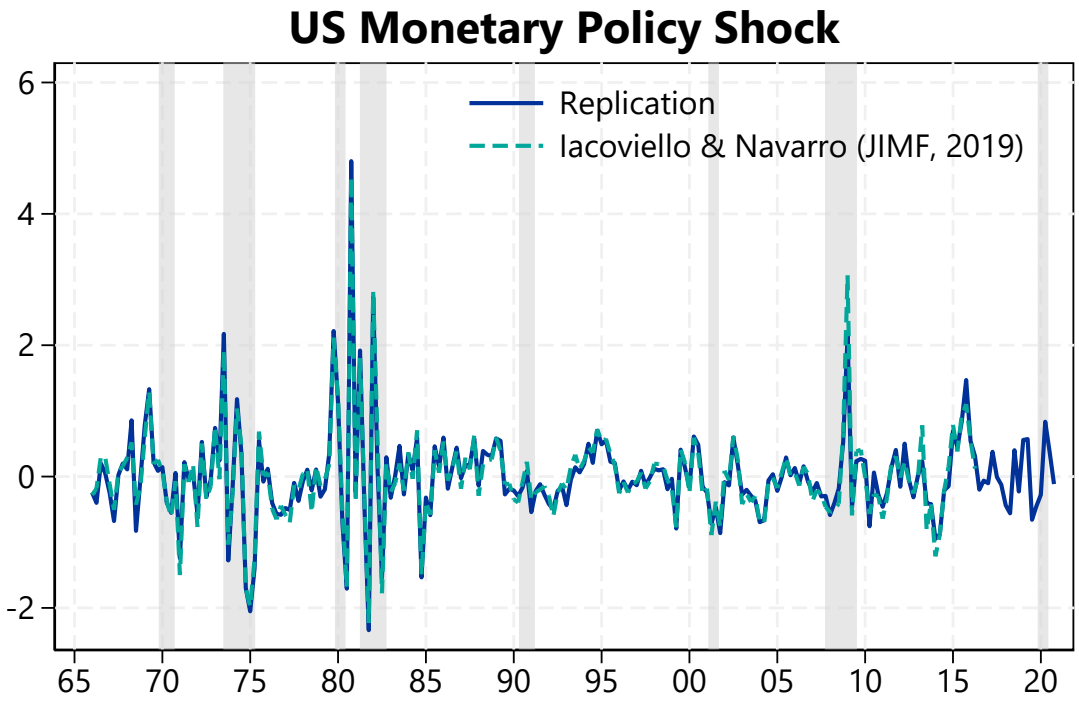
	Real GDP		Gini		Inflation		FX		KAopen		Trade Op	
Australia	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Austria	1988	2020	1988	2020	1988	2020	1988	2020	1988	2020	1988	2020
Belgium	1975	2020	1975	2020	1975	2020	1975	2020	1975	2020	1975	2020
Canada	1999	2020	1999	2020	1999	2020	1999	2020	1999	2020	1999	2020
Croatia	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020
Cyprus	1986	2020	1986	2020	1986	2020	1986	2020	1986	2020	1986	2020
Czech Republic	1992	2020	1992	2020	1992	2020	1993	2020	1996	2020	1992	2020
Denmark	1977	2020	1977	2020	1977	2020	1977	2020	1977	2020	1977	2020
Estonia	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020
Finland	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1970	2020
France	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Germany	1972	2020	1972	2020	1972	2020	1972	2020	1972	2020	1972	2020
Greece	1975	2020	1975	2020	1975	2020	1975	2020	1975	2020	1975	2020
Hong Kong	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Iceland	1997	2018	1997	2017	1997	2018	1997	2018	1997	2018	1997	2018
Ireland	1972	2020	1972	2020	1972	2020	1972	2020	1972	2020	1972	2020
Israel	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020
Italy	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1970	2020
Japan	1968	2019	1968	2018	1968	2019	1970	2019	1970	2019	1970	2019
Korea	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Latvia	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020
Lithuania	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020
Malta	2000	2020	2000	2020	2000	2020	2000	2020	2000	2020	2000	2020
Netherlands	1978	2020	1978	2020	1978	2020	1978	2020	1981	2020	1978	2020
New Zealand	1983	2020	1983	2020	1983	2020	1983	2020	1983	2020	1983	2020
Norway	1971	2020	1971	2020	1971	2020	1971	2020	1971	2020	1971	2020
Portugal	1969	2020	1969	2020	1969	2020	1970	2020	1970	2020	1970	2020
Singapore	1974	2020	1974	2020	1974	2020	1974	2020	1974	2020	1974	2020
Slovakia	1994	2020	1994	2020	1994	2020	1994	2020	1996	2020	1994	2020
Slovenia	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020
Spain	1975	2020	1975	2020	1975	2020	1975	2020	1975	2020	1975	2020
Sweden	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Switzerland	1982	2020	1982	2020	1982	2020	1982	2020	1996	2020	1982	2020
United Kingdom	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1970	2020

Emerging Markets Economies (EMEs) - 53

	Real GDP		Gini		Inflation		FX		KAopen		Trade Op	
Albania	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020	1997	2020
Argentina	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Azerbaijan	1992	2009	1992	2008	1992	2009	1992	2009	1996	2009	1992	2009
Belarus	1992	2020	1992	2020	1992	2020	1992	2020	1996	2020	1992	2020
Bolivia	1993	2020	1993	2020	1993	2020	1993	2020	1993	2020	1993	2020
Bosnia and Herzegovina	2002	2016	2002	2015	2002	2016	2002	2016	2002	2016	2002	2016
Botswana	1987	2017	1987	2016	1987	2017	1987	2017	1987	2017	1987	2017
Brazil	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Bulgaria	1990	2020	1990	2020	1990	2020	1990	2020	1994	2020	1990	2020
Chile	1969	2020	1969	2020	1969	2020	1970	2020	1970	2020	1969	2020
China	1979	2020	1979	2020	1979	2020	1979	2020	1984	2020	1979	2020
Colombia	1971	2020	1971	2020	1971	2020	1971	2020	1971	2020	1971	2020
Costa Rica	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Dominican Republic	1987	2020	1987	2020	1987	2020	1987	2020	1987	2020	1987	2020
Ecuador	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020
El Salvador	1992	2020	1992	2020	1992	2020	1992	2020	1992	2020	1992	2020
Georgia	1989	2020	1989	2020	1989	2020	1995	2020	1996	2020	1989	2020
Ghana	1989	2018	1989	2017	1989	2018	1989	2018	1989	2018	1989	2018
Guatemala	1982	2015	1982	2014	1982	2015	1982	2015	1982	2015	1982	2015
Honduras	1989	2020	1989	2020	1989	2020	1989	2020	1989	2020	1989	2020
Hungary	1993	2020	1993	2020	1993	2020	1993	2020	1993	2020	1993	2020
India	1972	2020	1972	2020	1972	2020	1972	2020	1972	2020	1972	2020
Indonesia	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Iran	1970	2020	1970	2019	1970	2020	1970	2020	1970	2020	1970	2020
Jordan	1987	2018	1987	2017	1987	2018	1987	2018	1987	2018	1987	2018
Kazakhstan	1992	2020	1992	2020	1992	2020	1993	2020	1996	2020	1992	2020
Kenya	1977	2020	1977	2020	1977	2020	1977	2020	1977	2020	1977	2020
Kuwait	1994	2000	1994	1999	1994	2000	1994	2000	1994	2000	1994	2000
Malaysia	1971	2020	1971	2019	1971	2020	1971	2020	1971	2020	1971	2020
Mexico	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Mongolia	1996	2019	1996	2018	1996	2019	1996	2019	1996	2019	1996	2019
Nicaragua	1994	2015	1994	2014	1994	2015	1994	2015	1994	2015	1994	2015
Nigeria	1986	2020	1986	2019	1986	2020	1986	2020	1986	2020	1986	2020
Panama	1971	2020	1971	2020	1971	2020	1971	2020	1971	2020	1971	2020
Paraguay	1991	2020	1991	2020	1991	2020	1991	2020	1991	2020	1991	2020
Peru	1973	2020	1973	2020	1973	2020	1973	2020	1973	2020	1973	2020
Philippines	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1981	2020
Poland	1992	2020	1992	2020	1992	2020	1992	2020	1992	2020	1995	2020
Romania	1992	2020	1992	2020	1992	2020	1992	2020	1992	2020	1992	2020
Russia	1991	2020	1991	2020	1991	2020	1992	2020	1996	2020	1991	2020
Saudi Arabia	2008	2019	2008	2018	2008	2019	2008	2019	2008	2019	2008	2019
Senegal	1992	2019	1992	2018	1992	2019	1992	2019	1992	2019	1992	2019
South Africa	1976	2018	1976	2017	1976	2018	1976	2018	1976	2018	1976	2018
Sri Lanka	1971	2020	1971	2019	1971	2020	1971	2020	1971	2020	1971	2020
Tanzania	1990	2019	1990	2018	1990	2019	1990	2019	1990	2019	1990	2019
Thailand	1968	2020	1968	2020	1968	2020	1970	2020	1970	2020	1968	2020
Tunisia	1986	2016	1986	2015	1986	2016	1986	2016	1986	2016	1986	2016
Turkey	1988	2020	1988	2020	1988	2020	1988	2020	1988	2020	1988	2020
Uganda	1990	2020	1990	2020	1990	2020	1990	2020	1990	2020	1990	2020
Ukraine	1989	2020	1989	2020	1989	2020	1992	2020	1996	2020	1989	2020
Uruguay	1982	2020	1982	2020	1982	2020	1982	2020	1982	2020	1982	2020
Vietnam	1994	2020	1994	2020	1994	2020	1994	2020	1994	2020	1994	2020
Zambia	1977	2016	1977	2015	1977	2016	1977	2016	1977	2016	1994	2016

Notes. Country classification is based on the IMF definition as outlined in the World Economic Outlook. *Inflation* is measured with the GDP deflator, which is available for a wider panel of countries. *FX* is the bilateral exchange rate of the country vis-à-vis the US Dollar. *KAopen* is the Chinn-Ito index of capital account openness. *Trade Op* is trade openness, computed as the sum of imports and exports of goods and services over national GDP. For details on the measures and data sources see Table B.1.

