WORKING PAPER

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Abstract

Concerns about fiscal sustainability and worsening balance sheet conditions of major banks triggered a doom loop between banks and sovereigns during the European sovereign debt crisis. Despite closer financial integration and additional institutional safeguards, the home bias, i.e. bank holdings of domestic sovereign debt, is still high in most EU countries. Sovereign debt accumulation by the domestic financial sector may happen under the pressure of moral suasion, but the impact on consolidation by the sovereign is ambiguous. We therefore examine the non-linear effects of home bias on fiscal sustainability using panel smooth transition regression models on a fiscal rule for EU countries. We find that debt consolidation is a concern for governments, even when the home bias is high. Potential financial instability constrains governments' deficit bias, without endangering economic stabilisation, at least in countries with developed financial markets. Countries with shallow markets face constraints in stabilisation of economic shocks and must run procyclical policies to avoid debt problems. Foreign entry in the banking system disciplines sovereigns, yet state-owned banks soften budget constraints.

JEL Classification

Keywords

Acknowledgements

1. Introduction

Concerns about fiscal sustainability and worsening balance sheet conditions of major banks triggered a doom loop between banks and sovereigns during the 2010-2013 European sovereign debt crisis. Governments that supported the financial sector at a large budgetary cost saw their public debt explode. As banks kept large amounts of domestic public debt in their portfolios, their exposure to sovereign debt compromised financial stability, triggering collateral risk, capital losses, and counterparty risk. Shortfalls on the balance sheet can potentially destabilise the banking sector as a whole (Broner *et al.*, 2014; Altavilla *et al.*, 2017, Brunnermeier *et al.*, 2016).

The development of financial and institutional safeguards, together with ECB interventions, mitigated these risks, yet this high interdependence between the government and the banking sector is still challenging. Rising debt ratios in advanced economies are casting doubt on the fiscal capacity to provide economic stabilization, and increased spending needs, combined with rising interest rates in an inflationary context and a phasing out of QE poses challenges to fiscal policies and the financial system (Corsetti *et al.,* 2023). Limited fiscal space might call into doubt fiscal stability, and endanger financial stabilisation. The holdings of national sovereign debt by domestic banks, which had increased during the European sovereign debt crisis have gradually declined albeit at a slow pace (Becker and Ivashina, 2018). The home bias in sovereign portfolios is still substantial: out of all sovereign loans and securities in the euro area, close to 70 per cent is kept in the home country (Figure 1)(Mai, 2023; OECD, 2023). This nonetheless includes the holdings of both the national central bank – that have been rising to about 20 per cent – and non-bank financial institutions, which hold close to 10 per cent of sovereign debt in the EU. Domestic banks hold around 20 per cent of all sovereign loans and securities.

Figure 1. Sovereign debt holdings by origin in four largest EU countries by GDP, 2004-2023.
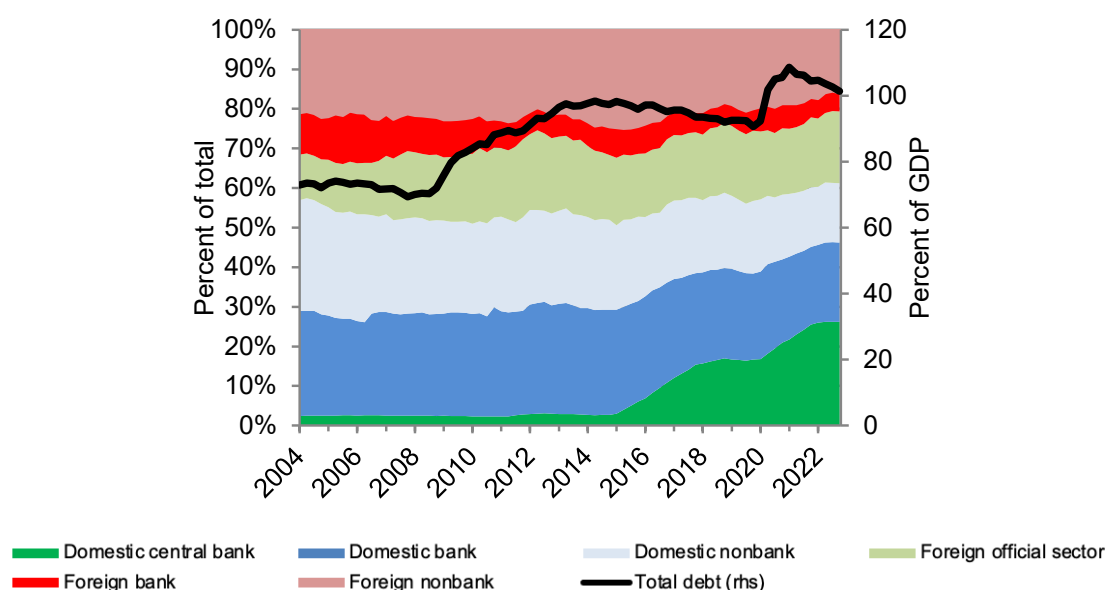
Note: data constructed from the updated version of Arslanalp and Tsuda (2014). Holdings in the largest four EU countries by GDP (Spain, France, Germany, Italy).

Such a high level of home bias need not be problematic for financial stability. Sovereign bonds play a useful role in banks' liquidity management, credit risk mitigation, asset pricing, financial intermediation and investment purposes, and large banks are key in making the sovereign bond market. Banks' holdings of sovereign debt are also key to the operationalisation of monetary policy. Specific government regulations therefore often favour domestic banks if they act as a market player for public debt. Prudential regulations allow banks to put zero risk-weight on local currency government debt in their portfolio. Banks adjust their portfolios accordingly.

Home bias might also be the result from moral suasion on domestic banks, so governments can place bonds with lower interest rates than what markets otherwise would ask (Battistini *et al.*, 2013, Acharya and Steffen, 2015, Becker and Ivashina, 2018, Ongena *et al.*, 2019). Research suggest that euro area banks required a higher risk premium on corporate lending after the Global Financial Crisis, and shifted towards domestic public debt – in particular after ECB programmes, with major effects on domestic and international bank lending (Altavilla *et al.*, 2017; Pietrovito and Pozzolo, 2023). Close political linkages, in particular with regional or public banks, might lead to regulatory capture (Englmaier and Stowasser, 2017; De Marco and Machiavelli, 2016; Altavilla *et al.*, 2017; Becker and Ivashina, 2018). Empirical evidence shows that during the sovereign debt crisis, holdings of domestic sovereign bonds increased more in

state-owned banks and for banks with low initial holdings of domestic sovereign bonds (Ongena *et al.,* 2019).[1,2]

While the reasons for the financial sector to absorb substantial amounts of domestic sovereign debt (during and after a sovereign crisis) have been subject of a large literature, the fiscal response to such developments has not been examined.[3] The financial repression at the root of the home bias would lead us to the assumption that governments will be less concerned less about public debt developments, yet the effects of a higher home bias on fiscal sustainability are not so straightforward.

On the one hand, fiscal discipline might be weakened as the easy placement of public debt mainly via the banking system creates a soft budget constraint (Asonuma *et al.*, 2015). On the other hand, increased holdings of domestic sovereign bonds can also act as a disciplinary device if governments fear the consequences of a financial crisis on domestic macroeconomic stability (Gros, 2013; Coeurdacier and Rey, 2013; Ichiue and Shimizu, 2015; Gennaioli *et al.*, 2018). Eventually, the response of the sovereign to the home bias is an empirical question. We test a standard fiscal rule à la Ghosh *et al.* (2013) in which the government sets the primary surplus in response to public debt, and employ a panel smooth transition regression model to capture the reaction of the sovereign in consolidating the budget for varying levels of the home bias. We identify a threshold level of home bias at which the fiscal response shifts. Variations over time and across the sample of 27 EU countries provide an opportunity to assess whether the home bias modifies the consolidation response across of governments in different institutional and economic environments.

In addition, we must account for other factors that modify the response of the sovereign. In a well-developed financial market, governments can issue debt on favourable terms, usually with large domestic banks as the major market makers. Large, competitive, and efficient financial markets allow governments to raise funds more easily to smooth out economic shocks without

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[1] Part of this home bias can be explained by monetary policy. In particular, Quantitative Easing by all major central banks in the wake of the Global Financial Crisis pushed up sovereign bond prices as a result of their massive purchase by central banks (Figure 1). Quite some evidence has found that banks privileged these safe assets over alternative investment opportunities. Crosignani (2021) shows that low-capital banks tilt their government bond portfolio toward domestic securities. As those same bonds could be pledged as collateral to obtain central bank liquidity, the Long-Term Refinance Operations allowed Italian banks to engage in a profitable trade by buying high-yield securities through cheap financing thanks to a government guarantee (Carpinelli and Crosignani, 2021).

[2] Macroprudential regulation on sovereign exposure may have shifted bank portfolios too. Tighter capital requirements made banks from countries in fiscal trouble increase their exposure to domestic sovereign bonds while other euro area banks could expand their loan portfolios (Hristov *et al.*, 2021).

[3] Empirical evidence on the role of the home bias on fiscal policy is limited to studies on financing costs. Spreads are typically found to be higher in financially developed countries with a high home bias (Arslanalp and Poghosyan, 2016; Andritzky, 2012). By contrast, in emerging markets, limited financial development forces absorption by domestic investors and reduces bond yields, most likely through financial repression (Ebeke and Lu, 2015; Asonuma *et al.,* 2015).

resorting to abrupt fiscal adjustments (Ebeke and Lu, 2015). Governments may even benefit from lower interest rates as well-regulated financial systems build up greater investors' confidence and could curb the risk premium. More developed capital markets also provide a broad range of debt instruments the government can use to manage its public debt portfolios more efficiently and to hedge against adverse interest rate movements or currency fluctuations. Direct government participation in the banking system potentially facilitates debt placement by the sovereign.

Shallow financial markets – and a less developed banking system – therefore enforce more fiscal discipline simply because the domestic market cannot absorb all public debt (Ebeke and Lu, 2015).[4] Even for low levels of the home bias, governments rapidly face sustainability concerns (Kaminsky *et al.*, 2004). And this problem can be exacerbated especially if public banks are involved. This forced consolidation typically comes at the expense of economic stabilisation. Even more developed financial markets might not be able to eschew this problem: an economic or financial crisis might eventually trigger a rise in the financing cost for governments, and if fiscal space is tight, trigger a sovereign debt crisis (Acharya and Rajan, 2013). Such a situation could then also require central bank intervention to take on the burden of bailing out banks and governments (Brunnermeier *et al.*, 2016). but exacerbates the problems of fiscal sustainability if sovereign stress increases (Becker and Ivashina, 2018).

In order to get around the problem of limited access to domestic financing, some governments have tapped into international financial markets. Some studies find that emerging markets place public debt abroad at easier conditions than domestically (Dell'Erba *et al.,* 2013; Affinito *et al.*, 2022) and would soften the budget constraint. Diversifying the investor base to include foreign bond holders can occur in two different ways. Firstly, governments can directly issue government debt on international bond markets. However, not all countries can borrow in domestic currency. This 'original sin' could contribute to additional fiscal stress if international crises propagate to those countries because of exchange rate fluctuations (Eichengreen and Hausmann, 1999; Rogoff, 2022) and might force fiscal policy to behave in a procyclical way if debt stabilisation is a prime concern.

Secondly, governments may be faced with foreign entry into the banking system. Entry of foreign banks typically renders the banking sector more efficient, as access to international markets reduces risk-taking and improves allocation of capital (Sengupta, 2007). Tighter constraints on fiscal policy can also result from the presence of foreign banks. They can transfer significant profits abroad, and limit tax resources. Foreign entry might be destabilising

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[4] Experiences from emerging Asian or Latin American economies show that placing government bonds domestically can contribute to the stabilisation of domestic financial markets (Ogawa and Imai, 2014; Carstens and Shin, 2019) and hence avoid procyclical fiscal policies (Frankel *et al.*, 2013).

for the host country's banking sector through the transmission of cross-border shocks, and carry a potential fiscal cost (Anginer *et al*., 2017), yet it can shield lending in case of domestic sovereign shocks (Albertazzi *et al*., 2021). Foreign banks might also be a more critical partner of the government for marketing public debt as default on domestic public debt held by foreign banks comes at little political cost to the sovereign (Balteanu and Erce, 2018; Azzimonti and Quadrini, 2024).

In the smooth transition model, we control in the fiscal rule for characteristics of the financial system, in particular the structure of the financial markets in terms of depth, access and efficiency of financial markets and institutions (using the IMF Financial Development Index (IMF, 2024)), as well as the role of foreign and state-owned banks, using the recent Panizza (2024) database.

