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European Governments' Fiscal Behaviour and Public Debt Holders: What Is the Financial Connection?

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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 2010-2013 sovereign debt crisis. Despite closer financial integration and additional institutional safeguards, the home bias, i.e. domestic bank holdings of domestic sovereign debt, is still high in most EU countries. We examine the effects of home bias on fiscal sustainability. In this paper, fiscal sustainability is understood in a broad sense of a government's ability to manage its finances in a way that ensures the long-term viability of its economic and social programmes, without compromising the stability of its financial system. We first extend two IMF databases on sovereign debt holdings to all EU Member States. We then apply panel smooth transition regression models on a fiscal rule. We find that a high home bias does not reduce the reaction of governments to public debt, but only if the financial system is sufficiently developed. A developed banking system allows sovereigns to raise more public debt at acceptable conditions to support economic stabilisation. An increased presence of foreign banks has a benign effect on sustainability by reducing governments' debt bias, but state-owned banks reduce it. We further test fiscal responses to public debt shocks with an interacted panel Vector Auto Regression model. Even though governments respond to public debt under a high home bias, they react only slowly and delay fiscal consolidations. Developing financial markets further through the completion of the Banking and Capital Markets Unions in the EU could help countries in the trade-off between economic stabilisation and debt sustainability, while bringing in more foreign banks might enforce stronger fiscal discipline.

JEL Classification: E43, G21, H62, H63.

Keywords: fiscal policy, government debt, home bias, financial development, banking, doom loop.

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ABBREVIATIONS

CDS	Credit default swap
EDP	Excessive Deficit Procedure
EU	European Union
GDP	Gross domestic product
HAC	Heteroskedasticy and autocorrelation robust
IMF	International Monetary Fund
IPVAR	Interacted panel vector autoregression
LM	Lagrange Multiplier
OLS	Ordinary least squares
PSTR	Panel smooth transition regression
VAR	Vector auto regression

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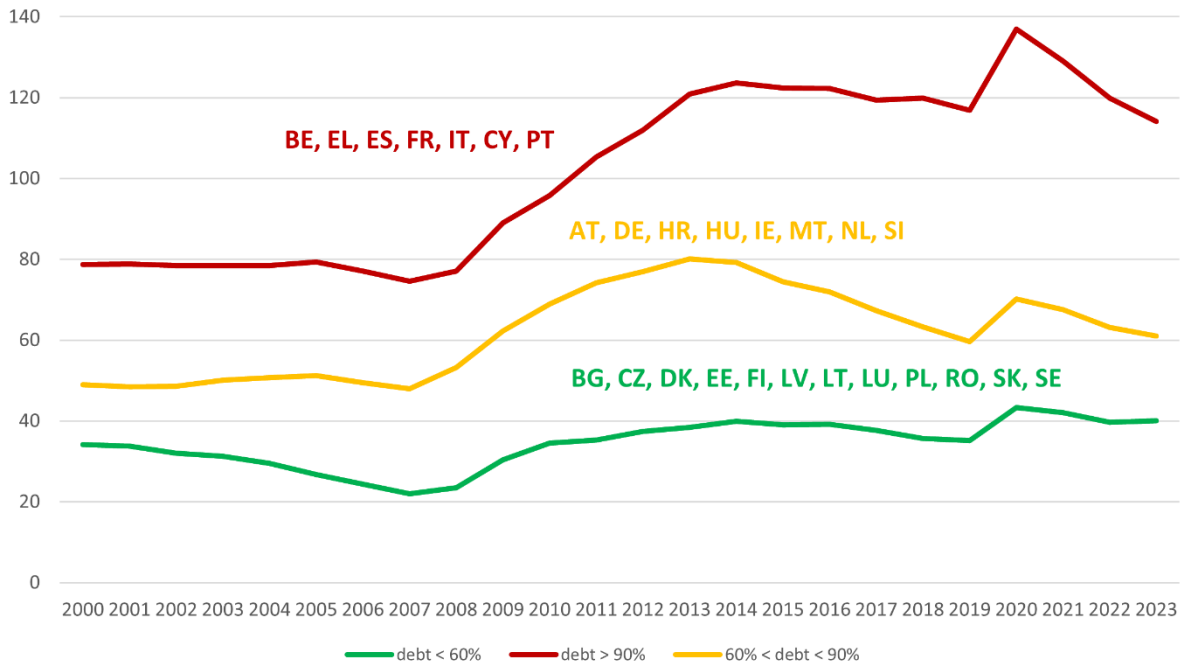
1. INTRODUCTION

Concerns about fiscal sustainability and worsening balance sheet conditions of major banks triggered a doom loop between banks and sovereigns during the 2010-2013 sovereign debt crisis. Rising debt ratios are casting doubt on the fiscal capacity to provide economic stabilisation, in particular if this endangered financial stabilisation. The home bias, i.e. domestic bank holdings of domestic sovereign debt, is still high in most EU countries. Our contribution is to examine the non-linear effects this home bias may have on fiscal behaviour in EU Member States, and how debt consolidation might interact with economic or financial stabilisation. We update two measures of home bias for all EU Member States, using the IMF database on sovereign debt holdings. We then apply a panel smooth transition regression model on a fiscal rule to examine how governments change the fiscal stance – and the speed of fiscal consolidation – for different levels of the home bias. Public debt in the EU (and other advanced economies) has been rising in the 21st century, mainly as a result of the 2008 Global Financial Crisis, the subsequent 2010-2013 sovereign debt crisis (Graph 1.1), as well as the economic downturn following the 2020 Pandemic. Public debt ratios differ importantly between EU Member States, ranging from 19.6% of GDP in Estonia to 161.9% of GDP in Greece (in 2023).

Graph 1.1. **Public debt ratios (% of GDP) for groups of EU Member States, 2000-2023**



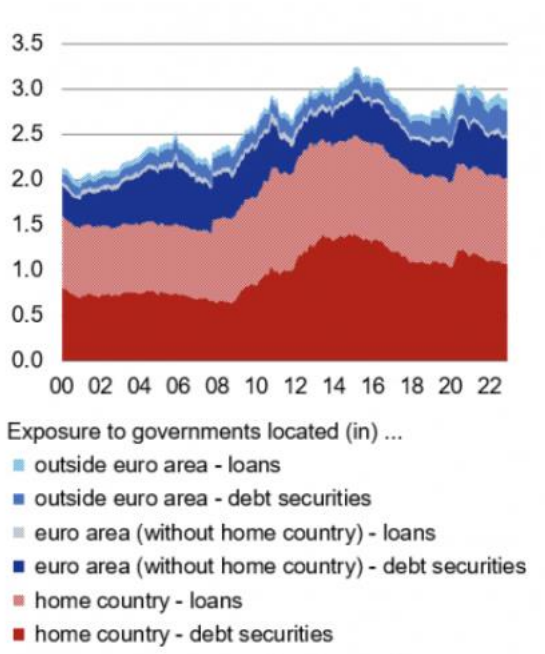
Source: AMECO, 2024.

One of the lessons of the 2010-2013 sovereign debt crisis is that banks and sovereigns can be caught in a 'doom loop'. On the one hand, sovereigns might support the financial sector at a large budgetary cost that undermines fiscal sustainability (e.g. Ireland in 2008/2009). On the other hand, banks keep large amounts of domestic public debt in their portfolios, increasing the exposure to sovereign risk (e.g. Greece in 2010/2011) (Broner *et al.*, 2014). Financial stability can be compromised if the value of government securities on banks' balance sheets falls, exposing banks to a reduction in the value of their assets, triggering collateral risk, capital losses, and counterparty risk. Shortfalls on the balance sheet can potentially destabilise the banking sector as a whole (Altavilla *et al.*, 2017, Brunnermeier *et al.*, 2016).

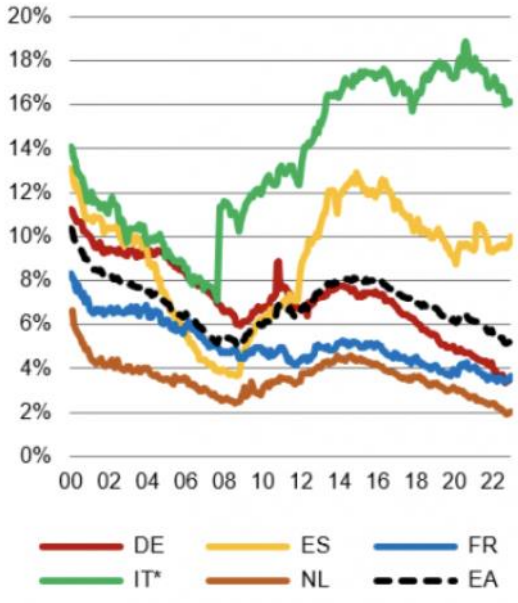
During the sovereign debt crisis, domestic banks increased their holdings of bonds of their national sovereign, i.e. increasing their 'home biases', as foreign banks reduced their exposure to high-debt countries. In 2013, the share of government debt held by the domestic banking sectors of euro area countries was more than twice that held in 2007 (Becker and Ivashina, 2018). Over the last decade, euro area banks have started curbing the financing of their governments only at a slow pace. The home bias in the sovereign portfolio is therefore still high: out of all sovereign loans and securities in the euro area, close to 70% is kept in the home country (Graph 1.2.a, Mai, 2023; OECD, 2023). This nonetheless includes the holdings of both the national central bank – that have been rising to about 20% – and non-bank financial institutions, which hold close to 10% of sovereign debt in the EU. Domestic banks hold around 15% of all sovereign loans and securities (Graph 1.3). Within the euro area, there are large differences between countries, with Italian and Spanish banks having an exposure of close to 16% and 10% respectively of all domestic sovereign loans and securities, while in France or Germany this number is just 4% (Graph 1.2.b, Mai, 2023).

Graph 1.2. **(a) Exposure of euro area banks to general government debt (total amount in tn EUR), and (b) domestic sovereign exposure (in % of total bank assets), 2000-2022**

a/

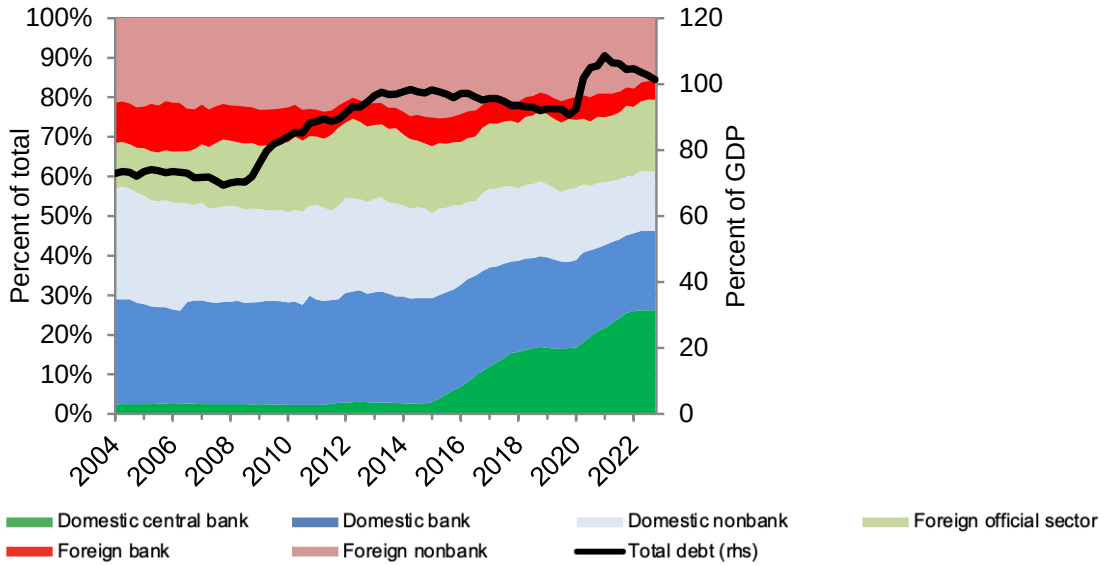


b/



Source: Mai (2023).

Graph 1.3. **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).

It is unclear whether a high home bias impairs fiscal discipline. On the one hand, debt consolidation may be less of a concern if a sovereign faces a soft budget constraint as it obtains easy access to financing through domestic banks to place additional debt. On the other hand, governments may want to avoid increasing the risk for its domestic financial system or a domestic default and thus consolidate public finances (in the same way as domestic banks may protect themselves from a sovereign that runs too high deficits). Such reactions depend strongly on the structure of the financial system. Firstly, more developed financial markets – and government bond markets in particular – might facilitate sovereign financing at acceptable conditions and ease the trade-off governments face between economic stabilisation and debt consolidation. Secondly, the sovereign exerts some indirect influence on the domestic financial sector by placing debt, and a direct one through regulation or participation in state-owned banks.

Against this background, we reexamine the impact of banks' home bias on fiscal sustainability in EU Member States over the past two decades. Compared to the existing literature, this paper innovates in three different ways. We first extend the existing Asonuma *et al.* (2015) dataset that includes two different home bias measures to all EU Member States for the period 2005-2022. Secondly, we use a simple fiscal reaction function in which we let the responses vary in a non-linear way with the home bias measures. We apply panel smooth transition regression models (PSTR) on a fiscal rule in which the response varies with the level of home bias. In contrast to previous research on fiscal reaction functions, this method allows us to track how the stabilisation of public debt and economic stabilisation are modified for different levels of home bias. In addition, we are interested in how sovereigns adjust their fiscal response in a context of different levels of financial development, and in particular of the structure of banking system by looking into the structure of the financial market, the role of foreign and state-owned banks respectively. Finally, we test fiscal responses to debt shocks with an interacted panel VAR (IPVAR) to check how the speed of fiscal consolidation varies with the home bias. In contrast to previous studies on the consolidating response of governments, this allows tracking the speed of consolidation for different levels of home bias.

The empirical results show that the home bias has an impact on the sustainability of fiscal policies. Higher public debt levels do not necessarily constrain fiscal policy in countries with a high home bias. Some EU countries with a high home bias let automatic stabilisers work and consolidate public finances when cyclical conditions improve. However, for other EU countries, counter-cyclical fiscal policy becomes more powerful as a stabilisation tool when financial access to markets improves, just as in emerging economies.

Our results also indicate that the willingness of the sovereign to limit deficits is affected by the structure of financial markets. EU countries with a large home bias can access financial markets more easily – as financial markets are deeper and more reliable – and therefore engage less in pro-cyclical fiscal consolidation, which allows them also to stabilise the economy. A low home bias instead pushes pro-cyclical fiscal consolidation as the sovereign has limited access to financial markets or no large domestic banking sector it can employ. An increased presence of foreign banks has a benign effect on fiscal sustainability, but state-owned banks reduce it.

