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## Signaling virtue or vulnerability? The changing impact of exchange rate regimes on government bond yields

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MPIfG Discussion Paper 22/5

**Signaling Virtue or Vulnerability?**

The Changing Impact of Exchange Rate Regimes  
on Government Bond Yields

Zsófia Barta, Lucio Baccaro, and Alison Johnston



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## Abstract

Do exchange rate regimes affect the conditions under which developed countries borrow? This paper argues that they do, but their impact on yields depends on the prevailing macroeconomic context. When investors regard inflation as the most relevant risk to bond holdings, monetary union has a distinct advantage over floating and fixed exchange rates because of its credible in-built mechanism to control inflation. However, once default is seen as the most relevant risk, exchange rate rigidity becomes a liability due to its constraining effect on governments' ability to respond to adverse shocks. We test our argument with a moving window panel analysis for twenty-three OECD countries from 1980 to 2017. We find that before the late 2000s, inflation was penalized under floating and (to a lesser extent) fixed exchange rate regimes, but not in countries in monetary union. Since the 2010s, inflation carries no penalty under any exchange rate regime. Variables linked to default risk (debt and entitlement spending) did not affect yields under any exchange rate arrangements until the mid-2000s. Afterwards, countries in monetary union (and to a lesser extent in fixed exchange rate regimes) were significantly penalized for public debt and entitlement spending, whereas countries with floating regimes were not. Our results speak to the literatures on governments' institutional commitments and "room to move."

**Keywords:** bond yields, euro, exchange rate regimes, financial markets, international political economy

## Zusammenfassung

Haben Wechselkursregime einen Einfluss auf die Konditionen, zu denen entwickelte Länder Staatsanleihen ausgeben können? Wir argumentieren in diesem Beitrag, dass dies der Fall ist, wobei ihre Wirkung auf die Anleiherenditen vom vorherrschenden makroökonomischen Kontext abhängt. Erachten Investoren Inflation als das entscheidende Risiko für Investitionen in Anleihen, so hat eine Währungsunion durch ihren glaubwürdigen integrierten Mechanismus zur Inflationskontrolle klare Vorteile gegenüber flexiblen und festen Wechselkursen. Wird jedoch ein Ausfall der Rückzahlungen als das entscheidende Risiko angesehen, werden starre Wechselkurse zum Nachteil, da sie die Fähigkeit von Regierungen, auf negative Schocks zu reagieren, verringern. Wir testen unser Argument mithilfe einer für den Zeitraum von 1980 bis 2017 mit gleitenden Zeitfenstern durchgeführten Panelanalyse von 23 OECD-Ländern. Die Ergebnisse zeigen, dass Inflation vor den späten 2000er-Jahren in flexiblen und (weniger stark) in festen Wechselkursregimen finanziell abgestraft wurde, jedoch nicht in den Ländern einer Währungsunion. Seit den 2010er-Jahren wirkt sich Inflation in keinem der Wechselkursregime auf die Renditen aus. Mit dem Ausfallrisiko verknüpfte Variablen (Staatsverschuldung und Sozialausgaben) hatten bis zur Mitte der 2000er-Jahre in keinem der Wechselkursregime einen Einfluss auf die Renditen. Danach wurden Länder in einer Währungsunion erheblich (und Länder in festen Wechselkursregimen weniger stark) für Staatsverschuldung und Sozialausgaben abgestraft, während dies bei Ländern in flexiblen Regimen nicht der Fall war. Unsere Ergebnisse tragen zur Literatur über institutionelle Selbstverpflichtungen und Handlungsspielräume von Regierungen bei.

**Schlagwörter:** Anleiherenditen, Euro, Finanzmärkte, internationale politische Ökonomie, Wechselkurssysteme

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# Signaling Virtue or Vulnerability? The Changing Impact of Exchange Rate Regimes on Government Bond Yields

## 1 Introduction

Do exchange rate regimes affect the conditions under which developed country governments borrow? In the 1980s and 1990s, several European countries attempted to achieve better standing in financial markets by fixing their exchange rates within the European Monetary System (EMS). The logic of this strategy was centered on importing the (inflation) credibility of Germany by “tying the hands” of governments around a set of deflationary policies required to maintain the peg with the deutsche mark (Weber 1991; Giavazzi and Pagano 1988). With the creation of the Economic and Monetary Union (EMU) in 1999, the strategy was set in stone, and, at least for some time, it paid off. Interest rates converged across Europe in the 1990s and 2000s as countries previously deemed less creditworthy saw the yields on their government bonds fall close to German levels, despite some persistent differences in their macroeconomic and fiscal fundamentals. But things changed drastically with the European debt crisis in 2010. Then, the interest rates of the EMU’s peripheral countries spiked again, yet the interest rates of other countries, such as France and Belgium, were not heavily affected by the crisis. Thus, it is not clear whether exchange rate regimes have a systematic impact on the conditions under which governments can access funding, and whether this impact is consistent over time.

In this paper, we argue that exchange rate regimes matter for bond yields, but their impact depends on the prevailing context in which credit markets evaluate fiscal and monetary performance.<sup>1</sup> In an *inflationary macroeconomic environment*, financial markets regard inflation – and the attendant depreciation of the currency in which the debt is denominated – as the most relevant risk to creditors’ investment in a country’s debt. In this context, giving up exchange rate flexibility has a distinct advantage over floating

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All three authors have contributed equally to the paper.

- 1 We focus in this paper on the ways in which investors assess macroeconomic fundamentals when evaluating risks to the value of the bonds they intend to hold – in an effort to better understand the link between macroeconomic policy outcomes and the conditions under which governments can borrow. By focusing narrowly on macroeconomic fundamentals, we abstract from other types of risks (duration, yield curve or liquidity risk, etc.) that might influence holders of government bonds whose decisions are subject to constraints due to regulations, reserve requirements, collateral agreements, etc. While these risks matter from a macroprudential point of view, we believe – in line with much of the IPE literature on the determinants of bond yields (Mosley 2003; Gray 2013; Brooks, Cunha, and Mosley 2015) – that it makes sense to theorize about the longer-run effects of macroeconomic fundamentals on prices independently of the risks created by shorter-term changes in financial market conditions. In our empirical investigations, we control for variation in liquidity and repricing risks across time via time fixed effects, whereas we account for the differential status of countries’ bonds as “safe assets” via country fixed effects.

exchange rates, because a rigid exchange rate regime has in-built mechanisms to control inflation, and thus to reassure investors (Giavazzi and Pagano 1988). If a country's inflation rate is higher than that of its main trading partners, the result is a loss of cost competitiveness, real exchange rate appreciation, accelerated deindustrialization, current account deficits, and capital flight with associated loss of foreign reserves. Given these higher costs of inflation, national actors – including central bankers – have incentives to adjust their price- and wage-setting behavior in order to bring inflation down (Hall and Franzese 1998; Johnston 2012; 2016). If the fixed peg is regarded as credible by investors, it significantly mitigates devaluation risk. Therefore, when the exchange rate is inflexible, financial markets are less likely to respond to short-term inflation movements by increasing risk premia than they are for countries experiencing inflation in a floating exchange rate regime. This argument applies *a fortiori* to a monetary union. Joining a monetary union substantially reduces creditors' fears that a government might inflate away the value of their bonds, because the link between the value of the currency in which the debt is denominated and domestic inflation and fiscal performance is completely severed, and although exit from the currency union remains a possibility, its cost is considerably higher than changing the nominal parity in a fixed exchange rate regime.

In contrast, in a *deflationary environment*, the main problem for bondholders is the sustainability of public debt. When the real burden of debt increases, investors are likely to worry about governments not being able to service their debts and having to default or restructure them. In this context, exchange rate rigidity turns into a liability because it overly constrains the ability of governments to manage the economy. In a flexible exchange rate regime, governments can allow the nominal exchange rate to fluctuate to stimulate net exports. In a fixed exchange rate regime, they have the option of modifying the nominal parity, even if this may cause tensions with trade partners and may be preceded by a depletion of foreign reserves. But in a currency union, governments that have “tied their hands” can only hope to reassure financial markets that they are still solvent by slashing expenditures and cutting taxes as well as engaging in other “internal devaluation” policies, which further exacerbate deflationary tendencies and increase the real burden of debt (Blyth 2013; Guajardo, Leigh, and Pescatori 2011; Mody 2018). As a result, members of a monetary union are more severely penalized by financial markets under a deflationary macroeconomic regime for policies perceived to undermine debt sustainability than in a floating regime. Far from being granted greater leeway in formulating their policies, members of a monetary union are held on a shorter leash than countries retaining exchange rate flexibility.

We illustrate the above argument with a moving window panel analysis of twenty-three OECD countries from 1980 to 2017. We focus on the way exchange rate regimes mediate the relationship between government bond yields, on the one hand, and monetary and fiscal variables – inflation, debt, the fiscal deficit, total social spending, and entitlement<sup>2</sup> spending – on the other. We find a significant penalty for inflation in the bond

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2 We use the words “entitlement spending” and “social security spending” interchangeably.



yields of countries in floating and fixed exchange rate regimes from the 1980s to the late 2000s, whereas members of the monetary union were immune to inflation penalties after the launch of the euro. From 2010, however, inflation carried no penalty under any exchange rate regime, demonstrating the irrelevance of inflationary concerns in a deflationary environment. In contrast, yields were largely unmoved by increases in public debt, fiscal deficits, social spending, or entitlements under any exchange rate arrangements before the mid-2000s. Since the mid-2000s, however, countries in monetary union have been significantly, and prolongedly, penalized for higher levels of public debt and entitlement spending, and temporarily penalized for higher fiscal deficits and social spending during the crisis (these penalties disappeared by the mid-2010s). Countries in floating regimes were subject to temporary penalties for higher debt, entitlement spending, and fiscal deficits in bond yields at the onset of the crisis, but in contrast to countries in monetary union, these penalties abated in the mid-2010s. Moreover, countries with floating exchange rates encountered *no* penalty on social spending, even during the crisis. Once offering protection against *inflation risk*, monetary union is now seen to amplify *default risk*.

Our results speak to two important debates in international political economy (IPE) about: (1) the strength and nature of constraints that globalized credit markets place on the policy choices of developed democracies and (2) the value of commitment devices for policy-makers. While several scholars expressed concern that governments have to toe a neoliberal line to access funding in global sovereign credit markets, placing governments in a “golden straightjacket” (Strange 1996; Rodrik 2000; 2011; Streeck 2014), others argued that developed country governments have considerable “room to move” with regard to their domestic policies (such as government spending and taxation), without having to fear increases in the cost of their debt (Mosley 2003, 50–102).

According to this argument, as long as inflation is the only threat to the value of bonds, the only policy variable investors have incentives to monitor and penalize is inflation, leaving governments relatively unconstrained in other areas. We probe deeper into this argument by focusing on the role policy commitment devices play – specifically inflexible exchange rate regimes – in influencing the degree of policy autonomy from market scrutiny and penalties and by examining whether the argument is generalizable across international macroeconomic regimes (Blyth and Matthijs 2017). Our results suggest that, in line with the room-to-move thesis, governments with floating exchange rates were not penalized for deficits, debt, and social expenditures in an inflationary regime, provided they kept inflation in check. For governments in a monetary union, markets disregarded the inflation risk, too. However, this outcome was contingent on the prior decision of those governments to deliberately restrict their room to move in macroeconomic policy by committing to full exchange rate inflexibility. The tying-of-hands strategy became a liability, however, once concerns over default became more pronounced. In this context, our findings suggest that the literature extolling the virtue of commitment devices and tying hands through the imposition of institutional constraints (see Barro and Gordon 1983; Rogoff 1985; Grilli, Masciandaro, and Tabellini 1991; Romer 1993;



Klein and Shambaugh 2012) is becoming obsolete as developed countries move from an inflationary to a deflationary environment. Greater flexibility is now becoming an asset in helping countries reduce the real burden of debt and lower the risk of debt default.