Our empirical results reveal that home bias has a substantial impact on fiscal sustainability. Three main findings stand out. The first one is that countries with high home bias do not necessarily suffer less fiscal discipline. In fact, countries with a high home bias typically have a sufficiently large banking system that absorbs public debt that allows them to let automatic stabilizers operate and adopt counter-cyclical fiscal policies. Financial market access enables countries to manage public debt manage, stabilize output fluctuations, and finance large spending shifts (such as the Global Financial Crisis or the Pandemic).

The second finding is that fiscal behaviour varies with the level of financial structure. Non-euro area countries tend to prioritize fiscal consolidation due to limited financial market depth and external borrowing constraints, just as in other emerging markets. In these countries, fiscal policy becomes more powerful as a stabilisation tool when financial access to markets improves (Carrière-Swallow and Céspedes, 2013; Eichengreen *et al*., 2023). But even euro area countries do not eschew financial risk: fiscal policy substantially consolidates at the expense of pronounced procyclical patterns, when financial risk builds up (Larch *et al*., 2021; Gootjes and De Haan, 2022).

The third finding is that the structure of the banking system matters. More liquid and efficient financial markets would allow governments to tap into bond markets more easily. While entry of foreign banks appears to support fiscal sustainability by diversifying debt placement, a higher share of state-owned banks reduces fiscal discipline and increases sovereign risk exposure.

Our research links – and extends – two different lines of recent research on the role of financial intermediation in sovereign debt. Research on fiscal policy behaviour has examined sustainability of public debt, focusing on the political economy reasons for public debt, without explicitly considering the role of the banking sector. Research on sovereign debt crises has

often focused on the economic and financial fallout without considering public debt strategies in 'normal times' (Balteanu and Erce, 2018; Asonuma *et al.*, 2024).

This paper is structured as follows. Section 2 discusses the dataset we develop to measure home bias, and introduces the panel smooth transition model to test fiscal behaviour. Section 3 discusses the main set of results, and examines the response in different groups of EU countries, and for different aspect of the financial sector, including a few robustness checks. Section 4 concludes.

2. Methodology

2.1 Measuring home bias

Only a complete asset pricing model, which includes frictions from government regulation or policy, would allow us to derive a bias in the holdings of domestic sovereign debt. For want of such a model, the literature has generally taken the holdings of domestic public debt by financial institutions as a measure of the home bias. Data constraints on financial institutions' balance sheets bar us from measuring their foreign sovereign debt holdings, so we need to develop proxies using their domestic holdings. Two different measures are commonly used.

A first debt-based measure proxies the home bias with the ratio of the banking system's domestic sovereign holdings to total public debt (of the general government).[5] This measure reflects the dependence of a government on the domestic banking system for the absorption of sovereign claims, and mostly reflects the 'supply' of public debt by governments.[6] Data on the domestic bank holdings of domestic sovereign debt became available in the August 2023 update of the Asonuma *et al.* (2015) dataset, using a source IMF WEO.[7]

We can therefore use the full sample of 27 EU Member States at annual frequency over the period 2001-2022.[8]

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[5] Data constraints on central or regional government debt – even if sizeable in some EU countries with federal government structures –limit our study to general government data and thus do not allow for differentiating between different government levels.

[6] The domestic banking system includes domestically or foreign-owned subsidiaries, which are incorporated within a specific country and operate under domestic bank regulations of national financial authorities. It does not include other resident holder of public debt, like individual or institutional investors, like NFS and central banks.

[7] Some countries that would not be covered using only IFS data from the IMF are Croatia, Czechia, Latvia, Lithuania, Malta, Romania and Slovakia. In the cases of Latvia in 2001-2003, Malta in 2001-2004, and Slovakia in 2001-2006, Asonuma's et al. (2015) extended dataset provides sovereign domestic debt in domestic hands excluding the central bank, but it does not distinguish between banks and non-bank holders. Assuming that in the missing years the split was equal to the first available year, we completed a balanced panel for all 27 EU Member States.

[8] A limitation of the Asonuma *et al.* (2015) dataset on home bias is that it restricts us to examining holdings by the banking sector only. However, while banks kept around 60 per cent of public debt at the start of the century, there has been a noticeable shift towards the ECB since 2015, and other domestic investors including non-bank institutions such as pension or insurance companies – and more recently, the general public. Such differences are substantial, even across EU Member States. While only 5.1 per cent of Cyprus's total public debt is held by domestic or foreign financial corporations, for example, in Denmark and Sweden they own around 74 per cent of

A second asset-based measure of the home bias computes the bank system's holding of domestic sovereign claims over total bank assets, following Acharya and Steffen (2015). This measure reflects banks' preference on domestic sovereign claims over alternative assets, and gives a complementary insight into the previous measure, as it reflects demand for domestic public debt on total of assets (yet not with regards to other sovereign 'foreign' or corporate debt holdings).

This asset-based measure is available for 23 EU Member States at annual frequency over the period 2005-2022. To construct this measure, we use as the numerator the domestic bank holdings of domestic sovereign debt reported in the August 2023 update of the Asonuma *et al.* (2015) database. The denominator, however, is computed by adding to the numerator the IFS data on other assets held by domestic banks, i.e. domestic bank holdings of reserves, foreign assets, and claims to other sectors. In this way, we obtain the total of domestic bank assets for all EU27 Member States over the period 2005-2022, except Slovakia, Latvia, Lithuania and Croatia whose data only becomes available starting between 2007 and 2011.

Figure 2. Home bias in EU countries (mean and 10/ 90th percentile).
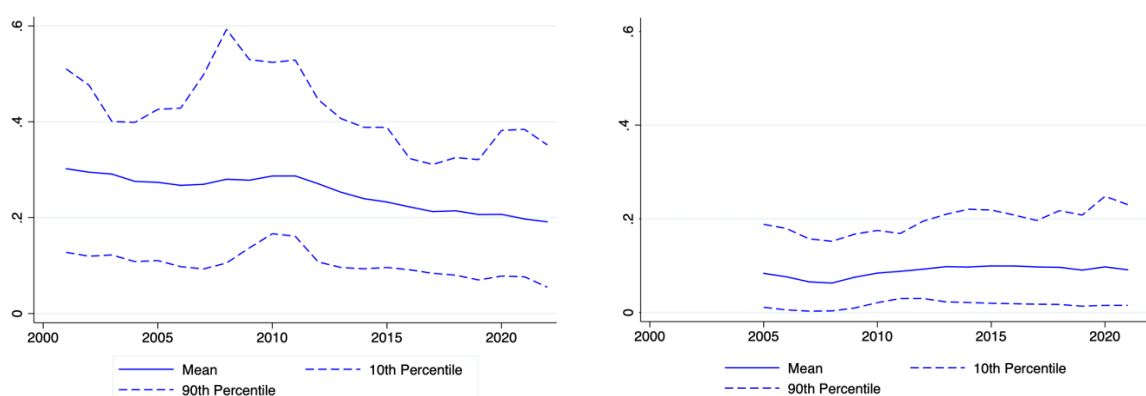
(a) debt-based home bias   (b) asset-based home bias

The interpretation of the debt and asset biased measures are rather distinct. The former measures domestic holdings as a share of total public debt and reflects how much domestic sovereign debt is absorbed by the banking system. The latter measure indicates how much sovereign debt the banking system holds, as a share of its total assets, and reflects the portfolio composition of the banking system. Hence, while the former measures the dependency of the sovereign on the banking system, the latter measures the appetite of the banking system to hold domestic sovereign debt.

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governments' debt. In countries like Ireland, Portugal, Malta and Hungary the percentage of total public debt owned by households varies between 11.2 and 21.2 per cent. Limitations on cross-country data do not allow us to include these investors in the analysis.

If we look at the two home bias measures, a few regularities appear that are important for the analysis. A plot of the average home bias, and the first and last decile, overall show a modest decline in the debt-based home bias measure over time, while for the asset-based home bias, we observe a moderate increase (Figure 2). Furthermore, the data reveal significant variations in home bias across EU countries. Figure 3 shows that in all EU countries, the home bias is larger for the debt-based measure, with the exception of Hungary and Slovenia (albeit for some years only). This is to be expected as typically, the total assets of the banking system are larger than general government debt. Secondly, in the euro area countries,[9] the debt-based measure has been constantly declining. The fact that domestic banks hold relatively less public debt is the result of the ECB's programmes. Outside the euro area, the ratio has been flat or slightly rising over time. Thirdly, the asset-based home bias ratio is not particularly high in countries with a developed financial system. There are two exceptions in the euro area – Belgium and Italy – and in four non-euro area countries – Czechia, Hungary, Poland and Romania. Finally, note how the growing presence of financial centres that attract much more financial investment due to a concentration of banking activities (Pogliani *et al.*, 2022), in particular in Ireland, Luxemburg and the Netherlands, might underestimate the level of home bias when using the asset-based measure. This concentration in a few 'outsized' financial centres also blurs the attribution of sovereign debt to the home market.

Figure 3. Home bias measures: debt-based (2001-2022) and asset-based (2005-2022).

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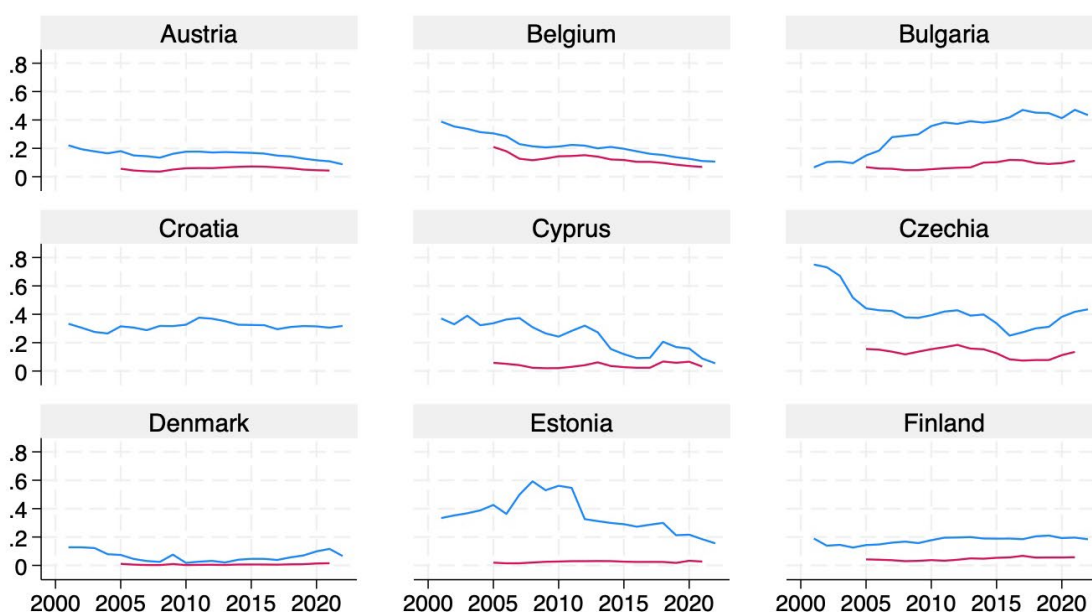
[9] Note that the euro area countries include all current countries using the euro, except Croatia (as it adopted the euro after the end of our sample). Cyprus, Estonia, Latvia, Lithuania, Malta, Slovenia and Slovakia joined the euro area between 2007 and 2013. We will consider them to be part of the euro area for the remainder of the analysis. The non-euro area countries in the sample are Bulgaria, Croatia, Czechia, Denmark, Hungary, Poland, Romania, and Sweden.
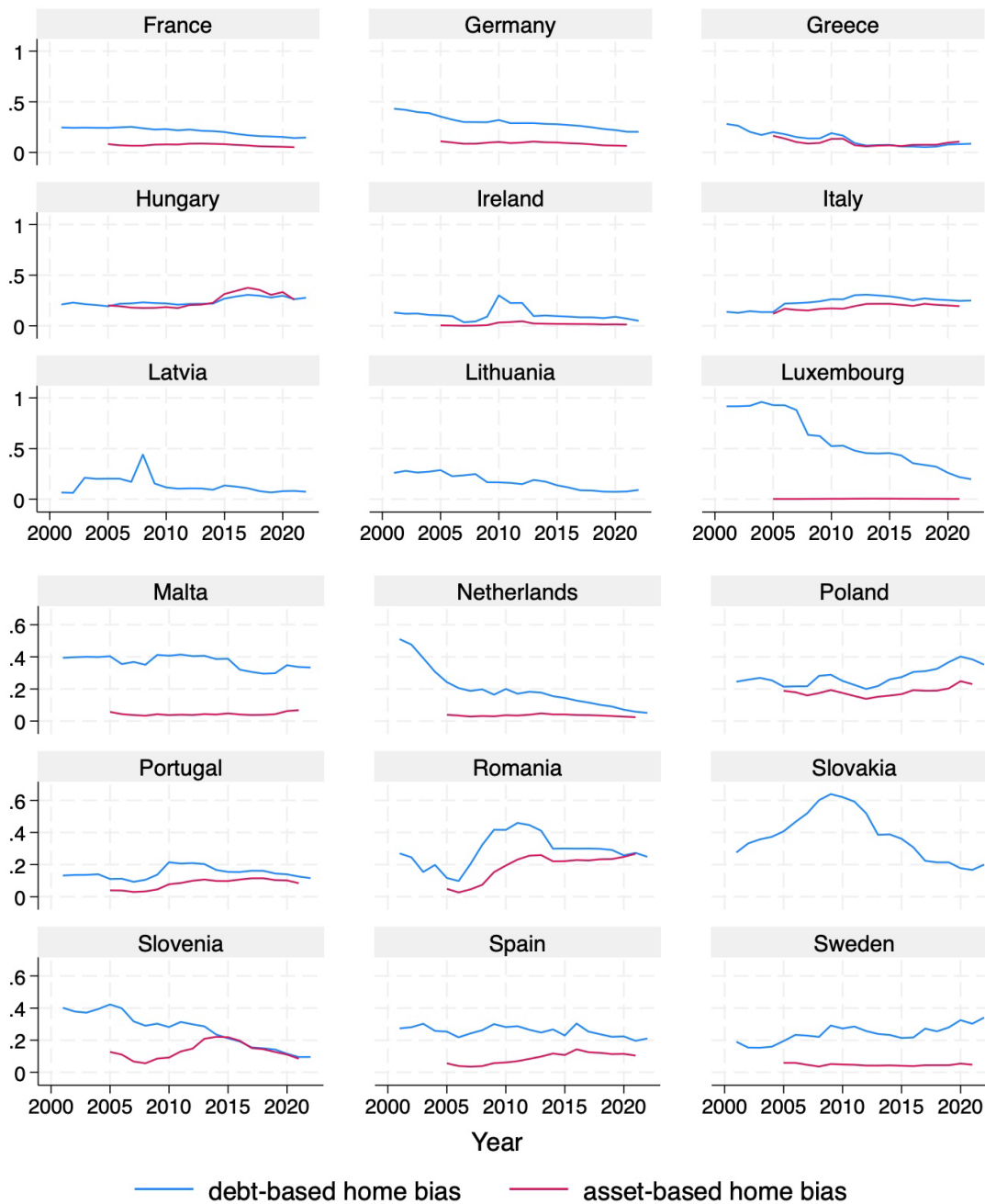
Source: Asonuma *et al.* (2015) and authors' calculations. The debt-based home bias is the ratio of the banking system's domestic sovereign holdings to total public debt (of the general government); the asset-based home bias is the bank system's holding of domestic sovereign claims over total bank asset.