We further find that under a high home bias, fiscal consolidations are more short-lived. While fiscal consolidation happens in all countries in the short term, it is only sustained beyond a horizon of five years in countries with a low home bias. Different robustness checks using different measures of home bias and different subsamples confirm this finding.

This paper is structured as follows. Section 2 reviews existing literature and discusses the role of the home bias in fiscal policy outcomes. Section 3 discusses the data we use, in particular different measures of home bias and their link to fiscal policy. Section 4 is testing a standard fiscal rule with smooth transition regression, while section 5 looks into the consolidation path using the Towbin-Weber panel IPVAR method. Both sections include robustness checks. Section 6 concludes.

2. LITERATURE REVIEW

Sovereign exposures are used by banks for liquidity management, credit risk mitigation, asset pricing, financial intermediation and investment purposes. Banks' holdings of sovereign exposures also play an important role as part of monetary policy operationalisation. As banks are generally one of the main investors in government debt, they also play a role in the operationalisation of fiscal policy. Empirical research into the impact of the home bias on the fiscal behaviour of sovereigns is limited. Some papers look indirectly into the effects of the home bias by examining crowding out effects in sovereign bond yields. Some initial research finds that an increase in the share of government debt held by domestic investors raises sovereign bond yields. Crowding out effects are typically found to be stronger 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). If these countries face acute market stress, a high home bias allows for massive absorption of public debt without consequences for yields (Acharya and Steffen, 2015). One of the few papers to explicitly test the effect of the home bias on fiscal responses is Asonuma *et al.* (2015): they find that while home bias reduces the cost of borrowing, it also dampens fiscal policy response leading to higher public debt levels.

The effects of increased home bias on fiscal sustainability are unclear, though. On the one hand, fiscal discipline might be weakened. Initially, the placement of public debt mainly via the domestic banking system might not immediately raise concerns about sustainability. However, as most research on the sovereign-bank doom loop forewarns, a large home bias might eventually raise the financing cost for governments, and if fiscal space tightens, might even trigger a sovereign debt crisis (Asonuma *et al.*, 2015). 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). 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 (Coeurdacier and Rey, 2013).[1] Governments concerned about financial stability would constrain further public debt issuance if this endangers economic and financial stability (Gennaioli *et al.*, 2018).

Against this background, it is not clear how home bias modifies the responses to fiscal policy. Testing the fiscal behaviour of the sovereign must take into account the reasons why domestic banks privilege

[1] Likewise, governments are unlikely to consider default if households keep most of their savings in domestic public debt. A government defaulting on that debt is likely to face political difficulties.

sovereign debt. The consequences for fiscal sustainability depend on three different factors that can result in a home bias:[2] macro-financial developments, the structure of financial markets, and policy distortions.

Let us start with the macro-financial developments such as monetary policy, macroprudential policies, and financial market structure (in particular of the banking system). The purchase of domestic sovereign bonds might reflect financial optimisation by domestic banks to support their financial conditions (Affinito *et al.*, 2022). We discuss each in turn.

Firstly, Quantitative Easing by all major central banks in the wake of the Global Financial Crisis eased financing conditions for banks. The massive purchase by central banks of sovereign bonds drove up their prices, making it a safe asset for banks as compared to alternative investment opportunities. While Ongena *et al.* (2019) do not find evidence that increased bond holdings are related to QE, 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). Indeed, banks' purchases of government bonds also had a positive effect on banks' balance sheets (Hildebrand *et al.*, 2017).

Secondly, next to monetary policy, macroprudential policy also has an impact on the home bias. Hristov *et al.* (2021) show that changes in capital-based macroprudential regulation in the euro area on the exposure of national banking sectors to domestic government debt have asymmetric effects. Tighter capital requirements make banks in the periphery countries increase their exposure to domestic sovereign bonds while banks in the core countries expand their loan portfolios (Hristov *et al.,* 2021).

Thirdly, the home bias is also driven by financial market structure and can modify the response of the sovereign to public debt. 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. While access to financial markets does not endanger fiscal sustainability, it does permit higher public debt levels. Consequently, the potential disciplinary impact of a high home bias might be less strong in countries with stronger financial development. 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).

Some governments with limited access to domestic financing have therefore tapped into international financial markets. Some studies find that emerging markets place public debt abroad at easier conditions than domestically (Affinito *et al.*, 2022). This 'original sin' could contribute to fiscal stress if international crises propagate to those countries (Eichengreen and Hausmann, 1999; Eichengreen *et al.*, 2023). In turn, 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). Gaining access to a more liquid international market can endanger fiscal sustainability in crisis times when either a domestic or an international crisis hit (Rogoff, 2022). Consequently, controlling for the deepness of domestic financial markets and financial institutions, as well as a control for crisis episodes is important in the empirical analysis of fiscal policy behaviour.

Fourth, the banking system plays a particular role in the placement of public debt and can provide or reduce incentives for fiscal responsibility. Financial development often involves foreign banks enhancing the capitalisation and liquidity of the domestic banking system. The entry of foreign banks makes the banking sector more efficient, reduces risk-taking, and improves allocation of capital (Sengupta, 2007), but might destabilise the host country's banking sector through the potential transmission of cross-border shocks. Entry of foreign banks might have varied effects on domestic fiscal policy. On the one hand, the transfer of profits abroad may drain tax resources, or deprive the government of a preferred partner for marketing public debt. On the other hand, fiscal discipline could be weakened as a default on domestic

[2] Hryckiewicz *et al.* (2022) provide an extensive overview of this literature.

public debt held by foreign banks comes at little direct cost to the sovereign (Balteanu and Erce, 2018), or if the international bank provides easier access to bond markets worldwide. As foreign banks are also subject to their own home bias, a doom loop can arise from even small amounts of public debt that trigger expectations of further defaults.[3] The ongoing financial integration process in the euro area might thus create very diverse incentives to keep public debt on banks´ books. The presence of foreign banks can alter the response of governments to fiscal risks.

In turn, while the arguments so far are based on macro-financial market forces, the home bias can also be influenced by regulations and policy decisions that make domestic banks shift assets towards their sovereign because they have specific linkages to the government. In this respect, specific government regulations can favour domestic banks if they act as a market player for public debt. Financial regulation allows domestic banks to put zero risk-weight on domestic public debt in their portfolio and sovereign exposures are also exempted from the large exposures limits. Pietrovito and Pozzolo (2023) argue that euro area banks increased their total assets and adjusted their portfolio from loans towards government bonds because banks required a higher risk-premium on corporate lending after the Global Financial Crisis. Risk averse banks consider domestic public debt as a less risky option than financing firms (Pietrovito and Pozzolo, 2023). Different regulations of the banking sector can therefore lead to different asset allocations across countries.

An additional issue that has been put under scrutiny is that governments facing difficulties to place new public debt may also exert moral suasion on domestic banks and 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). Close political linkages, in particular with sub-national or public banks, might lead to regulatory capture (Englmaier and Stowasser, 2017). 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). In addition, indirect evidence on the role of public debt placement comes from looking at ownership concentration in the banking sector. Saghi *et al.* (2023) find that higher ownership concentration is associated with greater banks' systemic risk, and this is particularly the case when banks have institutional investors or are publicly owned. Therefore, when testing fiscal behaviour, the role of state-owned banks can be crucial in modifying the incentives for governments to stabilise public debt.

One particular issue that is relevant for euro area countries is that a rising home bias may also be the optimal response to a lack of financial integration in the euro area. Within the euro area, banking systems are only integrated to a limited extent and it has been argued that this might still hinder the development of cross-border portfolios in sovereign bonds. In fact, as Broner *et al.* (2014) argue, during the sovereign debt crisis banks might have feared that bonds of some euro-area sovereign could be subject to redenomination or default risk, while a default of the domestic sovereigns was perceived as less likely. Progress on financial integration might have been considered as insufficient, and precautious banks might have shifted portfolios accordingly. In addition, it has been argued that banks discriminated towards domestic borrowers, both sovereign and corporate as the domestic sovereign is too big to fail, (Bocola, 2016).

In summary, with the purpose of our paper being to analyse if the home bias modifies the public debt sustainability response of EU governments, this literature review shows that existing studies find different potential political or financial motives of banks to accumulate domestic sovereign debt, and that those factors likely also modify the incentives of the sovereign to run fiscal policy, but this can move in opposite directions, potentially also in a non-linear way. Consequently, the research question is an empirical one. We will apply smooth transition models to let fiscal responses depend on the home bias to capture this non-linear behaviour. Before doing so, we need to update the home bias measures to all EU Member States.

[3] Another change in the financial landscape has the potential for playing a major role in these developments. The rise of digital competitors has made traditional banks lose partially their customer base, and governments in some countries have chosen to place public debt directly via digital channels over recent years (as in the case of Belgium or Spain).

3. DATA

In this section, we first present the two proxies for home bias that are common in the literature – the debt-based and the asset-based home bias measure – and extend the existing IMF database on sovereign debt holdings by Asonuma *et al.* (2015) to EU27 countries, and discuss some of the limitations of these measures. We then look more closely into the fiscal variables we use to characterise the fiscal stance in EU countries. In addition, we show the different variables that are related to fiscal policy and the factors behind the home bias we just discussed, in particular related to financial development and the structure of the financial system, or the economic situation.

3.1. MEASURING HOME BIAS

Deriving the optimal allocation between public debt from different sovereigns would require a complete asset pricing model, in which a particular friction – related to the factors we mentioned in the literature review – would introduce a bias. Unfortunately, data constraints on bank balance sheets bar us from measuring foreign sovereign debt holdings, and we need to develop proxies.

A first debt-based measure of the home bias proxies the home bias with the ratio of the banking system's domestic sovereign holdings to total public debt (of the general government).[4] This measure reflects the diversification of sovereign claims by residency of investors. While this measure mostly reflects the 'supply' of public debt by governments, and not the portfolio choice of investors, its advantage is its wider availability in the IMF WEO database. Data on the domestic bank holdings of domestic sovereign debt became available in the August 2023 update of the Asonuma *et al.* (2015) dataset.[5] We can therefore use the full sample of 27 EU Member States at annual frequency over the period 2001-2022.

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) or Asonuma *et al.* (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 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 these ratios, we use the same numerator as in the first measure: 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, that is, 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.[6]

The interpretation of the debt and asset biased measure are rather distinct. The former measures domestic holdings as a share of total public debt and reflects how much the government can issue public debt domestically. 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

[4] 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.

[5] 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.

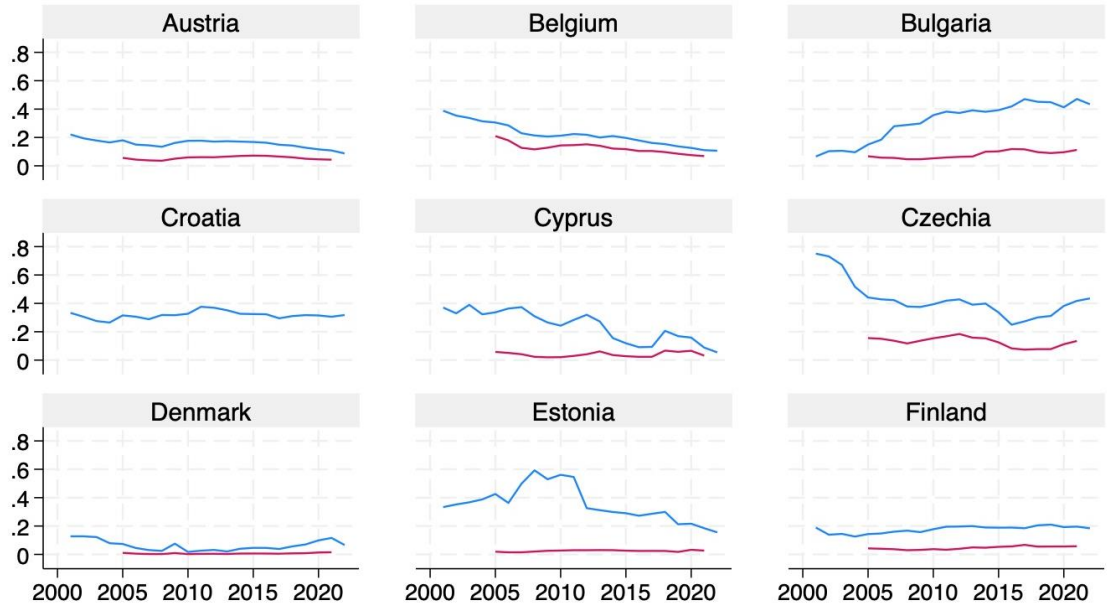
[6] In the remainder of the paper, we will compare the asset-based measure for the EU23 and the shorter EU27 sample.

measures the capacity of the government to obtain domestic financing, the latter measures the appetite of the banking system to hold domestic sovereign debt.