In other words, our paper nuances our understanding of the market-government nexus in developed countries by shedding light on the ways in which governments might loosen market constraints on some policy choices by committing to long-term policy regimes, and on the implications of such commitments under changing economic and market conditions. In this regard, the paper bridges the gap between the golden straight-jacket debate, which focuses on the reactions of bond yields to *policy choices*, and a related but disparate literature which explores the response of bond yields to *institutional factors* (such as political institutions, independent central banks, fiscal institutions, etc.<sup>3</sup>). Similarly to the latter studies, the paper explores the impact of commitment devices on sovereigns' credit conditions, but it expands the focus from their direct effect on yields to their implications for governments' room to move in a broader set of policy areas (not only inflation, debt, and fiscal deficits but also social spending and entitlements).

The paper proceeds as follows: The next section explores how credible commitment to monetary policy goals might affect the way investors monitor and penalize policy choices in fiscal policy areas, especially politically sensitive supply-side decisions. We then present our empirical strategy before testing our hypotheses. The final section provides a compact discussion of results and lays out the implications of our findings for several IPE literatures.

## 2 Commitment devices and policy autonomy from a theoretical perspective

Political economists have long recognized the choice of exchange rate regimes as one of the most fundamental long-term policy decisions a country can take, at least since Polányi (1944) called attention to the historical significance of the gold standard in cementing a liberal economic order. Strict adherence to fixed exchange rates requires policies that privilege disinflation over other policy goals, and invariably forces even countries that might otherwise prioritize employment and/or redistribution over low inflation to adjust to cross-national disequilibria by pursuing deflationary macroeconomic policies (see Hall 1994; Iversen 1998). Accordingly, the widespread adoption of fixed exchange rates among developed countries – first within the framework of the EMS, later in the EMU – has sometimes been interpreted as the triumph of neoliberalism across developed countries, along with the implementation of other monetary com-

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3 See for example: Poterba and Reuben (1999); Ahlquist (2006); Hallerberg and Wolf (2008); Beaulieu, Cox, and Saiegh (2012); Biglaiser and Staats (2012); or Bodea and Hicks (2015).

mitment devices that enshrine the primacy of low inflation over other policy goals, such as the delegation of monetary policy to independent central banks (McNamara 1999; Johnston 2016; Blyth and Matthijs 2017).

Indeed, in parallel with the adoption of these institutions, policy converged on focusing on lowering inflation and deficits across the developed world from the 1980s despite high levels of unemployment in many countries (Boix 2000; Garrett 1998). This universal policy pattern appeared to confirm early warnings that – once financial repression ended and capital was able to move freely across borders from the 1980s – “bond vigilantes” would coerce governments to prioritize low inflation by demanding much higher interest rates on bonds in high-inflation environments.<sup>4</sup> Consistent with these premises, some scholars have found that inflation was one of the strongest determinants of the spreads on bonds of developed country governments in the 1980s and 1990s until the mid-2010s (Mosley 2003, 80; Barta and Johnston 2018; 2021).

That said, it is unclear whether the widespread surrender to market preferences in *macroeconomic* policy led to convergence in *all* policy areas. Rather than being completely constrained in their policy choices by a golden straightjacket that makes funding conditional on generalized retrenchment and slashing of public expenditures (Korpi and Palme 2003; Pierson 1996; Pontusson 2005), governments seem to have retained policy autonomy when it came to raising and allocating resources within the binding overall fiscal and monetary constraints, with considerable leeway in managing the distribution of domestic incomes and the reproduction of labor (Garrett 1998). With yields noticeably less responsive to such policy choices than to inflation, governments seemed to have greater room to move in distributive and regulatory policy than the golden straightjacket assumed (Mosley 2003, 90–100, but cf. Barta and Johnston 2021).

This contrast in the degree of freedom governments enjoyed in different policy fields was attributed to the manner in which investors weigh the risks to the value of their investment in a country’s bonds and optimize their information processing to only concentrate on the indicators pertinent to the types of risks deemed most relevant for the given country. Investors who diversify their portfolios across large numbers of issuers around the globe cannot afford to monitor countries’ monetary and fiscal performance in any great detail beyond the handful of indicators that they consider most important for assessing the future value of their bonds. To economize on information processing, investors lump countries into broader categories of risk, based on cues like development, region or membership in international institutions, which then determine the appropriate set of indicators to pay attention to (Mosley 2003, 52; Gray 2013; Brooks, Cunha, and Mosley 2015). As default risk was believed to be negligible in the developed country category in the 1980s and 1990s, investors had no incentives to monitor and penalize policy variables beyond inflation, the main risk to the value of bonds, allow-

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4 “So if the fiscal and monetary authorities won’t regulate the economy, the bond investors will. The economy will be run by vigilantes in the credit markets” (Yardeni 1983).

ing governments ample room to move in domestic policy choices such as the size and distribution of spending (Mosley 2003, 54–61).<sup>5</sup>

This argument about investors’ information-optimizing strategies raises important questions about governments’ ability to modulate – and loosen – the constraints on some of their policy choices by committing to longer-term macroeconomic policy regimes that promise to quasi lock in the outcomes that investors attach primary importance to. If investors use cues to “pre-screen” risk and minimize the amount of information they have to monitor, governments themselves can in principle provide the appropriate cues to alter investors’ incentives to scrutinize and penalize their policies. According to this logic, signaling long-term commitment to investors’ preferred outcomes via the choice of monetary and fiscal institutions – like central bank independence, fixing exchange rates to a low-inflation anchor, or fiscal institutions meant to guarantee balanced budgets – might reduce the sensitivity of yields to specific policy choices in a wide range of areas.

Pondering the role of institutional commitment in creating greater elbow room for governments in domestic policies draws attention to a potential omitted variable in the room-to-move argument, likely to be significant both for empirical and theoretical reasons. Empirically, it is important to note the widespread adoption of institutional commitments to low inflation and deficits in developed countries in the 1980s and 1990s, such as fixed exchange rates (Melitz 1988; Fratianni and von Hagen 2019), independent central banks (Bernhard and Leblang 2002; Bodea and Hicks 2015), and fiscal rules (Hallerberg and Wolf 2008). Could the room to move that developed countries seemed to enjoy in that period be the result of successful signaling of commitment? Theoretically, commitment is important for better understanding investors’ singular focus on headline macroeconomic indicators, because it is not immediately obvious that lack of concern about default risk could in itself make investors oblivious to policy outcomes beyond price indices (and to a smaller extent deficits) without reassurance that low inflation is locked in by the institutional framework. In assessing the risk that future inflation might erode the value of the currency their bonds are denominated in, investors can draw on indicators beyond current inflation and deficits. Welfare spending, minimum wages, or the generosity of unemployment benefits and pensions provide cues about upward pressures on wage levels (along with current inflation, which influences inflationary expectations), while changes in deficits are indicative of prospective demand pull on inflation. Such policy outcomes are likely to be disregarded only if creditors expect monetary authorities to make determined efforts to counterbalance their impact on inflation.

Fixing exchange rates within international monetary cooperation – like the EMS and, later, the EMU – represents perhaps the purest case of long-term commitment to de-

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5 To the extent that investors go beyond the scrutiny of macroeconomic indicators, for example to incorporate elections and government partisanship in their decisions, they are assumed to do so to adjust their inflation expectations (Bernhard and Leblang 2002; Fowler 2006; Bechtel 2009; Sattler 2013).

flationary macroeconomic policies, because of the external constraint on governments' ability to renege on the exchange rate parity (see Backus and Driffill 1985; Rogoff 1985). Since domestic monetary and fiscal institutions – such as independent central banks and fiscal rules – have shown mixed success in cementing low inflation and balanced budgets and their outcomes have been found to differ depending on domestic politics (Grilli, Masciandaro, and Tabellini 1991; Alesina and Perotti 1995; Bernhard 1998; Broz 2002; Hallerberg and Wolf 2008; Bodea and Hicks 2015; Barta 2018), the impact of such domestic institutional commitment devices on yields is complicated by variation in credibility.<sup>6</sup> Within international commitment arrangements like the EMS, on the other hand, governments that fail to keep inflation in sync with the anchor either have to negotiate exchange rate readjustments with a number of important – but likely unaccommodating<sup>7</sup> – trading partners or pay the price of mismatched parities with the rest of the countries within the system in terms of eroding competitiveness, current account imbalances, balance of payment problems and, potentially, speculative attacks on the currency. The prospect of such penalties creates strong incentives for governments to prioritize low inflation. (Such prioritization might lead to the adoption of disciplining domestic institutions like fiscal rules and independent central banks to help ensure compliance, but the incentives to allow such institutions to dictate policy still arise from the external commitment to fixed exchange rates.) Obviously, irrevocable delegation of monetary policy from the domestic political sphere to the supranational level in the EMU cements the credibility of commitment to low-inflation policies even further, by breaking the link between domestic policy and the value of the currency in which bonds are denominated, and by entrusting the currency to an institution most insulated from political pressures to sacrifice inflation targets for other policy goals.

The above discussion suggests a difference in the degree to which bond yields are responsive to the threat of inflation across exchange rate regimes. In a flexible exchange rate regime, an increase in inflation generates an expectation of exchange rate depreciation. Conversely, in a *credible* peg and *a fortiori* in a monetary union, inflation is unlikely to be perceived as equally worrisome for two reasons: the exchange rate cannot devalue, and there are in-built mechanisms that ensure that any inflation spurt remains a short-lived phenomenon. In other words, in an inflationary environment, nominal interest rates are likely to be less responsive to inflation if the exchange rate is rigid than if it is flexible.

Associated with this, in the presence of such credible commitment to low inflation in credible fixed exchange rate regimes and monetary union, investors' concerns about the eroding of the value of the currency their bonds are denominated in is likely to be alleviated enough to induce investors to economize on their monitoring costs and ig-

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6 Bodea and Hicks (2015) find no impact of central bank independence on yields in the context of developed countries. Poterba and Reuben (1999) and Hallerberg and Wolf (2008) find that effective fiscal institutions lead to lower yields.