A simple scatter plot of the asset-based home bias measures and the primary balance (relative to GDP) reveals no discernible pattern, neither in euro area nor in non-euro area countries (Figure 4a). By contrast, Figure 4b suggests that when general government debt (relative to GDP) is high, a substantial part of banks' assets is put into domestic sovereign assets both in euro area and non-euro area countries. We also observe that even if the level of public debt is substantially lower in the non-euro area countries, the positive correlation is significantly higher, implying that banks in these countries take up more of the additional domestic sovereign debt.

However, this positive correlation disappears when employing the debt-based measure. As this measure reflects the diversification of the pool of claimants of sovereign debt, higher public debt does not seem to be concentrated – with a few exceptions – in domestic hands only.

Figure 4. Home bias measure and fiscal situation (average 2001-2022).

a/ Primary balance as per cent of GDP

b/ Public debt as per cent of GDP

Source: Asonuma *et al.* (2015), AMECO (2024).

2.2 The PSTR methodology

In order to test the fiscal response to public debt, we use a standard fiscal reaction function following Ghosh *et al.* (2013). This reaction function measures how governments set budgets in response to economic and political objectives, and we follow common practice by estimating a fiscal policy rule (1) in which a fiscal indicator s responds to (lagged) public debt d and a set of control variables X.

$$s_{i,t} = \mu_i + \sum_{j=1}^{n} \theta_j X_{j,i,t} + \lambda d_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

Following Bohn (1998) and Ghosh *et al.* (2013), the coefficient λ measures the debt stabilising response. A positive λ indicates that governments – on average, in sample – stabilise public debt B. Lack of a significantly positive response would indicate a lack of consolidation.

A linear fiscal rule in which a fiscal indicator reacts to public debt has been tested extensively in the literature (Davig and Leeper, 2011; Leeper and Li, 2017). We instead test a non-linear fiscal reaction function by letting the debt response λ vary with the home bias.[10] This panel smooth transition regression model (PSTR), following Gonzalez *et al.* (2017), can be written in generic form as in (2), where Y includes both debt and the control variables, *i* is the country and t time:

$$s_{i,t} = \delta_i + \sum_{j=1}^{n} \beta_{0,j} Y_{j,i,t} + \sum_{j=1}^{n} \beta_{1,j} Y_{j,i,t} w(z_{i,t}; \gamma, f) + \varepsilon_{i,t} \tag{2}$$

The home bias is the transition variable z_{it} that models possibly different regimes in the response to public debt [11] In contrast to a linear panel model (1), the regression coefficients φ vary under different regimes by the transition function $w(z_{i,t}; \gamma, f)$. All the observed states of the home bias variable – and the number of regimes – are distinguished endogenously. The PSTR model assumes that the change in the coefficients of the empirical model induced by the transition variable is fully exogenous.[12]

As can be seen in (3), the transition function $w(\circ)$ – assumed to be observable, continuous and bounded – moves around a vector of location parameters *f* that captures the threshold level of the transition variable z_{it}, whilst *γ* measures the slope of the transition function indicating the smoothness of the transition between regimes. The steepness of the response is governed by γ. For γ → 0, the transition function is a constant and the model reduces to a linear panel fixed effects model with a homogeneous slope for any positive value of *m*. The

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[10] Note that our model is more general than an alternative regime-switching models that only considers the change in the time series properties of the model (Davig and Leeper, 2011), or a panel model with slope-heterogeneity that would split the sample into different groups of countries with similar behaviour. In our specification, the transition occurs over different years and countries at a certain threshold of the home bias.

[11] Asonuma *et al.* (2015) include the home bias as a control variable for measuring the debt response. They find that a higher home bias reduces the cost of borrowing, but leads to higher public debt levels. Erce (2015) finds that a stronger home bias exacerbates the feedback loop effect of sovereign into bank risk.

[12] Hence, we do not address a possible source of endogeneity by which higher public debt might induce regulatory or other policy changes to increase the domestic investor base for sovereign debt, and modify the home bias (Ogawa and Imai, 2014; Carstens and Shin, 2019). Instrumental variable procedures have not been developed in the context of PSTR models.

larger γ, the steeper the difference across regimes. The transition function is typically modelled with a logistic function (see Teräsvirta, 1994),[13] bounded between 0 and 1, as follows:

$$w(z_{i,t}; \gamma, f) = (1 + exp(-\gamma \prod_{j=1}^{m}(z_{i,t} - f_j))^{-1} \quad (3)$$

As the coefficients vary over units and time, a necessary simplifying assumption to estimate a PSTR model is that each unit's effect μ is fixed, hence correlating with the regressors. As different tests for heteroskedasticity and autocorrelation in the panel indicate potential issues,[14] we run a HAC robust estimator on the PSTR model. In addition, to account for common shocks to EU countries, we include time fixed effects. The estimation of the parameters $(\delta, \varphi_j, \gamma, f)$ in PSTR occurs with a combination of panel fixed effects procedures and NLS.[15]

2.3 The fiscal rule

Fiscal rules as in (2) must control for a set of conditioning variables. We include three types of additional control variables. The effects of these control variables will also modify for different levels of home bias.

Firstly, following the Barro (1979) tax smoothing principle, the budget balance *s* moves with the business cycle and transitory government expenditures. For the business cycle, it is not just automatic stabilisers that are responsible for cyclical movements in the budget. Governments additionally react with taxes or spending policies in a systematic way to the cycle (Golinelli and Momigliano, 2009). As in Ghosh *et al.* (2013), we measure cyclical responses with an output gap measure.[16] We further include inflation and short-term interest rates to control for monetary policy actions. Tax smoothing models further argue that tax rates should be constant over time to minimize the excess burden of taxation. A temporary surge in spending due to e.g. wartime or crisis expenditure, should be financed by debt, but fiscal policy should adjust and consolidate after this surge. Barro (1979) suggests computing an

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[13] See Gonzalez *et al.* (2017) and Teräsvirta (1994) for a detailed discussion of the smooth transition regression models.

[14] The modified Wald test for groupwise heteroskedasticity has a χ^2 test statistic of 118.44 (p-value is 0.00), and the Wooldridge test for first order autocorrelation has as a test statistic F(1, 16) = 6.243 (p-value is 0.00).

[15] The individual fixed effects in the panel are eliminated by a within-transformation after which the transformed model is estimated by NLS to model the transition function. The selection of appropriate values of γ and *f* for the NLS optimisation is done by choosing the starting values of the parameters and using a grid search across the parameters of the transition function such that the parameters which yield the minimum sum of squared errors are selected.

[16] See Appendix A for the detailed data description.

'expenditure gap', i.e. the deviation of real government spending from its potential level to test the response to temporary spending surges.

Secondly, we have argued that financial structure matters for the fiscal response. Access to domestic financing can modify the response of the sovereign. A proxy for the level of financial development that measures access, efficiency, and financial depth of a country's financial system, is the IMF Financial Development Index database (IMF, 2024). The overall index is scaled between 0 and 1, with higher levels indicating stronger development. Figure 5 shows that financial development is generally weaker in the EU Member States that joined the EU after 2003. Detailed sub-indices feature access, efficiency, and financial depth.

Figure 5. Financial Development Index in EU27 (average over 2001-2022).

Source: IMF (2024).
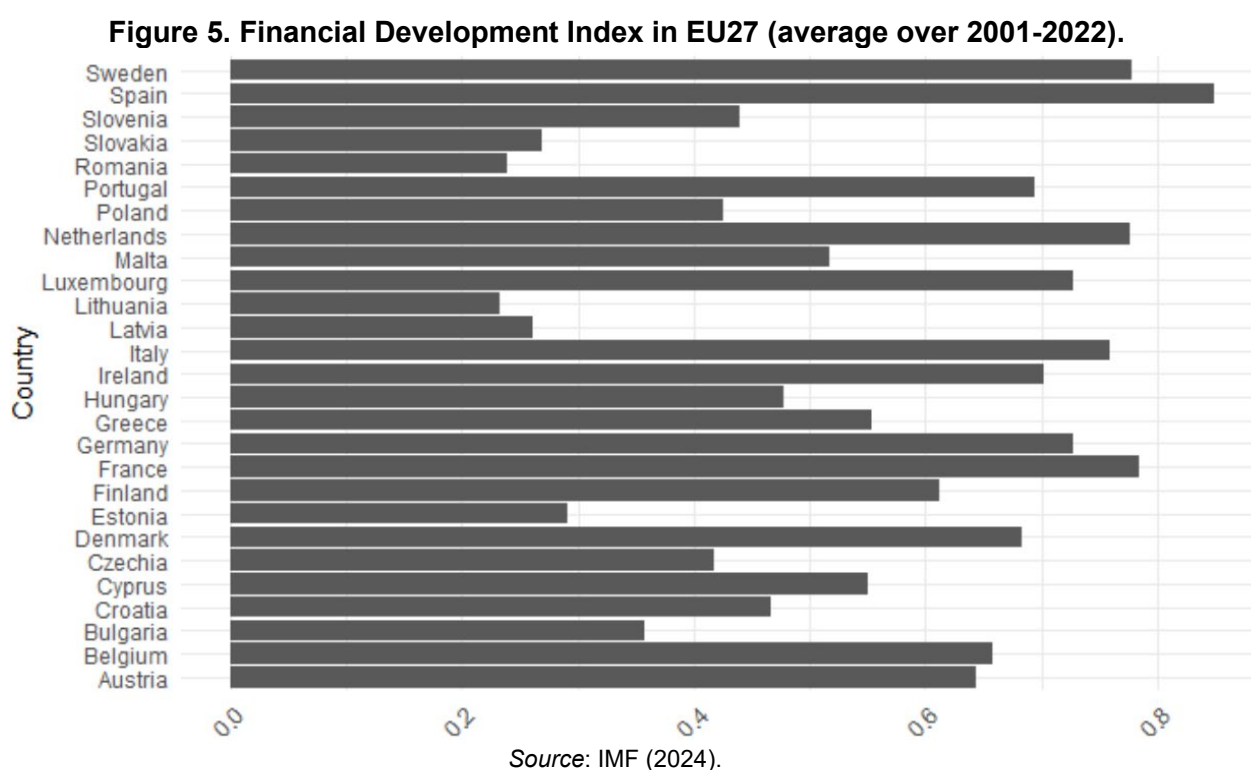
In addition, the structure of the banking sector may matter for the debt response. A larger share of foreign owned banks can have either stabilising or destabilising effects on fiscal policy. Foreign entry can provide easier access to international markets, turn the banking sector more efficient, reduce risk-taking, and improve allocation of capital (Ebeke and Lu, 2015). Foreign banks' limited exposure to host-country sovereign bonds insulates their balance sheets from domestic debt shocks, reducing the risk of bank bailouts that strain public finances. Foreign banks are also less likely to keep purchasing distressed sovereign debt (Altavilla *et al.*, 2017). But foreign banks can destabilise public finances as it exposes the host country's banking sector through the transmission of cross-border shocks, and there are fiscal losses as a result of profit transfers or the lack of a market maker of debt. A selective default on domestic public

debt held by foreign banks comes at little political cost to the sovereign (Balteanu and Erce, 2018).[17] We control for the ownership of banks and distinguish between domestic versus foreign-owned banks by using the Panizza (2024) database. Figure 6 reports the share of foreign-owned banks (as a share of total assets, including those of development banks).[18] The strongest presence of foreign banks is seen in the EU countries that joined the EU after 2003. By contrast, in all the largest EU economies, as well as a few smaller ones, like Denmark or Greece, domestic banks dominate the banking sector.