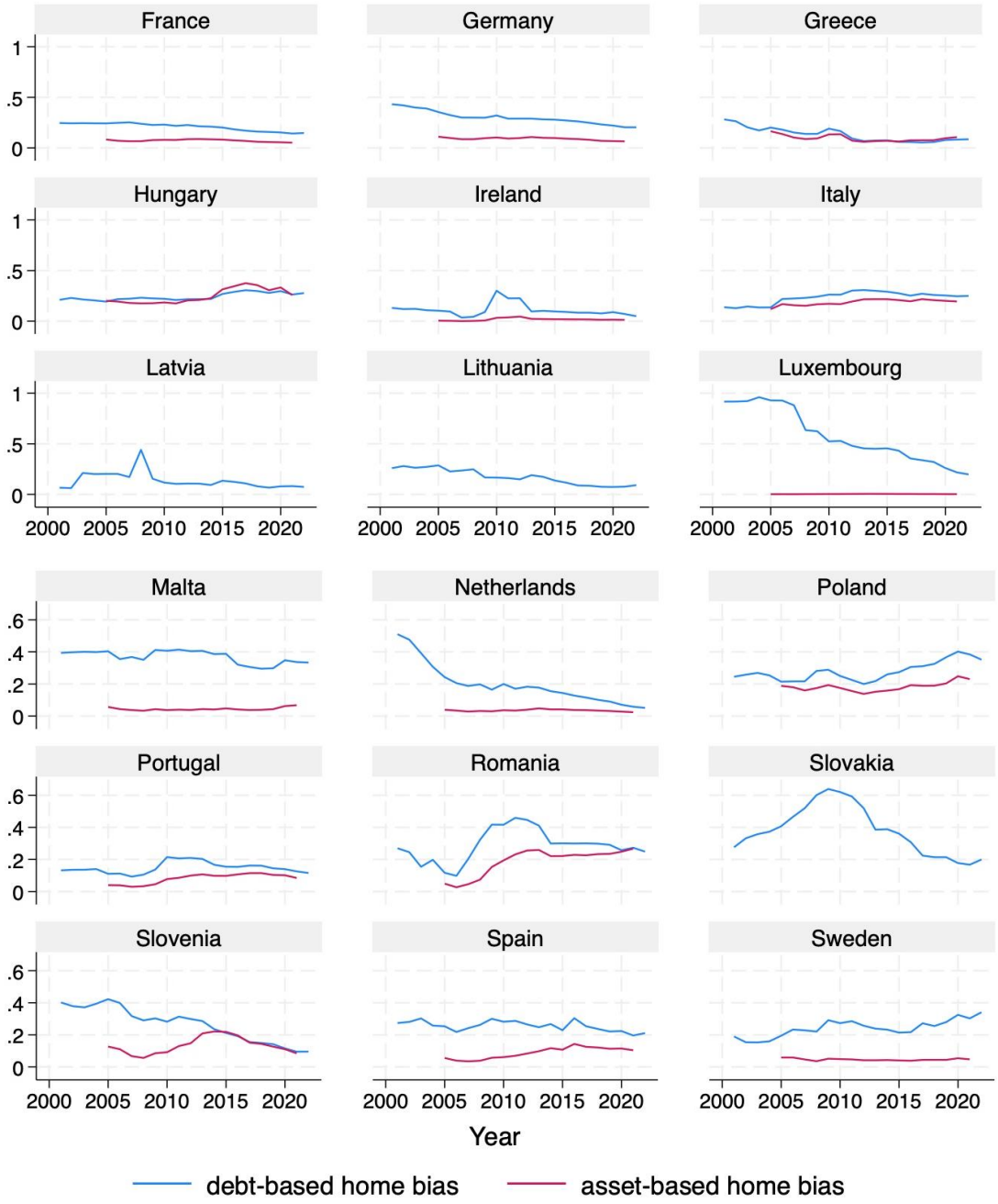
A major limitation of the Asonuma *et al.* (2015) dataset on home bias is that it restricts us to examining holdings by the banking sector only. However, while banks kept around 60% of public debt at the start of the century, there has been a noticeable shift towards the ECB since 2015, and other domestic investors including non-bank institutions such as pension or insurance companies – and more recently, the general public. Such differences can be substantial, even across EU Member States. While only 5.1% of Cyprus's total public debt is held by domestic or foreign financial corporations, for example, in Denmark and Sweden they own around 74% of 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%. Limitations on cross-country data do not allow us to include these investors in the analysis. Relatedly, as a result of financial integration, there is growing evidence of financial centres that attract much more financial investment (as compared to economic activity) due to a concentration of banking activities (Pogliani *et al.*, 2022). This concentration in a few 'outsized' financial centres, in the EU in particular Ireland, Luxemburg and the Netherlands, might underestimate the level of home bias when using the asset-based measure and blur the attribution to the markets of origin.

If we look at the two home bias measures, there are a few regularities that are important for the analysis (Table 3.1, Graph 3.1). Firstly, the debt-based measure is always higher than the asset-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,[7] 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.

Graph 3.1. **Home bias measures: debt-based (2001-2022) and asset-based (2005-2022)**



[7] 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.

Table 3.1. **Summary statistics**

Country	Primary balance ratio (% of GDP)	Public debt ratio (% of GDP)	Home bias ratio (to public debt)	Home bias ratio (to total bank assets)
Austria	0,09	74,95	0,16	0,06
Belgium	0,32	101,82	0,22	0,12
Cyprus	-0,04	77,41	0,24	0,04
Estonia	-0,16	8,04	0,36	0,02
Finland	0,35	53,74	0,18	0,05
France	-2,33	82,84	0,21	0,07
Germany	1,38	68,40	0,30	0,09
Greece	-2,27	146,38	0,13	0,10
Ireland	-3,64	60,37	0,11	0,02
Italy	0,98	121,96	0,23	0,19
Latvia	-1,52	29,39	0,14	-
Lithuania	-1,10	30,62	0,17	-
Luxembourg	1,85	15,90	0,58	0,00
Malta	-0,49	60,54	0,37	0,04
Netherlands	-0,20	55,19	0,20	0,04
Portugal	-1,23	99,04	0,15	0,08
Slovakia	-1,91	45,90	0,38	-
Slovenia	-1,69	49,02	0,27	0,13
Spain	-3,24	74,36	0,26	0,09
euro area	*-0,78*	*66,12*	*0,24*	*0,07*
Bulgaria	-0,02	28,07	0,32	0,08
Croatia	-1,31	58,65	0,32	-
Czechia	-1,86	32,99	0,43	0,13
Denmark	1,92	40,50	0,06	0,01
Hungary	-0,29	69,37	0,24	0,25
Poland	-1,62	48,92	0,28	0,18
Romania	-2,67	29,00	0,29	0,19
Sweden	1,08	42,55	0,24	0,05
non-euro area	*-0,59*	*44,24*	*0,27*	*0,13*
EU27	*-0,73*	*59,43*	*0,25*	*0,09*

Source: IMF (2014) and AMECO (2024).

3.2. MEASURING FISCAL POLICY

We must make some choices on the specification of the fiscal variables to be included in the two empirical models we use to test the consequences of home bias on fiscal behaviour. Our purpose is to model the

role the home bias plays in debt policies. We therefore measure fiscal policy stance with the primary balance of the government expressed relative to GDP as the dependent variable, for which positive (*negative*) values indicate surpluses (*deficits*), based on calculations by DG ECFIN and provided via the AMECO database.

In turn, in section 5 we use the cyclically adjusted primary balance of the governments expressed relative to potential GDP as calculated by DG ECFIN and provided via AMECO.[8] Public debt is measured by the total general government debt ratio (to GDP). Table 3.1 shows summary statistics for both series.

3.3. VARIABLES AFFECTING FISCAL POLICY

Government budgets are set up in response to economic and political objectives, so we control for corresponding co-variates. Following the Barro (1979) tax smoothing principle,[9] two variables that have an impact on the budget balance are the business cycle and transitory government expenditures (e.g., wartime or depression expenditure). We measure cyclical changes with an output gap, which represents the deviation of output (GDP) from its long-term trend and expressed as a percentage of potential GDP, using estimations by DG ECFIN as agreed with EU Member States, reported in AMECO. The inclusion of the business cycle is key as not only automatic stabilisers are at play, but governments also react with taxes or spending policies in a systematic way to the cycle (Golinelli and Momigliano, 2009).

Concerning the interaction between the primary balance ratio to GDP, our dependent variable, and the business cycle, various arguments need to be taken into consideration. Firstly, some papers as Larch *et al.* (2021) have used the cyclically adjusted primary balance, but to avoid issues that could arise from using the cyclically adjusted primary balance and its simultaneous determination with the output gap in our dataset, we use the primary balance. Although we use the cyclical variables computed by Havik *et al.* (2014), the cyclicality of the trend GDP estimates could otherwise have been a concern. Secondly, controlling the behaviour of fiscal policy for cyclical changes is relevant,[10] as fiscal policy might react in a systematic way to cyclical changes (Golinelli and Momigliano, 2009). Nonetheless, there is a potential endogenous effect of fiscal policy on the output gap if fiscal policy decisions have an impact on the economic cycle. As we investigate the primary balance, this problem of endogeneity is of less concern, and we avoid the use of instrumental variables (that have not been developed for PSTR models yet). Finally, not including the output gap could lead to omitted variable bias implying that the other remaining estimates will be biased.

To capture transitory spending, Barro (1979) suggests computing an "expenditure gap", i.e. the deviation of real government spending from its potential level (and is therefore) expressed as a percentage of potential GDP. This structural spending level is the cyclical component of expenditure, as proposed by Havik *et al.* (2014) and included in the AMECO database.

Other macroeconomic variables also have a relation to the fiscal stance. In first instance, we include inflation – as measured by the log change in the GDP deflator – and also included short-term interest rates – as measured by the Euribor (source: Bloomberg) – as a proxy for monetary policy effects. As fiscal developments over the Global Financial Crisis and the Pandemic caused large changes in the bond market behaviour, so we control for sovereign risk by including the 5-year credit default swaps (CDS, in dollars, source: Bloomberg). As the fiscal situation in some countries might be influenced by competitiveness and imbalances, we include the current account balance (as a percentage of GDP, AMECO). Some EU countries

[8] While for section 4 using the cyclically adjusted primary balance is likely to be problematic given its plausible endogeneity in the PSTR model, the endogeneity characteristic of VAR models such as that in section 5 enables us to focus on the fiscal policy abstracting from automatic stabilisers.

[9] According to the tax smoothing principle, the public deficit should be used such that the tax rate is constant over time to minimise the excess burden of taxation.

[10] Unless there is a reason to believe that the inclusion of the output gap strikes a relationship that violates an assumption on which the PSTR estimator is built.

had excessive fiscal deficits, and were subject to an EDP. We measure the years the EU Member State is in an Excessive Deficit Procedure (EDP) with a simple dummy from Bökemeier and Wolski (2022).[11]

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).

3.4. VARIABLES RELATED TO THE HOME BIAS

There are several other variables we will use in the analysis to control for the size and structure of financial system. We use as a first proxy the level of financial development which measures access, efficiency, and financial depth of a country's financial system, using the IMF Financial Development Index database (IMF, 2024). The index is scaled between 0 and 1, with higher levels indicating stronger development. Graph 3.2 shows that financial development is weaker in the EU Member States that joined the EU after 2003.

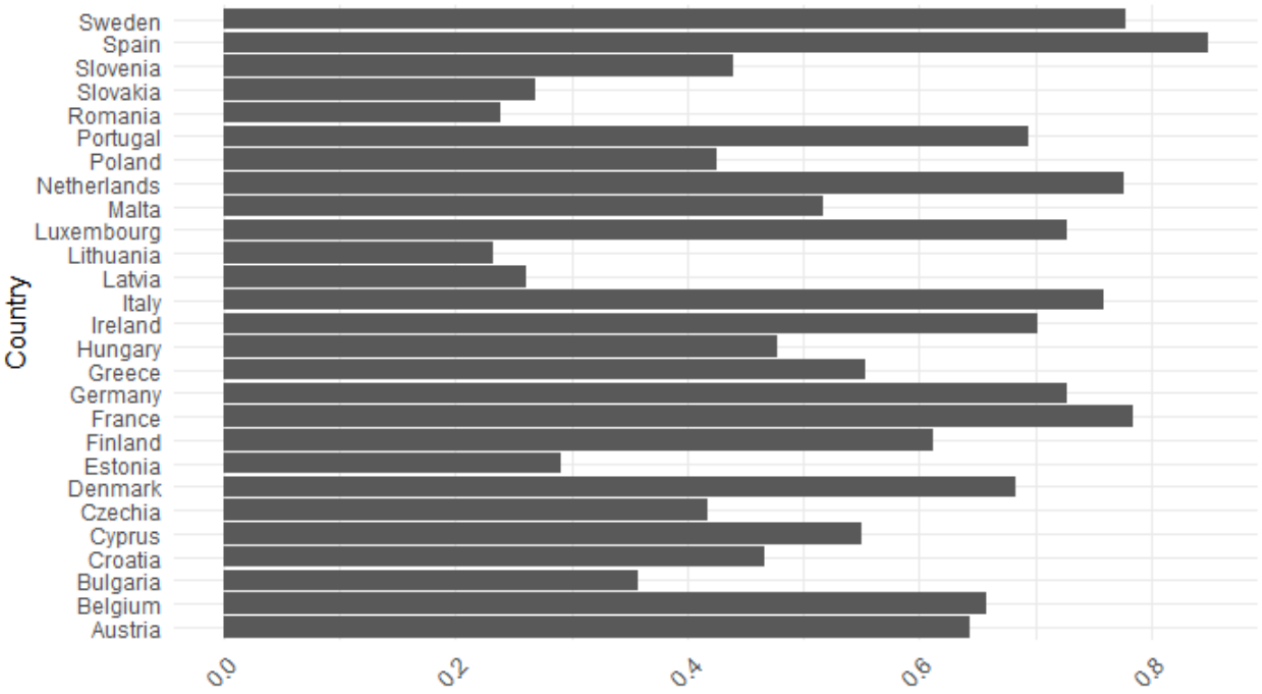
Secondly, we control for the ownership of banks and distinguish between domestic versus foreign banks by using the Panizza (2023) database, and use the share of foreign-owned banks (as a share of total assets, including those of development banks).[12] Graph 3.3 reports the average share in percent. Across countries, the strongest presence of foreign banks is seen in the EU Member States that joined the EU after 2003. By contrast, in some EU countries, in particular some of the smallest, like Denmark or Greece, and in all the largest EU economies, domestic banks dominate the banking sector. An alternative is to look at the share of publicly owned banks. The same database of Panizza (2023) computes the share of state-owned banks. This is computed as the percentage of state ownership by weighting the assets of each bank by the share of government ownership in a specific bank-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%. Graph 3.4 reports the average sample share of state-owned banks in percent. We observe that the highest state ownership shares are observed in Slovenia, Portugal, the Netherlands (in order of importance, and all with average shares higher than 30%), closely followed by Greece and Germany (in order of importance, with average shares higher than 20%).

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 (iMaPP) 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.

[11] 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.

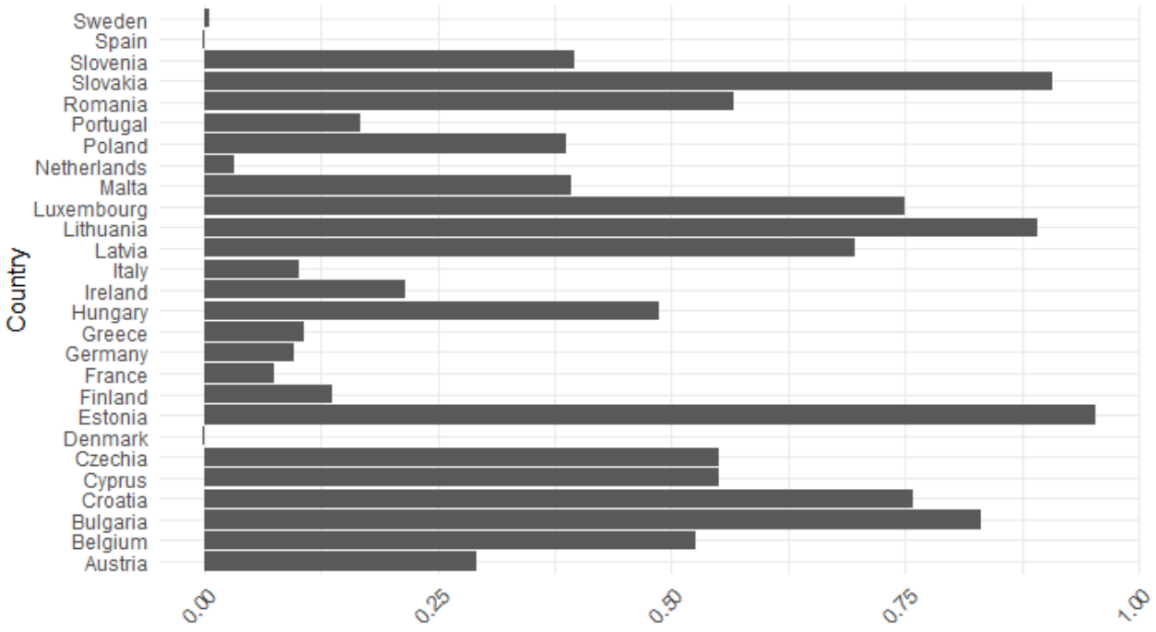
[12] A bank is considered foreign owned if the foreign bank holds at least a 50% share (Panizza, 2023).