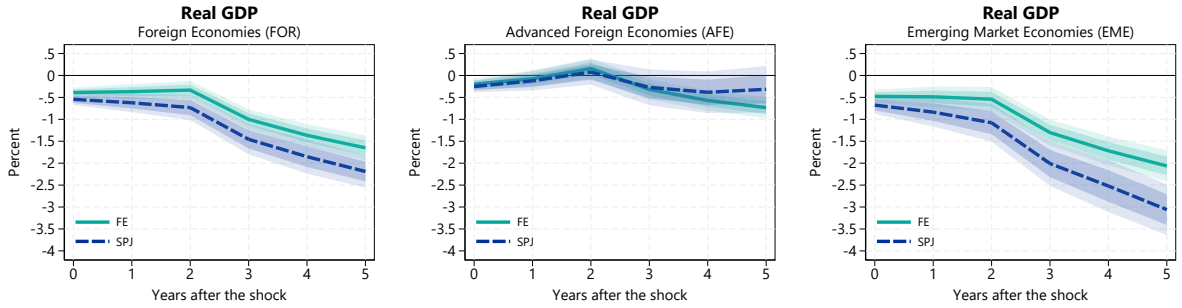
Figure B.1: Replicated and original MP shocks by Iacoviello and Navarro (2019)



Notes. Shaded areas represent NBER recessions. For the period 2009–2015, we substitute the federal funds rate with the Wu-Xia shadow rate to account for unconventional monetary policy and the zero lower bound. The shocks are calculated as the residuals of a regression of the federal funds rate on contemporaneous and lagged values of inflation, log US GDP, corporate spreads, log foreign GDP, as well as lagged values of the federal funds rate, and linear and quadratic time trends. The sample covers 1966:Q1–2020:Q4. **Source.** Iacoviello and Navarro (2019) and author's calculations.

C Robustness and alternative estimates

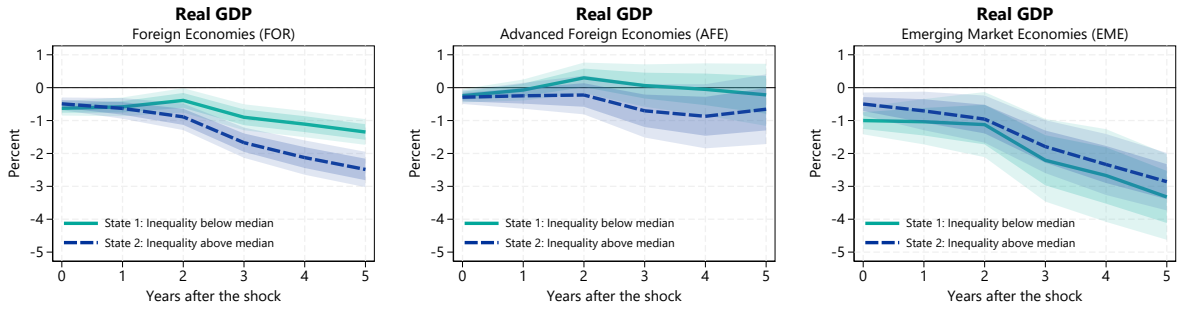
Figure C.1: Effects of US monetary policy on foreign economies' GDP, FE vs SPJ estimator



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. "FE" refers to estimates obtained using the Fixed Effects estimator, while "SPJ" denotes those derived from the Split-Panel Jackknife estimator. The empirical model is defined in Equation 2. We control for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

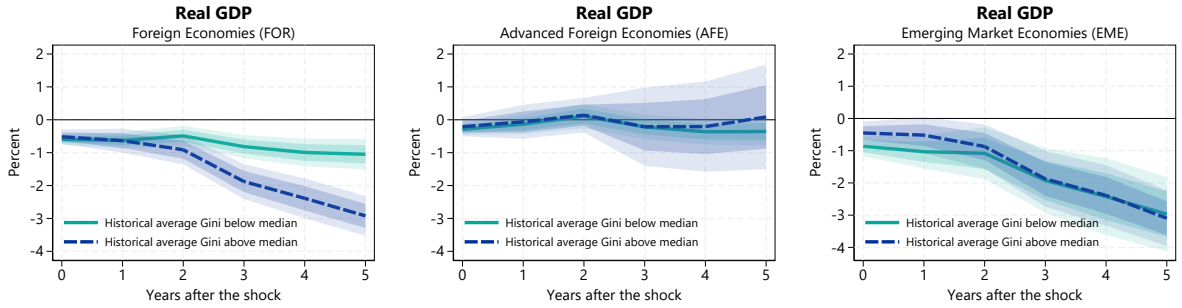
C.1 Alternative specifications for the local projections

Figure C.2: Heterogeneous effects of US monetary policy on foreign economies' GDP, Alternative specification: binary state-dependence



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point in State 1 (low inequality, Gini below annual median, solid teal green line) and State 2 (high inequality, Gini above annual median, dashed blue line). The line is the point estimate and the dark and light shaded areas are 68% and 90% confidence bands, respectively. We control for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

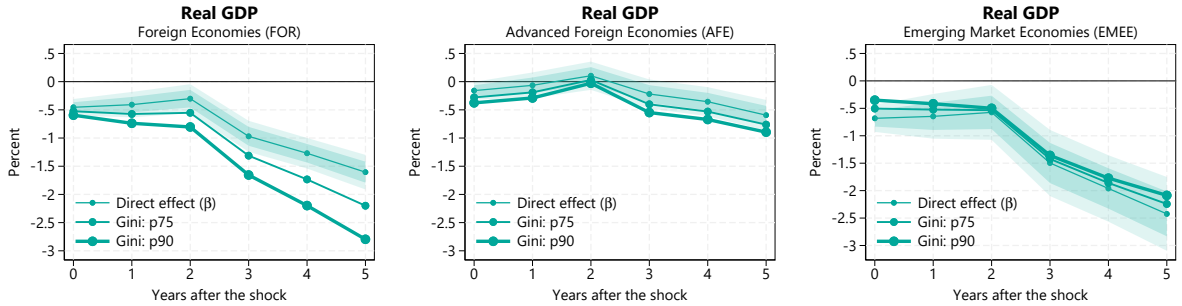
Figure C.3: Heterogeneous effects of US monetary policy on foreign economies' GDP, Alternative specification: comparative approach



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point for the group of countries whose average Gini is below (solid teal green line) and above (dashed blue line) median. The line is the point estimate and the dark and light shaded areas are 68% and 90% confidence bands, respectively. We control for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

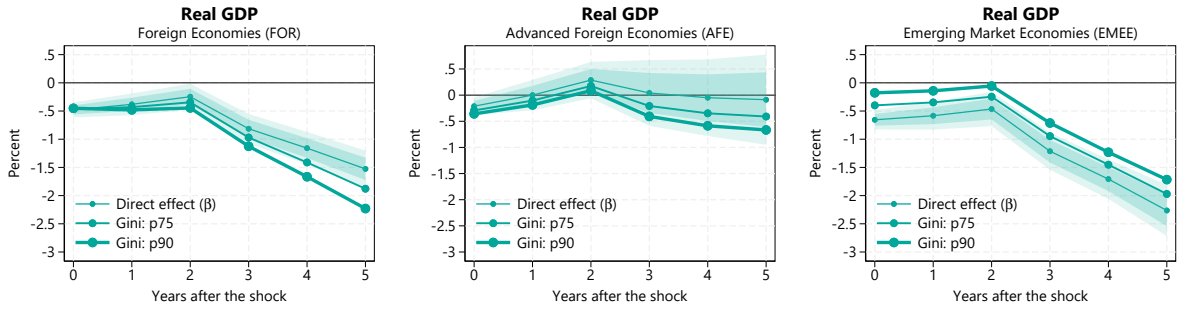
C.2 Robustness of state-dependent local projections

Figure C.4: Heterogeneous effects of US monetary policy on foreign economies' GDP, Without controls