Figure 6. Foreign bank ownership ratio in EU27 (average over 2001-2022).

Source: Panizza (2024).
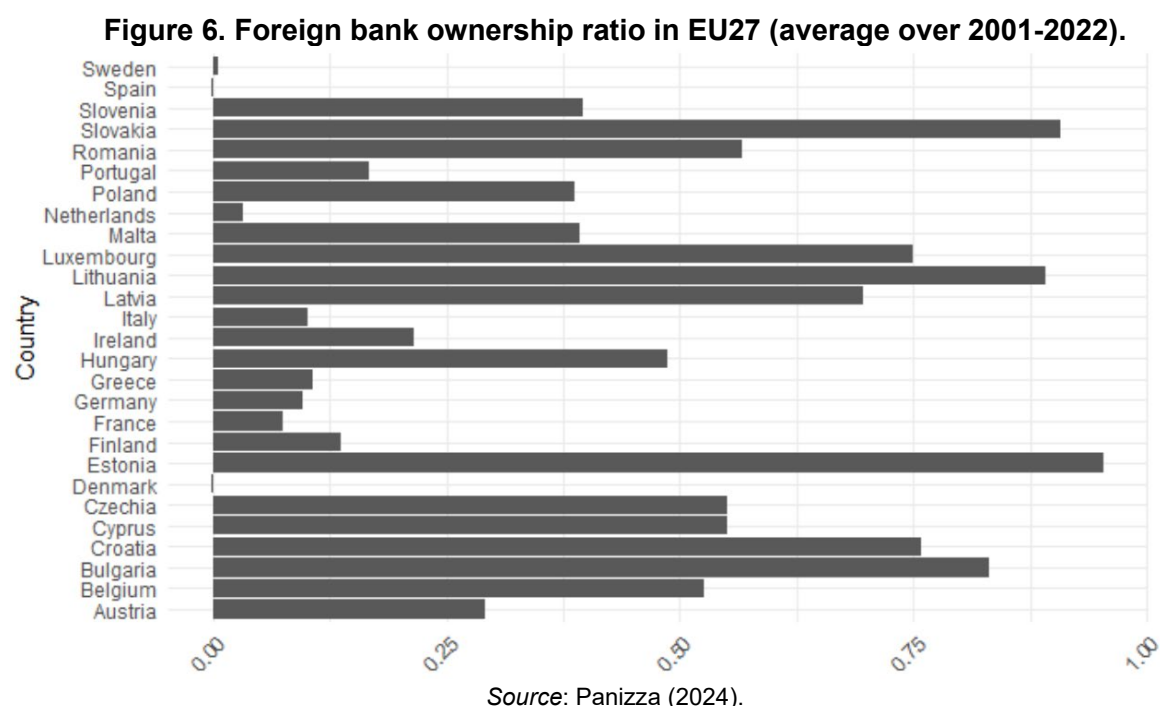
The database of Panizza (2024) further allows us to distinguish between private and public banks. This distinction is important as public banks may influence incentives for fiscal policymakers. On the one hand, governments might be tempted to use their potential influence on state-owned banks and place public debt mostly with public banks, and hence soften budget constraints. On the other hand, they could impose more discipline if the financial stability of public banks is of concern.

Panizza (2024) computes the share of public banks in the banking system by weighting the assets of each bank by its share of government ownership in a specific year and then dividing by total banking assets in the same country-year. The threshold for considering a bank as state-owned is set at 50 per cent. Figure 7 reports the average sample share of state-owned banks in percent. We observe that the highest state ownership shares are observed in

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[17] Even if there is a risk of an international doom loop: limited defaults of public debt might trigger expectations of further defaults in other countries (Erce, 2014).

[18] A bank is considered foreign owned if the foreign bank holds at least a 50 per cent share (Panizza, 2024).

Slovenia, Portugal, the Netherlands (in order of importance, and all with average shares higher than 30 per cent), closely followed by Greece and Germany (in order of importance, with average shares higher than 20 per cent).

Figure 7. Share of state bank ownership in EU27 (average over 2001-2022).
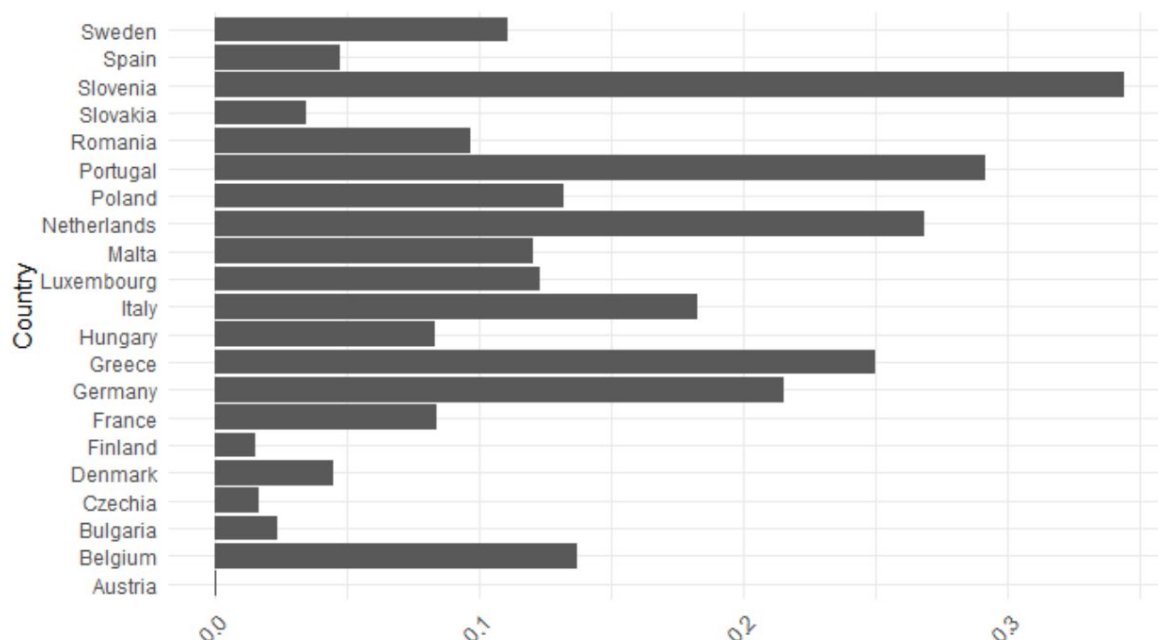
Source: Panizza (2024).

Another concern regarding the banking sector might be that troubled banks might require a bail-out. Several measures for macroprudential policies have been developed to keep an oversight on developments in the banking sector. We use a numerical indicator of regulatory limits on the loan-to-value ratio, from the Integrated Macroprudential Policy database by Alam *et al.* (2024). The index varies between 0 and 100 and reflects the use of different tools that target loan terms or restrict the loan eligibility of household borrowers.

Thirdly, particular events, such as the Global Financial Crisis and the Pandemic, have led to large fiscal imbalances over the past two decades. These events led to strong spending surges, in particular in countries that had already shown other macroeconomic balances. In EU countries, fiscal imbalances spurred a sovereign debt crisis, and led to a reassessment of sovereign risk. We control for sovereign risk by including the 5-year credit default swaps. As the fiscal situation in some countries might be influenced by competitiveness and imbalances, we also include the current account balance. Some EU countries had large budget deficits, and were subject to an Excessive Deficit Procedure (EDP). We measure time spent under

closer EC surveillance with a simple time dummy from Bökemeier and Wolski (2022).[19] In the long term, the fiscal stance is also influenced by the effect of institutions, and we measure government effectiveness – i.e., the perception of the quality of public and civil service – using the World Wide Government Indicators from the World Bank (2024).

2.4 Prior testing

We have no economic prior on the number of regimes fiscal policy can be in. We argued to a possibly different response of fiscal policy under a low or high bias, but this response might not be significantly different (and hence a linear response is appropriate), nor does it exclude additional non-linearities in intermediate regimes. We can test for the optimal number of regimes with the 'sequence of homogeneity' test that determines the optimal number of transitions in (2).[20] Under a single transition, the model that best describes the regression model is homogenous in each of the two regimes, and the coefficients in (2) then switch between the parameter vectors β_0 and $\beta_0 + \beta_1$ for the low and high values of the transition variable (z_{it}), with the change centred on f_1.[21] The test expands under the assumption that the maximum number of regime switches is p. With an unbalanced panel dataset of 27 countries and a sample period of at most 20 years, p can at most be set at 3. This implies that we test for the significance of models with up to three transition functions.

A Lagrangian Multiplier (LM) test is applied consecutively, testing that the coefficients in the vector β_1 for 1, β_2 for 2 or β_3 for 3 transitions are zero, conditional upon the existence of a higher number of regimes, as follows: $H_{0*} : \beta_{3*} = \beta_{2*} = \beta_{1*} = 0$, $H_{03*} : \beta_3 = 0$, $H_{02*} : \beta_{2*} = 0 \mid \beta_{3*} = 0$ and finally $H_{01*} : \beta_{1*} = 0 \mid \beta_{3*} = \beta_{2*} = 0$. The LM test comes in two versions, once with a χ^2, and once with an F-distribution. As Teräsvirta (1994) and Gonzalez *et al.* (2017) demonstrate, the model specification with the strongest rejection of the null hypothesis is selected as the appropriate model and indicates the optimal number of regimes.

The sequence of homogeneity tests with both measures of the home bias as a transition variable is shown in Table 1. Both measures give similar insights. The LM test under the χ^2 distribution in panel (a) show that the null H_{01*} and H_{03*} depict regimes with the strongest rejections. If we consider the test based on the F-distribution, then regime H_{01*} is the one with the strongest rejection. Hence, a model with one transition, i.e. two regimes, is more suitable for the data. Panel (b) similarly finds that the null H_{01*} again has the most severe rejection for

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[19] We also experimented with a dummy for the Global Financial Crisis (2008-2010) and the Pandemic (2020-2021), yet there was high multicollinearity with the EDP dummy.
[20] See Gonzalez *et al.* (2017) and Teräsvirta (1994) for a detailed discussion of the test.
[21] With two transitions, the transition function attains its minimum at $(c_1 + c_2)/2$ and coefficients switch between β_0, $\beta_0 + \beta_1$ and $\beta_0 + \beta_1 + \beta_2$ for the low, intermediate and high values of *z*.

both the χ^2 and F-distributions, which indicates that a model with one transition is optimal for the data. As we have two regimes in all cases, there is a low-bias and high-bias regime.

Table 1. Sequence of homogeneity test.

a/ Model with debt-based home bias as transition variable

m	LMχ^2		LM$_F$	
	test stat.	p-value	test stat	p-value
3 (H$_{03}$*)	42,46***	(0,00)	3,013***	(0,00)
2 (H$_{02}$*)	22,16*	(0,04)	1,640*	(0,08)
1 (H$_{01}$*)	44,60***	(0,00)	3,435***	(0,00)

b/ Model with asset-based home bias as transition variable

m	LMχ^2		LM$_F$	
	test stat,	p-value	test stat	p-value
3 (H$_{03}$*)	33,51***	(0,00)	2,312**	(0,01)
2 (H$_{02}$*)	28,53***	(0,00)	2,069**	(0,02)
1 (H$_{01}$*)	34,74***	(0,00)	2,641***	(0,00)

Note: Results of LM sequence of homogeneity test based on χ^2 and F-distribution; m denotes the number of regime transitions.