Graph 3.2. **Financial Development Index in EU27 (average over 2001-2022)**



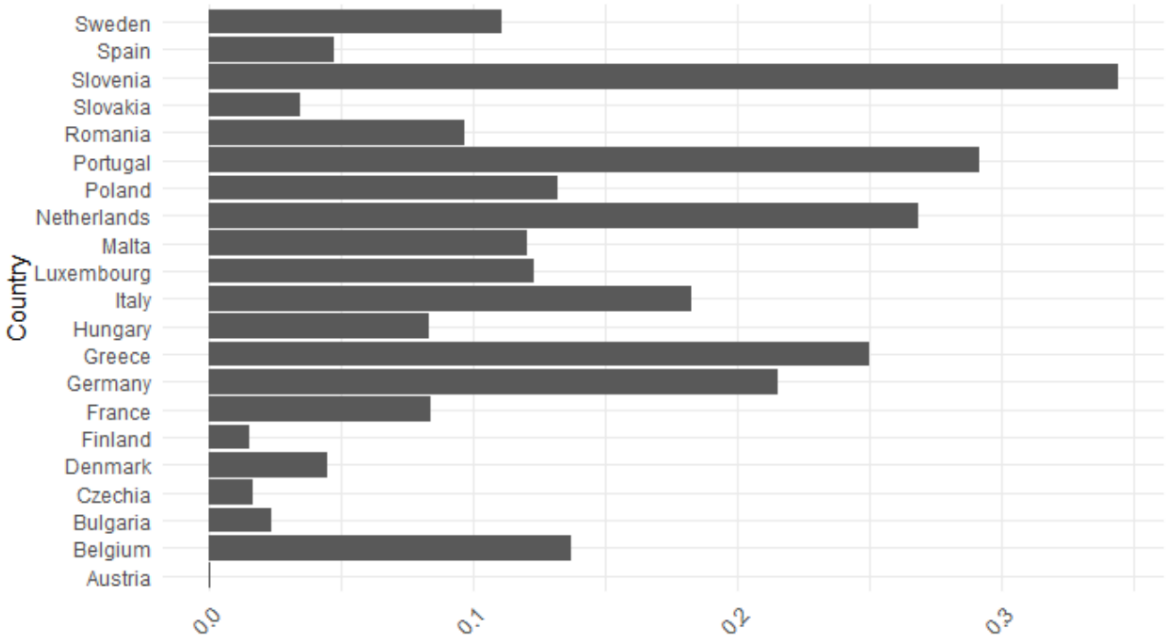
Source: IMF, 2024.

Graph 3.3. **Foreign bank ownership ratio in EU27 (average over 2001-2022)**



Source: Panizza, 2023.

Graph 3.4. **Share of state bank ownership in EU27 (average over 2001-2022)**



Source: Panizza, 2023.

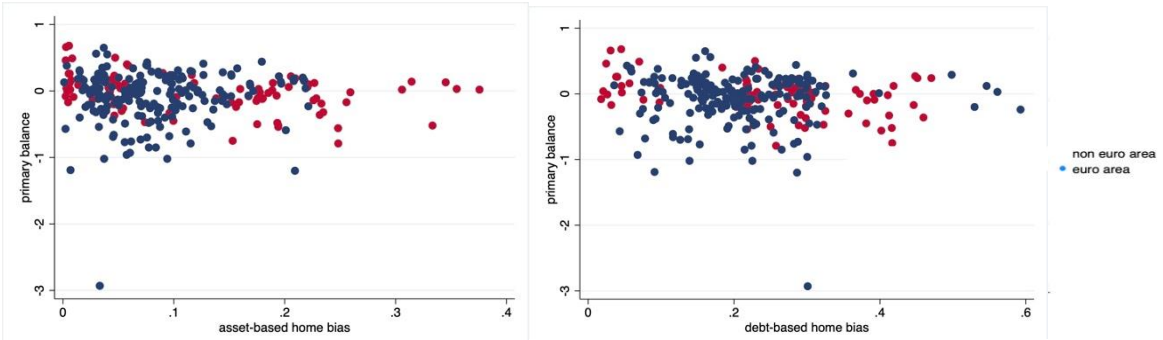
4. FISCAL RULE – SMOOTH TRANSITION REGRESSION

4.1. FISCAL POLICY AND HOME BIAS

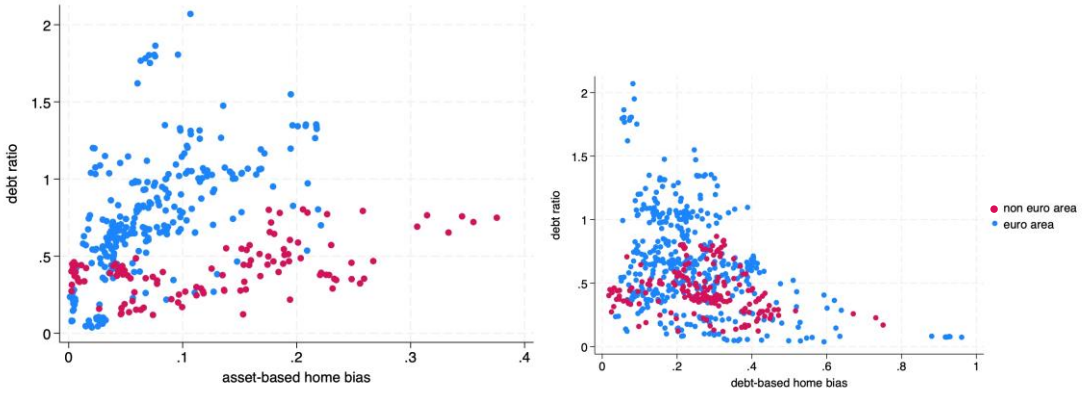
Whether this fiscal adjustment pattern is influenced by the level of home bias, is, as indicated in section 2, an empirical question. A simple look into the correlation between the fiscal policy stance and the home bias shows there is no discernible pattern between the home bias and the primary balance ratio, neither in euro area nor in non-euro area countries (Graph 4.1a). In contrast, Graph 4.1b suggests that higher levels of the home bias weaken fiscal discipline, as the public debt ratio is also higher. i.e., when public debt 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.

Graph 4.1. **Home bias measure and fiscal situation (average 2001-2022)**

a/ Primary balance as % of GDP



b/ Public debt as % of GDP



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

A linear regression of a simple fiscal rule in which a fiscal indicator reacts to public debt, and the home bias would just be a control variable, would not correctly measure the change in fiscal policy to different levels of the home bias. Instead, we must allow for possible non-linear shifts in the response according to the level of the home bias and test how the debt sustainability response of fiscal policy gets modified as the home bias changes. We do so in two different ways: with a panel smooth transition regression model in this section, and a Towbin-Weber interacted panel VAR in the next section.

4.2. METHODOLOGY

We apply a panel smooth transition regression model (PSTR), following Gonzalez *et al.* (2017), that can be written in generic form as in (1), where *i* is the individual entity in the panel whilst *t* is the time dimension:

$$Y_{it} = \mu_i + \beta_0 x_{it} + \beta_1 x_{it} w(z_{it}; \gamma, f) + u_{it} \quad (1)$$

In contrast to a linear panel model (1),[13] the regression coefficients β vary under different regimes. The transition function $w(z_{it}; \gamma, f)$ models this change, by conditioning the change on the transitional variable z_{it}. As can be seen in (2), the transition function – assumed to be observable, continuous and bounded – moves around a vector of location parameters f that captures the threshold level of the transitional variable z_{it}, whilst γ measures the slope of the transition function and shows the smoothness of the transition between regimes. The transition function is typically modelled with a logistic function (see Teräsvirta, 1994),[14] bounded between 0 and 1, as follows:

$$w(z_{it}; \gamma, f) = (1 + exp(-\gamma \prod_{j=1}^{m}(z_{it} - f_j))^{-1} \quad (2)$$

The PSTR model is one way to introduce non-linear behaviour in the reaction coefficients. An alternative estimator such as regime-switching models would do so by considering only the change in the time series properties of the model (1). A panel model with slope-heterogeneity – as in Pesaran and Yamagata (2008)

[13] Note that for a smooth transition regression model as (1), we need to assume the entity's effect μ to be fixed, hence correlating with the regressors.

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

– would split the sample into different groups of countries with similar behaviour. The PSTR model instead lets the coefficients of the model vary with a specific characteristic – the measures of home bias – but this implies that there is no specific change in time or across countries, as the transition occurs over different years and countries.

Note further that the introduction of non-linear behaviour in the reaction coefficient in (1) implies that in contrast to linear panel models, several simplifying assumptions are required. The panel model can only be estimated under the assumption of fixed effects. The consequence is then that the PSTR model does not allow for the typical testing procedures common to linear panel models.[15] As different tests for heteroskedasticity and autocorrelation in the panel indicated potential issues (as reported in footnote 14),[16] we run a HAC robust estimator on the PSTR model, adjusting estimates to heteroscedasticity and serial autocorrelation.

The number of regimes (m) depends on the variations in the data. For instance, when m = 1, the model is made up of two extreme regimes associated with high and low values of the transition variable (z_{it}). Hence, the coefficients from (1) switch between β_0 and $\beta_0 + \beta_1$ with the change centred on f_1. When m = 2, the transition function attains its minimum at $(c_1 + c_2)/2$ and attains its maximum at 1 for both low and high values of the transition variable. The procedure determines the optimal number of regimes that can be found in the data.

The steepness of the response is governed by γ, and how larger γ gets, the steeper the difference across regimes. For $\gamma \rightarrow 0$, the transition function becomes a constant and the model reduces to a linear panel fixed effects model with a homogeneous slope for any positive value of m. Individual country-year observations are not restricted to staying in the same group or category but can switch between the groups depending on the heterogeneity of their fiscal behaviour.

Regarding the parameter estimation (β_0, β_1, γ, f) in the PSTR setting, a combination of panel fixed effects procedures and non-linear least squares (NLS) is used. The individual fixed effects in the panel are eliminated by 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.

We apply this PSTR model to a standard fiscal reaction function that follows closely the modelling in Barro (1979), Bohn (1998) or Ghosh *et al.* (2013). In this reaction function, the primary balance s is assumed to be a function of the (first lag of the) debt to GDP ratio B, and some macroeconomic control variables X. We use the primary balance of the government expressed relative to GDP as the dependent variable. The lagged debt-ratio is the main co-variate of interest, and following Bohn (1998), a government that consolidates public debt runs higher surpluses (on average, over the sample period).

By contrast to Ghosh *et al.* (2013), we model a non-linear fiscal reaction function by letting the response vary with the home bias. The home bias is the transition variable that models possibly different regimes in the response to public debt. All the observed states of the home bias variable – and the number of regimes – are distinguished endogenously by the PSTR. As a high home bias could either weaken or strengthen fiscal discipline, as discussed in section 2, we have no prior on the response to public debt under different levels of home bias. The PSTR model assumes that the change in the coefficients of the empirical model induced by the transition variable is fully exogenous. 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. Instrumental variable procedures have moreover not been developed in the context of PSTR models yet. We include variables such as financial structure, and macroeconomic developments, that have an influence on fiscal behaviour to control for such effects.

[15] A Hausman test cannot be run.

[16] 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).

4.3. PRIOR TESTING

Before testing the responses, we must determine the optimal number of regimes in this sample. We have no economic prior on the number of regimes: the literature discussed in section 2 offers different reasons for a different response of fiscal policy under low or high bias, but this assumption can be tested. For smooth transition models, the optimal number of regimes is determined by the 'sequence of homogeneity' test.[17] Under this test, the PSTR model is expanded 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, we have to set p at 3. This implies that we test for significance of models with 1, 2 or 3 transition functions.

A Lagrangian Multiplier (LM) test is applied to test several hypotheses consecutively, such that the coefficients for 1, 2 or 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 $H_{01}*: \beta_1* = 0 \mid \beta_3* = \beta_2* = 0$, and the LM test comes in two versions, once with a χ^2, and once with an F-distribution. As Terasvirta (1994) and Gonzalez *et al*. (2017) demonstrate, the properties of the sequential tests are such that they lead to choose the specification with the strongest rejection of the null hypothesis.

Table 4.1. **Sequence of homogeneity test**

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

	LMx^2		LM_F	
m	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

	LMx^2		LM_F	
m	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.

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 on the panel model with home bias as a transition variable gives the output in Table 4.1. In panel (a), we first look at the debt-based home bias. If we consider the LM test with the χ^2 distribution, then the null $H_{01}*$ and $H_{03}*$ depict regimes with the strongest rejections. However, 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. Similarly, panel (b) of Table 4.1 displays the result with the asset-based home bias as the transition variable. The LM tests show that the null $H_{01}*$ again has the most severe rejection for 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 will be a low-bias and high-bias regime. The

[17] See Gonzalez *et al*. (2017) and Teräsvirta (1994) for a detailed discussion of the test.

threshold value we report indicates the level of the home bias at which the regime transitions from the low to the high home bias.

An additional insight can be got from a test for no remaining heterogeneity. The null hypothesis of this test is that a model specification with one transition function (and two regimes) is an appropriate one, against the alternative hypothesis that the model would require an additional (second) transition function. Table 4.2 shows the test statistics and their p-values (based on the 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 simply by time (due to structural breaks, for example). We run the parameter constancy test, whose null hypothesis indicates that parameters in the model specification (with one transition function and two regimes) do not depend on time against the alternative hypothesis states that a time varying PSTR specification is more appropriate. Table 4.3 reports the test statistics for both measures of the home bias, and shows we do not have evidence against the null. Hence, the empirical model is not misspecified and a PSTR model is the appropriate choice.