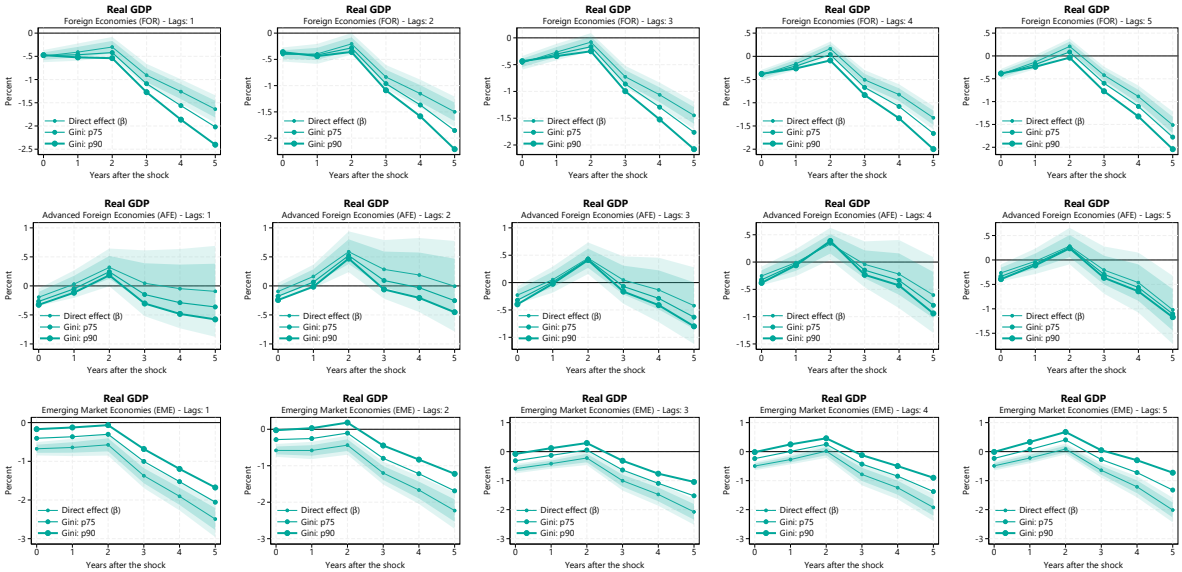
Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls only for one lag of GDP (log), and linear and quadratic time trends.

Figure C.5: Heterogeneous effects of US monetary policy on foreign economies' GDP, Controls interacted with the Gini



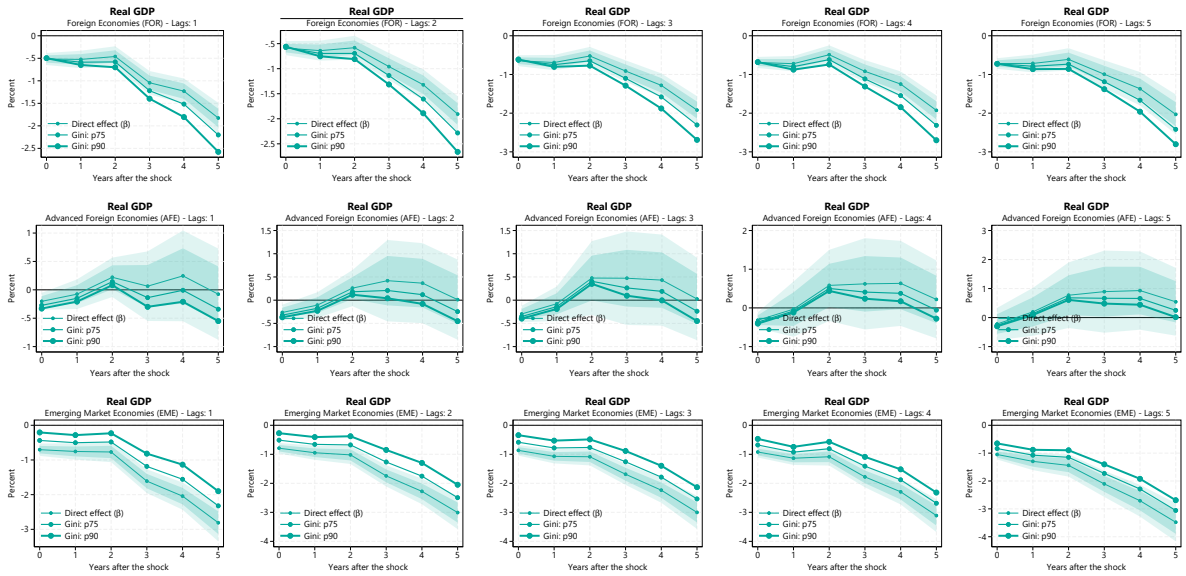
Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, linear and quadratic time trends, as well as interactions between each control variable and the Gini index.

Figure C.6: Heterogeneous effects of US monetary policy on foreign economies' GDP, Different number of lags for control variables



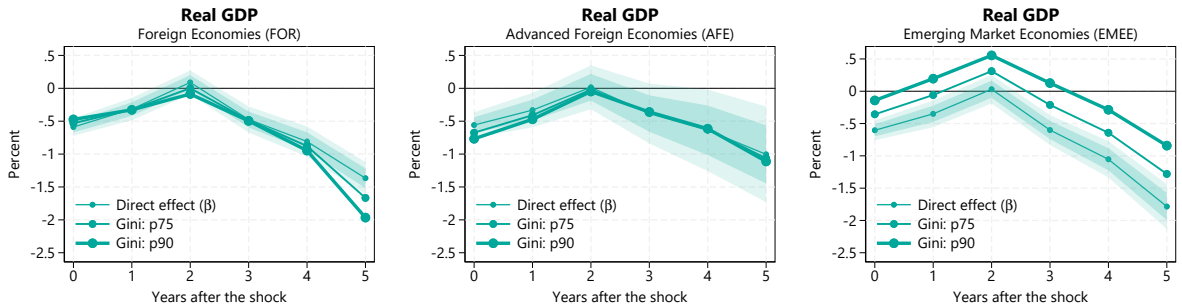
Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls for one to five lags of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

Figure C.7: Heterogeneous effects of US monetary policy on foreign economies' GDP, Different number of lags for the shock



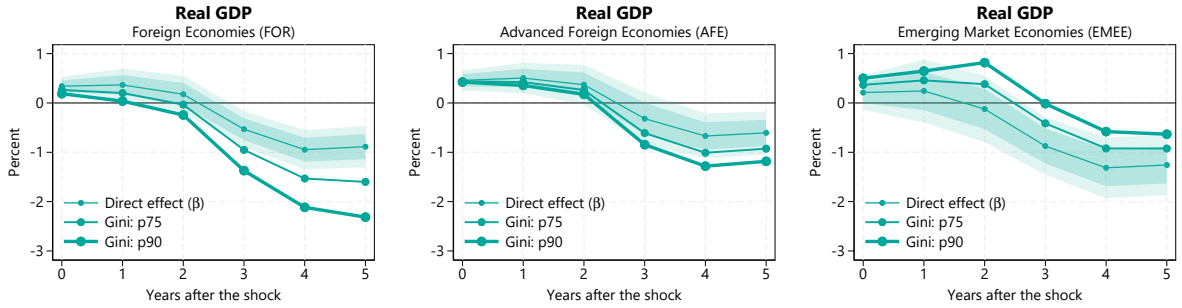
Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls for one to five lags of the shock, one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends.

Figure C.8: Heterogeneous effects of US monetary policy on foreign economies' GDP, 1986–2020



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends. Responses are estimated over the period 1986–2020.

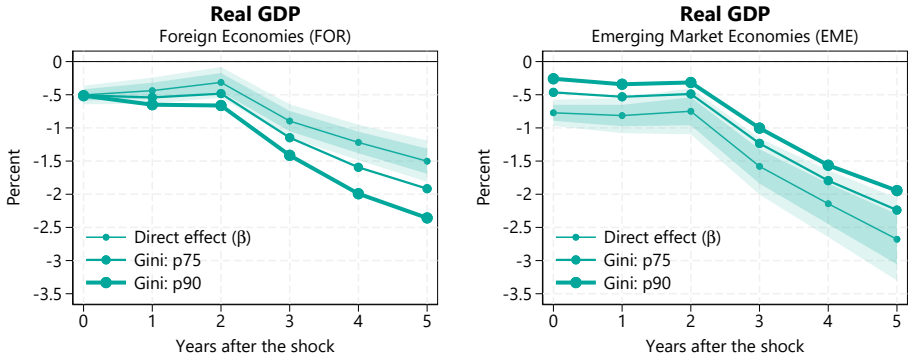
Figure C.9: Heterogeneous effects of US monetary policy on foreign economies' GDP, 1966–2006



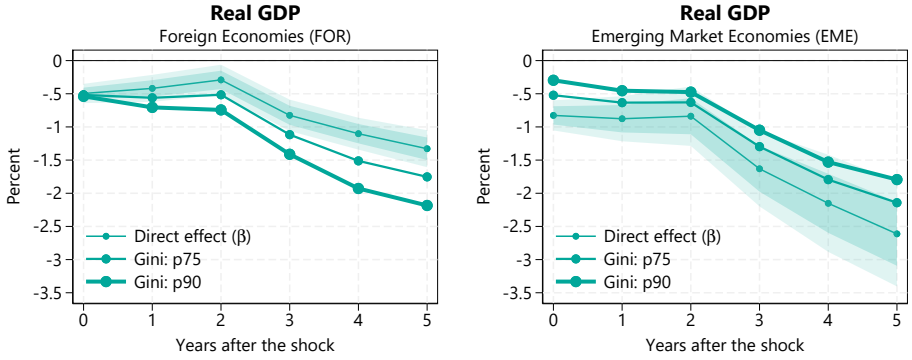
Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends. Responses are estimated over the period 1966–2006.