One concern with the previous test is that non-linear models will overfit, and therefore result in rejection of a linear model too often. An additional test for remaining heterogeneity therefore tests the number of transitions comparing only the non-linear models amongst themselves. The null hypothesis is that a model specification with one transition function is an appropriate one, against the alternative hypothesis that the model would require a second transition function. Table 2 shows the test statistics and their p-values (based on HAC estimates) for the baseline specification on the full sample, for the two home bias measures. Results seem to indicate lack of evidence against the null, hence, the model with one transition function is not misspecified.

A potential criticism on the PSTR model is that the smooth transition would be equivalent to a time-varying model in which parameters are not modified by the transition variable, but are the result of structural breaks. We therefore run the parameter constancy test, whose null hypothesis indicates that parameters in the preferred model specification (with one transition function) do not depend on time against the alternative hypothesis states that a time-varying specification is more appropriate. Table 3 reports the test statistics for both measures of the home bias, and shows we do not have evidence against the null. Hence, a smooth transition model is the appropriate choice in comparison to a markov-switching model.

Table 2. Test for remaining heterogeneity.

Model	$LM\chi^2$		LM_F		$HAC\chi^2$		HAC_F	
	test stat	p-value	test stat	p-value	test stat	p-value	test stat	p-value
Debt-based home bias	54,47***	(0,00)	1,93**	(0,01)	0,76	(0,99)	0,03	(0,99)
Asset-based home bias	38,81**	(0.04)	1,34	(0,14)	-4,28	(0,99)	-0,16	(0,99)

Source: authors' calculations.

Table 3. Parameter constancy test.

Model	$LM\chi^2$		LM_F		$HAC\chi^2$		HAC_F	
	test stat	p-value	test stat	p-value	test stat	p-value	test stat	p-value
Debt-based home bias	61,24***	(0,00)	2,17**	(0.01)	3,18	(0,99)	0,11	(0,99)
Asset-based home bias	94,99***	(0,00)	3,28***	(0.00)	-2,42	(0,99)	-0,08	(0,99)

Source: authors' calculations.

3. Results

3.1 Baseline results

The PSTR estimates of the fiscal responses on the full EU27 sample are shown in Table 4 for the debt- and asset-based home bias measure in columns (a) and (b) respectively.[22] The fiscal rule estimates, and the threshold value for the home bias at which the response transitions, are compared between the low- and high-bias regime. For the debt-based home bias, the threshold value at which this switch occurs stands at a 22 per cent home bias. Given that the average debt-based home bias ratio in the EU stands at 25 per cent (and Figure 3 shows this is the case for at least 17 EU Member States at some point in the sample), it implies that changes in the home bias can have important non-linear effects on fiscal policy. Similarly, for the asset-based home bias, the switch occurs at a threshold value of just 4 per cent (while the average ratio is 9 per cent in the EU27).

Given the outcomes of the tests for homogeneity in regimes in Tables 2 and 3, it is no surprise that all responses are significant within the same regime, as the non-linear estimation provides a better fit on the empirical model. But the size of the effect is significantly different across regimes, above and below the threshold level of the home bias. This transition does not involve the response to debt, though. The main finding of Table 4 – for both home bias measures – is

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[22] Some papers have tested the response to the cyclically adjusted primary balance, rather than the total balance. Estimates using this measure resulted in very similar outcomes. Results are available upon request.

that fiscal policy stabilises public debt under both regimes. The response is dampened slightly for a higher debt-based home bias, but it is much higher for countries with a high asset-based home bias.

The relevant difference is driven instead by the different cyclical response across the regimes. For both home bias measures, the cyclical response shows procyclical tendencies under a low home bias, but turns countercyclical under a high home bias. Moreover, fiscal policy does not stabilise temporary rises in spending in a significant way under the low home-bias regime. It also fails do so when the home bias is high, albeit the response is not significant as such. This finding indicates that at higher levels of home bias, the government can pursue both economic and budget stabilisation, and is able to place public debt with banks without creating issues for debt sustainability. By contrast, at low levels of home bias, there is a limited capacity to issue public debt, and the government is forced to curb economic stabilisation.

Such a finding is in line with other studies examining the reasons for procyclical fiscal policy (Gavin and Perotti, 1997; Talvi and Vegh, 2005; Frankel *et al.*, 2013). Some governments – mostly in emerging markets – cannot access international financial markets during a crisis, and face higher interest rates on sovereign bond markets, and therefore must cut back spending or raise taxes. In turn, in countries with sufficient fiscal space, the government is able to rely on domestic financial markets to issue public debt. The reason we find a similar effect in EU countries is due to financial frictions (Fernandez *et al.,* 2021). The PSTR estimates for financial development show that for low levels of the debt-based home bias, a higher degree of development of financial markets and institutions would make governments run lower surpluses on average. At the threshold level of 22 per cent, the response switches, and governments run significantly higher surpluses at higher levels of financial development. The size of the coefficient is also large as it concerns a change of 0.56 per cent of GDP for a 0.10 increase in the level of the index (on a scale of 100).[23] Additional room could be created for governments to issue public debt if financial markets were more developed, at least if the holdings of debt by the domestic financial system as a share of total debt are not too high. I.e., if there are growing concerns on the effect of debt holdings on the stability of the banking sector that force the government to consolidate (Acharya and Rajan, 2013), the effect reverses and we find the debt response to be relatively stronger for a lower home bias. When governments are more dependent on the banking system to place the debt they reach a limit on the absorption of additional sovereign debt. In this situation a more developed financial system will have disciplinary effects on governments.

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[23] Note that the average standard deviation of the financial development index is 0.06.

If we measure the home bias with the asset-based measure, stronger financial development has the opposite effect: the surpluses are on average higher (*lower*) under the low (*high)* bias. The size of the coefficient is of similar magnitude in both cases (between 0.06 and 0.03 per cent of GDP for a 0.10 increase in the level of the index). The result shows the relevance of looking at both home bias measures simultaneously. Under a low asset-home bias, banks are not taking on much domestic debt on their portfolios, due to the banks' perceptions of the higher risk associated with the debt securities. More developed financial markets would make it even harder for the government to issue debt via banks that are not willing to take on the additional domestic debt in their portfolios. In this situation a better development of financial system will have a disciplinary effect on government because consolidation of public finances would increase banks' confidence in the sovereign. Hence, the government is somehow constrained in placing more public debt. Instead, when the banking sector displays a high bias, i.e. it takes on a lot of domestic debt already, it allows governments to be more flexible on fiscal policy and run lower surpluses on average. If banks perceive debt securities as less risky, a developed financial system will release the pressure on government. Financial development acts as a catalyst: it can have disciplinary effects or can release the pressure on governments depending on its dependency on the banking system and how banks perceive the sovereign risks.

Financial frictions may come from specific sources. An additional control variable we include is the foreign ownership structure of the banking system. Its impact on fiscal policy is not clear a priori. Column (a) of Table 4 show that increased foreign ownership of the banking system unambiguously raises the surplus under the high bias regime. A high share of foreign-owned banks seems to support fiscal discipline if there is a high debt-based home bias. This result is in line with Grittersová's (2020) result that rating agencies attribute improved ratings to countries with a higher level of foreign bank ownership.

Table 4. PSTR estimates of fiscal rule (2), full sample.

	a/ Debt-based home bias		b/ Asset-based home bias	
	Low	High	Low	High
Debt	0,0488***	0,0314***	0,0070***	0,0541***
	(0,0021)	(0,0002)	(0,0006)	(0,0013)
Output gap	-0,0024***	0,0028***	-0,0265***	0,0032***
	(0,0001)	(0,0005)	(0,0040)	(0,0005)
Expenditure gap	-0,0137***	-0,0012	-0,0552***	-0,0023
	(0,0003)	(0,0014)	(0,0064)	(0,0013)
Financial development	-0,0568***	0,0546***	0,0694***	-0,0376***
	(0,0045)	(0,0022)	(0,0086)	(0,0029)
Foreign bank ownership	-0,0191***	0,0466***	0,0439***	0,0145***
	(0,0012)	(0,0028)	(0,0006)	(0,0021)
Inflation	0,1369***	0,1848***	0,5754***	0,1077***
	(0,0172)	(0,0116)	(0,0942)	(0,0036)
Current account	0,0008***	0,0027***	0,0005***	0,0033***
	(0,0001)	(0,0001)	(0,0000)	(0,0000)
Interest rates	0,0013***	0,0045***	0,0038***	0,0021***
	(0,0001)	(0,0002)	(0,0002)	(0,0003)
CDS	0,0000	-0,0001*	-0,0003***	0,0000*
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Macroprudential index	-0,0003***	-0,0006***	-0,0005***	0,0002***
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Government effectiveness index	0,0257***	-0,0091***	0,0222***	-0,0032***
	(0,0025)	(0,0005)	(0,0026)	(0,0001)
EDP	-0,0087***	-0,0159***	-0,0180***	-0,0084***
	(0,0004)	(0,0004)	(0,0033)	(0,0010)
Threshold		0,22		0,04
Number of observations	*330*	*330*	*285*	*285*
Country fixed effects	*Yes*	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*	*Yes*

Note: coefficients of PSTR model (2), with standard errors in brackets.

The results in column (b) also ratify the effects we just described for financial development. In a financial system with a low asset-based home-bias, and hence a limited take up of public debt, foreign entry disciplines governments further as it would further curb the holdings by domestic banks of domestic public debt. For a higher level of home bias, as domestic banks take up more debt, the effect of foreign entry is still present, but is less important. Our result

complements findings by Albertazzi *et al.* (2021): they argue that foreign bank intermediaries alleviate the doom loop as they keep lending to the host economy. We find in addition a separate disciplining effect on fiscal policy, especially if local banking markets are not able to finance the sovereign.

3.2 Original sin in emerging markets

The problem of shallow domestic financial markets and the lack of a large domestic bond market that channels domestic savings to government bonds is related to the original sin problem. Original sin, as defined by Eichengreen and Hausmann (1999), refers to the inability of emerging markets to borrow internationally in their own currency, making them vulnerable to exchange rate fluctuations and financial instability. Fiscal expansions to stabilise economic downturns are riskier as currency depreciation inflates debt burdens, possibly triggering capital flight or, at worst, defaults. These restrictions on the use of countercyclical policies oblige governments to pursue procyclical austerity measures that exacerbate the downturn but contain public debt. Experiences from emerging Asian or Latin American economies show that placing government bonds domestically can contribute to the stabilisation of domestic financial markets (Ogawa and Imai, 2014; Carstens and Shin, 2019). In spite of closer financial integration, Eichengreen *et al.* (2023) highlight the persistence of original sin problems constraining fiscal policy responses during crises.

We examine if the results of Table 4 could be linked to the original sin problem in a few EU emerging markets. A recently developed dataset by Onen *et al.* (2023) on foreign currency public debt holdings shows that in our sample, Romania, Bulgaria and Croatia hold more than 50 per cent of sovereign debt in foreign currency, while for Hungary and Poland the level is about 20 per cent, but its share is negligible for all other EU countries. We split the sample into EU Member States into a group of advanced and emerging economies. We follow the World Bank classification for emerging markets and developing economies, and include Croatia, Hungary, Poland, Romania, together with Bulgaria, Czechia, Cyprus, and the Baltic states. This split roughly coincides with the EU countries that joined after 2003.

Columns (a) and (b) of Table 5 show the outcomes for the advanced EU economies. These results are broadly similar to the ones observed in the full sample. Governments stabilise debt more strongly at higher levels of the home bias but never neglect consolidation. Only when the banking sector absorbs a large part of domestic sovereign debt, can governments pursue economic stabilisation. In all other cases, and when there is little appetite by banks for sovereign debt, consolidation comes at the cost of foregoing countercyclical policies (nor does the government correct deviations in spending). This result is reminiscent of the trade-off between fiscal and economic stabilisation detected in other studies for EU countries (Larch *et*

al., 2021). The result is not incompatible with a political deficit bias, but our result highlights the important role of the banking sector in driving procyclical fiscal policies.

Columns (c) and (d) of Table 5 show fiscal behaviour in the emerging EU markets, and show a more complex picture than what happens under original sin. As we can see in column (d), when the home bias is high – i.e. the banking system holds a lot of domestic sovereign debt on its balance sheet – then the government strongly focuses on fiscal consolidation and foregoes economic stabilisation. The threshold level of 20 per cent at which this switch occurs is not extremely high for emerging EU countries, where holdings are on average 13 per cent for the asset-based measure. The additional insight we get from using the debt-based home bias measure is that these countries offload debt on the banking sector: this is shown by the lack of consolidation (and the limited economic stabilisation effort) when banks hold a large share of total public debt. Instead, when there is limited financing capacity, these governments stabilise the economy and spending.