Table 4.2. **Test for remaining heterogeneity**

	LMx		*LM$_F$*		*HACx*		*HAC$_F$*	
Model	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 4.3. **Parameter constancy test**

	LMx		*LM$_F$*		*HACx*		*HAC$_F$*	
Model	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.

4.4. BASELINE RESULTS

In this sub-section, we report results on the full sample, before presenting results for different country groups in the following sub-section. Table 4.4 shows the PSTR estimates for the debt-based and asset-based home bias measure in columns (a) and (b), first for the low-bias regime, and then for the high-bias regime.

For the debt-based home bias, the threshold value at which the switch between regimes happens is at a 22% home bias. From Table 3.1, we can see that this is the case for 17 EU Member States (while the EU average for the debt-based home bias stands at 25%). For the asset-based home bias, the switch occurs at a lower threshold value of just 4% (while the average ratio is 9% in the EU27).

The main finding that stands out for both measures is that fiscal policy in EU27 countries in all cases stabilises public debt. Columns (a) and (b) show that the debt sustainability response of fiscal policy is

always significant and positive implying government run sustainable policies. However, while the response is dampened slightly for a higher debt-based home bias, it is significantly higher for countries with a high asset-based home bias.

The explanation comes from observing the change in the cyclical response across both regimes. For both home-bias measures, the cyclical response is markedly different: under a low home bias fiscal policy shows procyclical tendencies, but changes under a high home bias as it exhibits countercyclical patterns. In addition, fiscal policy becomes more responsive to temporary rises in spending under the high home-bias regime but does not do so when the home bias is low.

We interpret this finding as indicating that at higher levels of home bias, the government is able to choose both economic and budget stabilisation, and is able to place public debt with the banks without creating issues for public debt sustainability. A high level of public debt holdings indicates in fact a strong capacity of government to stabilise the economy by issuing public debt. In 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 more easily able to rely on domestic financial markets to issue public debt.

This view is further endorsed by looking at the results for the control variables that measure the role of financial development (see section 3.3). Let us compare the outcomes for low and high bias regimes in Table 4.4 for the EU27 sample.

If we measure the home bias with the debt-based home bias, at low levels more developed financial markets would make governments run lower surpluses overall. Instead, governments run significantly higher surpluses in the high home bias regime as financial development increases. The size of the coefficient is also large as it concerns a change of 0.56 per cent of GDP for a 0.1 increase in the level of the index. The result indicates that additional room could be created for governments to issue public debt if financial markets were more developed.

If we measure the home bias with the asset-based measure, the opposite effect occurs: 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 0.1 increase in the level of the index). This outcome endorses the interpretation we put forward earlier. At higher levels of home bias, governments have increased capacity to place public debt (in domestic banks), and they can temporarily stabilise the economy and increase spending outlays, and hence lower surpluses. Such a situation is not inconsistent with maintaining fiscal sustainability.

An additional control variable we include is the ownership structure of the banking system. A larger share of foreign banks can have both stabilising and destabilising effects on fiscal policy. Foreign banks can provide easier access to international markets, turn the banking sector more efficient, reduce risk-taking, and improves allocation of capital (Sengupta, 2007). They can also serve as stabilising anchor in case of a domestic crisis. It can be destabilising though as foreign entry might destabilise the host country's banking sector through the transmission of cross-border shocks, with a potential fiscal cost. If foreign banks transfer significant profits abroad, this can limit tax resources. Foreign banks might also be a more critical partner of the government for marketing public debt. Finally, default on domestic public debt held by foreign banks comes at little political cost to the sovereign (Balteanu and Erce, 2018).[18]

Columns (a) and (b) of Table 4.4 show that increased foreign ownership of the banking system unambiguously raises the surplus under the high bias regime. This indicates that governments do not have an incentive to run high deficits and place public debt with foreign banks to possibly default on that portion of public debt. In contrast, a high share of foreign-owned banks seems to support fiscal discipline.

[18] 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.

4.5. RESULTS FOR DIFFERENT GROUPS OF EU MEMBER STATES

Findings for the entire EU27 sample might hide different fiscal behaviours in different groups of EU Member States. We thus analyse four subgroups: the euro area and non-euro area countries, and then EU Member States that joined after 2003 separately from the EU Member States that became member before 2004.

We first look at the sample of euro area countries. Column (a) of Table 4.5 shows that under a high debt-based home bias, fiscal policy substantially increases the debt sustainability response, while exhibiting more pronounced procyclical patterns and allowing for transitory deviations in spending without a correcting response, which is a typical finding for euro area countries (Larch *et al.*, 2021; Gootjes and De Haan, 2022). Our results support the interpretation that euro area countries have been running fiscal policies that – whilst sustainable on average – do not attempt to stabilise the economy. These economies have gained fiscal space by placing a large part of this public debt with domestic banks. However, as column (b) for the asset-based home bias shows, if the holdings of domestic public debt by the banking system become larger than the threshold value, 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. Or it might indicate that banks prefer sovereign debt of countries in which fiscal policy features these characteristics.

For the non-euro area countries, the fiscal behaviour is rather different. We observe in column (c) of Table 4.5 that at higher levels of the debt-based home bias, the government pays more attention to the stabilisation of public debt as compared to the low home bias regime. Correspondingly, governments 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. 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; Eichengreen *et al.*, 2023).

An alternative subsample to look at is to split the sample into the EU Member States that joined after 2003 separately from those that became members before. Columns (a) and (b) of Table 4.6 show outcomes for the 15 EU Member States till 2004, using the debt- and asset-based measures respectively. In this case, we observe in column (a) that public debt sustainability is stronger at higher levels of the home bias, and there is seemingly no trade-off with economic stabilisation. However, this type of response switches if we use the asset-based measure of the home bias in column (b): there is more public debt sustainability but no macroeconomic stabilisation nor does the government correct deviations in spending. Why do these two results differ? On the one hand, governments in the 15 incumbent EU Member States have been able to raise sufficient financing capacity and are able to issue more public debt to stabilise the economy, which explains the results in column (a). However, if banking stability becomes a concern and the banking sector increasingly holds domestic sovereign debt, then these governments put more focus on debt sustainability.

Columns (c) and (d) of Table 4.6 show fiscal behaviour in the EU Member States that joined after 2003, and confirm some of the insights for the other groups of EU Member States. Having limited financing capacity allows these governments to stabilise the economy and spending only at low levels of debt bias; at higher levels these responses become insignificant (column (c)). In addition, as we can see in column (d), when the home bias is high – i.e. the domestic banking system holds a lot of domestic sovereign debt – then the government must focus on fiscal consolidation and forego economic stabilisation. Note that the threshold level at which this switch occurs is quite high, as the threshold value at which the switch occurs implies the banking system holds 20% of its assets in domestic sovereign debt.

Table 4.4. **PSTR results, EU27**

	a/ Debt based home bias		b/ Asset based home bias	
	Low	High	Low	high
Debt lag	0,0488	0,0314	0,0070	0,0541
	(0,0021)	(0,0002)	(0,0006)	(0,0013)
Expenditure gap	-0,0137	-0,0012	-0,0552	-0,0023
	(0,0003)	(0,0014)	(0,0064)	(0,0013)
Output gap	-0,0024	0,0028	-0,0265	0,0032
	(0,0001)	(0,0005)	(0,0040)	(0,0005)
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, with standard errors in brackets.

Table 4.5. **PSTR results, euro area vs. non-euro area**

	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 lag	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)
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)
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)
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.

Table 4.6. **PSTR results, sample of EU Member States by year of membership**

	EU before 2004				EU after 2003			
	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 lag	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)
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)
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)
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.

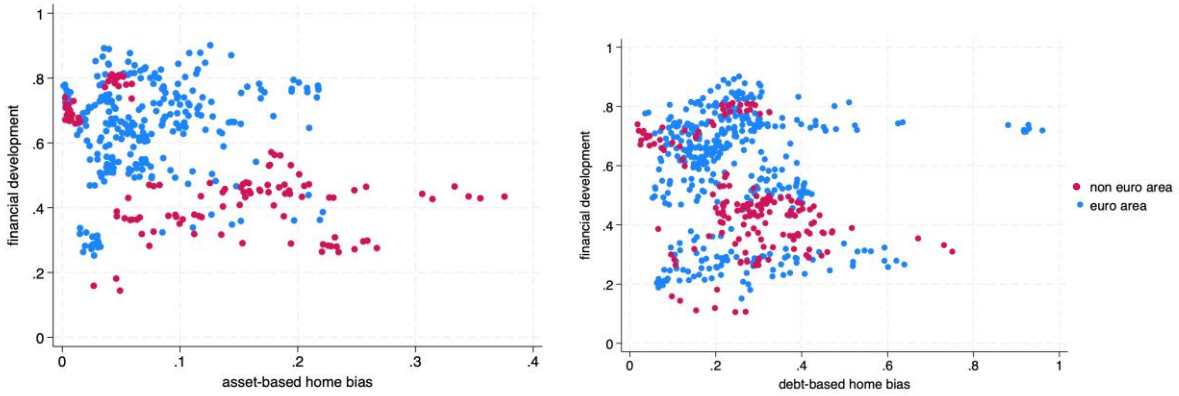
The picture that emerges from these findings is that EU Member States belong to two different groups. On the one hand, in a group of euro area countries, there is sufficient financing capacity to issue public debt and stabilise the economy, but as fiscal space gets tighter, fiscal policy turns procyclical. In addition, when the banking sector holds on its assets a substantial part as domestic sovereign debt, the government needs to focus on consolidating public debt. On the other hand, there is a group of EU Member States that rather behave similar to emerging market economies, and they have limited financing capacity to issue public debt and pursue economic stabilisation. At even very low levels of sovereign debt holdings by the banking system, they might need to focus on consolidating public debt and forego economic stabilisation.

4.6. THE ROLE OF FINANCIAL DEVELOPMENT

The results in Tables 4.4 to 4.6 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. This confirms the findings of Asonuma *et al.* (2015) that suggest that a captive domestic investor base can reduce rollover risks for the sovereign and, as a result, may reduce efforts for fiscal consolidation.

There is no obvious correlation between the level of financial development and the home bias (Graph 4.2) and lower financial development is not necessarily associated with a lower home bias. However, 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. Consequently, given that the financial development is on average lower outside the euro area than inside, this might partially explain the diverse impact under the low and high home bias described above.

Graph 4.2. **Financial development and the home bias (average 2001-2022)**



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

The Financial Development Index can be split in three components: depth, access and efficiency of financial markets and institutions (IMF, 2024). Table 4.7 looks in detail into the impact of the different subindices of financial development and displays the results for the full sample of EU27 countries, using both the debt- and asset-based measures of the home bias (in panel 1 and 2 respectively). The results in columns (a) to (f) report for each subindex the estimates of the PSTR model. The outcomes confirm previous results and corroborate insights.

For the debt-based measure, according to panel 1, low-bias countries respond slightly more strongly to debt, and more financial development would lower the surplus. The depth of financial markets, or the access to financial institutions seem to lower on average the surplus a government runs. 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 easily (enabling lower surpluses on average). The latter results might indicate that the public has easier access to government bonds that are being placed through the banking system.[19] This access seems more difficult for countries with a high debt-based home bias.

In panel 2 of Table 4.7, 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 more financial development lowers the fiscal surplus. This is confirmed when we consider 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 – as measured by net interest margin, return on equity or return on assets – leads to lower deficits.

4.7. THE ROLE OF PUBLIC BANKS

So far, in the main results of Tables 4.4 to 4.6, we have considered the role of foreign banks. The database of Panizza (2023) further distinguishes between private and public banks. This distinction is important as public banks may influence incentives for fiscal policymakers. On the one hand, they could impose more discipline if the financial stability of public banks is of concern. On the other hand, governments might be tempted to use their potential influence on state-owned banks and place public debt mostly with public banks.

In Table 4.8, we therefore substitute the previous control variable (share of foreign-owned banks) with the share of state-owned banks (Panizza, 2023) and test the same PSTR model. The results for the debt-based home bias (column (a)) indicate that for a higher bias, the government does pay attention to public debt, yet the average surplus is now lower. 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)), then we observe that a larger share of public banks reduces the surplus (albeit the government then stabilises public debt more strongly).

4.8. ALTERNATIVE TRANSITION VARIABLES

Further insights into the role of the financial and banking system can be got from using those indicators as alternative transition variables. Hence, the PSTR model now assumes the coefficients in the fiscal rule (1) get modified for different levels of financial development or bank ownership indicators. We do not include the home-bias measures as a control variable in (1) to avoid additional non-linearities. We run the PSTR model on the EU27 sample using three alternative transition variables and report the findings in Table 4.9. Note that in all cases, we found two regimes to be the optimal number.

The first alternative is to use the Financial Development Index. In this case, the optimal number of regimes is 2,[20] and the threshold between low and high development stands at 0.64, with Graph 3.2 showing which countries have a financial development below or above this threshold. Column (a) of Table 4.9 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.

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

[20] Results are available upon request.

A second alternative is to look at the role of bank ownership.[21] A banking sector that is dominated by domestic banks might be more prone to political pressures or stand ready to absorb larger amounts of sovereign debt. In contrast, foreign banks might provide access to a larger market but could also more easily withdraw financing. We use the share of banks that are foreign – expressed as the share of assets held by foreign banks on the total assets of the banking system (Panizza, 2023)[22]. Graph 3.3 shows the share of foreign ownership in the banking sector in different EU countries. We again find two regimes, with a threshold value of 23% in the smooth transition model. Thus, it seems about a quarter of the banking sector being owned by foreign banks is the crucial value to differentiate the fiscal response. Among others, the five largest EU economies have a foreign ownership below this threshold (Graph 3.4). The results of the PSTR model in column (b) of Table 4.9 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 our previous results: strong financial development – in particular with foreign-owned banks – makes it easier for governments to place public debt on bond markets.

Finally, we also use the share of public banks as a transition variable. Column (c) of Table 4.9 shows that a larger share of public banks – above a threshold level of 9% - makes the government stabilises public debt more strongly. However, fiscal policy becomes procyclical, and spending outlays are not matched with increased taxation or spending cuts. It thus seems that public banks in trouble have forced governments to consolidate, in spite of other stabilisation concerns.

[21] Not including it as a control variable in the PSTR.

[22] A bank is considered foreign owned if the foreign bank holds at least a 50% share, although results hold also if the threshold is put at 20% (Panizza, 2023).