Figure C.10: Heterogeneous effects of US monetary policy on foreign economies' GDP, Excluding countries with large informal economy

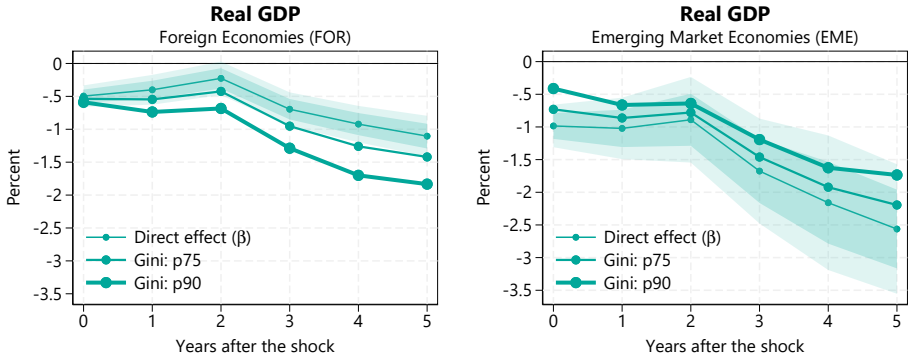
(a) Excluding the 10 countries with the highest share of informal employment



(b) Excluding the 15 countries with the highest share of informal employment



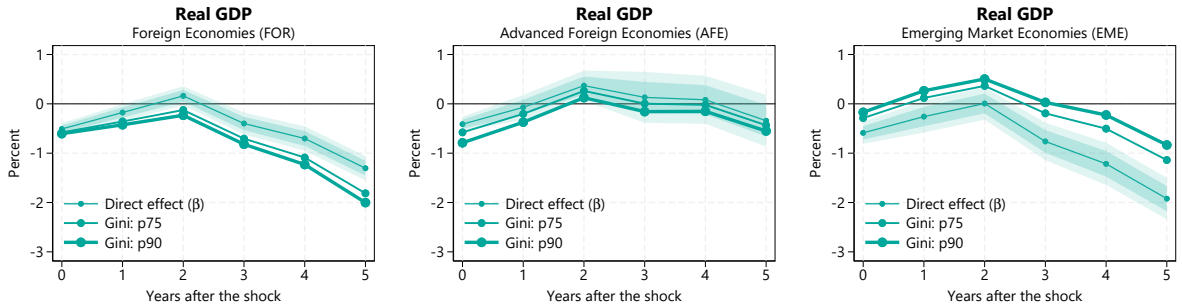
(c) Excluding countries where the share of informal employment is higher than 50%



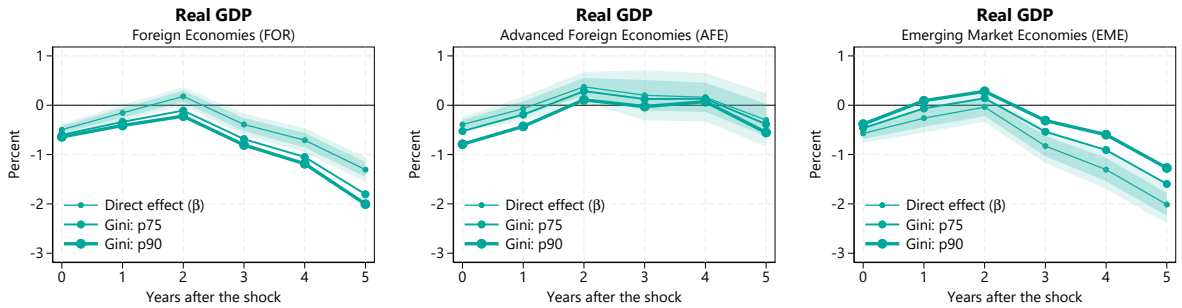
Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends. Countries are excluded based on their share of informal employment in total employment (source: ILO National Labour Force Survey). The 10 countries with the highest share of informal employment are Uganda, Nigeria, Tanzania, Senegal, India, Kenya, Zambia, Bolivia, Honduras, and Indonesia. The next five countries are Guatemala, Ghana, Botswana, Peru, and Ecuador. Countries with an informal employment share exceeding 50% include these 15, as well as Vietnam, Sri Lanka, Paraguay, El Salvador, Thailand, Mexico, Panama, Colombia, Dominican Republic, Georgia, and Jordan. IRFs for AFEs are not reported, as all the excluded countries are EMEs.

Figure C.11: Heterogeneous effects of US monetary policy on foreign economies' GDP, Alternative data for inequality

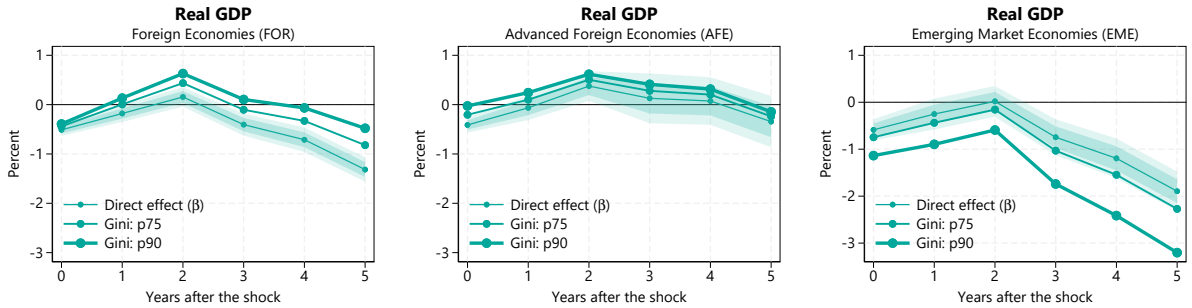
(a) Disposable income Gini (WID)



(a) Share of disposable income owned by the Top 1% (WID)



(a) Share of disposable income owned by the Bottom 50% (WID)



Notes. Impulse responses to a monetary policy shock that increases the FFR by 1 percentage point. The solid line represents the point estimate, while the dark and light shaded areas correspond to the 68% and 90% confidence bands, respectively. The direct effect (β) reflects the impact of the shock when inequality is at its average level. The other two lines represent the responses when inequality is at the 75th and 90th percentiles of the cross-country and time distribution. The thicker the line and the larger the marker, the higher the level of inequality. The empirical model is defined in Equation 3 and controls for one lag of GDP (log), GDP deflator (log), bilateral exchange rate with the US dollar (log), exchange rate regime, the Chinn-Ito index of capital account openness, trade openness, the rule of law index, and linear and quadratic time trends. Inequality data comes from the World Inequality Database (WID).

D Model

This Appendix reports the complete model and all derivations for exposition reasons. There are three economies in the model, indexed by c, each with size n_c. Within each country, there are two types of households: i) constrained households (ch), who do not have access to financial markets and consume their labour income; ii) unconstrained households (uh), who work, save through domestic and foreign bonds, and own domestic firms. The share of each group in the total population is n_j where $j \in \{ch, uh\}$. Income inequality is generated through differences in total households' income: while constrained (ch) households only earn wages, unconstrained ones (uh) have access to financial income. Firms produce undifferentiated final goods which are bundled together by retailers and sold on final markets with monopoly power. Under the Calvo formalism, retailers can update prices only with probability ξ_c and final prices are sticky. Goods and bonds are traded across countries and determine the exchange rate. We assume that bond markets are incomplete, hence the Uncovered Interest Rate Parity (UIP) condition does not hold across countries. The model is calibrated following Eichenbaum et al. (2021) and Ferrari Minesso and Pagliari (2023), with time being discrete, and it is solved using local methods (first-order linearisation). As in Eichenbaum et al. (2021) a standard sequence-of-markets equilibrium concept is adopted. Households and firms are assumed to be optimising, so their first-order conditions are satisfied, markets clear, and the resource constraints are satisfied.

D.1 Households

D.1.1 Constrained households

Constrained households only consume through labour income. Their period utility, which depends on consumption and leisure, is:

$$U_{c,ch,t} = e^{C}_{c,t} \ln \left(C_{c,ch,t} - h_c C_{c,ch,t-1} \right) - \frac{\chi_{c,l}}{1+\phi_c} L^{1+\phi_c}_{c,ch,t} \tag{D.1}$$

where c is the country index. The budget constraint is:

$$P_{c,t} C_{c,ch,t} = w_{c,t} L_{c,ch,t} - T_{ch} \tag{D.2}$$

$C_{c,ch}$ is consumption, $L_{c,ch}$ aggregate labour, P_c the CPI price index, w_c the nominal wage (constant across groups) and T_{ch} steady-state taxes. $e^{C}_{c,t}$ is a common consumption preference shock. There are habits in consumption captured by the parameter h. First

order conditions imply:

$$\frac{e^C_{c,t}}{C_{c,ch,t} - hC_{c,ch,t-1}} - E_t \frac{\beta_c e^C_{c,t+1} h_c}{C_{c,ch,t+1} - h_c C_{c,ch,t}} = \lambda_{c,ch,t} \tag{D.3a}$$

$$\chi^b_c L^{\phi_c}_{c,ch,t} = \lambda_{c,ch,t} \frac{w_{c,ch,t}}{P_{c,t}} \tag{D.3b}$$

where $\lambda_{c,ch,t}$ is the Lagrangian multipliers associated to the budget constraint.