Results confirm further the role of financial development and foreign bank entry, and explain the original sin problem. In the advanced EU economies, stronger financial development always allows for substantially higher deficits, and foreign entry does not discipline fiscal policy, independently of the level of the home bias. Instead, if we look at the emerging EU countries, a similar pattern as in Table 4 appears. When debt absorption by the financial system is limited (column c), more developed financial markets or institutions – and foreign entry of banks – would raise deficits. But it would make governments raise surpluses for a higher bias out of a concern for financial stability. If we look at column (d) instead, banking systems that do not take up domestic public debt effectively constrain governments' deficit bias. Foreign entry only exacerbates this effect: the financial sector would be disciplining fiscal policy by diversifying away from the domestic sovereign, and the more so if foreign ownership in the banking system is higher.

Table 5. PSTR estimates of fiscal rule (2), EU Member States by year of membership.

	EU advanced				EU emerging			
	a/ Debt-based home bias		b/ Asset-based home bias		c/ Debt-based home bias		d/ Asset-based home bias	
	Low	High	Low	High	Low	High	Low	High
Debt	0,0244***	0,2296***	0,0297***	0,0642***	0,1222***	-0,0102***	0,0414***	0,2750***
	(0,0016)	(0,0125)	(0,0017)	(0,0001)	(0,0674)	(0,0293)	(0,0038)	(0,0275)
Output gap	-0,0135***	0,1332***	-0,0070***	-0,0076***	0,0166***	0,0039***	0,0119***	-0,0269***
	(0,0019)	(0,0339)	(0,0006)	(0,0006)	(0,0010)	(0,0112)	(0,0004)	(0,0056)
Expenditure gap	-0,0333***	0,2435***	-0,0206***	-0,0229***	0,0276***	0,0025	0,0212***	-0,0703***
	(0,0036)	(0,0594)	(0,0002)	(0,0007)	(0,0024)	(0,0258)	(0,0011)	(0,0125)
Financial development	-0,1066**	-0,1534*	-0,1579***	-0,1182***	-0,1235	0,1616***	0,1411***	-0,4633***
	(0,0058)	(0,1152)	(0,0191)	(0,0060)	(0,1299)	(0,0337)	(0,0156)	(0,0585)
Foreign bank ownership	-0,0171***	-0,1051***	-0,1420***	-0,0185***	-0,0088	0,0982***	0,0720***	-0,1210***
	(0,0013)	(0,0272)	(0,0264)	(0,0007)	(0,0248)	(0,0226)	(0,0011)	(0,0284)
Inflation	0,0583***	0,1076	0,4804***	-0,3905***	-0,2439	0,1519*	0,1697***	-0,2138***
	(0,0078)	(0,0867)	(0,0411)	(0,0048)	(0,2188)	(0,0907)	(0,0355)	(0,0580)
Current account	0,0026***	-0,0051***	-0,0014***	0,0054***	-0,0021***	0,0017	0,0001***	0,0100***
	(0,0000)	(0,0001)	(0,0004)	(0,0001)	(0,0007)	(0,0012)	(0,0000)	(0,0002)
Interest rates	0,0045***	0,0049***	0,0053***	0,0077***	-0,0023**	0,0014***	-0,0010***	0,0161***
	(0,0001)	(0,0005)	(0,0006)	(0,0004)	(0,0013)	(0,0005)	(0,0002)	(0,0014)
CDS	0,0000	-0,0007***	-0,0004***	0,0000	0,0000	0,0000	-0,0001***	0,0001***
	(0,0000)	(0,0002)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Macroprudential index	-0,0007***	-0,0014***	-0,0002***	-0,0013***	0,0004***	-0,0010***	-0,0008***	0,0015***
	(0,0000)	(0,0004)	(0,0001)	(0,0001)	(0,0001)	(0,0004)	(0,0001)	(0,0002)
Government effectiveness index	-0,0056***	0,0200***	0,0013	0,0003	-0,0123	0,0007	-0,0048***	-0,0644***
	(0,0011)	(0,0317)	(0,0043)	(0,0008)	(0,0246)	(0,0059)	(0,0002)	(0,0029)
EDP	-0,0117***	-0,0137***	-0,0153***	-0,0017***	0,0011	-0,0025	-0,0057***	-0,0500***
	(0,0009)	(0,0047)	(0,0002)	(0,0005)	(0,0145)	(0,0061)	(0,0019)	(0,0046)
Threshold		0,30		0,04		0,24		0,20
Number of observations	195	195	195	195	135	135	90	90
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: coefficients, with standard errors in brackets.

3.3 Fiscal policy in the EMU

Original sin is due to the inability to issue debt in domestic currency, but EU countries having adopted the euro face a similar issue as they are constrained to issue public debt in a common currency. A single currency not only creates additional incentives for lower government levels to run unsustainable fiscal policies (Beetsma and Uhlig, 1999). A single currency also exacerbates the financial exposure of sovereigns. In fact, euro area countries suffered from fiscal stress due to external financial crises that propagated domestically in the banking system. During the European sovereign debt crisis, banks might have feared that bonds of

some euro-area sovereign could be subject to redenomination risk, while a default of the domestic sovereigns was perceived as less likely (Broner *et al*., 2014). Lack of progress on financial integration might actually have pushed precautious banks to shift portfolios to their domestic sovereign, rather than creating cross-border portfolios of sovereign euro area or EU bonds. The consequences of such a shift can be dramatic for intermediation domestically, as banks discriminated towards domestic corporate borrowers as the domestic sovereign is too big to fail (Bocola, 2016).

We compare fiscal behaviour in the euro area to EU countries with their own exchange rates. We first look at the sample of euro area countries. A typical finding for euro area countries (Larch *et al.*, 2021; Gootjes and De Haan, 2022) is that fiscal policy is procyclical. We confirm this finding: column (a) of Table 6 shows a pronounced procyclical patterns and no corrections to transitory deviations in spending, yet no risk to fiscal sustainability. We also shed a new light on this issue. These economies have gained fiscal space by placing a large part of public debt with domestic banks. However, as column (b) shows, if the holdings of domestic public debt by the banking system become larger than a threshold value (4% of total assets), euro area governments have turned to a more disciplined policy that increasingly responds to higher public debt, but also behaves countercyclically and matches temporarily higher outlays with higher taxes. Therefore, procyclical policies under a low home bias might be the typical fiscal response under a common currency, as long as debt problems do not constrain the domestic financial sector.

Further note that in euro area countries, we find a similar effect of financial development as in Table 4: governments could issue more debt and run higher deficits in a more developed financial system but only if this does not put at risk financial stability. Banks that are not willing to take up additional public debt effectively constrain the deficit bias (column b). Foreign entry of banks disciplines fiscal policy when there is already a high share of domestic debt held by banks.

Table 6. PSTR estimates of fiscal rule (2), euro area versus non-euro area countries.

	Euro area				Non-Euro area			
	a/ Debt-based home bias		b/ Asset-based home bias		c/ Debt-based home bias		d/ Asset-based home bias	
	Low	High	Low	High	Low	High	Low	High
Debt	0,0508***	0,0307***	0,0381***	0,0805***	-0,0450	0,0191	0,0525***	0,1119***
	(0,0000)	(0,0000)	(0,0063)	(0,0019)	(0,0416)	(0,0157)	(0,0131)	(0,0022)
Output gap	-0,0012***	-0,0095***	-0,0466***	0,0105***	-0,0115	0,0070***	0,0082***	0,0121***
	(0,0000)	(0,0000)	(0,0086)	(0,0021)	(0,0101)	(0,0022)	(0,0001)	(0,0005)
Expenditure gap	-0,0122***	-0,0238***	-0,0923***	0,0086**	-0,0289*	0,0064	0,0013***	0,0203***
	(0,0000)	(0,0000	(0,0157	(0,0047)	(0,0185)	(0,0053)	(0,0000)	(0,0010)
Financial development	-0,1193***	0,1355***	0,9486***	-0,4118***	0,1279***	-0,1597***	-0,1368***	-0,2385***
	(0,0000)	(0,0001)	(0,1070)	(0,0882)	(0,0619)	(0,0370)	(0,0148)	(0,0015)
Foreign bank ownership	-0,0481***	0,0834***	-0,0009***	0,0045***	0,0949***	0,0933***	0,0905***	0,0285***
	(0,0000)	(0,0000)	(0,0005)	(0,0001)	(0,0047)	(0,0051)	(0,0087)	(0,0023)
Inflation	0,0655***	0,6956***	0,0174***	0,0060***	0,0964***	0,0349***	-0,0386***	0,1575***
	(0,0000)	(0,0001)	(0,0084)	(0,0004)	(0,0114)	(0,0087)	(0,0032)	(0,0027)
Current account	0,0003***	0,0049***	-0,0098	-0,0317***	0,0026***	-0,0009*	-0,0010***	0,0045***
	(0,0000)	(0,0000)	(0,0162)	(0,0009)	(0,0007)	(0,0006)	(0,0001)	(0,0000)
Interest rates	0,0009***	0,0059***	0,0030***	0,0074***	0,0021*	-0,0039***	-0,0060***	0,0016***
	(0,0000)	(0,0000)	(0,0002)	(0,0005)	(0,0011)	(0,0010)	(0,0003)	(0,0002)
CDS	0,0000	-0,0001***	-0,0260***	-0,0042**	0,0000**	0,0000**	0,0000**	0,0000**
	(0,0000)	(0,0000)	(0,0077)	(0,0010)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Macroprudential index	-0,0001***	-0,0012***	0,0005**	0,0004***	-0,0005***	0,0000	0,0003***	0,0006***
	(0,0000)	(0,0000)	(0,0003)	(0,0001)	(0,0001)	(0,0003)	(0,0000)	(0,0000)
Government effectiveness index	0,0295***	-0,0428***	-0,0649**	-0,1008***	-0,0006	0,0808***	0,0734***	0,0308***
	(0,0000)	(0,0000)	(0,0345)	(0,0011)	(0,0193)	(0,0043)	(0,0032)	(0,0000)
EDP	-0,0072***	-0,0090***	-0,0003***	0,0000	-0,0217***	0,0029	-0,0079***	-0,0050***
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0050)	(0,0094)	(0,0025)	(0,0007)
Threshold		0,23		0,04		0,26		0,10
Number of observations	240	240	195	195	90	90	90	90
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: coefficients, with standard errors in brackets.

For the non-euro area countries, the fiscal behaviour is rather distinct. We observe in column (c) of Table 6 that at higher levels of the debt-based home bias (at a threshold at 26 per cent), the government pays more attention to the stabilisation of public debt, adopt countercyclical fiscal measures, and correct transitory spending deviations to keep the budget in balance. Such a finding indicates that higher levels of home bias allow governments of non-euro area countries to place more debt domestically, and this increased financing capacity enhances the use of fiscal policy as an economic stabilisation tool. Under a low bias, this capacity is limited and fiscal policy does not respond in a significant way to cyclical or debt variations. This result is probably because many non-euro area countries – except for Sweden – are classified as emerging markets. Findings for emerging markets show that fiscal policy becomes more powerful as a stabilisation tool in these countries when financial access to markets improves (Carrière-Swallow and Céspedes, 2013). This finding is also endorsed by the large impact of more developed financial systems. In contrast to euro area countries, a more strongly developed financial system would enable governments to run higher deficits (around 0.15 per cent of GDP for a 0.10 increase in the level of the index). By contrast, and as in the euro area, foreign entry in the banking system would constrain fiscal policy strongly: at all levels of home bias, governments constrain deficits.

The picture that emerges from these findings is that EU Member States belong to two different groups. On the one hand, in a group of euro area countries, there is sufficient financing capacity to issue public debt but countries forego stabilising the economy. Only as fiscal space gets tighter, and banks stop taking on addition debt, does fiscal policy turn countercyclical. On the other hand, there is a group of EU countries that behave similarly to emerging market economies, as they have limited financing capacity to issue public debt and pursue economic stabilisation. Developing financial markets and institutions would enable these countries to smooth out economic shocks.

3.4 The role of the financial and banking system in detail

The results have so far shown that large, competitive, and efficient financial markets allow governments to raise funds more easily to smooth out economic shocks without resorting to abrupt fiscal adjustments (Ebeke and Lu, 2015). Governments may even benefit from lower interest rates as well-regulated financial systems build up greater investors' confidence and could curb the risk premium. More developed capital markets also provide a broad range of debt instruments the government can use to manage its public debt portfolios more efficiently and to hedge against adverse interest rate movements or currency fluctuations. Access to financial markets permits countries to run up higher public debt levels. In turn, shallow financial markets – and a less developed banking system – might enforce more fiscal discipline simply

because the home market cannot absorb all public debt. In such countries, even at low levels of home bias, governments face more quickly sustainability concerns (Kaminsky *et al*., 2004).