Table 4.7. **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 hom**

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 lag	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)
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)
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)
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)

Government effectiveness index	0,0177	0,0002	0,0201	-0,0133	0,0178	-0,0012	0,0072	0,0010	0,0111	-0,0061	0,0164	-0,0096
	(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	-0,0205	-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)
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)
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 lag	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)
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)
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)
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)
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)
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 4.8. **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 lag	0,0200	0,0400	-0,0400	0,0600
	(0,0000)	(0,0000)	(0,0400)	(0,0000)
Expenditure gap	-0,0400	-0,0100	-0,0300	0,0000
	(0,0000)	(0,0000)	(0,0100)	(0,0100)
Output gap	-0,0100	0,0000	-0,0100	0,0000
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
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 4.9. **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 lag	0,0300	0,0600	0,0700	0,0100	0,0100	0,0500
	(0,0100)	(0,0400)	(0,0100)	(0,0100)	(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)
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)
Foreign bank ownership	0,0000	-0,0300	-0,0300	0,0200	0,0100	0,0100
	(0,0100)	(0,1000)	(0,0100)	(0,0100)	(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.

5. STABILISING DEBT RESPONSE – PANEL VAR MODEL

5.1. TESTING GOVERNMENT RESPONSES TO PUBLIC DEBT

We have tested in section 4 the response of fiscal policy to public debt with a fiscal rule: this response indicates the in-sample reaction of fiscal policy to public debt developments and the average degree of sustainability of fiscal policy. In the following we shock public debt and investigate how fiscal policy reacts as from the next year, for different degrees of home bias. Our purpose is not to disentangle the source of the shock to public debt, as this may be due to discretionary fiscal decisions, the movement of interest rates, the economic cycle and other macroeconomic developments or stock-flow adjustments. Our sole objective is to check the speed of the fiscal adjustment, and to see the speed of response by governments to shocks in the public debt ratio. Some governments may draw out the necessary increase in primary surpluses over time, while other governments may prefer a 'cold turkey' strategy with a quick adjustment. In addition, the home bias may play an important role in the path of adjustment. If governments can place large volumes of public debt with the banking sector, it might be inclined not to force quick adjustment. If by contrast, the banking sector does not want to take on more public debt, then the government may have to shorten the consolidation path. The home bias is in other words another of the conditioning variables that determine fiscal consolidation.

We first show how to test such a response in a VAR model, and then condition the response to different levels of home bias in the Towbin-Weber panel VAR. After discussing the main results, we consider several robustness checks.

We start from a basic panel VAR model (3):

$$y_{i,t} = \mu_{0i} + A(L)y_{i,t-1} + \epsilon_{i,t}\,, \tag{3}$$

where y_{it} is a vector of endogenous variables in country *i* in period *t*, μ_{0i} is a vector of country-specific fixed effects, A(L) is a lag polynomial with VAR coefficients and ϵ_{it} are error terms with zero mean and country-specific variances, which can be correlated with each other. The VAR contains the cyclically adjusted primary balance $s_{i,t}$ we introduced in section 3, and public debt $B_{i,t}$ (as a ratio to GDP), as in Favero and Giavazzi (2007). We can write out (3) fully to get (4):

$$\begin{bmatrix} 1 & 0 \\ \alpha_{0,i,t}^{21} & 1 \end{bmatrix} \begin{bmatrix} s_{i,t} \\ B_{i,t} \end{bmatrix} = \mu_i + \sum_{l=1}^{L} \begin{bmatrix} \alpha_{l,i,t}^{11} & 0 \\ \alpha_{l,i,t}^{21} & \alpha_{l,i,t}^{22} \end{bmatrix} \begin{bmatrix} s_{i,t-l} \\ B_{i,t-l} \end{bmatrix} + \epsilon_{i,t}. \tag{4}$$

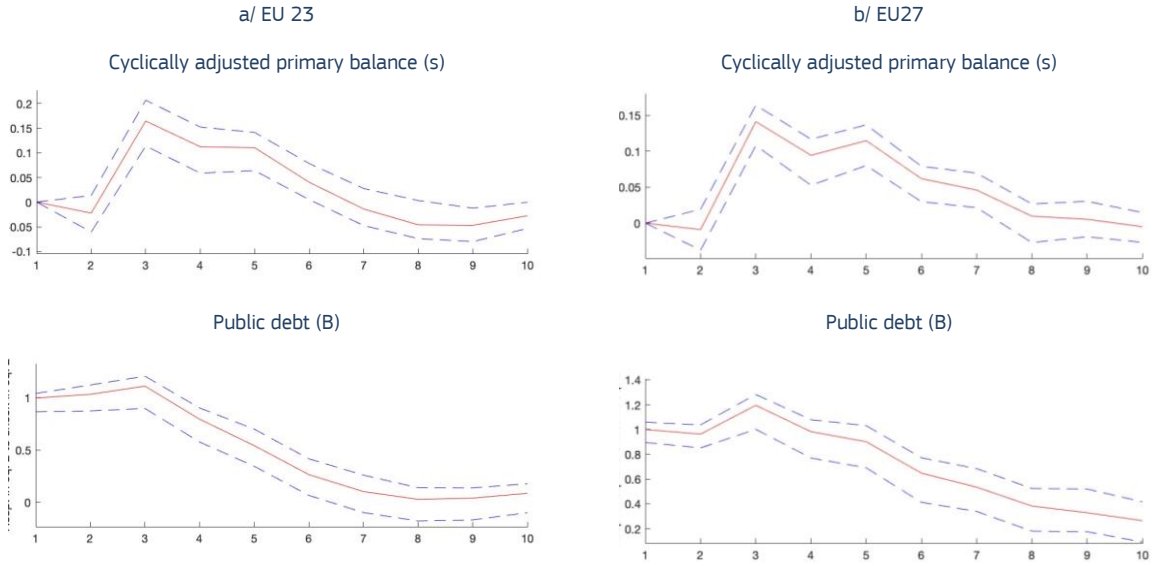
Time-invariant country-specific characteristics are reflected in μ_i, the country-fixed effect. Identification of the model in (4) is achieved by a simple Cholesky ordering. This ordering follows from the assumption that public debt is influenced by different factors such as interest rates, maturity structure, and inflation and not just by fiscal policy changes in the year. The panel VAR can be estimated by OLS. Since the error terms are uncorrelated across equations by construction, we can estimate (4) equation by equation without loss in efficiency.

We report impulse responses for a panel VAR model. As we examine fiscal consolidation programmes, which from a policy point of view are extensive programmes – typically beyond the current government's term- we decided to include up to four lags. The length of consolidation programmes implies long lags. We estimated the Towbin-Weber panel VAR also with only up to one or two lags, but the autocorrelation patterns in the VAR do not interact in smooth ways with a slowly moving transition variable (as is the case

of the home bias). All impulse responses are reported on a horizon of 10 years, together with 90% bootstrapped error bands.

Graph 5.1 shows the effect of a shock in year 1, and then shows the projection of the transmission effects over the following years, for the group of EU23 or EU27 countries. Estimation of the panel VAR shows that for both samples, the effect of a shock to public debt causes initially a slightly negative response of the cyclically adjusted primary balance, as is to be expected (panels a and b in Graph 5.1). A rise in public debt leads to an adjustment in fiscal policy but these effects dampen out over time. After about seven years, the effects of the adjustment have disappeared. These results are in line with most of the literature on the economic effects of public debt shocks (Hebous, 2011; Afonso *et al.*, 2018).

Graph 5.1. **Response of cyclically adjusted primary balance and public debt to an orthogonalised shock in debt, panel VAR, EU23 (2005-2021) and EU27 (2001-2022)**



Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

5.2. METHODOLOGY: THE INTERACTED PANEL VAR

To explore the relevance of home bias and how fiscal policy reacts over time, we introduce the Interacted Panel Vector Autoregression (IPVAR) as a framework to test the conditional response across economies to shocks in public debt. This VAR model – proposed by Towbin and Weber (2013) – is similar to the panel VAR model in equation (3). The identification is also based on the same Cholesky ordering of the variables. We use again up to 4 lags and assume the interaction term has no level effect (assuming therefore homogenous dynamics and intercepts across groups). We report symmetric confidence intervals on the impulse responses (at 90%), based on normally distributed errors.

The interesting property of the IPVAR is that one can let the estimated coefficients vary deterministically with different characteristics Z_{it} of the panel units.[23] In order to analyse how responses vary with some characteristics of the panel units, each of the VAR coefficients (*m,n*) at a certain time horizon *p* in (4) is allowed to vary with Z_{it} as follows:

$$\alpha_{p,it}^{mn} = \beta_{p,1}^{mn} + \beta_{p,2}^{mn} Z_{it}. \qquad (5)$$

[23] In contrast to the stochastically time-varying coefficient or the smooth transition frameworks often employed in single country VAR models.

The terms in (5) condition the estimated VAR coefficients. There are various ways to test the relevance of the conditioning terms for the dynamics of the transmission of uncertainty shocks.

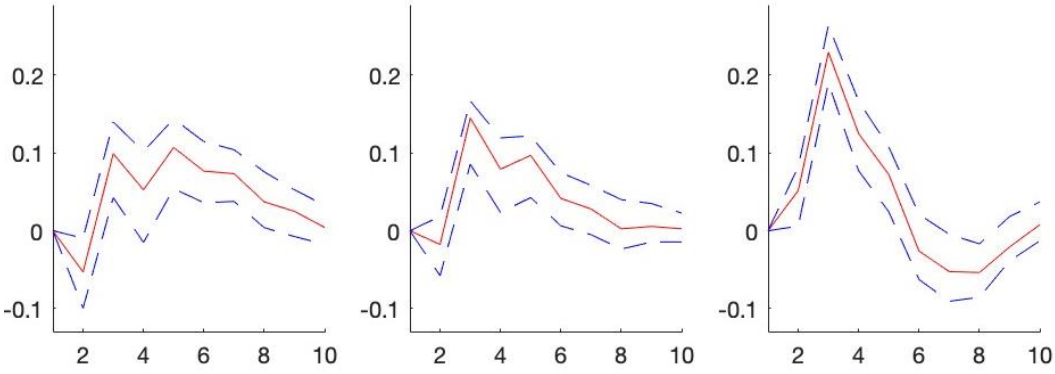
A first way to look at the IPVAR results is to compare the impulse responses embedded in the matrix A in (3). The interaction terms make the VAR coefficients non-linear combinations. However, even if the error terms are not correlated across panel units, estimation can nevertheless be done by OLS. Though, the impulse responses are a non-linear function of these OLS estimates, so error bounds that are bootstrapped will be more accurate than analytical ones. We report 90 per cent error bands. At what value of the conditioning characteristic Z_{it} to report the impulses is a matter of choice. As the home bias measures are a continuous variable, we report impulse responses at the first (25th) quartile, the median, and the third (75th) quartile value. The use of the first and third quartile excludes the predominant effect of outlier observations in a heterogeneous panel, so we would have a more homogenous behaviour between the first and third quartile. In order to test whether the IPVAR model produces significant differences in the response to a specific shock at a specific time horizon, we look directly at the empirical distribution of impulse response differences and evaluate with a t-test their difference.

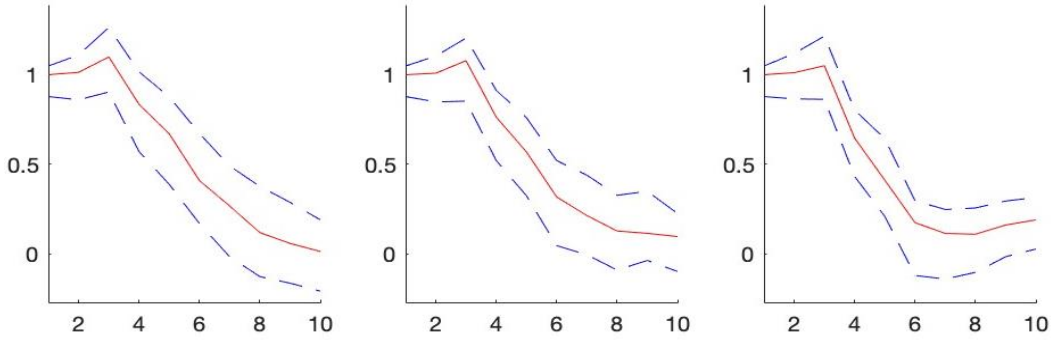
Another formal way is to test the restrictions in (5) with a Wald-test that looks into the additional explanatory power that Z_{it}, hence testing that $\beta_{p,2}^{mn} = 0$ (and assuming that any other coefficients are zero). The response can go both ways. On the one hand, a higher home bias can relax the financing constraints of the government, leading to a slower adjustment process. On the other hand, it might force governments to cut budget deficits, imposing more discipline.

5.3. BASELINE RESULTS

We first look at the difference in responses using the asset-based home bias measure for the panel of EU23 countries. Graph 5.2 reports the impulse responses of the IPVAR for the cyclically adjusted primary balance and public debt for these three different categories. Results indeed show a clear difference in fiscal policy response: in countries with a low home bias, the correcting response is initially limited, yet the primary balance is still significantly positive after ten years. The same observation is also true for countries with a median basis, yet the response tapers off slightly more quickly. The difference between the two groups is not significant though. In turn, countries with a high home bias show a stronger initial reaction but the peak response then drops off quickly. A t-test on the difference between the impulse response functions with the middle-income group shows a significant difference in the primary balance over 10 years at the 15 per cent significance level (t-test statistic: 1.08). This is even stronger comparing the top and bottom quartile response (p-value 0,09). A Wald-test shows that home bias is not explaining the differences in responses though (p-value 0.43).

Graph 5.2. **Response of primary balance to an orthogonalised public debt shock, panel VAR, EU23, 2005-2021, by different levels of asset-based home bias**



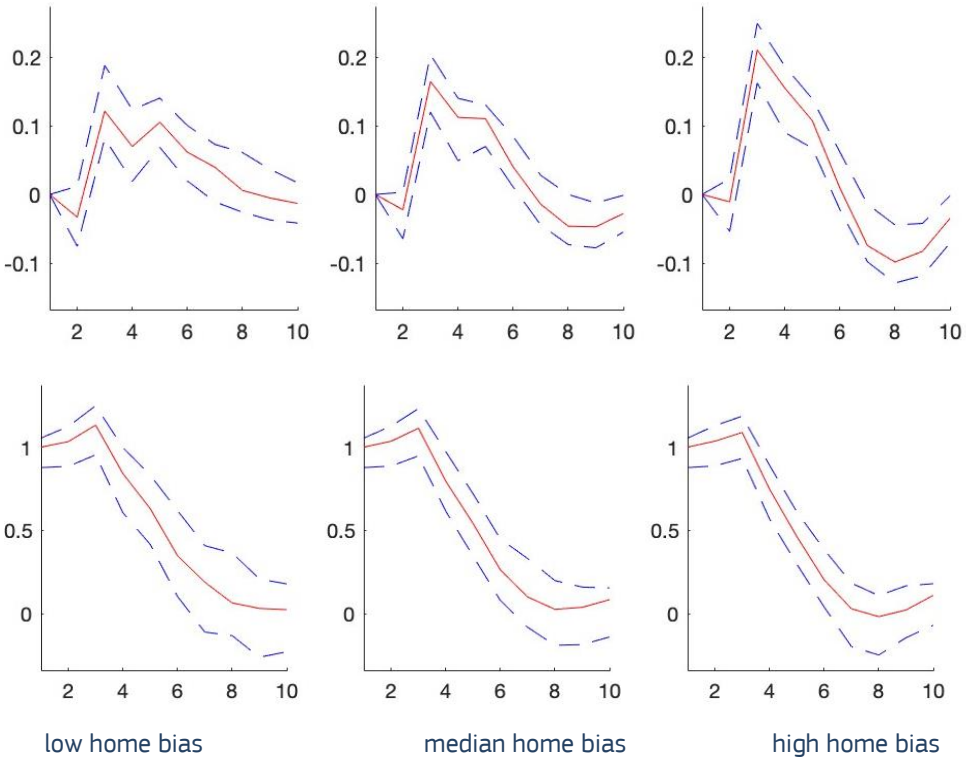


Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt to GDP ratio.