7 Höpner and Spielau (2018) describe the political conflicts of negotiating realignments between supporters of a “hard” and “soft” currency policy within the EMS's early years.

nore policy outcomes that they would scrutinize under floating exchange rate regimes. Therefore, we expect yields to have different sensitivity to policy indicators under different exchange rate arrangements. Under floating exchange rates, investors monitor all aspects of policy that can affect future inflation, such as current inflation, deficits, and social spending with implications for wage pressure.<sup>8</sup> Under fixed exchange rates, keeping an eye on current inflation gives investors sufficient information to assess governments' ability to comply with their inflation targets, if the parity is considered credible by investors. If it is not considered credible, investors broaden their scrutiny beyond inflation to other indicators. Under monetary union, even current inflation rates lose their relevance, because the value of the union's currency is insulated from domestic prices. In other words, credibly fixed exchange rates and, particularly, monetary union can create considerable room to move for developed country governments without fear of penalties on their fiscal policies *as long as investors see inflation as the single most significant threat to the value of their investments in the countries' bonds*. These considerations yield the following hypotheses:

- H1: As long as investors are worried about inflation but unconcerned about the possibility of default,*
- (a) yields are affected by inflation, deficits, social spending, and entitlements under floating exchange rates;*
  - (b) yields are not affected by any policy variables under monetary union; and*
  - (c) the impact of variables is a priori indeterminate under fixed exchange rates: if markets perceive them to be credible, outcomes should be similar to (b), but similar to (a) if markets perceive them as non-credible.*

However, the assumption that inflation is investors' paramount concern cannot be taken to hold universally independently of historical context. The international economic environment before the Covid-19 pandemic is very different from that of the 1980s and 1990s. Far from being the most important problem for policy-makers and bondholders, inflation declines in developed countries at this time. In spite of repeated injections of liquidity through various quantitative easing programs, central banks throughout the advanced world are unable to hit their low inflation targets, in some cases significantly undershooting them. We seemed to have entered an era of secular stagnation, in which growth is sluggish, interest rates are very low, especially on safe assets (Caballero, Farhi, and Gourinchas 2017), and monetary policy is unable to stimulate the economy due to the "zero lower bound" constraint (Summers 2014; Teulings and Baldwin 2014). Nor is it tenable to assume that investors still consider default risk negligible among developed countries. The new macroeconomic environment is characterized by a large increase in the stock of public debt, as governments had to bail out their domestic banks after the financial crisis and then had to intervene massively in response to the Covid-19

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8 Note, however, that the argument about information economizing (Mosley 2003; Gray 2013; Brooks, Cunha, and Mosley 2015) suggests that markets may respond more strongly to certain key indicators (e.g., inflation) than to secondary indicators.

pandemic to keep their domestic economies afloat. The developments of the past decade – including Greece’s downfall, a series of external bailouts in Europe, as well as the inability of several developed countries to return to trajectories of growth that would help ease their debt burdens in the wake of the 2008 global financial crisis – dispelled any illusion that developed countries cannot default (see Barta 2018).

Therefore, bondholders are now likely to worry about the solvency of governments, and to watch closely the indicators that are associated with their fiscal stance, such as the fiscal deficit and public debt. Unlike in the past, they are also more likely to scrutinize and penalize the domestic policies that they see as having the potential to cause a deterioration in debt sustainability. In this context, keeping a country’s fiscal position constant, bondholders may be averse to increases in social spending, particularly on entitlements (social insurance programs like pensions and unemployment/disability benefits), which constitute implicit long-term liabilities that tend to endogenously increase during periods of economic distress and can unambiguously be classified as social consumption (rather than investment) expenditures without any promise of improving long-term sustainability via increasing long-term growth.

Under the new circumstances, the tying of hands under rigid exchange rate arrangements is likely to create tighter, rather than looser, constraints on governments’ policy autonomy. Concerns about default magnify the importance of governments’ ability to use their full policy toolkit to address negative shocks to the economy to maintain their debt servicing capacity. Governments seen as unable to effectively address economic downturns – and exploit the safety valve of a (depreciating) nominal exchange rate – are going to be more strongly penalized for policies that increase their financial liabilities. While this may also apply to countries with floating exchange rates, there the impact is less certain (it depends on whether markets perceive the deterioration of fiscal conditions as a temporary phenomenon or a permanent one affecting the growth rate and hence the sustainability of debt negatively). Furthermore, the penalty is likely to be lower for such countries since they have more policy tools at their disposal when faced with external shocks that threaten to increase the real burden of debt. Members of the eurozone are especially constrained, as they are unable to let the exchange rate fluctuate to respond to economic shocks and simultaneously unable to adjust the nominal parity as they would be able to if they had maintained the EMS. Furthermore, like developing countries, they are de facto forced to borrow in a foreign currency, since the European Central Bank is institutionally prevented from lending to them directly to help them fund budgetary shortfalls (De Grauwe 2011; 2013). These considerations yield the following hypotheses:

*H2: Once the risk of default eclipses concerns about inflation,*

*(a) yields are sensitive to policy indicators linked to government liabilities, such as deficit, debt, and entitlement spending, in a monetary union;<sup>9</sup>*

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9 Again, the argument about information economizing suggests that markets may respond more strongly to particular fiscal variables.



- (b) *the response of yields to the same set of fiscal indicators is lower under floating exchange rate regimes than in monetary unions; and*
- (c) *the outcomes of fixed exchange rate regimes depend on the perceived credibility of the peg (and are similar to floating exchange rates or monetary union accordingly).*

Admittedly, the scope conditions for both of the above sets of hypotheses are difficult to pin down, because they are based on assumptions about investors' *perceptions* of the relative risk of inflation and default, which are difficult to capture, especially as they change across time.<sup>10</sup> Interview evidence allows for relative certainty that investors did indeed see inflation as a significantly greater threat to their investment than default in the 1980s and 1990s (Mosley 2003, 50–101), while obvious changes in circumstances in the past ten years lend credence to the conjecture that the relationship has been the polar opposite in more recent times. Yet, it is impossible to identify a clear landmark in the development of these perceptions, especially because a gradual process (of the waning importance of inflation differentials by the end of the 1990s) is combined with a series of shock-like events (the succession of sovereign debt crises within Europe in the early 2010s). Therefore, we simply posit that the behavior of yields changes, and leave the determination of the turning point to the data in our empirical analysis below. Combining the previous sets of hypotheses allows us to generate expectations about the time path of variables:

*H3: With the passage of time,*

- (a) *the sensitivity of yields to inflation declines in floating regimes;*
- (b) *the sensitivity of yields to fiscal indicators (deficit, debt, and social and entitlement spending) increases in monetary unions; and*
- (c) *the time path of fixed exchange rate regimes depends on whether they are perceived as credible, in which case the time path will be similar to monetary unions, or non-credible, in which case it will be similar to floating exchange regimes.*

### **3 Inflation risk, default risk, and exchange rate regimes: An analysis of twenty-three OECD countries**

We employ a moving window panel analysis on twenty-three OECD countries<sup>11</sup> from 1980 to 2017. Specifically, we analyze the interaction of exchange rate regimes and fiscal and monetary variables over multiple twenty-year (moving) windows. The strategy of

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10 For an innovative new account of how investor perceptions change and consensus is formed across markets, see Beckert and Arndt (unpublished manuscript).

11 These countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the UK, and the US.



repeating our regression on a moving sample of twenty-year periods allows us to eschew the problematic decision of identifying an a priori break point where investors shift from being most concerned about inflation toward being most concerned about default, especially since this shift is most likely gradual. Our windows are twenty years long, and the sample “moves” by one year each time. Our first estimate window covers the years 1980 to 1999, the second covers 1981 to 2000, the third 1982 to 2001, and so on. The last window covers the period from 1998 to 2017. Hence, we have nineteen twenty-year windows in total. Crucially, a moving window approach requires our data to be well-balanced; otherwise, the presence of missing data might drive differences in empirical results for our variables across our nineteen windows rather than the changing effects of those variables themselves over time (see Lall 2017). This means that we are somewhat constrained in the types of controls we can include in our models – we elaborate on this in greater depth below when we justify why we do not incorporate certain variables into our models. Our final model specification includes variables with complete time series data for all twenty-three countries. Our baseline model can be summarized as follows:

$$n.i.r_{i,t} = \beta_0 + \beta_1 \sum ER_{i,t} + \beta_2 MacroInd_{i,t} + \beta_3 (\sum ERregime_{i,t} * MacroInd_{i,t}) + \beta_4 \sum X_{i,t} + \beta_5 \sum Z_{i,t} + \beta_6 \sum T_t + \beta_7 \sum FE_i + \varepsilon_{i,t}$$

$n.i.r_{i,t}$ , our dependent variable, is the nominal interest rate on long-term securities (10-year treasuries in most cases) in country  $i$  in year  $t$ .<sup>12</sup> Data for nominal interest rates for most of our sample stems from the European Commission’s (2020) Annual Macroeconomic Database (AMECO). Nominal interest rate data for Australia, Canada, Iceland, New Zealand, Norway, and Switzerland is from the OECD (2020a).  $\sum ER_{i,t}$  is the exchange rate regime that country  $i$  adheres to in year  $t$ . The IMF’s classification scheme for exchange rate regimes identifies five categories: monetary union, floating exchange rates (which includes managed floats and free floats), conventional fixed exchange rate regimes (“fixed pegs,” such as the EMS’s exchange rate mechanism, or unilateral fixed pegs, such as existed between Austria and Germany in the late 1970s and 1980s), crawling pegs, and “other” managed arrangements.<sup>13</sup> Floating exchange rates serve as the (excluded) baseline category within our regression models.<sup>14</sup> Even though the IMF classifies conventional fixed pegs and crawling pegs as “soft peg” regimes, we treat them as separate categories because the latter allows gradual appreciation/depreciation in

12 All countries have complete time series for nominal interest rates, except Iceland, which lacks interest rate data before 1994.

13 This “other” category captures residual arrangements that do not fit into other classification schemes. Within our sample, only Switzerland fell into this category (only for the years 2011 and 2012). In 2011 and 2012, the Swiss National Bank established a minimum exchange rate for the Swiss franc vis-à-vis the euro to combat significant overvaluation of its currency (IMF 2012, 13). This managed arrangement was abandoned for a crawl-like peg in May 2013, which in turn was abandoned for a floating exchange rate regime in January 2015 (IMF 2014 and 2016).

14 The euro is in a floating exchange rate regime vis-à-vis the other currencies. However, our focus is on the member countries of the euro, which are unable to let their currency float in order to ease the adjustment to external shocks and capital flight.

Table 1 Exchange rate regimes within the OECD (1980–2017)

Exchange rate regime	Members (by year)	Degree of restrictiveness
<i>Monetary union</i>	Austria (1999–2017), Belgium (1999–2017), Finland (1999–2017), France (1999–2017), Germany (1999–2017), Greece (2001–2017), Ireland (1999–2017), Italy (1999–2017), Luxembourg (1999–2017), Netherlands (1999–2017), Portugal (1999–2017), Spain (1999–2017)	<i>Most restrictive</i>
<i>Fixed peg</i>	Austria (1980–1998), Belgium (1980–1998), Denmark (1980–2017), Finland (1980–1991, 1996–1998), France (1980–1998), Germany (1980–1998), Greece (1998–2000), Iceland (1990–2000), Ireland (1980–1998), Italy (1980–1991, 1996–1998), Luxembourg (1980–1998), Netherlands (1980–1998), New Zealand (1983–1984), Norway (1980–1991), Portugal (1992–1998), Spain (1986–1998), Sweden (1980–1992), UK (1991–1992)	
<i>Crawling peg</i>	Australia (1980–1982), Greece (1980–1997), New Zealand (1980–1982), Portugal (1980–1991), Switzerland (2013–2014)	
<i>“Other” managed arrangement</i>	Switzerland (2011–2012)	
<i>Floating exchange rate</i>	Australia (1983–2017), Canada (1980–2017), Finland (1992–1995), Iceland (1980–1989), Iceland (2001–2017), Italy (1992–1995), Japan (1980–2017), New Zealand (1985–2017), Norway (1992–2017), Spain (1980–1985), Sweden (1993–2017), Switzerland (1980–2010, 2015–2017), UK (1980–1990, 1993–2017), US (1980–2017)	<i>Least restrictive</i>

the anchor currency (which allows for greater adjustment in the event of rising inflation), while the former places greater constraints on movements vis-à-vis the anchor currency,<sup>15</sup> and hence presents a stronger commitment device. Table 1 illustrates the degree of restrictiveness of each of these regimes and presents the distribution of our sample across the five categories for our 1980–2017 time period. Data on exchange rate regimes since 1990 stems from various IMF Annual Reports on Exchange Arrangements and Exchange Restrictions (for the years 2004, 2006, 2008, 2012, 2014, 2016, and 2018) and Bubula and Ötcker (2002). Data on exchange rate classification before 1990 was taken from the archives of countries’ central banks and other government archives (see Appendix A for a list of these sources by country).