D.1.2 Unconstrained households

Relative to constrained households, unconstrained households have access to global financial markets for bonds. Therefore they can save through purchases of domestic and foreign bonds, subject to financial frictions. Their period utility function is:

$$U_{c,uh,t} = e^C_{c,t} \ln \left(C_{c,uh,t} - h_c C_{c,uh,t-1} \right) - \frac{\chi_{c,l}}{1+\phi_c} L^{1+\phi_c}_{c,uh,t} \tag{D.4}$$

The budget constraint is:

$$\begin{aligned} P_{c,t} C_{c,uh,t} + B_{c,c,uh,t} + \sum_{l \neq c} \frac{B_{l,c,uh,t}}{NER_{l,c,t}} + P_{c,t} I_{c,uh,t} = w_{c,t} L_{c,uh,t} + R_{c,t-1} B_{c,c,uh,t-1} + \\ + \sum_{l \neq c} \frac{R_{l,t-1} B_{l,c,uh,t-1}}{NER_{l,c,t}} - \sum_{l \neq c} \frac{\phi^B_c}{2} \left(\frac{B_{l,c,uh,t}}{P_{c,t} NER_{l,c,t}} \right)^2 P_{c,t} + P_{c,t} R^k_{c,t} K_{c,uh,t-1} - T_{uh} + \Pi_{c,t} \end{aligned} \tag{D.5}$$

$B_{l,c,uh}$ are holdings of bonds issued by country l by unconstrained households uh in country c (with $l = c$ the special case of domestic bond holdings). $NER_{l,c,t}$ is the nominal exchange rate and $R_{l,t}$ the returns on safe assets from country l. Financial markets are subject to cross-border frictions, captured by the parameter ϕ^B_c. There are habits in consumption captured by the parameter h. T_{uh} are steady-state taxes.

$K_{c,uh}$ are holdings of capital, $I_{c,uh}$ new investments, R^k_c returns on capital, and Π_c firms' profits. The law of motion of capital is:

$$K_{c,uh,t+1} = \left\{ (1-\delta_c) K_{c,uh,t} + I_{c,uh,t} \left[1 - \frac{\phi^K_c}{2} \left(\frac{I_{c,uh,t}}{I_{c,uh,t-1}} - 1 \right)^2 \right] \right\} \tag{D.6}$$

There are frictions in capital installation, captured by the parameter ϕ^K_c, while δ_c denotes the depreciation rate of capital. First order conditions are:

$$\frac{e^C_{c,t}}{C_{c,uh,t} - hC_{c,uh,t-1}} - E_t \frac{\beta_c e^C_{c,t+1} h_c}{C_{c,uh,t+1} - h_c C_{c,uh,t}} = \lambda_{c,uh,t} \tag{D.7a}$$

$$\chi_c L^{\phi_c}_{c,uh,t} = \lambda_{c,uh,t} \frac{w_{c,uh,t}}{P_{c,t}} \tag{D.7b}$$

$$\beta_c E_t \left(\frac{\lambda_{c,uh,t+1}}{\pi_{c,t+1}} \right) = \frac{\lambda_{c,uh,t}}{R_{c,t}} \tag{D.7c}$$

$$\lambda_{c,uh,t} \left[1 + \phi^B_c \left(\frac{B_{l,c,uh,t}}{P_{l,t} RER_{l,c,t}} \right) \right] = \beta_c E_t \left(\frac{\lambda_{c,uh,t+1} R_{l,t+1}}{\pi_{c,t+1}} \frac{NER_{l,c,t}}{NER_{l,c,t+1}} \right) \tag{D.7d}$$

$$\begin{aligned} Q_{c,t} \left\{ \left[1 - \frac{\phi^K_c}{2} \left(\frac{I_{c,uh,t}}{I_{c,uh,t-1}} - 1 \right)^2 \right] - \frac{I_{c,uh,t}}{I_{c,uh,t-1}} \phi^K_c \left(\frac{I_{c,uh,t}}{I_{c,uh,t-1}} - 1 \right) \right\} + \\ + \beta_c E_t \left[Q_{c,t+1} \phi^K_c \left(\frac{I_{c,uh,t}}{I_{c,uh,t-1}} - 1 \right) \left(\frac{I_{c,uh,t+1}}{I_{c,uh,t}} \right)^2 \right] = \lambda_{c,t} \end{aligned} \tag{D.7e}$$

$$\beta_c E_t \left[Q_{c,t+1} (1 - \delta_c) + \Lambda_{c,t+1} R^k_{c,t+1} \right] = Q_{c,t} \tag{D.7f}$$

where $\lambda_{c,uh,t}$ is the Lagrangian multiplier associated with the budget constraint and Q_c is the price of capital. Aggregate consumption is:

$$C_{c,t} = \sum_{j=ch,uh} n_j C_{c,j,t} \tag{D.8}$$

The Gini coefficients for each country ($GINI_c$) are constructed as follows:

$$GINI_{c,t} = \frac{\sum_{i=ch,uh} \sum_{j=ch,uh} |x_i - x_j|}{2 \sum_{i=ch,uh} n_i x_i} \tag{D.9}$$

where x_i is the income of household group $i \in \{ch,\ uh\}$.

D.2 Production

In each country there is a *continuum* of perfectly competitive firms, indexed by k. Firms' production function is:

$$X_{c,t}(k) = A_{c,t} \left(K_{c,t}(k) \right)^{\alpha_c} \left(L_{c,t}(k) \right)^{1-\alpha_c} \tag{D.10}$$

where A_c is a total factor productivity shock. Total output is the sum of output consumed domestically and exported, formally $X_t(k) = \sum_{l=1,2,3} X^b_{c,l,t}(k)$ with domestic

demand being for $X^b_{c,c,t}(k)$. Cost minimisation implies:

$$R^k_{c,t}(k) = A_{c,t} MC_{c,t}(k) \alpha_c \left(K_{c,t}(k)\right)^{\alpha_c - 1} \left(L_{c,t}(k)\right)^{1-\alpha_c} \tag{D.11a}$$

$$W_{c,t}(k) = A_{c,t} MC_{c,t}(k)(1-\alpha_c) \left(K_{c,t}(k)\right)^{\alpha_c} \left(L_{c,t}(k)\right)^{-\alpha_c} \tag{D.11b}$$

where MC_c is the Lagrangian multiplier associated with the optimisation problem of firms, and W_c is the real wage.

D.3 Retailers and aggregation

Retailers aggregate intermediate goods and transform them into final goods. Define $Y_{c,c}$ and $Y_{l,c}$ as the domestic demand and export of final goods to country l. The following aggregators for domestic demand is adopted:

$$C_{c,c,t} + I_{c,c,t} + G_{c,c,t} = Y_{c,c,t} \tag{D.12}$$

where $C_{c,c}$, $I_{c,c}$, $G_{c,c}$ denote final consumption, investment, and government spending in country c of goods produced in country c (i.e., domestic). Exports aggregators are defined as:

$$\sum_{l \neq c} C_{l,c,t} + I_{l,c,t} + G_{l,c,t} = Y_{l,c,t} \tag{D.13}$$

where $C_{l,c}$, $I_{l,c}$, $G_{l,c}$ denote final consumption, investment, and government demand in country l of goods produced in country c. In other terms, these are total exports from country c to country l. $Y_{c,c}$ and $Y_{l,c}$ are produced aggregating across undifferentiated intermediate goods produced by domestic and foreign firms respectively. The demand function for these goods is:

$$Y_{c,c,t} = \left[\int_0^1 X_{c,c,t}(k)^{\frac{\nu_c - 1}{\nu_c}} dk\right]^{\frac{\nu_c}{\nu_c - 1}} \quad \text{and} \quad Y_{l,c,t} = \left[\int_0^1 X_{l,c,t}(k)^{\frac{\nu_c - 1}{\nu_c}} dk\right]^{\frac{\nu_c}{\nu_c - 1}} \tag{D.14}$$

where ν_c is the elasticity of substitution across different goods produced by country c. Price aggregators are:

$$P_{c,c,t} = \left[\int_0^1 P_{c,c,t}(k)^{1-\nu_c} dk\right]^{\frac{1}{1-\nu_c}} \quad \text{and} \quad P_{l,c,t} = \left[\int_0^1 P_{l,c,t}(k)^{1-\nu_c} dk\right]^{\frac{1}{1-\nu_c}} \tag{D.15}$$

with $P_{c,c,t}$ and $P_{l,c,t}$ being the prices of domestically consumed and exported goods. Demand functions for individual varieties are:

$$X_{c,c,t}(k) = \left[\frac{P_{c,c,t}(k)}{P_{c,c,t}}\right]^{-\nu_c} Y_{c,c,t} \quad \text{and} \quad X_{l,c,t}(k) = \left[\frac{P_{l,c,t}(k)}{P_{l,c,t}}\right]^{-\nu_c} Y_{l,c,t} \tag{D.16}$$