By contrast, when using the alternative debt-based home bias measure for the same panel of EU23 countries, we see that the response of the cyclically adjusted primary balance under different levels of the home bias is rather similar (Graph 5.3). However, it seems to be stronger and more persistent when the home bias is low, while the response is cut off quickly after six years in countries with a median or high home bias and even turns negative after six years. This difference between the impulse responses of the median and top quartile is statistically significant (at 5%), yet a joint F-test on all interaction terms shows no significant differences in the coefficient.

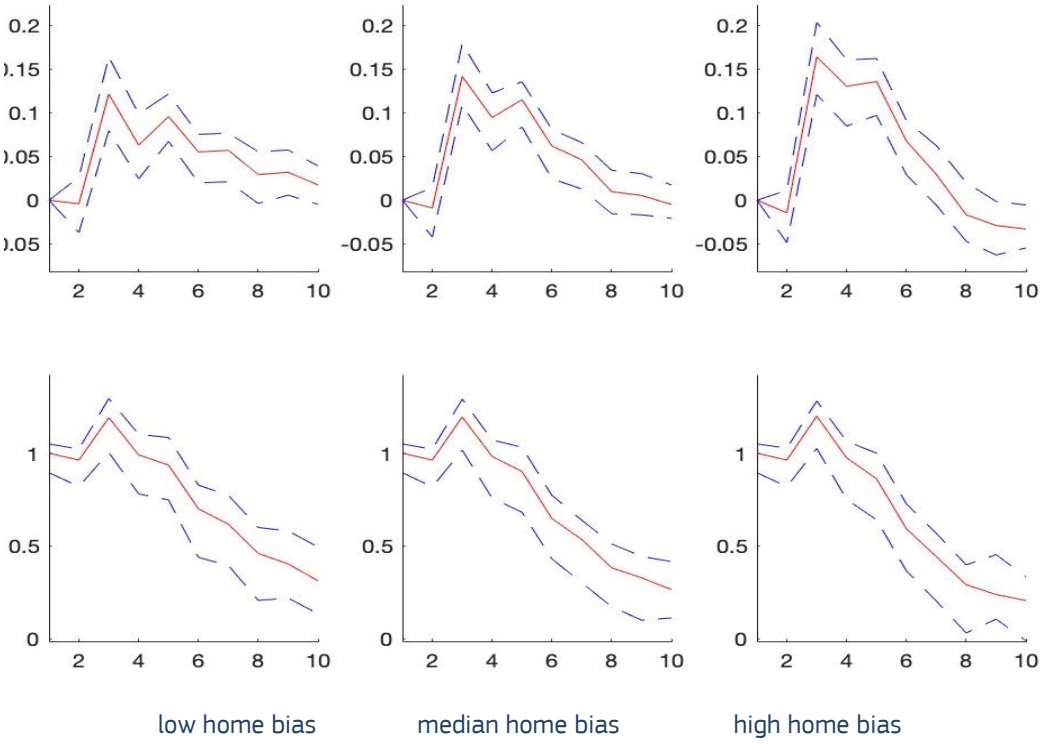
If we extend the sample to 27 EU countries for which we can compute the debt-based home bias, responses display the same differences across groups. There is a significant difference (at 10%) between the top and bottom quartiles (Graph 5.4).

Graph 5.3**. Response of primary balance to an orthogonalised public debt shock, panel VAR, EU23, 2005-2021, by different levels of debt-based home bias**



Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

Graph 5.4. **Response of primary balance to an orthogonalised public debt shock, panel VAR, EU27 countries, 2001-2022, by different levels of debt-based home bias measure**



Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

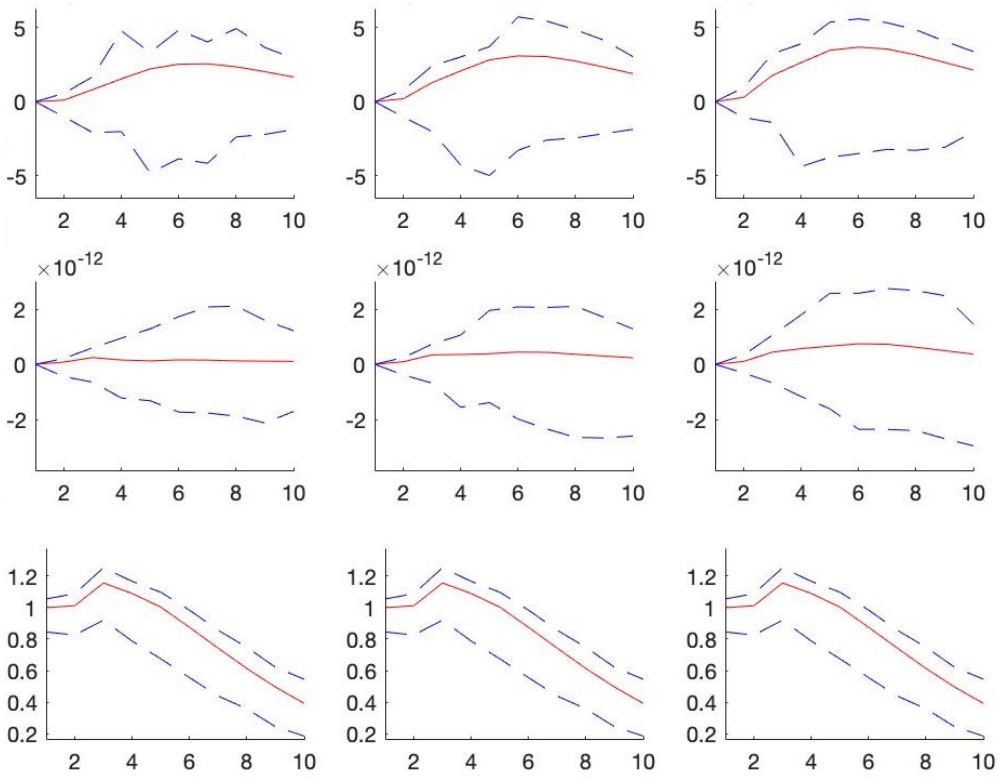
5.4. ROBUSTNESS CHECKS

A first robustness check is to include the output gap among the variables in the VAR

$$\begin{bmatrix} 1 & 0 & 0 \\ \alpha_{0,i,t}^{21} & 1 & 0 \\ \alpha_{0,i,t}^{31} & \alpha_{0,i,t}^{32} & 1 \end{bmatrix} \begin{bmatrix} s_{i,t} \\ y_{i,t} \\ B_{i,t} \end{bmatrix} = \mu_i + \sum_{l=1}^{L} \begin{bmatrix} \alpha_{l,i,t}^{11} & 0 & 0 \\ \alpha_{l,i,t}^{21} & \alpha_{l,i,t}^{22} & \alpha_{l,i,t}^{23} \\ \alpha_{l,i,t}^{31} & \alpha_{l,i,t}^{32} & \alpha_{l,i,t}^{33} \end{bmatrix} \begin{bmatrix} s_{i,t-l} \\ y_{i,t-l} \\ B_{i,t-l} \end{bmatrix} + \epsilon_{i,t}. \quad (6)$$

In response to a public debt shock, the control for output does not lead to significant responses of the cyclically adjusted primary balance, nor of output, possibly due to the low number of observations. However, the response of the primary balance is significantly different between the different groups (Graph 5.5). For countries with a low home bias, responses are significantly weaker at 10% than for countries with a median home bias, and the same is true for the difference between countries with a median and high home bias. This difference is again statistically significant (at 10%). Though, a general Wald-test shows that home bias is not explaining the differences in responses though (p-value 0.86). Similar results are obtained for a sample of EU23 or EU27 countries, when using the asset and the debt-based home bias measure respectively.

Graph 5.5. **Response of primary balance to an orthogonalised global uncertainty shock, panel VAR, EU23 countries, 2005-2021, by different levels of asset-based home bias measure**

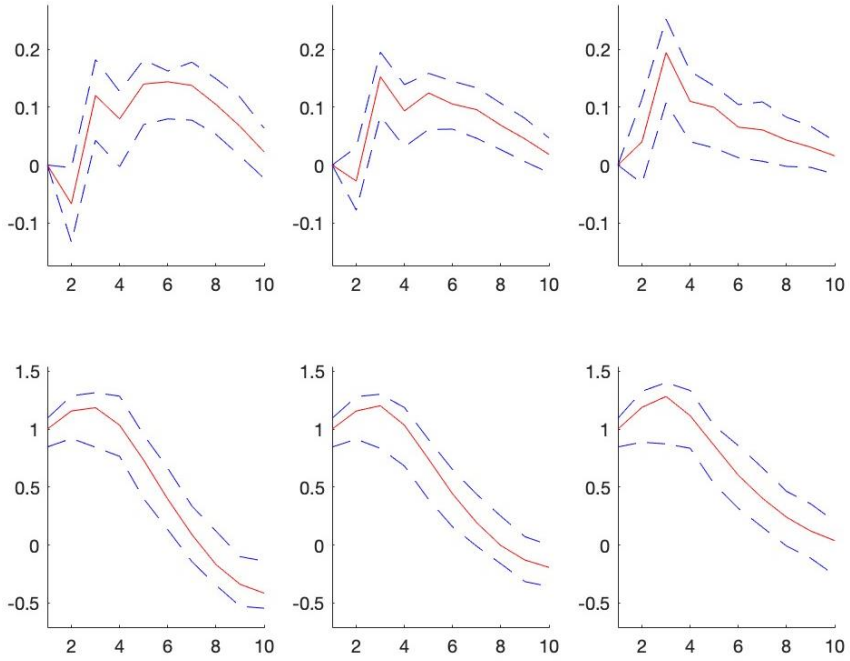


Note: Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the level of output, and the third row the public debt ratio (to GDP).

A second robustness check is to exclude the countries that display extreme ratios. This is the case for Italy. As discussed in section 3 and shown on graph 1.2b, it is the largest euro area country with a very high domestic sovereign exposure (in % of total bank assets). Responses are very similar to the ones obtained for the full panel (Graph 5.6). The difference is significantly different between the median and high home bias at 10% significance (t-statistic: 1.44). Though, a Wald-test does again not show a significant difference across all three groups jointly (p-value 0.36).

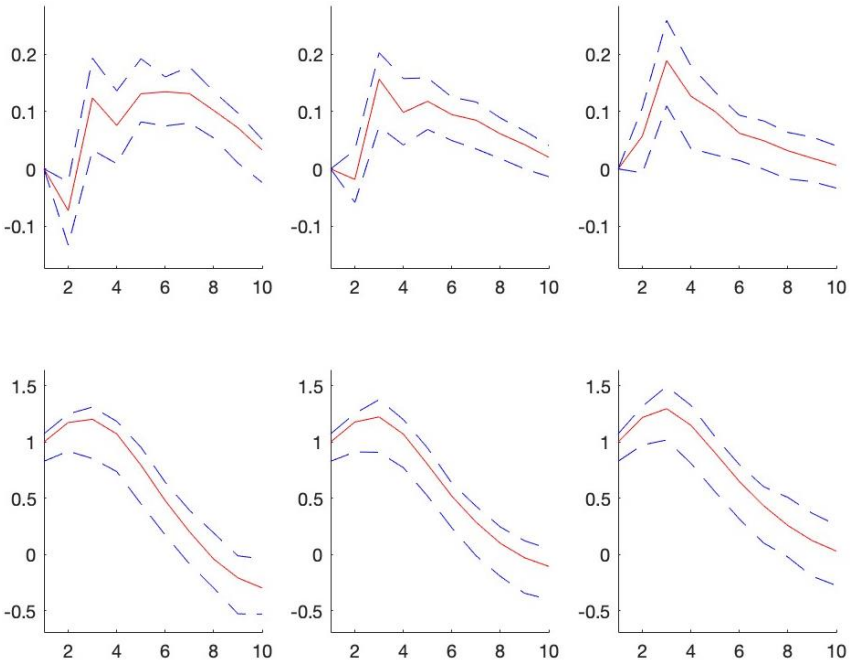
Instead, when using the asset-based home bias measure, then Luxembourg shows a specific pattern as it has a high debt-based home bias but, due to its role as a financial centre, a very low asset-based home bias (see Table 3.1). Results are again very similar (Graph 5.7). The difference between the median and high home bias countries is marginally significant now (t-statistic: 1.13), yet a Wald test cannot confirm the response is different across all three groups.