$MacroInd_{i,t}$  are the monetary and fiscal indicators that our hypotheses posit might affect the risk premia component of nominal interest rates, in country  $i$  at time  $t$ . These include inflation, deficits, government debt, total social spending as well as spending on entitlements. As explained above, we single out entitlement spending for scrutiny from among the various types of social spending because of their expected impact on long-term solvency (constituting implicit liabilities that tend to endogenously increase during periods of economic distress and do not improve long-term growth prospects). Incidentally, entitlements are also the only subcomponent of social spending for which

15 Realignments occur in fixed pegs, but they usually require the agreement of all parties, which makes adjustment more difficult (see Höpner and Spielau 2018).

there is balanced data for our entire sample.<sup>16</sup>  $\sum ERregime_{i,t} * MacroInd_{i,t}$  is the interaction term between these indicators and the exchange rate regime that country  $i$  belongs to at time  $t$ . This interaction captures differences in the impact of our variables of interest on nominal interest rates under different exchange rate regimes. Data for *inflation* stems from the OECD (2020b). For data on *government debt and the fiscal deficit*<sup>17</sup> (both as a percentage of GDP) we rely on Armingeon et al. (2020), who have extrapolated government debt and fiscal deficit data for all countries in our sample back to 1980.<sup>18</sup> For reasons of collinearity, we test the impact of debt and deficit in separate models. Data for *social spending* (which includes spending on cash benefits, such as entitlements, and in-kind social transfers, such as healthcare, education, social housing, etc.) stems from the OECD (2021), while figures on *entitlement spending* (also called social security transfers) include pension spending, unemployment, sickness and disability benefits, and family allowance and are taken from Armingeon et al. (2020). Rather than placing all interactions between our five policy variables and exchange rate regimes into the same model, we examine them one by one, giving us a total of five models for our moving window analysis. All models, regardless of the interaction term, control for inflation, while all models except the one incorporating the interaction between the fiscal deficit and exchange rate regime use government debt as the primary default risk control.  $\sum X_{i,t}$  is a vector of economic indicators that are commonly expected to affect bond yields, in country  $i$  at time  $t$ . These include GDP growth,<sup>19</sup> the (first differenced) unemployment rate,<sup>20</sup> and the current account balance<sup>21</sup> (as a percentage of GDP).

Ideally, we would like to control for a number of factors that affect domestic financial market conditions and, therefore, modulate the demand for countries' bonds, such as capital mobility, the share of foreign/domestic-denominated debt within the total debt stock, and measures of financial repression and/or home bias. Data on capital mobility, measured by the Chinn-Ito capital account openness index (2021), is missing for Luxembourg for the entire period and for Switzerland before 1996. We exclude this control from our main models to preserve our sample, but we emphasize that when this variable is controlled for (which would omit those observations lacking data), our results are similar to those produced below (we present these results in Appendix B). Data on the currency denomination of sovereign debt from the Bank of International

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16 Data for taxation and discretionary types of social spending (such as spending on social services, health, education, and public goods) is subject to much more pervasive missing data problems, particularly before 1995, in the OECD and EU AMECO macroeconomic databases.

17 Positive/negative values indicate a fiscal deficit/surplus.

18 While government debt data is complete for all countries within our sample, the database lacks fiscal deficit data only for New Zealand until 1985 and Switzerland until 1989. For this reason, we use government debt, rather than the fiscal deficit, as our main control for a country's creditworthiness in the other moving window analyses.

19 Data is taken from the OECD (2019).

20 We take the first difference of unemployment because its time series is non-stationary across our panel. Data is taken from the European Commission's (2020) AMECO Database.

21 Data is taken from the European Commission's (2020) AMECO Database and the OECD (2020c).

Settlements is missing observations for most of our sample of countries for most of our sample period (e.g., data for the United Kingdom is missing all the way up to 1998, for Switzerland up to 1999, for Norway up to 2005, and for Japan up to 2012), making it impossible to directly control for currency denomination. That said, we surveyed the available data to identify countries whose proportion of foreign currency-denominated debt is more than marginal (greater than 2 percent of the total outstanding debt), in order to identify cases in which the “original sin” phenomenon (i.e., the problem of being indebted in foreign currency) could complicate the determination of yields. In our sample, only Canada and Sweden had shares of foreign currency-denominated debt that ever went beyond 2 percent, based on the available data (in the case of Canada the largest share was around 10 percent, in Sweden around 17 percent). As a robustness check, we ran our models excluding these two countries, and the results do not change. (We present these results in Appendix C.) Controlling for financial repression/home bias proved to be the greatest challenge, because we are unaware of any quantitative operationalization of the concepts (beyond the qualitative overview provided in Reinhart and Sbrancia, 2011, for eleven out of the twenty-three countries in our sample). While financial repression/home bias is likely to differ both across countries and across time and could affect our results to some extent, we suspect that intertemporal variation within countries is likely to be limited enough to wash out in our twenty-year windows, whereas significant, lasting cross-country variation in financial repression/home bias can be approximately controlled for by country fixed effects.

$\sum Z_{it}$  is a vector of political factors that have been found by various studies to move markets (e.g., Bechtel 2009; Breen and McMenamin 2013; Sattler 2013; Barta and Johnston 2018). These include three controls. The first is whether country  $i$  had an election in year  $t$  (1 if yes, 0 if no). The second is the partisanship of the executive. We control for this variable via executive seat share held by left/social democratic parties and center/Christian Democratic parties. Conservative/liberal party seat share serves as the omitted baseline category. The third control is the degree of power-sharing within government, for which we use Breen and McMenamin’s (2013) concentration indicator, based on Lijphart’s (1999) measure of joint power in the executive parties realm. Data for our political variables stems from Armingeon et al. (2020). One crucial political variable we purposefully do *not* incorporate into our models, but which has been discussed at length in its impact on inflation and inflation expectations, is central bank independence (CBI). The primary problem with incorporating CBI in our analysis is that its value for all eurozone countries after 1999 (2001 for Greece) perfectly correlates with the monetary union exchange rate regime dummy, causing this exchange rate category to be dropped from our model output. In other words, by controlling for CBI, we could not examine how monetary union tempers (or magnifies) how our policy variables impact the risk premia on government bonds.

$\sum T_t$  is a vector of  $n-1$  time dummies to control for (global) financial shocks and changes in global liquidity that may prompt an increase in interest rates on government debt across all countries in a given year. Crucially, these dummies control for large-scale

changes in central bank behavior, such as the massive increase in liquidity due to quantitative easing in the wake of the financial crisis. Time dummies also capture any change in the world interest rate.  $\sum FE_i$  is a vector of fixed effects to control for omitted variables that affect nominal interest rates across countries but do not vary over time (i.e., reserve currency status, which also accounts for the likelihood that a given country's bonds are considered "safe assets" during "flights to safety"). Finally, we incorporate country-clustered standard errors to rectify bias in our standard errors driven by heteroskedasticity and contemporaneous correlation.

## 4 Results section

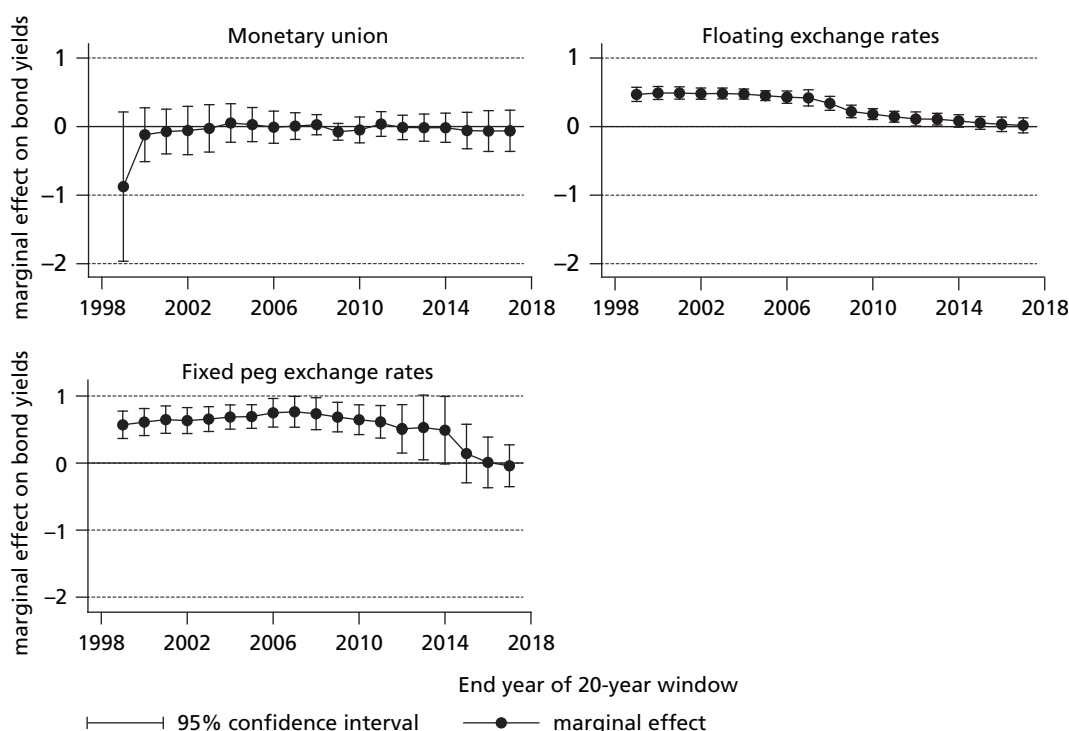
### Results

In order to save space (recall that nineteen regression models for each of the five exchange rate regime/policy variable interactions we examine are estimated in our moving window approach), we do not report the coefficients of control variables, and we present our key results graphically, plotting the point estimates of the marginal effects of our variables of interest on nominal interest rates, conditioned by exchange rate regime<sup>22</sup> for each twenty-year window, as well as the 95 percent confidence interval for that point estimate. The full tables of regression results and marginal effects are provided in the appendices. If the confidence interval straddles zero – marked by the horizontal black line – this indicates a statistically insignificant effect. Windows start with the 1980–1999 period and end with 1998–2017. Although our interactive models account for all five exchange rate regimes, we do not present here the results for "other managed arrangements" and crawling pegs, because both categories have a large number of years with few or no observations in them, and hence have expansive confidence intervals that make it difficult to observe the results for the fixed peg, floating, and monetary union exchange rate regime categories within the same figure. We present the results for crawling pegs in Appendix D. We do not present those for the "other managed arrangement" category, because this regime only existed for two country-years within our sample. Furthermore, it is important to emphasize that the graph for fixed exchange rates is heavily influenced by Denmark, which is the only country in our sample to remain in this exchange regime after 1999. Figures 1, 2, 3, 4, and 5 present results for the interaction effect between exchange rate regime and inflation, debt, the deficit, social spending, and entitlement spending, respectively.

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22 Countries may be present in the results of two different exchange rate regimes within multiple windows if they leave one for the other during the twenty-year period.