The results in Tables 4 to 6 suggest that a high level of financial development permits governments to run a higher deficit, suggesting that more public debt can be placed on the financial market. But we also show there is a limit to the absorption of public debt as high levels of holdings might raise fiscal risk for the banking sector. There is no obvious correlation between the level of financial development – as measured by the Financial Development Index (IMF, 2024) – and the home bias (Figure 8) and lower financial development is not necessarily associated with a higher home bias. Asonuma *et al.* (2015) suggest this could be the case because portfolio allocation options are more limited for banks in countries with less developed financial markets, and hence, relatively limited access to international capital markets.

Figure 8. Financial development and the home bias (average 2001-2022).
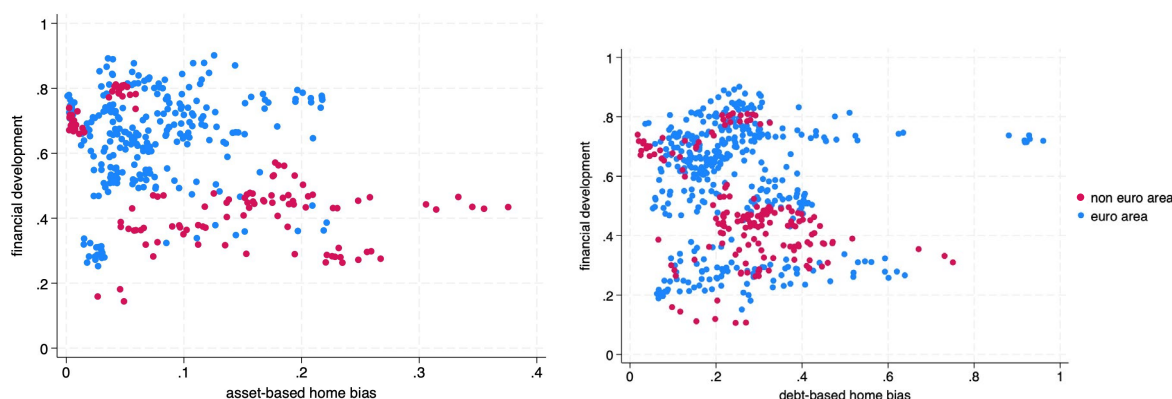
Source: Asonuma *et al.* (2015), AMECO (2024).

We can actually detail the effects of financial development further, as the overall index can be decomposed in three parts that measure the depth, access and efficiency, and so for financial markets and for financial institutions (IMF, 2024). We substitute each of these six indices for the overall index in the fiscal rule in turn. Table 7 displays the results of the PSTR estimates for the full sample of EU27 countries, using both the debt- and asset-based measures of the home bias (in panels 1 and 2 respectively). The results in columns (a) to (f) report for each subindex the estimates of the PSTR model. The outcomes corroborate insights into the effect of financial development on fiscal policy.

For the debt-based measure, according to panel 1, the depth of financial markets allow government to run higher deficits. The former result is not surprising: depth of financial markets measures stock market capitalisation to GDP, stocks traded to GDP, international debt securities of government to GDP, and total debt securities (of both financial and non-financial corporations) to GDP. More liquid financial markets would allow governments to tap into bond

markets more. The results further show that improved access to financial institutions (panel 1, column c) has a similar impact. It might indicate that the public has easier access to government bonds that are being placed through the banking system.[24] By contrast, more efficient financial institutions – as measured by net interest margin, return on equity or return on assets – do not seem to give governments a higher fiscal margin. This does not come as a surprise as an efficient financial sector would less likely be subject to government pressures to absorb public debt.

In panel 2 of Table 7, we see that for the asset-based measure of home bias, results are slightly different for the various measures of financial development. Recall that under the high bias regime, public debt is stabilised, and as the banking sector is not willing to take up much domestic debt, more financial development constrains the deficit bias. This is confirmed when we look at the result in columns (a)-(b) or (c)-(d) for the asset-based measures and look at financial depth or at access of financial markets and institutions. Columns (e)-(f) show that for both a low and high home bias, the government runs a higher surplus if financial markets or institutions are more efficient. The effect is particularly strong for financial institutions: it indicates that more efficient banks lead to lower deficits, possibly indicating that the financial system can discipline fiscal policy if banks are constrained to be competitive. The last finding is consistent with our previous findings on the disciplining role of foreign banks too.

3.5 The role of public banks

There is growing evidence that public banks soften the financing constraints of governments in general (Gonzalez-Garcia and Grigoli, 2013), and during the European sovereign debt crisis in particular (Altavilla *et al*., 2017; Becker and Ivashina, 2018; Ongena *et al.,* 2019)

We test the effect of public banks by using it as a control variable in (2). We substitute the share of foreign-owned banks with the share of state-owned banks and test the same PSTR model. Table 8 confirms the general results for the full sample in Table 4 for the debt-stabilising and the cyclical response. The results for the debt-based home bias (column (a) indicate that a larger share of public banks lowers the average surplus. This confirms the fear that governments that increasingly place public debt domestically – while still inclined to stabilise public debt – run higher deficits in the presence of a large share of public banks. Similarly, if we look at the asset-based measure (column (b)), we observe that a larger share of public banks unambiguously reduces the surplus.

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[24] Access to financial institutions measures the number of bank branches and ATMs per 100,000 adults.

3.6 Alternative transition variables

Further insights into the role of the financial and banking system can be gotten from alternatively using the different financial indicators as transition variables. We focus on financial development, foreign entry and public banks. Hence, the PSTR model now assumes the coefficients in the fiscal rule (2) are modified for different levels of financial development or bank ownership. We do not include the home-bias measures as a control variable in (2) to avoid additional non-linearities. We run the PSTR model on the EU27 sample using these three alternative transition variables and report the findings in Table 9. Note that in all cases, we found two regimes to be the optimal number with the sequence of homogeneity test.[25]

The first alternative we use is the overall Financial Development Index. The threshold between low and high development stands at 0.64, which excludes all countries joining the EU after 2004 (Figure 5). Column (a) of Table 9 indicates that at higher levels of financial development, governments consolidate more as the debt sustainability response is about doubled in comparison to the regime with low financial development. For either low or high levels of financial development, we find that fiscal behaviour exhibits acyclical patterns and there is no response to deviations from the spending-trend. The result endorses the finding that a higher financial development increases the capacity to place public debt with the banking system while ensuring governments focus on stabilising public debt.

The second alternative is to look at the role of foreign banks.[26] The threshold value suggests that about a quarter of the banking sector being owned by foreign banks is the crucial value to differentiate the fiscal response. The five largest EU economies have a foreign ownership below this threshold (Figure 6). The results of the PSTR model in column (b) of Table 9 show that the fiscal response to public debt is about five times as strong when the presence of foreign banks is limited. Moreover, with a limited presence of foreign banks, fiscal policy is countercyclical and controls spending. This is not the case for countries with a large presence of foreign banks, as fiscal policy is acyclical. This result underscores the ambiguous role of foreign entry: strong financial development makes it easier for governments to place public debt on bond markets, but entry of foreign-owned banks seems to curb public debt issuance, in spite of the disciplinary effect that seems to lower surpluses on average (in Tables 4 to 6).

Finally, we also use the share of public banks as a transition variable. Column (c) of Table 9 shows that a larger share of public banks – above a threshold level of 9 per cent - makes the government stabilise public debt more strongly. However, fiscal policy becomes procyclical, and spending outlays are not matched with increased taxation or spending cuts. It thus seems

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[25] Results are available upon request.
[26] Not including it as a control variable in the PSTR.

that public banks in trouble have forced governments to consolidate, in spite of other stabilisation concerns. Specific episodes of trouble with public banks in some of the countries with a high share of public banks (Germany, Greece and Slovenia) confirm the fiscal issues that can arise in these cases.

Table 7. PSTR results with different sub-indicators of financial development, sample of EU27 countries (2001-2022 for debt-based home bias; 2005-2022 for asset-based home bias).

Panel 1 - Debt-based home bias	(a) Depth of financial institutions		(b) Depth of financial markets		(c) Access to financial institutions		(d) Access to financial markets		(e) Efficiency of financial institutions		(f) Efficiency of financial markets	
	Low	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Debt	0,0411***	0,0371***	0,0438***	0,0351***	0,0514***	0,0340***	0,0406***	0,0489***	0,0449***	0,0420***	0,0456***	0,0084***
	(0,0010)	(0,0004)	(0,0006)	(0,0000)	(0,0003)	(0,0000)	(0,0007)	(0,0001)	(0,0001)	(0,0000)	(0,0006)	(0,0025)
Output gap	-0,0019***	0,0026***	-0,0015***	0,0014***	-0,0042***	0,0039***	-0,0020***	0,0030***	-0,0048***	0,0027***	-0,0022***	0,0016***
	(0,0001)	(0,0004)	(0,0001)	(0,0000)	(0,0000)	(0,0001)	(0,0002)	(0,0001)	(0,0000)	(0,0000)	(0,0001)	(0,0001)
Expenditure gap	-0,0127***	-0,0011	-0,0117***	-0,0046***	-0,0178***	0,0011***	-0,0128***	-0,0010***	-0,0178***	-0,0008***	-0,0130***	-0,0041***
	(0,0001)	(0,0010)	(0,0000)	(0,0001)	(0,0000)	(0,0003)	(0,0001)	(0,0000)	(0,0000)	(0,0001)	(0,0007)	(0,0002)
Financial index sub-indicator	-0,0170***	-0,0259***	-0,0459***	0,0583***	-0,0356***	0,0307***	0,0040***	-0,0691***	0,1039***	0,0184***	-0,0121***	0,0681***
	(0,0000)	(0,0034)	(0,0003)	(0,0028)	(0,0002)	(0,0005)	(0,0009)	(0,0041)	(0,0000)	(0,0005)	(0,0004)	(0,0056)
Foreign bank ownership	-0,0065***	0,0143***	-0,0293***	0,0623***	0,0010***	0,0278***	0,0010***	-0,0083***	0,0050***	0,0247***	-0,0045***	0,0723***
	(0,0019)	(0,0005)	(0,0012)	(0,0025)	(0,0004)	(0,0004)	(0,0005)	(0,0013)	(0,0002)	(0,0001)	(0,0023)	(0,0055)
Inflation	0,1196***	0,2020***	0,1468***	0,1750***	0,1237***	0,1908***	0,1143***	0,1971***	0,0961***	0,2110***	0,1741***	0,1594***
	(0,0158)	(0,0121)	(0,0076)	(0,0039)	(0,0020)	(0,0017)	(0,0119)	(0,0085)	(0,0010)	(0,0009)	(0,0149)	(0,0053)
Current account	0,0011***	0,0027***	0,0011***	0,0027***	0,0007***	0,0027***	0,0014***	0,0025***	0,0008***	0,0028***	0,0012***	0,0024***
	(0,0000)	(0,0001)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0001)	(0,0000)	(0,0000)	(0,0001)	(0,0001)
Interest rates	0,0011***	0,0045***	0,0006***	0,0046***	0,0016***	0,0045***	0,0016***	0,0039***	0,0008***	0,0048***	0,0011***	0,0026***
	(0,0000)	(0,0001)	(0,0000)	(0,0001)	(0,0000)	(0,0000)	(0,0000)	(0,0001)	(0,0000)	(0,0000)	(0,0003)	(0,0001)
CDS	0,0000	-0,0001	0,0000	-0,0001	0,0000	-0,0001	0,0000	-0,0001	0,0000	-0,0001	0,0000	-0,0001
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Macroprudential index	-0,0005	-0,0002	-0,0002	-0,0006	-0,0004	-0,0006	-0,0006	-0,0002	-0,0008	0,0000	-0,0003	-0,0004
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
	0,0177**	0,0002***	0,0201***	-0,0133***	0,0178***	-0,0012***	0,0072***	0,0010***	0,0111***	-0,0061***	0,0164***	-0,0096***