Final consumption goods are created by combining goods from each country. Aggregate consumption C_c is therefore:

$$C_{c,t} = \left\{\sum_l \omega_{c,l} \left(C_{c,l,t}\right)^{\rho_c}\right\}^{\frac{1}{\rho_c}} \tag{D.17}$$

$C_{c,l}$ is intermediate consumption in country c and produced in l. For example, $C_{c,c}$ is domestic consumption of domestically produced goods. $\omega_{c,l} \in [0,1]$ captures the share of goods produced in country l in total consumption, with $\omega_{c,c}$ the home bias. Similarly, aggregate government spending and investment are:

$$G_{c,t} = \left\{\sum_l \omega_{c,l} \left(G_{c,l,t}\right)^{\rho_c}\right\}^{\frac{1}{\rho_c}} \tag{D.18}$$

$$I_{c,t} = \left\{\sum_l \omega_{c,l} \left(I_{c,l,t}\right)^{\rho_c}\right\}^{\frac{1}{\rho_c}} \tag{D.19}$$

where $G_{c,c}$ ($I_{c,c}$) is government consumption (investment) of domestically produced goods, while $G_{c,l}$ ($I_{c,L}$) is government consumption (investment) of goods produced in country l. Cost minimisation defines the demand function for consumption of domestic and imported goods:

$$\begin{aligned}
C_{c,c,t} &= \left(\frac{P_{c,c,t}}{P_{c,t}}\right)^{\frac{1}{\varrho_c - 1}} \omega_{c,c} C_{c,t}, \quad C_{c,l,t} = \left(\frac{P_{c,l,t}}{P_{c,t}}\right)^{\frac{1}{\varrho_c - 1}} \omega_{c,l} C_{c,t} \\
G_{c,c,t} &= \left(\frac{P_{c,c,t}}{P_{c,t}}\right)^{\frac{1}{\varrho_c - 1}} \omega_{c,c} G_{c,t}, \quad G_{c,l,t} = \left(\frac{P_{c,l,t}}{P_{c,t}}\right)^{\frac{1}{\varrho_c - 1}} \omega_{c,l} G_{c,t} \\
I_{c,c,t} &= \left(\frac{P_{c,c,t}}{P_{c,t}}\right)^{\frac{1}{\varrho_c - 1}} \omega_{c,c} I_{c,t}, \quad I_{c,l,t} = \left(\frac{P_{c,l,t}}{P_{c,t}}\right)^{\frac{1}{\varrho_c - 1}} \omega_{c,l} I_{c,t}
\end{aligned} \tag{D.20}$$

whereby, demand in country c for goods produced in country l depends on their price relative to the aggregate price level and total consumption in country c. The aggregate price is:

$$P_{c,t} = \left\{ \sum_{l} \omega_{c,l} \left(P^{b}_{c,l,t} \right)^{\frac{\rho_c}{1-\rho_c}} \right\}^{\frac{\rho_c - 1}{\rho_c}} \tag{D.21}$$

D.4 Monopolists

Goods are sold on the final market by monopolists who set prices with some degree of market power. We assume there are frictions in price setting à-la Rotemberg. Formally, monopolists optimise:

$$E_t \sum_{d=0}^{\infty} (\beta_c)^d \Lambda_{c,t+d} \left\{ \frac{NER_{l,c,t} P_{l,c,t}}{P_{c,t}} X_{l,c,t}(k) - TC_{c,t} - \frac{\phi_{c,r}}{2} \left(\frac{P_{l,c,t}}{P_{l,c,t-1}} - 1 \right)^2 \right\} \tag{D.22}$$

where TC are total costs and $\phi_{c,r}$ the Rotemberg parameter. $l = c$ is the case of domestic goods sold in the domestic economy and the exchange rate $NER_{c,c,t}$ is 1. First order condition is:

$$\begin{aligned} (1 - \nu_c) + \frac{MC_{c,t} \nu_c}{P_{l,c,t} NER_{l,c,t}} - \phi_{c,r} \left(\pi_{l,c,t} - 1 \right) \frac{\pi_{l,t}}{P_{l,c,t-1} NER_{l,c,t}} + \\ \beta_c E_t \left[\frac{\lambda_{t+1}}{\lambda_t} \frac{Y_{l,c,t+1}}{Y_{l,c,t}} \phi_{c,r} \left(\pi_{l,c,t+1} - 1 \right) \frac{\pi_{l,c,t+1}}{P_{l,c,t} NER_{l,c,t}} \right] = 0 \end{aligned} \tag{D.23}$$

Inflation rates are $\pi_{c,l,t} = \frac{P_{c,l,t}}{P_{c,l,t-1}}$ and $\pi_{c,t} = \frac{P_{c,t}}{P_{c,t-1}}$. Notice that the Rotemberg parameter $\phi_{c,r}$ can be written as a function of the probability of updating prices ξ_c as $\phi_{c,r} = \frac{(\nu_c - 1)\xi_c}{(1-\xi_c)(1-\beta_c \xi_c)}$

D.5 Public sector

The central bank sets the policy rate and manages its own balance sheet. The policy rate follows a Taylor-type rule of the form:

$$R_{c,t} = R_{c,t}^{\gamma_{c,r}} \left[R_{c,ss} \left(\frac{Y_{c,t}}{Y_{c,t-1}} \right)^{\theta_Y} \pi_{c,t}^{\theta_\pi} \right]^{1-\gamma_{c,r}} \tag{D.24}$$

where Y_c is total output. The government sets public consumption exogenously and all shocks follow an AR(1) process.