Figure 1 The impact of inflation on bond yields by exchange rate regime



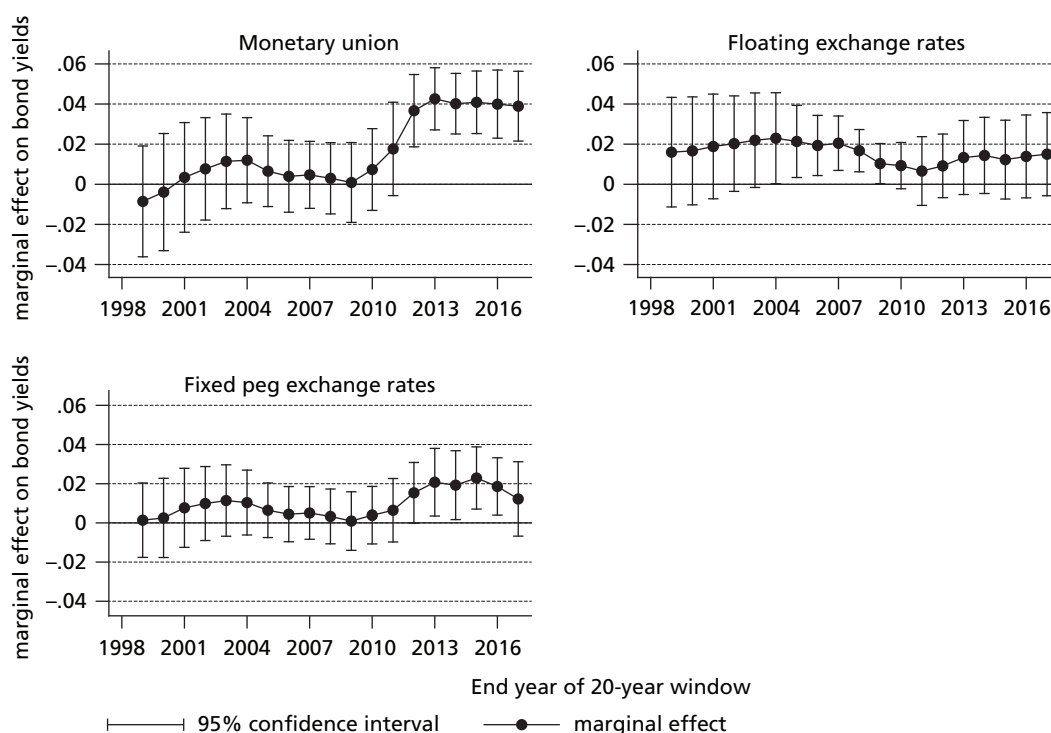
Results presented in Figure 1 show that inflation has a significant positive effect on nominal interest rates in countries in floating and fixed exchange rate regimes for much of the period under consideration. A 1 percent increase in inflation leads to a 50 basis point and 70 basis point increase in nominal interest rates for countries in floating and fixed exchange rate regimes, respectively, in early windows. However, inflation loses significance in the most recent windows, in which the deflationary years after the financial crisis and the European debt crisis carry greater weight. In contrast, interest rates do not respond to inflation in countries in monetary union in any sample windows.<sup>23</sup> These results bear out hypotheses 1a and 1b, demonstrating that in an inflationary environment, inflation matters in floating exchange rates but not in a monetary union. Interestingly, in an inflationary environment, markets treat fixed exchange rates similarly to, and in fact a bit worse than, floating exchange rates. Results also substantiate hypothesis 3a that the inflation penalty in floating (and fixed) exchange rates declines over time. In fact, interest rates cease to be sensitive to inflation under any exchange rate regime in a deflationary environment.

Results presented in Figure 2 show that public debt has no significant effect on interest rates under any exchange rate regime in the early windows. For countries with floating exchange rates, the point estimate of the marginal effect of government debt remains at

23 The wide confidence interval for the first window is due to this window containing only the first year of monetary union: 1999.



Figure 2 The impact of government debt on bond yields by exchange rate regime

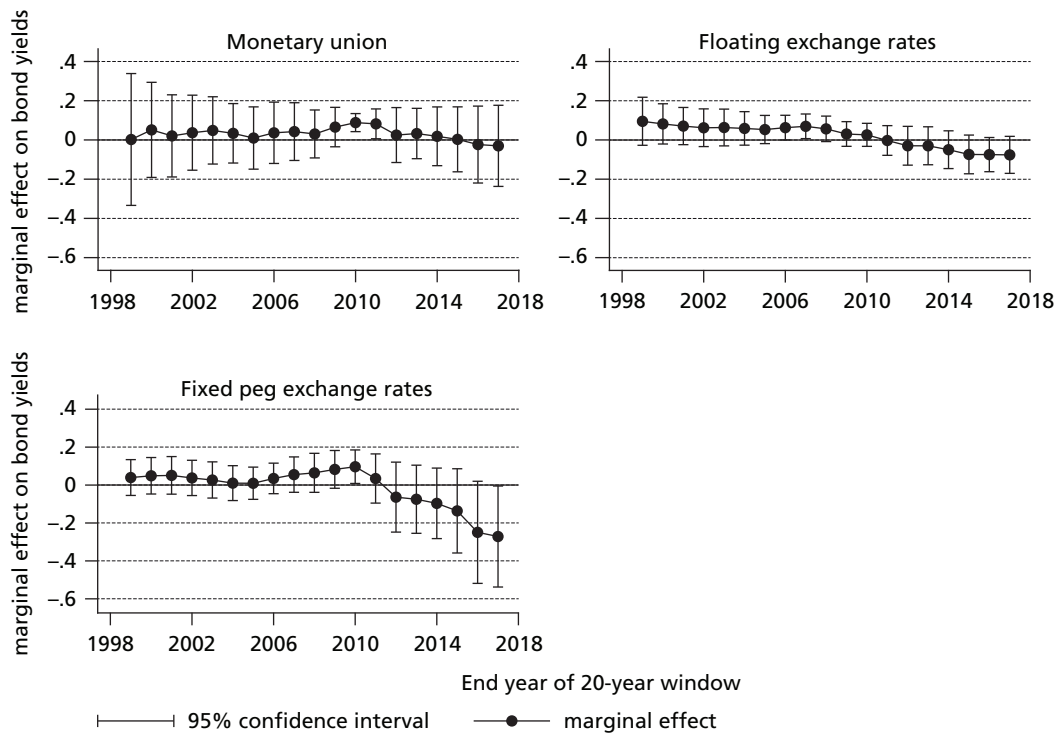


about 2 percent throughout the period, which implies that a 10 percent increase in public debt is associated with a 20 basis point increase in nominal interest rates, although the confidence intervals often straddle the zero line. Statistically significant effects emerge when the years around the US subprime mortgage crisis and the subsequent global financial crisis have greatest weight in the windows, but the significance disappears once the 2010s enter the window. A similar story emerges for fixed exchange rates: government debt briefly has a significant positive effect on nominal interest rates (once the early 2010s enter the window) but then loses its significance for the last window. In contrast, government debt has a significant and prolonged positive effect on nominal interest rates in countries in monetary union throughout the last six windows. These results confirm the expectation (formulated in hypotheses 2a and 3b) that debt would gradually be penalized by bond yields for countries in a monetary union as worries about inflation gave way to concerns about default. They also bear out the prediction of hypothesis 2b that the impact of debt is stronger in a monetary union than in fixed or floating exchange rates.

Figure 3 shows that the marginal effect of fiscal deficits is never statistically significant, except for a select number of windows: deficits were associated with significantly higher bond yields for countries in floating exchange rate regimes for the 1987–2006 and 1988–2007 windows, for countries in monetary union for the 1991–2010 and 1992–2011 windows, and for countries in fixed pegs for the 1991–2010 and 1998–2017 windows. (For the latter, the effect on bond yields is significantly *negative*, which is likely explained by the fact that this category only includes Denmark in the years after



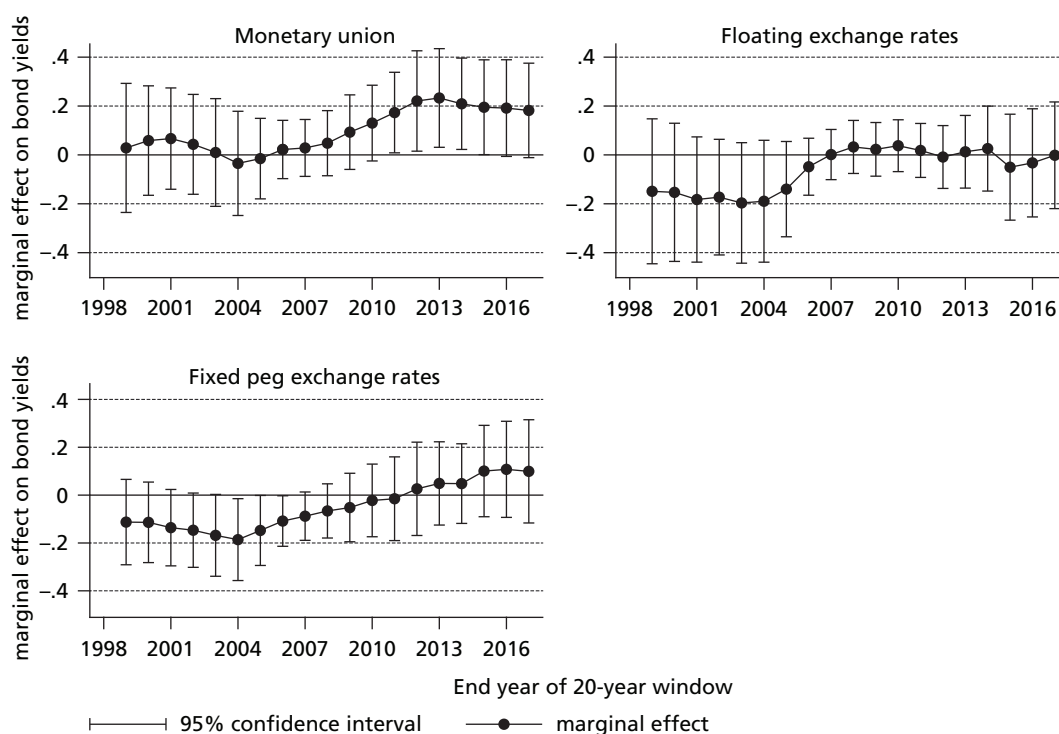
Figure 3 The impact of fiscal deficits on bond yields by exchange rate regime



2000. Therefore, the counterintuitive effect might possibly reflect some idiosyncratic factor in the AAA-rated country that managed to generate persistent fiscal surpluses in the 2000s.) The statistical significance of the marginal effect in earlier windows for countries in floating regimes, compared to countries in monetary union and fixed pegs, can likely be attributed to the fact that their members were more heavily exposed to the banking and housing crises of the mid- to late 2000s than they were to the sovereign debt crises of the late 2000s and early 2010s. Point estimates display a declining trend across all three exchange rate regimes starting in 2010, which suggests that deficits became less important over time for the determination of nominal interest rates. These results are not consistent with our theoretical expectations expressed in hypothesis 1a that deficits would always have a positive effect on yields under floating exchange rates in an inflationary regime. Nor do they substantiate the expectations that deficits positively affect interest rates in countries under monetary union once investors start to see default as a real risk (hypothesis 2a) and that the penalty associated with deficits is lower under floating exchange rates (hypothesis 2b).<sup>24</sup> Combined with the findings on government debt, however, the pattern of results suggests that in a deflationary environment it may be government debt, not public deficits, that carries more importance for financial markets when assessing the default risk of countries, particularly those in a monetary union.

24 However, they are in line with the information-economizing hypothesis that markets do not penalize other possible determinants of country risk once the key indicator (in this case inflation) is controlled for.