Graph 5.6. **Response of primary balance to an orthogonalised debt shock, panel VAR for EU23 countries not including Italy, 2005-2021, by different levels of asset-based home bias measure**



Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

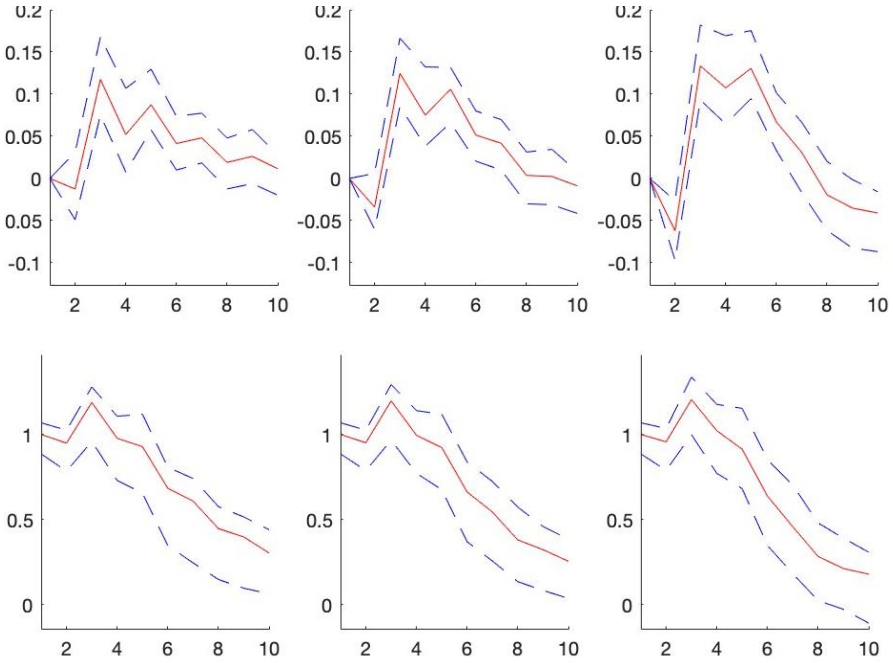
Graph 5.7. **Response of primary balance to an orthogonalised public debt shock, panel VAR for EU23 countries not including Luxembourg, 2005-2021, by different levels of asset-based home bias measure**



Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

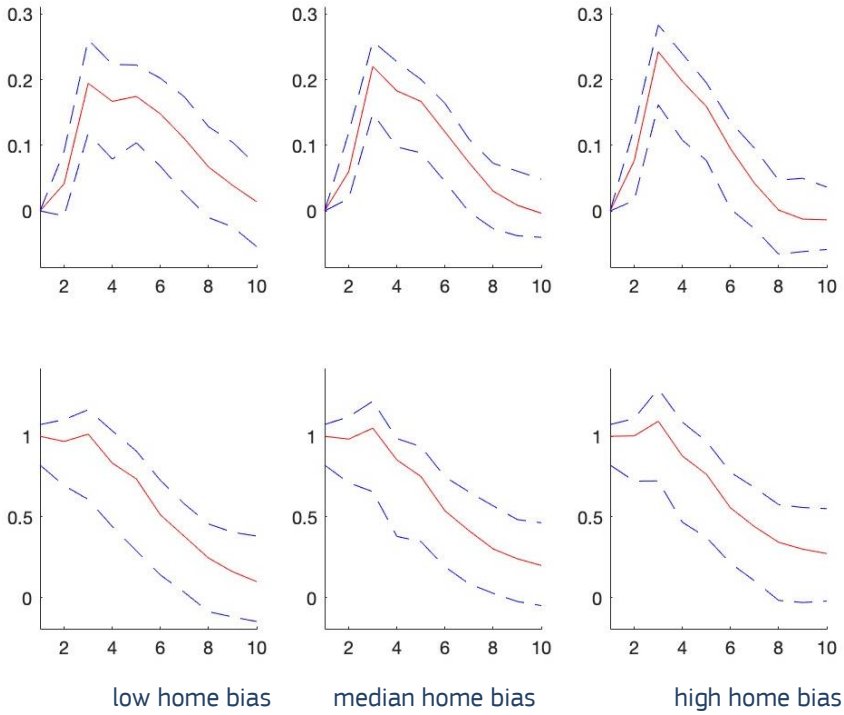
There are a couple of other interesting subsamples to examine. As in section 4, we look at the difference between responses in a euro area and a non-euro area subsample (Graph 5.8 and Graph 5.9, respectively). The differences within these groups are less outspoken, which endorses the previous results. Home bias seems not to be the main driver for significant differences across the low or high bias observations. For the euro area countries, the stabilising response to public debt is smaller as compared to the one in non-euro area countries. It tapers off quickly, and the more so, the higher the home bias. This is not the case in the non-euro area countries, where the stabilising response is very similar across subgroups. Probably because these observations overlap with an alternative split into EU Member States joining prior or after 2003, we find very similar results on these subsamples (Graph 5.10 and Graph 5.11).

Graph 5.8. **Response of primary balance to an orthogonalised public debt shock, panel VAR for euro area panel, 2001-2022, by different levels of debt-based home bias measure**



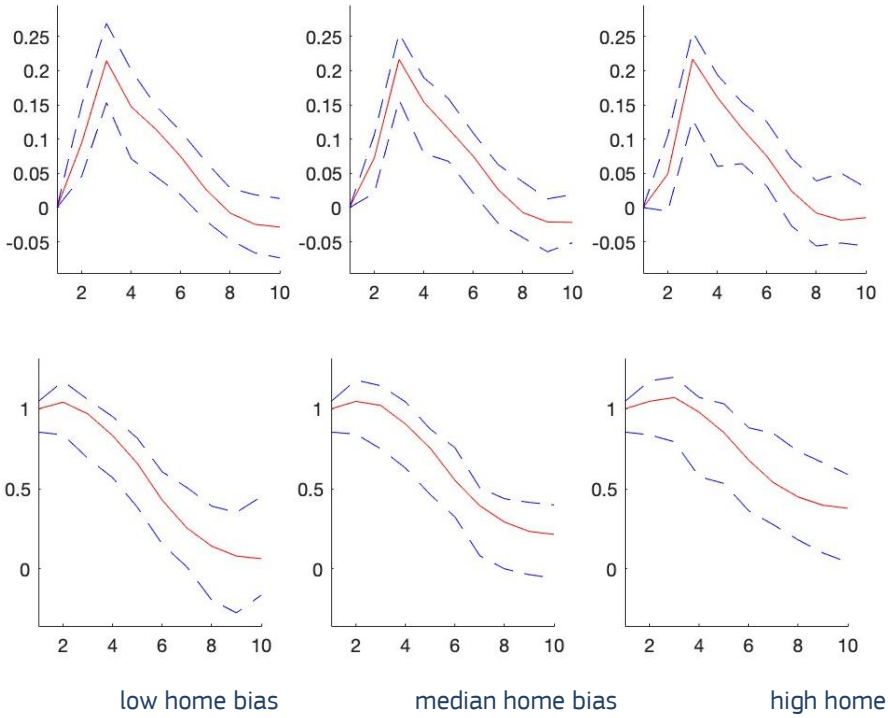
Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

Graph 5.9. **Response of primary balance to an orthogonalised public debt shock, panel VAR for non-euro area panel, 2001-2022, by different levels of debt-based home bias measure**



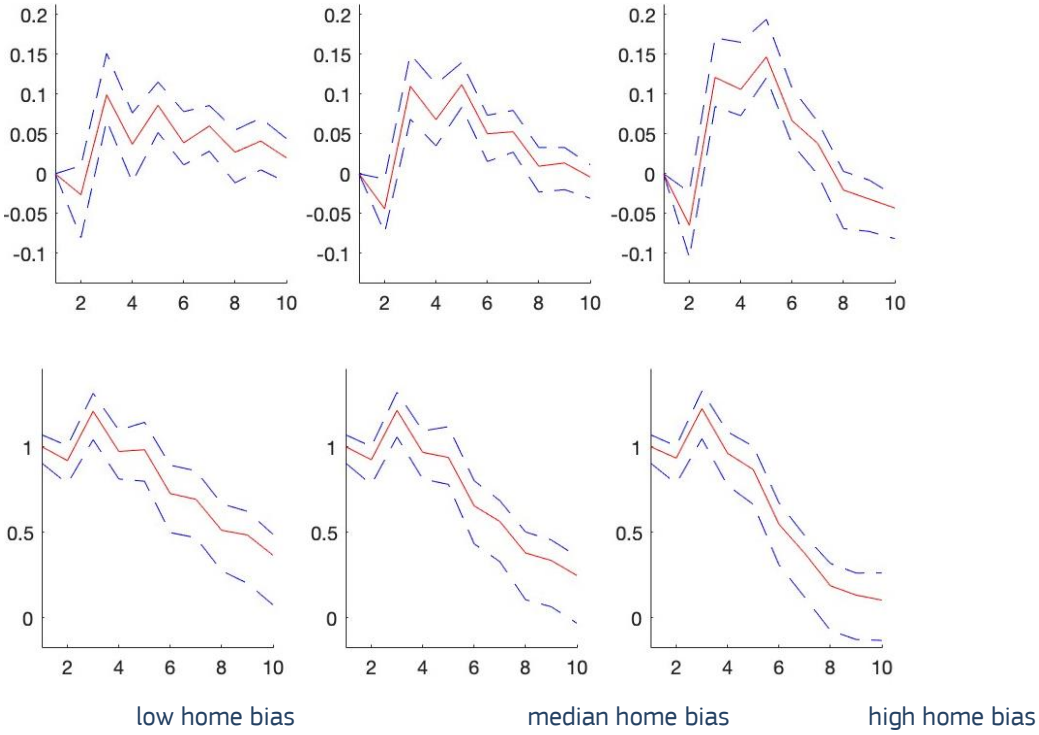
Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

Graph 5.10. **Response of primary balance to an orthogonalised public debt shock, panel VAR for EU Member States joining after 2003 panel, 2001-2022, by different levels of debt-based home bias measure**



Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

Graph 5.11. **Response of primary balance to an orthogonalised public debt shock, panel VAR EU Member States prior to 2004 panel, 2001-2022, by different levels of debt-based home bias measure**



Note: unit standard deviation, and impulse response with 90% error bands (bootstrapped). The first row displays the cyclically adjusted primary balance to potential GDP ratio, the second row the public debt ratio (to GDP).

6. 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 study provides novel insights into the complex relationship between home bias and fiscal policy in the European Union. Our contribution to the existing literature is to extend the current IMF databases on home bias to EU countries, and additionally examine the reaction of governments to public debt developments for different degrees of home bias.

Our analysis has shown that home bias exhibits a non-linear relationship with fiscal policy. Overall, our findings suggest that under a high home bias some sovereigns can rely on domestic banks to provide additional fiscal room, especially during economic downturns and, while this may enable economic stabilisation, this type of response comes at the expense of rising public debt over time, and a lack of sustained fiscal consolidation.

Moreover, the study highlights significant differences across EU Member States. Our analysis reveals that home bias has a stronger impact on fiscal policy in new Member States, limiting economic stabilisation yet

guaranteeing stabilisation of public debt. In contrast, the 15 incumbent EU Member States exhibit a weaker home bias effect on fiscal policy, indicating that these countries have developed more robust national fiscal frameworks. Similarly, we find that the home bias has a more pronounced impact on fiscal policy in non-euro area countries than in euro area countries.

We believe this effect is due to the role of financial markets, and in particular the banking system. Stronger financial development seems to enable countries to raise public debt, but doing so does not impede economic stabilisation. In those countries with a less developed financial system, governments do not have access to such a reliable financing channel to the same degree. We further find that the presence of foreign banks can play a major role in this respect. Governments that do not have easy access to a large domestic banking sector to finance public debt are pushed to consolidation of public finances more quickly. The increased presence of foreign banks contributes to financial development, but it does not give incentives to governments to abandon fiscal consolidation. However, countries with a higher share of state-owned banks exhibit a stronger home bias effect on fiscal policy, i.e. participation in public banks reduces debt sustainability.

We further find that under a high home bias, fiscal consolidation seems more short-lived. While fiscal consolidation happens in all countries in the short term, it seems only sustained beyond a horizon of five years in countries with a low home bias. Different robustness checks using different measures of home bias, and different subsamples mainly confirm this finding.

The welfare consequences of these outcomes are not clear-cut. Deeper financial markets that allow governments to smooth economic shocks 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 the European level including through the Banking and Capital Markets Unions could be a way forward by enabling sovereigns to access the integrated financial markets more easily. These issues are becoming more pressing as EU countries have historically high debt levels and may be confronted in the future with limitations on the way public debt can be placed on financial markets, especially once financial and monetary conditions tighten, or external pressures from the macroeconomic side or technology side (like digitalisation) force the banking system to adjust. In all cases, a stronger focus on debt in the reformed EU fiscal framework and the new fiscal rules should reduce the risk of such scenarios.

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ANNEX I – CORRELATION

Table Annex I. **Correlation between variables in empirical model**

	Home bias (debt)	Home bias (asset)	Primary balance	Lagged debt	Expenditure gap	Output gap	Fin. dev. Index	Foreign Bank Ownership	State Bank Ownership	GDP Deflator	Current account	Interest rate	CDS	EDP	Macro prud
Macro prud	0.19	-0.27	-0.14	0.22	-0.01	0.01	0.3	-0.03	0.18	0.01	-0.13	-0.01	-0.02	0.15	1
EDP	0.04	0.13	-0.31	0.23	0.24	-0.25	0.07	-0.01	0.16	-0.16	-0.14	0.16	0.36	1	0.15
CDS	0.27	0.26	-0.27	0.07	0.16	-0.16	-0.24	0.3	0.09	-0.03	-0.34	0.32	1	0.36	-0.02
Interest rate	0.18	0.08	0.02	-0.4	-0.35	0.35	-0.33	0.36	-0.22	0.2	-0.49	1	0.32	0.16	-0.01
Current account	-0.22	-0.17	0.28	0.12	0.19	-0.21	0.34	-0.42	0.18	-0.3	1	-0.49	-0.34	-0.14	-0.13
GDP Deflator	0	-0.08	0.13	-0.2	-0.26	0.29	-0.22	0.21	-0.11	1	-0.3	0.2	-0.03	-0.16	0.01
State Bank Ownership	0	0.18	-0.12	0.29	0.13	-0.14	0.02	-0.15	1	-0.11	0.18	-0.22	0.09	0.16	0.18
Foreign Bank Ownership	0.46	0.4	-0.07	-0.28	-0.17	0.15	-0.8	1	-0.15	0.21	-0.42	0.36	0.3	-0.01	-0.03
Fin. dev. Index	-0.37	-0.47	0.1	0.46	0.16	-0.15	1	-0.8	0.02	-0.22	0.34	-0.33	-0.24	0.07	0.3
Output gap	-0.02	-0.08	0.54	-0.2	-0.99	1	-0.15	0.15	-0.14	0.29	-0.21	0.35	-0.16	-0.25	0.01
Expenditure gap	-0.01	0.04	-0.57	0.2	1	-0.99	0.16	-0.17	0.13	-0.26	0.19	-0.35	0.16	0.24	-0.01
Lagged debt	-0.21	0.27	0.05	1	0.2	-0.2	0.46	-0.28	0.29	-0.2	0.12	-0.4	0.07	0.23	0.22
Primary balance	-0.19	-0.13	1	0.05	-0.57	0.54	0.1	-0.07	-0.12	0.13	0.28	0.02	-0.27	-0.31	-0.14
Home bias (asset)	0.51	1	-0.13	0.27	0.04	-0.08	-0.47	0.4	0.18	-0.08	-0.17	0.08	0.26	0.13	-0.27
Home bias (debt)	1	0.51	-0.19	-0.21	-0.01	-0.02	-0.37	0.46	0	0	-0.22	0.18	0.27	0.04	0.19

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