D.6 Calibration

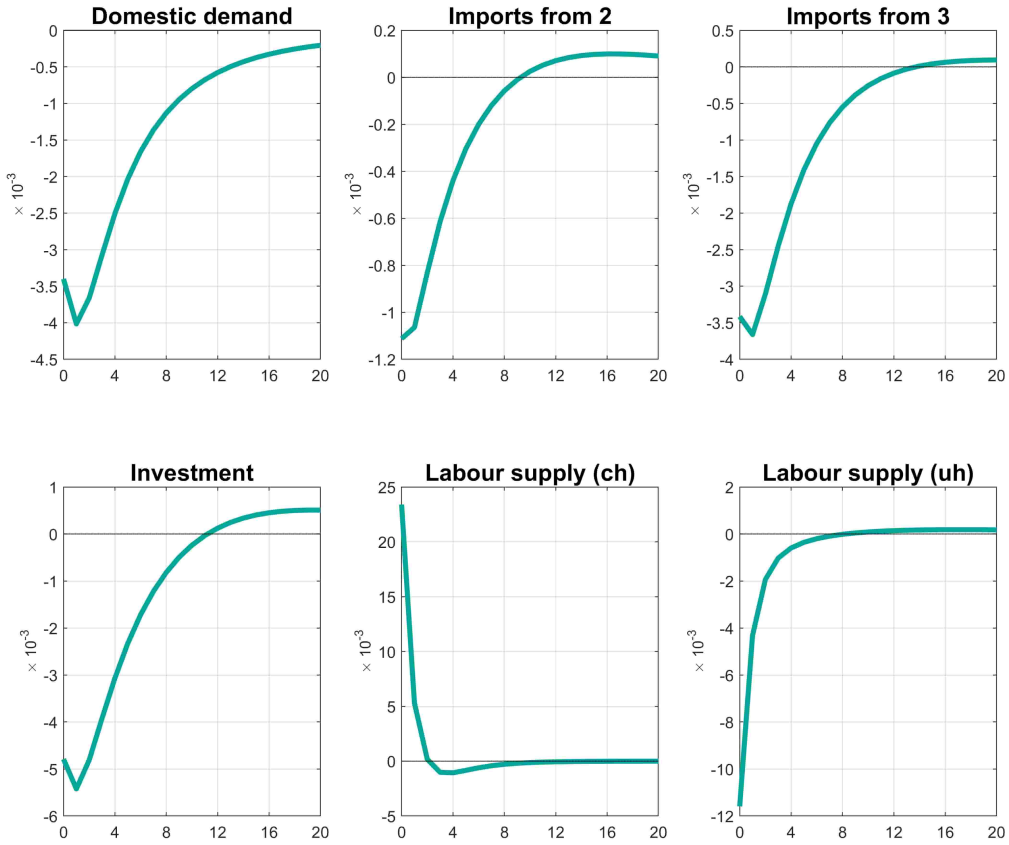
Table D.1: Calibrated parameters

Parameter	*Description*	*Value*	*Parameter*	*Description*	*Value*
$n_{c,1}$	Country size	0.43	ϕ_1^K	Capital adjustment cost	1.728
$n_{c,2}$	Country size	0.28	ϕ_2^K	Capital adjustment cost	1.728
$n_{c,3}$	Country size	0.29	ϕ_3^K	Capital adjustment cost	1.728
$n_{ch,1}$	Share of constrained households	0.3 (0.4)†	δ_1	Depreciation rate of capital	0.025
$n_{ch,2}$	Share of constrained households	0.3 (0.4)†	δ_2	Depreciation rate of capital	0.025
$n_{ch,3}$	Share of constrained households	0.3 (0.4)†	δ_3	Depreciation rate of capital	0.025
$n_{uh,1}$	Share of unconstrained households	0.7 (0.6)†	ρ_1	Elasticity of substitution across goods	0.33
$n_{uh,2}$	Share of unconstrained households	0.7 (0.6)†	ρ_2	Elasticity of substitution across goods	0.33
$n_{uh,3}$	Share of unconstrained households	0.7 (0.6)†	ρ_3	Elasticity of substitution across goods	0.33
β_1	Discount factor	0.9926	ξ_1	Calvo parameter	0.5
β_2	Discount factor	0.9926	ξ_2	Calvo parameter	0.5
β_3	Discount factor	0.9926	ξ_3	Calvo parameter	0.75
h_1	Habit formation	0.75	ν_1	Demand elasticity	6
h_2	Habit formation	0.75	ν_2	Demand elasticity	6
h_3	Habit formation	0.75	ν_3	Demand elasticity	6
ϕ_1	Inverse Frish elasticity of labour	1	$\omega_{1,1}$	Home bias	0.85
ϕ_2	Inverse Frish elasticity of labour	1	$\omega_{2,2}$	Home bias	0.85
ϕ_3	Inverse Frish elasticity of labour	1	$\omega_{3,3}$	Home bias	0.85
$\gamma_{1,r}$	Interest rate smoothing	0.75	α_1	Production technology	0.3
$\gamma_{2,r}$	Interest rate smoothing	0.75	α_2	Production technology	0.3
$\gamma_{3,r}$	Interest rate smoothing	0.75	α_3	Production technology	0.3
$\theta_{1,\pi}$	Sensitivity to inflation	1.2	L_1	Steady state labour supply	1
$\theta_{2,\pi}$	Sensitivity to inflation	1.2	L_2	Steady state labour supply	1
$\theta_{3,\pi}$	Sensitivity to inflation	1.7	L_3	Steady state labour supply	1
$\theta_{1,Y}$	Sensitivity to output	0.2	G/Y_1	Steady state gov. spending over output	0.2
$\theta_{2,Y}$	Sensitivity to output	0.2	G/Y_2	Steady state gov. spending over output	0.2
$\theta_{3,Y}$	Sensitivity to output	0.1	G/Y_3	Steady state gov. spending over output	0.2
ϕ_1^B	Foreign bond holding cost	0.001			
ϕ_2^B	Foreign bond holding cost	0.001			
ϕ_3^B	Foreign bond holding cost	0.001 (0.1)⋆			

Notes. Different countries are denoted with subscripts 1, 2, and 3. †The first parameter is the one of the original calibration, while the second one (in brackets) refers to the scenario of simulated higher inequality. ⋆The first parameter is the one of the original calibration, while the second one (in brackets) refers to the scenario in which the cost of holding foreign bonds is substantially higher in country 3 compared to the other two countries. **Source.** Eichenbaum et al. (2021), Ferrari Minesso and Pagliari (2023), Kaplan et al. (2014), Aguiar et al. (2025), and author's elaboration.

E Additional model results

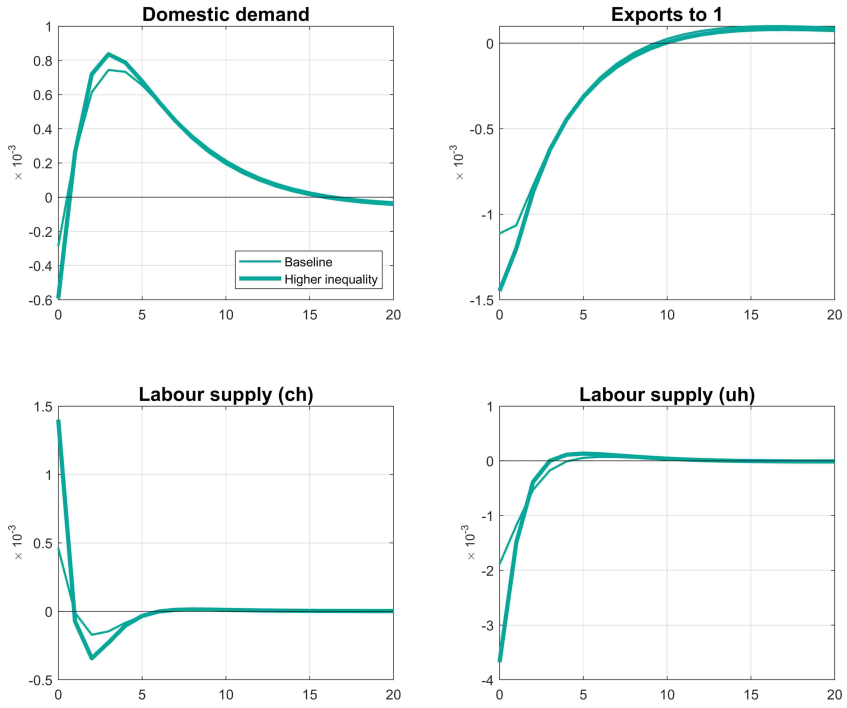
Figure E.1: Effect of US monetary policy on US variables – Additional variables



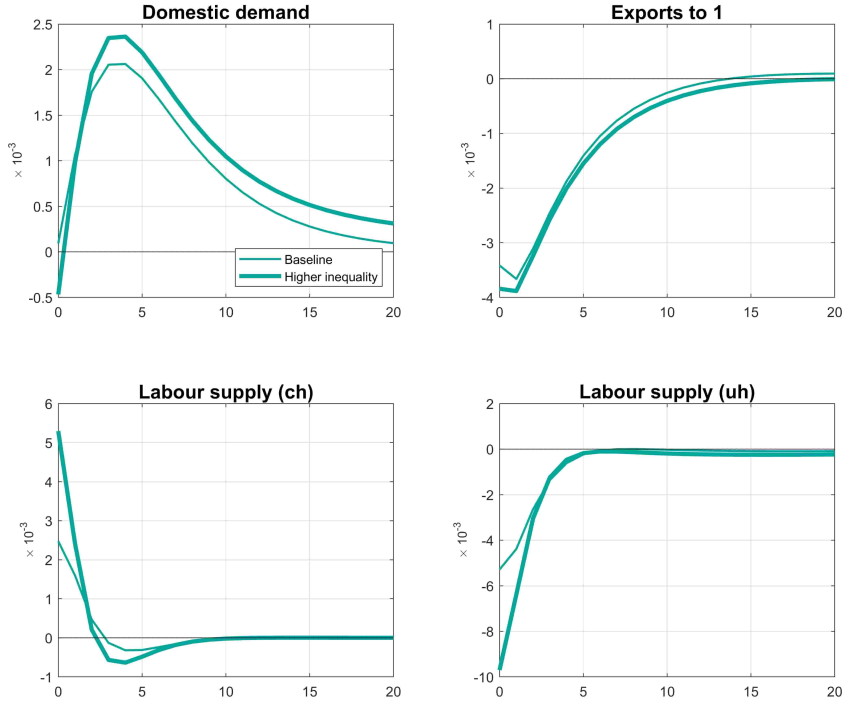
Notes. Impulse responses depict deviations from the steady state following a shock to the interest rate (tightening) in country 1 (United States). The horizontal axes display quarters after the shock has hit.

Figure E.2: Effect of US monetary policy on foreign economies – Different levels of inequality, additional variables