Government effectiveness index	(0,0008)	(0,0000)	(0,0003)	(0,0004)	(0,0003)	(0,0000)	(0,0005)	(0,0004)	(0,0001)	(0,0000)	(0,0001)	(0,0007)
EDP	-0,0099***	-0,0199***	-0,0096***	-0,0151***	-0,0065***	-0,0178***	-0,0113***	-0,020***5	-0,0089***	-0,0187***	-0,0093***	-0,0157***
	(0,0002)	(0,0006)	(0,0001)	(0,0002)	(0,0001)	(0,0000)	(0,0001)	(0,0005)	(0,0000)	(0,0000)	(0,0004)	(0,0003)
Threshold		0,22		0,22		0,22		0,23		0,22		0,22
Number of observations	330	330	330	330	330	330	330	330	330	330	330	330
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel 2 - Asset-based home bias	(a) Depth of financial institutions		(b) Depth of financial markets		(c) Access to financial institutions		(d) Access to financial markets		(e) Efficiency of financial institutions		(f) Efficiency of financial markets	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Debt	0,0161***	0,0490***	0,0099***	0,0519***	0,0142***	0,0502***	0,0391***	0,0514***	0,0589***	0,0569***	0,0265***	0,0514***
	(0,0026)	(0,0012)	(0,0008)	(0,0016)	(0,0021)	(0,0014)	(0,0087)	(0,0028)	(0,0080)	(0,0015)	(0,0035)	(0,0038)
Output gap	-0,0268***	0,0027***	-0,0268***	0,0033***	-0,0262***	0,0028***	-0,0245***	0,0031***	-0,0286***	0,0015***	-0,0243***	0,0031***
	(0,0029)	(0,0004)	(0,0041)	(0,0005)	(0,0034)	(0,0004)	(0,0026)	(0,0006)	(0,0033)	(0,0000)	(0,0026)	(0,0010)
Expenditure gap	-0,0549***	-0,0031***	-0,0556***	-0,0018	-0,0539***	-0,0035***	-0,0504***	-0,0025**	-0,0547***	-0,0057***	-0,0511***	-0,0025
	(0,0037)	(0,0011)	(0,0066)	(0,0014)	(0,0050)	(0,0012)	(0,0033)	(0,0013)	(0,0045)	(0,0002)	(0,0041)	(0,0021)
Financial index sub-indicator	-0,0014	-0,0078*	0,0550***	-0,0122***	0,0223***	-0,0303***	-0,0336**	-0,0099***	0,2731***	0,0519***	0,0508	-0,0029***
	(0,0307)	(0,0045)	(0,0082)	(0,0009)	(0,0020)	(0,0008)	(0,0131)	(0,0027)	(0,0542)	(0,0059)	(0,0302)	(0,0013)
Foreign bank ownership	0,0193	0,0229***	0,0559***	0,0215***	0,0208***	0,0262***	0,0129***	0,0207***	0,0366***	0,0307***	0,0598***	0,0238***
	(0,0161)	(0,0023)	(0,0005)	(0,0007)	(0,0004)	(0,0008)	(0,0070)	(0,0005)	(0,0008)	(0,0001)	(0,0175)	(0,0014)
Inflation	0,5855***	0,1017***	0,5559***	0,1089***	0,5749***	0,0933***	0,4750***	0,1077***	0,3626***	0,1170***	0,5226	0,1085***
	(0,0965)	(0,0011)	(0,0979)	(0,0022)	(0,0871)	(0,0029)	(0,0524)	(0,0002)	(0,0304)	(0,0001)	(0,0446)	(0,0022)
Current account	0,0002**	0,0031***	0,0001***	0,0031***	0,0004***	0,0031***	-0,0005	0,0033***	-0,0013***	0,0037***	0,0000	0,0033***
	(0,0001)	(0,0000)	(0,0000)	(0,0000)	(0,0001)	(0,0000)	(0,0004)	(0,0001)	(0,0005)	(0,0001)	(0,0003)	(0,0002)
Interest rates	0,0041***	0,0018***	0,0047***	0,0019***	0,0041***	0,0009***	0,0033***	0,0020***	0,0068***	0,0023***	0,0033***	0,0019***
	(0,0000)	(0,0002)	(0,0002)	(0,0003)	(0,0006)	(0,0003)	(0,0004)	(0,0003)	(0,0004)	(0,0003)	(0,0002)	(0,0003)
CDS	-0,0003***	0,0000	-0,0003***	0,0000	-0,0003***	0,0000	-0,0003***	0,0000	-0,0002***	0,0000	-0,0002***	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Macroprudential index	-0,0002***	0,0000	-0,0005***	0,0001***	-0,0003***	0,0002***	-0,0001***	-0,0001***	-0,0013***	0,0002***	-0,0005***	0,0000
	(0,0002)	(0,0000)	(0,0001)	(0,0000)	(0,0000)	(0,0000)	(0,0002)	(0,0000)	(0,0002)	(0,0000)	(0,0001)	(0,0000)
Government effectiveness index	0,0348***	-0,0051***	0,0320***	-0,0043***	0,0303***	-0,0095***	0,0363***	-0,0077***	0,0199***	-0,0079***	0,0298***	-0,0084***
	(0,0081)	(0,0001)	(0,0024)	(0,0001)	(0,0003)	(0,0003)	(0,0005)	(0,0010)	(0,0044)	(0,0000)	(0,0026)	(0,0018)

EDP	-0,0182***	-0,0092***	-0,0156	-0,0089***	-0,0201***	-0,0055***	-0,0241***	-0,0085***	-0,0219***	-0,0057***	-0,0188***	-0,0078***
	(0,0039)	(0,0008)	(0,0037)	(0,0009)	(0,0031)	(0,0009)	(0,0055)	(0,0003)	(0,0046)	(0,0000)	(0,0032)	(0,0003)
Threshold		0,04		0,04		0,04		0,04		0,04		0,04
Number of observations	285	285	285	285	285	285	285	285	285	285	285	285
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: coefficients, with standard errors in brackets.

Table 8. PSTR results, full sample EU27 countries, using share of state-owned banks as control variable.

	(a) Debt-based home bias		(b) Asset-based home bias	
	Low	High	Low	High
Debt	0,0200***	0,0400***	-0,0400	0,0600***
	(0,0000)	(0,0000)	(0,0400)	(0,0000)
Output gap	-0,0100***	0,0000	-0,0100***	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Expenditure gap	-0,0400***	-0,0100***	-0,0300***	0,0000
	(0,0000)	(0,0000)	(0,0100)	(0,0100)
Financial development	-0,0100***	0,0000	0,0100	-0,0500***
	(0,0000)	(0,0000)	(0,0200)	(0,0100)
State-owned banks	0,0200***	-0,0500***	-0,0400***	-0,0400***
	(0,0000)	(0,0000)	(0,0100)	(0,0100)
Inflation	0,1500***	0,1000***	0,0800*	0,1400***
	(0,0400)	(0,0000)	(0,0600)	(0,0200)
Current account	0,0000	0,0000	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Interest rates	0,0000	0,0000	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
CDS	0,0000	0,0000	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Macroprudential index	0,0000	0,0000	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Government effectiveness index	0,0200***	0,0000	0,0200***	0,0000
	(0,0000)	(0,0000)	(0,0100)	(0,0000)
EDP	0,0000	-0,0100***	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0100)	(0,0000)
Threshold		0,22		0,09
Number of observations		255		240
Country fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes

Note: coefficients, with standard errors in brackets.

Table 9. PSTR results, full sample EU27 countries, using alternative transition variables.

	(a) Financial Development		(b) Foreign bank ownership		(c) State-owned banks	
	Low	High	Low	High	Low	High
Debt	0,0300***	0,0600	0,0700***	0,0100	0,0100***	0,0500***
	(0,0100)	(0,0400)	(0,0100)	(0,0100)	(0,0000)	(0,0000)
Output gap	0,0000	0,0000	0,0100***	0,0000	-0,0100***	-0,0100***
	(0,0100)	(0,0300)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Expenditure gap	0,0000	-0,0100	0,0100	-0,0100	-0,0300***	-0,0300***
	(0,0300)	(0,0400)	(0,0100)	(0,0100)	(0,0000)	(0,0000)
Financial development	-	-	-0,0300***	0,0200**	-0,0200**	0,0100***
			(0,0100)	(0,0100)	(0,0100)	(0,0070)
Foreign bank ownership	0,0000	-0,0300	-	-	0,0100***	0,0100***
	(0,0100)	(0,1000)			(0,0000)	(0,0000)
Inflation	0,0800	0,1800	0,1200***	0,0900***	0,2100***	-0,0200*
	(0,1200)	(0,1400)	(0,0400)	(0,0200)	(0,0100)	(0,0100)
Current account	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Interest rates	0,0000	0,0100	0,0100***	0,0000	0,0000	0,0000
	(0,0000)	(0,0100)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
CDS	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Macroprudential index	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Government effectiveness index	0,0000	0,0100***	0,0100***	0,0000	0,0100***	0,0000
	(0,0100)	(0,0000)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
EDP	-0,0100	-0,0200**	-0,0200***	-0,0100***	-0,0100***	0,0000
	(0,0100)	(0,0100)	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Threshold		0,64		0,23		0,09
Number of observations		330		330		255
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: coefficients, with standard errors in brackets.

4. Conclusion

Concerns on fiscal sustainability and worsening balance sheet conditions of major banks triggered a doom loop between banks and sovereigns in the euro area during the 2010-2013 sovereign debt. Institutional safeguards and monetary policy interventions have reduced such linkages. Nevertheless, the home bias, i.e. domestic banks holding predominantly domestic sovereign debt in their portfolios, is still high in most EU countries, and despite the strengthened institutional and regulatory framework in the EU and the euro area it cannot be completely excluded that similar problems could arise in the future.

This paper makes three contributions. First, we complement evidence on the doom loop. But rather than looking at the effect of fiscal stress on the financial system, we look into the response of fiscal policy to public debt, taking into account the absorption by the financial system of additional public debt. We examine the non-linear effects that the home bias may have on fiscal behaviour, and how debt consolidation might interact with economic or financial stabilisation. Secondly, and more broadly, we examine the role that financial repression may have on fiscal policy behaviour. We show how the banking system plays a particular role in the placement of public debt and can provide or reduce incentives for fiscal responsibility. We detail the role of the financial system – and in particular the role of foreign entry and state-owned banks – in the sovereign bond market, and suggest ways to examine the original sin in emerging markets. Finally, we extend the dataset by Asonuma *et al.* (2015) to include all EU countries for both the debt- and asset-based home bias measures. One of the limitations of our paper is that we did not consider holdings by individual investors or non-bank financial institutions, and the particular role played by monetary policy on government bond markets. Future extensions of datasets in that direction could explore shifts in debt financing.

Our findings point to the role of financial structure in understanding the capacity of the government to issue public debt. A high home bias is not necessarily reducing fiscal discipline if it reflects a well-developed financial and banking system that can absorb public debt easily. In these countries – mostly euro area member states – automatic stabilizers operate and counter-cyclical fiscal policies are possible in response to shocks, allowing for an optimal smoothing. Nevertheless, fiscal policy substantially consolidates at the expense of pronounced procyclical patterns, when financial risk builds up (Larch *et al.*, 2021; Gootjes and De Haan, 2022). By contrast, non-euro area countries must prioritize fiscal consolidation due to limited financial market depth and external borrowing constraints, just as in other emerging markets. Fiscal policy could become a more powerful stabilisation tool if financial access to markets were to improve (Carrière-

Swallow and Céspedes, 2013; Eichengreen *et al.*, 2023). We further find that entry of foreign banks appears to support fiscal sustainability by diversifying debt placement, yet a higher share of state-owned banks reduces fiscal discipline and increases sovereign risk exposure.

The welfare consequences of our results are not clear-cut. Deeper financial markets that allow governments to smooth economic shocks – in particular in emerging Europe – is to be traded off against the potentially strong disruptive effect of a major public debt crisis. Integration of financial markets and banking sectors at European level including through the Banking and Capital Markets Unions could be one step forward by enabling sovereigns to access integrated financial markets more easily, and withstand the transmission of external shocks that are harder to tackle under a common currency. Borio *et al.* (2023) correctly argue that governments should consider the risk of financial instability when assessing fiscal space. Their report suggests several ways that governments can improve regulations and macroprudential oversight to avoid excessive accumulation of public debt. We find that governments do indeed consolidate under pressure of financial stability. In addition, encouraging cross-border banks in the EU might enforce fiscal discipline indirectly. Doing so might require further steps in setting up a common bank resolution authority (Erce, 2014; Azzimonti and Quadrini, 2024).

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Appendix A. Data description

variable	definition	source
Primary balance relative to GDP	general government primary balance to GDP ratio (in percent)	DG ECFIN (AMECO)
Debt	general government debt ratio to GDP ratio (in percent)	DG ECFIN (AMECO)
Output gap	deviation of GDP from long-term trend, as a percentage of potential GDP,	DG ECFIN (AMECO)
Expenditure gap	structural spending level, as a percentage of potential GDP	DG ECFIN (AMECO) (Havik *et al.*, 2014)
Financial Development Index	Overall index, and the components on depth, access, and efficiency (of both financial markets and institutions)	IMF (2024)
Foreign bank ownership	Percentage share of foreign-owned banks (as a share of total assets, including those of development banks), with foreign-owned banks defined as having a 50 per cent plus share of foreign owners	Panizza (2024)
State-owned banks	Percentage share of assets of each bank having at least a 50 per cent share of government ownership, by total banking assets	Panizza (2024)
Inflation	log change in the GDP deflator	AMECO
Current account	current account balance, as a percentage of GDP	AMECO
Interest rates	euribor	Bloomberg
CDS	5-year credit default swaps, in USD	Bloomberg
Macroprudential index	regulatory limits on the loan-to-value ratio	Alam *et al.* (2024)
Government effectiveness index	perception of the quality of public and civil service	World Wide Government Indicators, World Bank (2024)
EDP		Bökemeier and Wolski (2022)

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