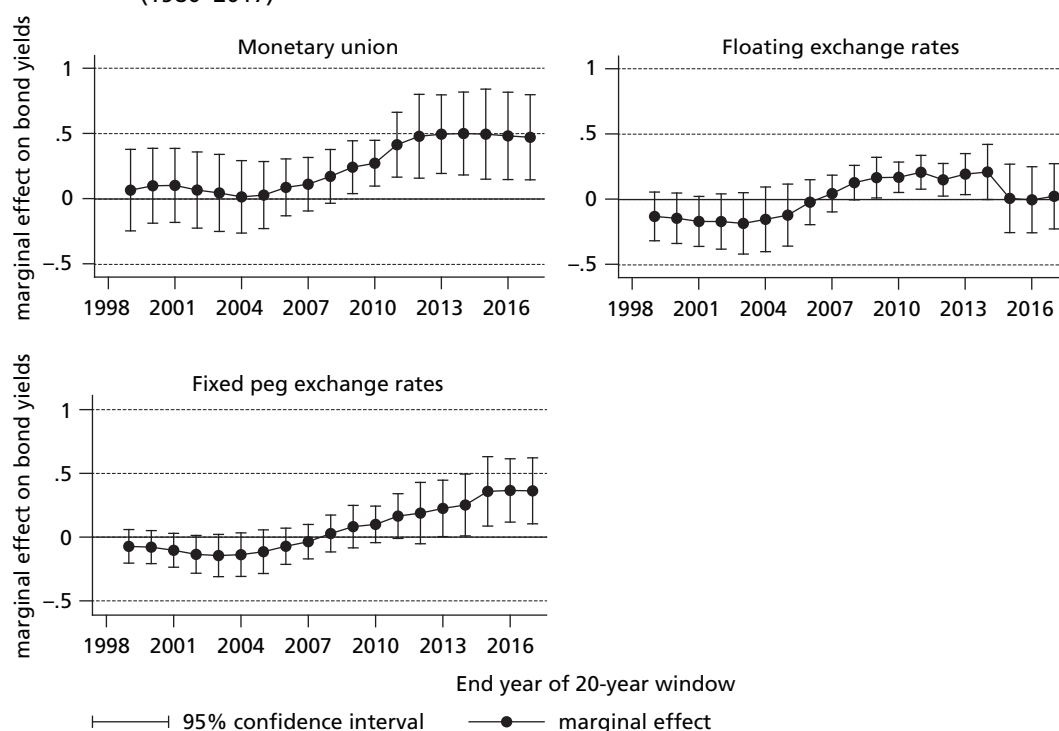
Figure 4 The impact of social spending on bond yields by exchange rate regime



As revealed in Figure 4, the marginal effect of social spending on bond yields is statistically insignificant for countries in floating exchange rate regimes in all windows. (Higher levels of social spending are associated, unexpectedly, with significantly *lower* bond yields for countries in fixed pegs for the 1985–2004, 1986–2005, and 1987–2006 windows, but that, again, is likely the result of the “Denmark-effect” described above.<sup>25</sup>) For countries in monetary union, however, higher social spending is associated with higher bond yields, once the years of the European debt crisis fully enter the window: coefficients are significantly positive for the 1992–2011, 1993–2012, 1994–2013, 1995–2014, and 1996–2015 windows. These results contradict the expectation expressed in hypothesis 1a that investors might use levels of social spending to gauge inflation risk in an inflationary environment under floating exchange rates, but they substantiate our predictions in hypotheses 2b and 3b that countries in monetary union (but not other exchange rate arrangements) would face the most significant penalties for higher (public) spending in later windows when default risk trumps inflation risk. In a deflationary environment, countries that float their currencies may have greater flexibility over the determination of their social spending policies because they are not penalized for higher spending levels.

25 When capital account (financial) openness is controlled for, the effect of social spending on bond yields for countries in fixed pegs becomes non-significant for all windows (the results for countries in monetary union continue to hold – see Figure B.4 in Appendix B).

Figure 5 The impact of entitlement spending on bond yields by exchange rate regime (1980–2017)



Results for entitlement spending (Figure 5) go in the same direction as those for the broader category of social spending and are statistically stronger. Displaying a roughly similar pattern as public debt (perhaps unsurprisingly, given that entitlements are implicit liabilities that governments are legally obligated to pay to beneficiaries), they show that the response of bond yields to entitlement spending rises significantly over time under monetary unions (confirming hypotheses 2a and 3b), and they are higher under monetary union than under floating exchange rates in a deflationary environment (confirming hypothesis 2b). Entitlements temporarily gain significance in the windows around the global financial crisis in floating exchange rate regimes, and permanently in monetary union after the onset of the European debt crisis. For countries in fixed exchange rate regimes, entitlements only gain significance in the mid-2010s. Furthermore, the penalty is highest for monetary union countries. However, entitlements are not used by investors to gauge inflation risk in an inflationary environment (contradicting hypothesis 1a). It is important to highlight that the regressions control for government debt; hence the impact of entitlement spending is over and above its effect on increasing government debt.

## Robustness checks

These results indicate a strong contrast between the penalties on fiscal variables (primarily debt and entitlement spending) within and outside of monetary union once default is considered a real possibility. We attribute this contrast to perceptions about differences in governments' macroeconomic maneuvering space – and thus their ability to sustain debt – in and out of monetary union. But is macroeconomic maneuvering space a universal concern for all countries within a monetary union? The EMU united countries of fairly varied credit profiles, and it is not inconceivable that the penalties we detected among monetary union members might be driven by outliers perceived to have the least sustainable debt situation. Therefore, as a robustness check, we replicate our analysis excluding outliers with (1) the highest debt-to-GDP ratios prior to the European debt crisis (Belgium, Greece, and Italy) and (2) the lowest credit ratings prior to the crisis (Greece, Italy, and Portugal) in order to ascertain whether our findings for monetary union members were driven by a handful of heavily indebted members at greater risk of default, or whether they hold more generally. We purposefully exclude countries with the least favorable credit and debt profiles *prior* to the crisis, rather than countries hardest hit by the debt crisis (often referred to derogatorily as the PIIGS – Portugal, Ireland, Italy, Greece, and Spain) in order to avoid lumping together countries that could reasonably be perceived as at risk from the start of the monetary union (Portugal, Italy, and Greece) with countries that had excellent credit profiles until they fell victim to the turmoil following the subprime crisis (Ireland and Spain both had very low debt-to-GDP ratios and AAA credit ratings up to the crisis), which would constitute a post hoc rationalization for picking our countries of concern (and an unreflective use of PIIGS as a category).

The results of the robustness checks are presented in Appendix E (countries with the highest debt-to-GDP ratios are excluded) and F (countries with the lowest credit ratings are excluded). They mostly confirm our results for the full sample. When the most heavily indebted members of the monetary union are excluded (see Figure E.2 in the Appendix), debt has a significant positive impact on bond yields once the years of the European debt crisis enter the sample. While the magnitude of this impact declines in later windows, it still remains significant throughout. When countries with the lowest credit ratings are excluded (Figure F.2 in the Appendix), debt has a prolonged positive and significant impact on bond yields within the monetary union, not only after the crisis but also in windows which only include pre-crisis years. In contrast to the results for the full sample, fiscal deficits have a prolonged positive and significant impact on bond yields for monetary union countries once the crisis sets in (see Figures E.3 and F.3). This suggests that the fiscal deficit of heavily indebted and lower-rated EMU members was treated more leniently by markets during the crisis than the fiscal deficits of EMU members with better fundamentals (perhaps reflecting a perception that risk is to some extent pooled between EMU members, due to the weak credibility of the “non-bailout clause” of the Maastricht Treaty). The impact of social spending on bond yields – which lacked significance except for a select number of windows in our full sample – also lacks significance when the EMU's most indebted and lowest rated members are excluded. Likewise, the

significantly positive and prolonged effect of entitlements on bond yields post-crisis also survived in our restricted sample. Results for inflation remain consistent across both robustness checks: countries in monetary union continue to be shielded from inflation risk.

## 5 Discussion and conclusion

In this paper, we have analyzed the impact of economic and fiscal variables on nominal long-term bond yields in advanced countries, hypothesizing that the effects would depend both on the exchange rate regime and on the macroeconomic environment. Membership in a monetary union provides protection against the main risk perceived by international financial markets in an inflationary environment: the risk of erosion of the real value of financial assets. By contrast, in a deflationary environment, the main risk is the inability of governments to service their debts. In such an environment, exchange rate rigidity, especially membership in a monetary union, becomes a liability because it constrains the ability of governments to react quickly and effectively to adverse shocks.

The pattern of results largely supports our theoretical expectations. We find that monetary union used to have a distinct advantage over floating exchange rates (and fixed pegs) up until the early 2010s. A marginal increase in inflation was associated with zero penalty for members of the former and positive penalty for countries with the latter. However, the inflation advantage of monetary union withered away toward the end of the period we analyze, when, independently of the exchange rate regime, inflation ceased to affect bond yields significantly. Conversely, from the early 2010s, countries in monetary union started paying a higher price for increases in government debt relative to both floating and fixed exchange rates and were punished persistently for increases in entitlement spending (but only temporarily for social spending in general). The significance of annual deficits is unclear even in a deflationary environment. Fiscal deficits trigger no significant penalties under any exchange rate regime except in a small number of windows and subsamples, suggesting that investors focus on debt as a longer-term indicator of solvency – rather than on any one year's borrowing or saving – when setting risk premia.

Overall, these findings qualify and contextualize earlier literature on governments having room to move even under conditions of financial globalization and capital mobility (Garrett 1998; Mosley 2003). Consistent with this literature, we find that markets were solely concerned about inflation until the 2000s, and they did not penalize fiscal variables (deficits, debt, and social expenditures) once inflation was controlled for. For countries in a monetary union, markets did not even penalize inflation. The implication is that governments wanting to avoid the inflation penalty had to reassure markets that they had put in place institutions to ensure the prevention or prompt reabsorption of an inflationary spike. This required them to tie their hands in a currency union. However, the outlook became very different in a deflationary environment where inflation

risk became negligible. No longer concerned about inflation, financial markets focus on default risk and penalize governments for increasing their debt, but only when governments have deliberately limited their macroeconomic discretion in a monetary union. In this new environment, exchange rate rigidity is a risk itself.

Interestingly, our results also suggest that fixed exchange rates are treated similarly to floating exchange rates under inflationary conditions (increases in inflation lead to significant increases in bond spreads) and similarly to monetary unions under deflationary conditions (increases in public debt and entitlement spending drive up bond yields). In other words, they seem to combine the downsides of the other two exchange rate regimes and none of the upsides. That said, we reiterate that the results for fixed exchange rates must be taken with a grain of salt, as they are largely shaped by one country, Denmark, which remained the only representative of this regime in our sample after 2000.

Finally, our results also speak to a long debate in political economy – and macroeconomics – about the benefits of hands-tying institutional devices. During the 1980s and early 1990s – when inflation *was* a pivotal risk for investors – prominent macroeconomists extolled the virtue of inflation-minded independent central banks and rigid exchange rate arrangements that removed governments' capacity to devalue (Barro and Gordon 1983; Rogoff 1985; Grilli, Masciandaro, and Tabellini 1991). These institutions did what they were intended to. In the 1980s and especially the 1990s, there was significant (and sustained) downward convergence in inflation rates across post-industrial countries. However, little consideration was given to whether these institutions would constrain governments' capacity to stave off (and recover from) debt crises and sudden stops, as the European debt crisis made painfully clear. The past ten years have demonstrated that the virtues of inflationary commitment devices may not only be obsolete in an era of quasi deflation, but also have transformed into liabilities.