(a) Country 2

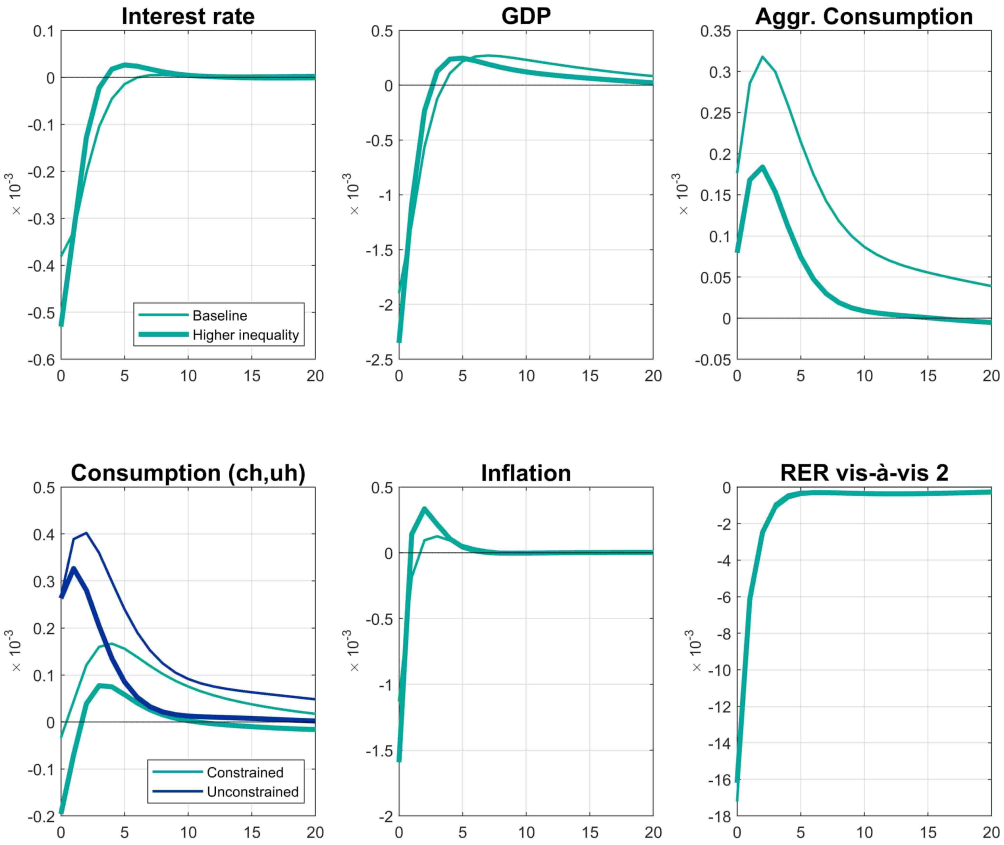


(b) Country 3



Notes. Impulse responses depict deviations from the steady state following a shock to the interest rate (tightening) in country 1 (United States). *'Baseline'* refers to the original calibration, while *'Higher inequality'* is a scenario where the Gini is 20% higher. The horizontal axes display quarters after the shock has hit.

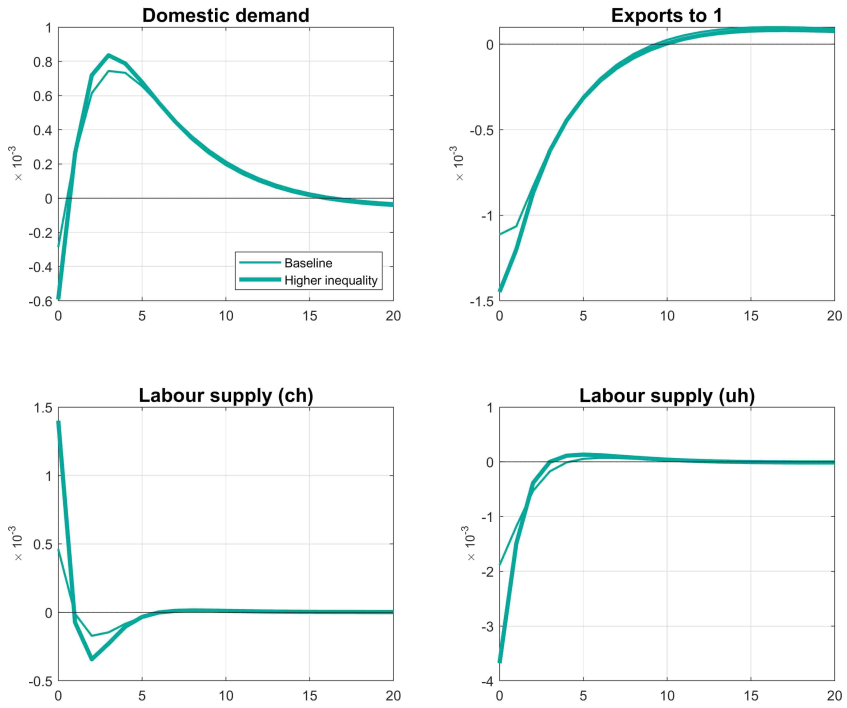
Figure E.3: Effect of US monetary policy on country 2 – Different levels of inequality and higher cost of foreign bond holding for country 3 ($\phi_2^B = 0.001, \phi_3^B = 0.1$)



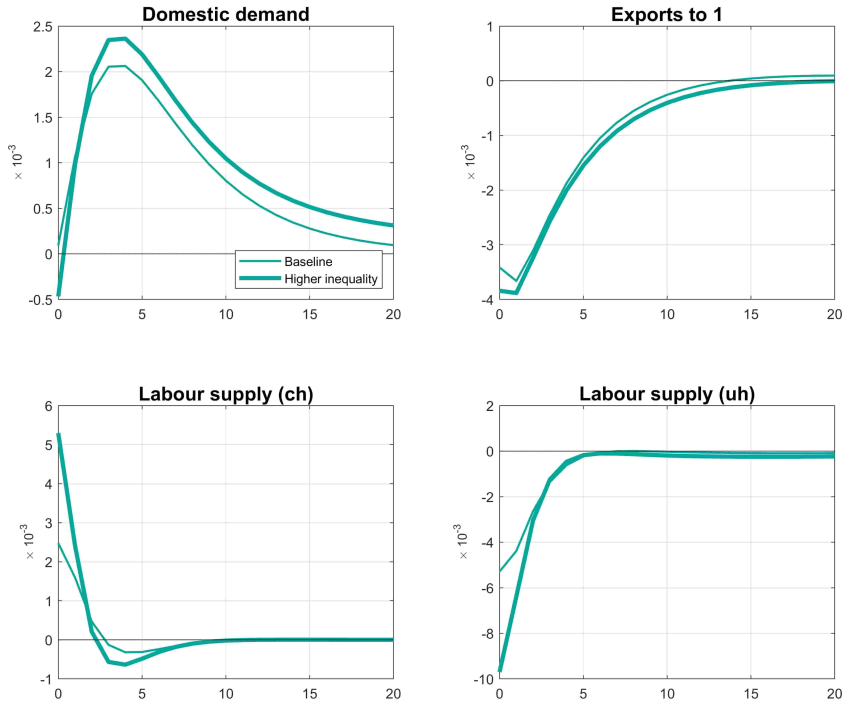
Notes. Impulse responses depict deviations from the steady state following a shock to the interest rate (tightening) in country 1 (United States). *'Baseline'* refers to the original calibration, while *'Higher inequality'* is a scenario where the Gini is 20% higher. A decrease in the exchange rate (RER) denotes an appreciation of the currency of country 1 (US dollar). The horizontal axes display quarters after the shock has hit.

Figure E.4: Effect of US monetary policy on foreign economies – Different levels of inequality and higher cost of foreign bond holding for country 3 ($\phi_2^B = 0.001, \phi_3^B = 0.1$), additional variables

(a) Country 2

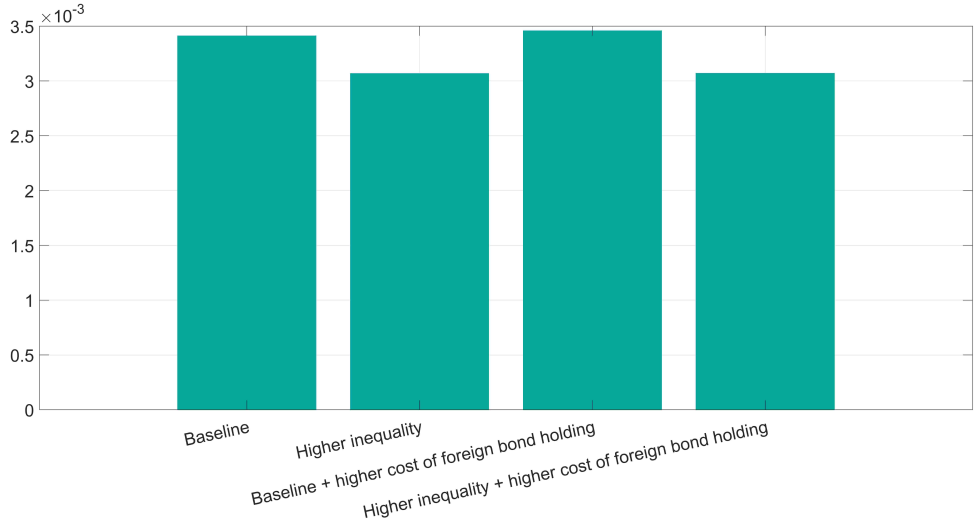


(b) Country 3



Notes. Impulse responses depict deviations from the steady state following a shock to the interest rate (tightening) in country 1 (United States). *'Baseline'* refers to the original calibration, while *'Higher inequality'* is a scenario where the Gini is 20% higher. The horizontal axes display quarters after the shock has hit.

Figure E.5: US optimal monetary policy, welfare gains



Notes. Welfare gains under different inequality scenarios. Gains are showed in terms of consumption equivalent, computed as $exp[(1-\beta)(\mathcal{W}_{scenario} - \mathcal{W}_{reference})] - 1$, where $\mathcal{W}_{scenario}$ is the welfare obtained running the model under each scenario and $\mathcal{W}_{reference}$ is the welfare associated with the model under the *'Baseline'* scenario and without any optimisation of domestic monetary policy. *'Baseline'* refers to the original calibration, while *'Higher inequality'* is a scenario where the Gini is 20% higher as defined in Table 1. In the *'higher cost of foreign bond holding'* scenario $\phi_3^B = 0.1$.