## Appendix A Sources used for identifying sample countries' exchange rate regimes over time

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## Appendix B Results controlling for capital mobility (measured via the Chinn-Ito capital account openness index)

Figure B.1 The impact of inflation on bond yields by exchange rate regime

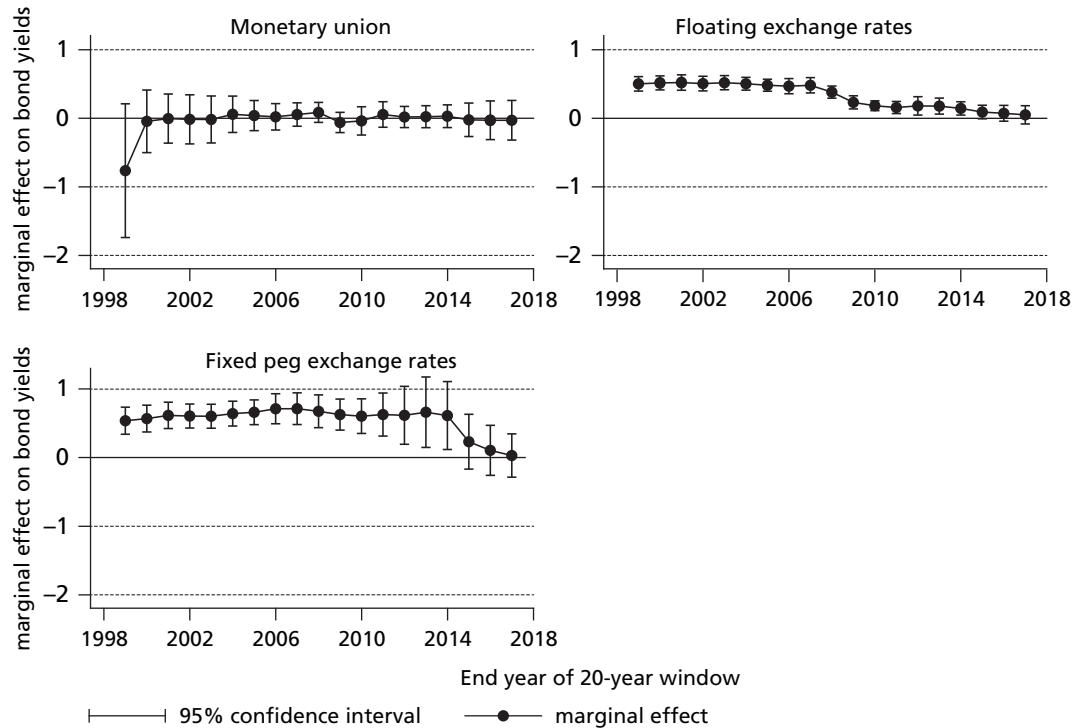


Figure B.2 The impact of government debt on bond yields by exchange rate regime

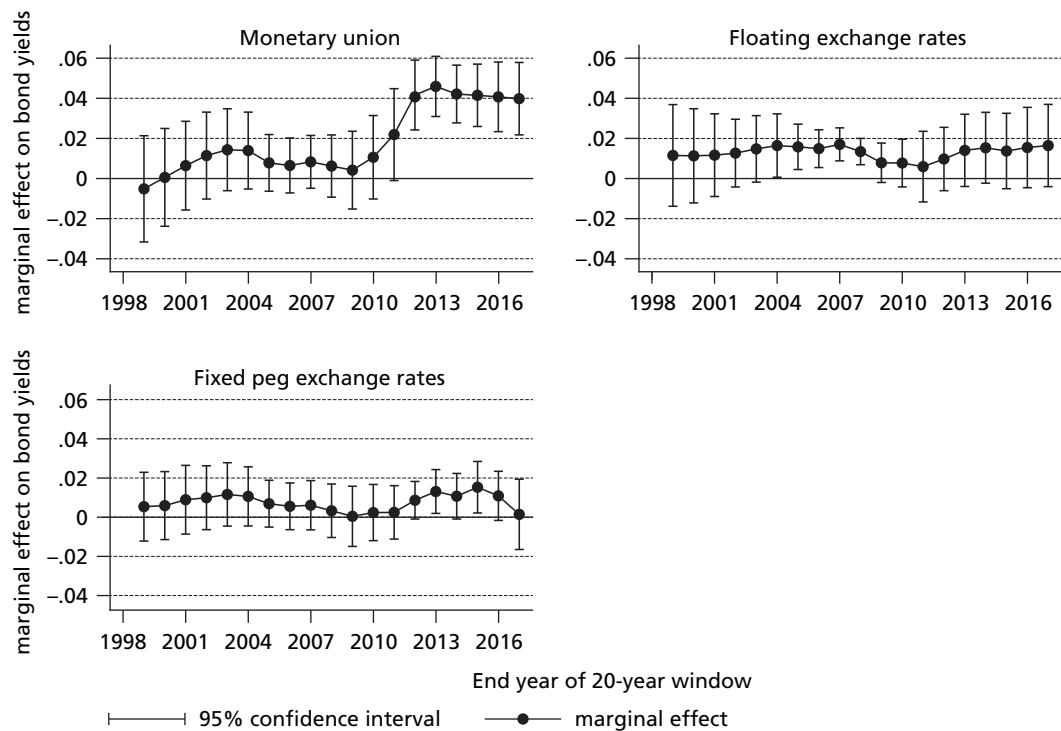


Figure B.3 The impact of fiscal deficits on bond yields by exchange rate regime

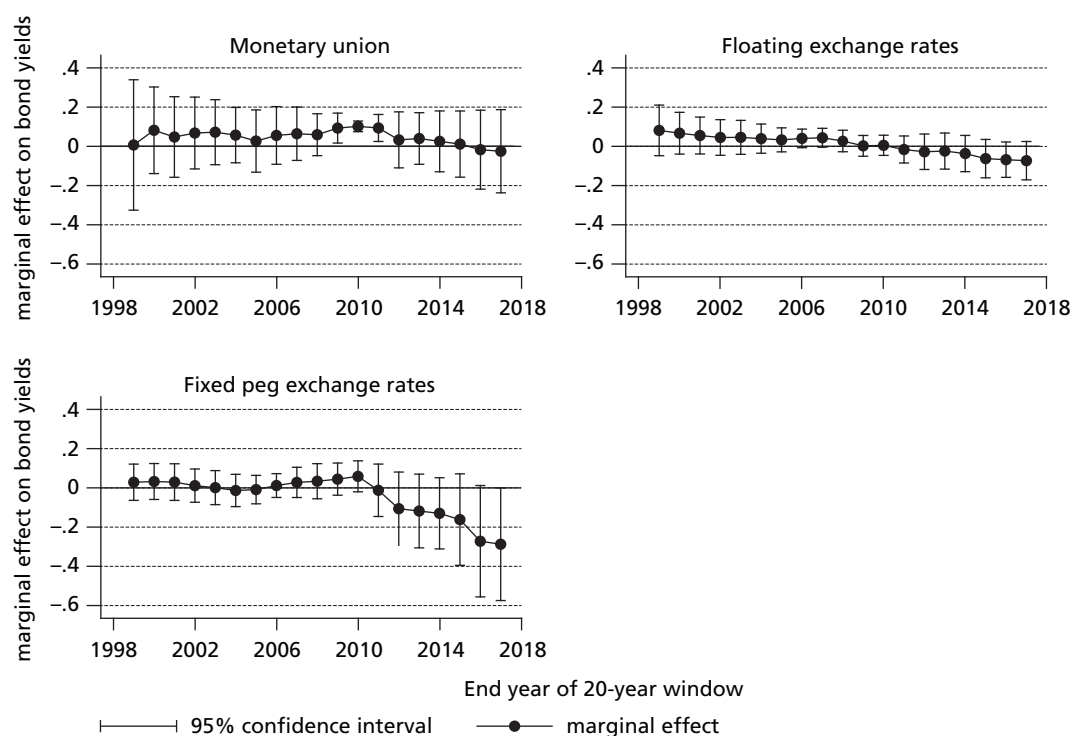


Figure B.4 The impact of social spending on bond yields by exchange rate regime

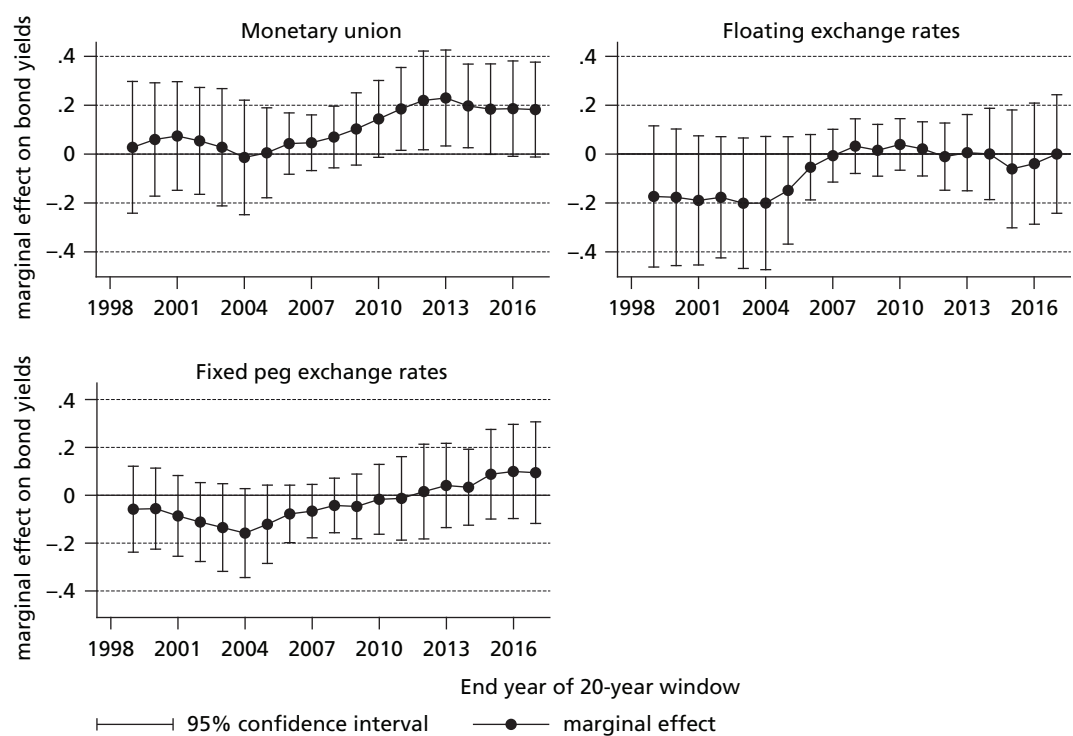
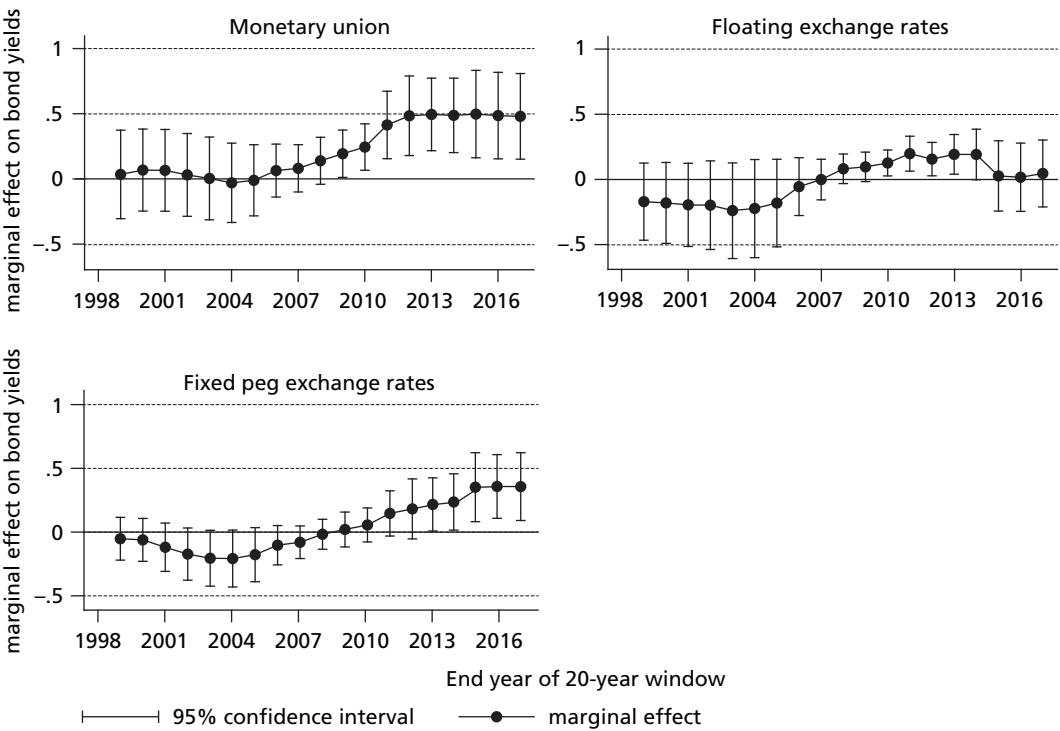


Figure B.5 The impact of entitlement spending on bond yields by exchange rate regime



## Appendix C Results excluding countries with a greater share of foreign currency-denominated debt than 2 percent (Canada and Sweden)

Figure C.1 The impact of inflation on bond yields by exchange rate regime

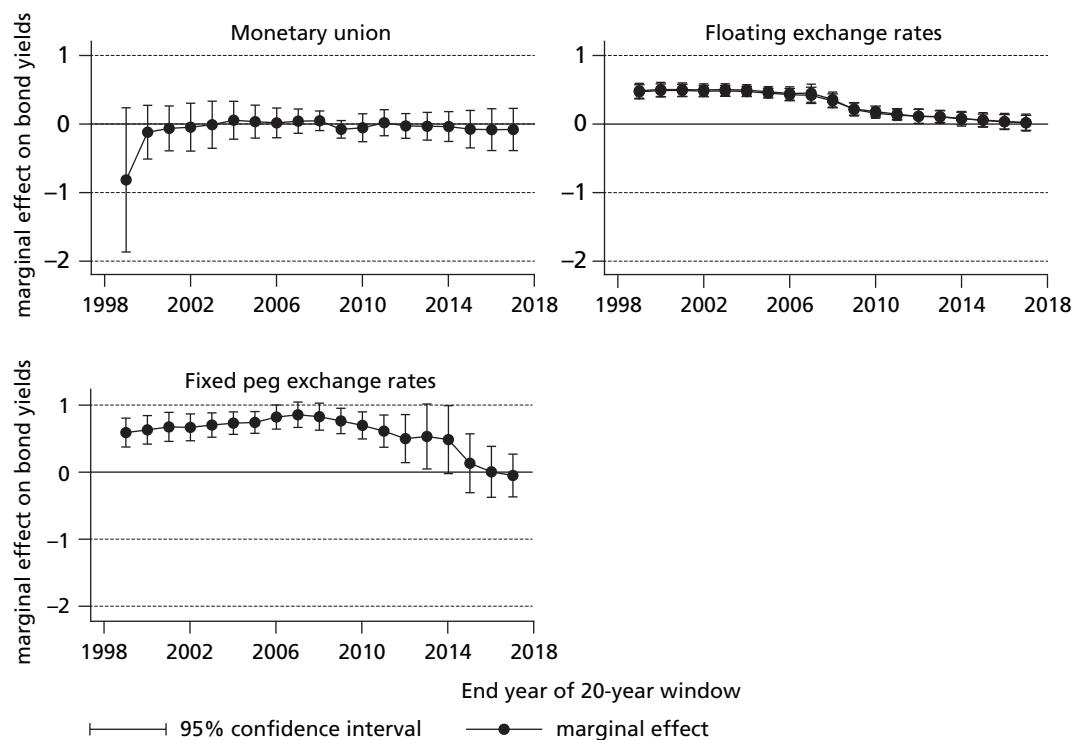


Figure C.2 The impact of government debt on bond yields by exchange rate regime

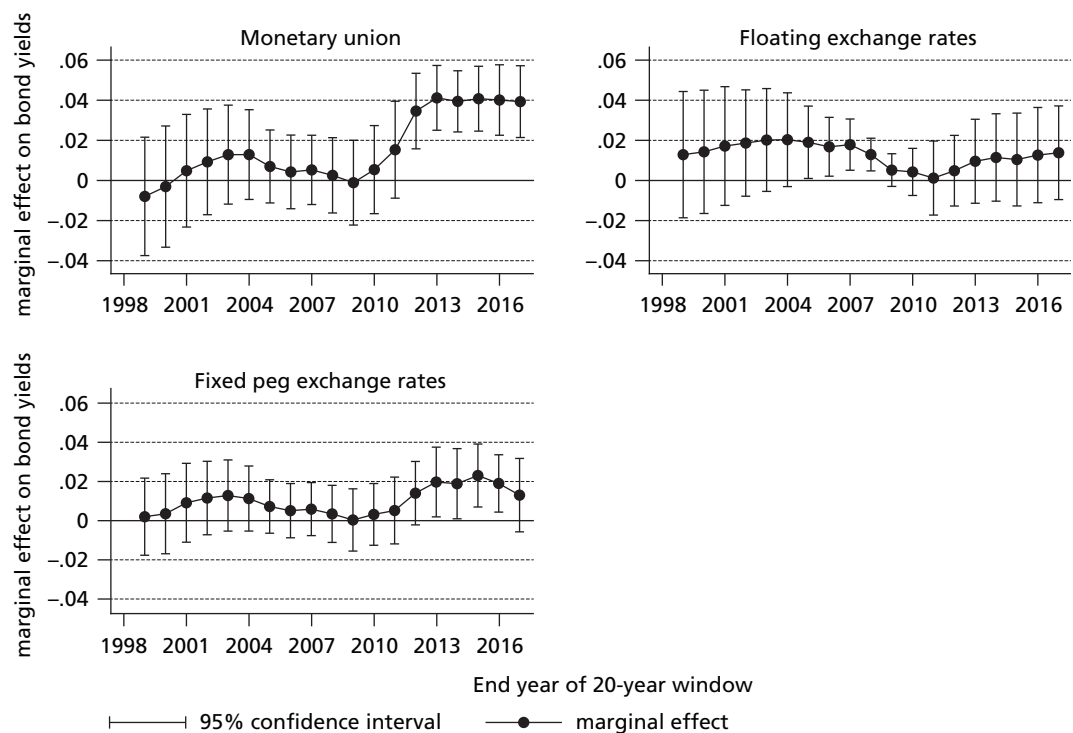


Figure C.3 The impact of fiscal deficits on bond yields by exchange rate regime

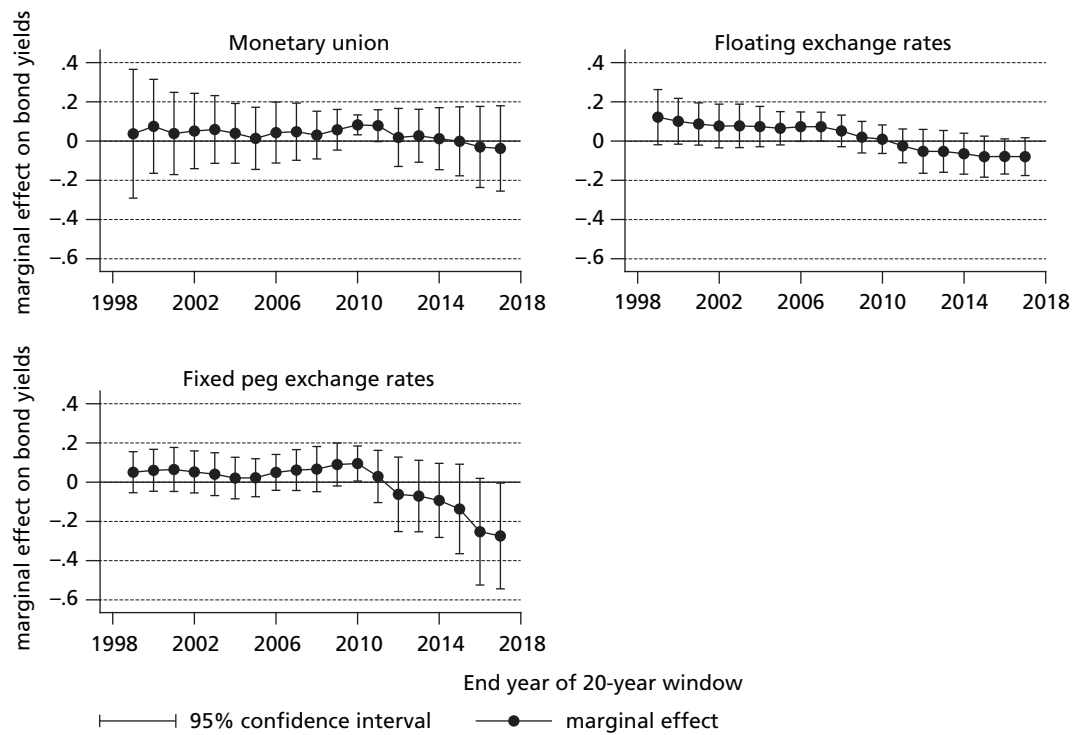


Figure C.4 The impact of social spending on bond yields by exchange rate regime

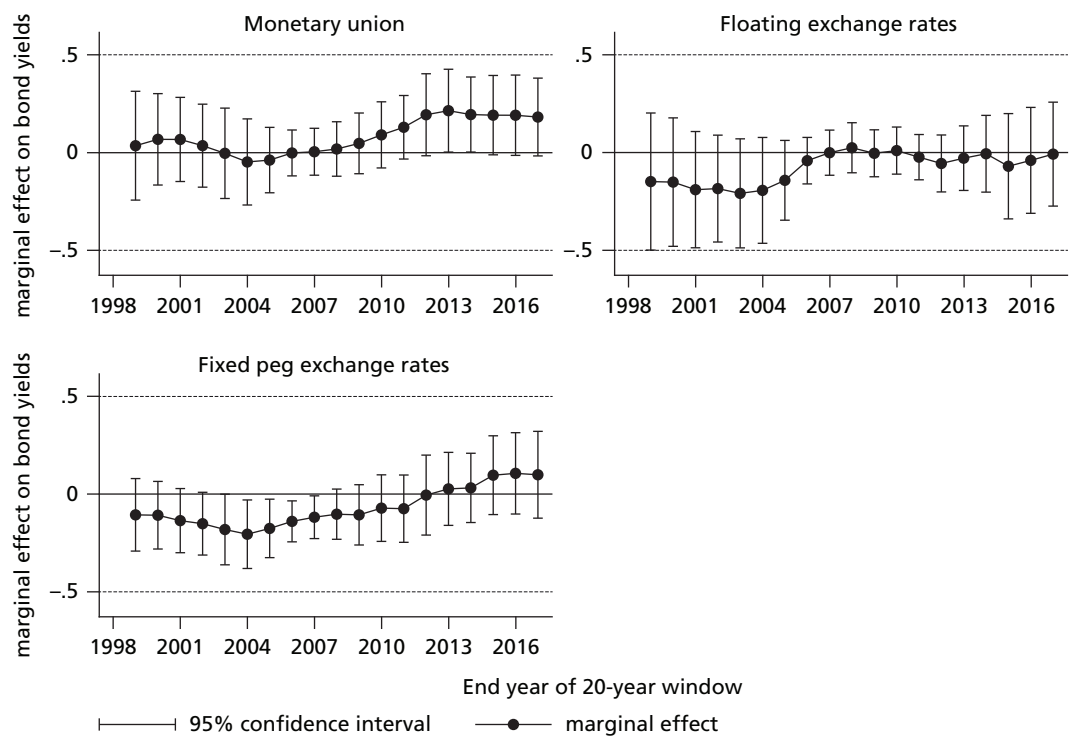
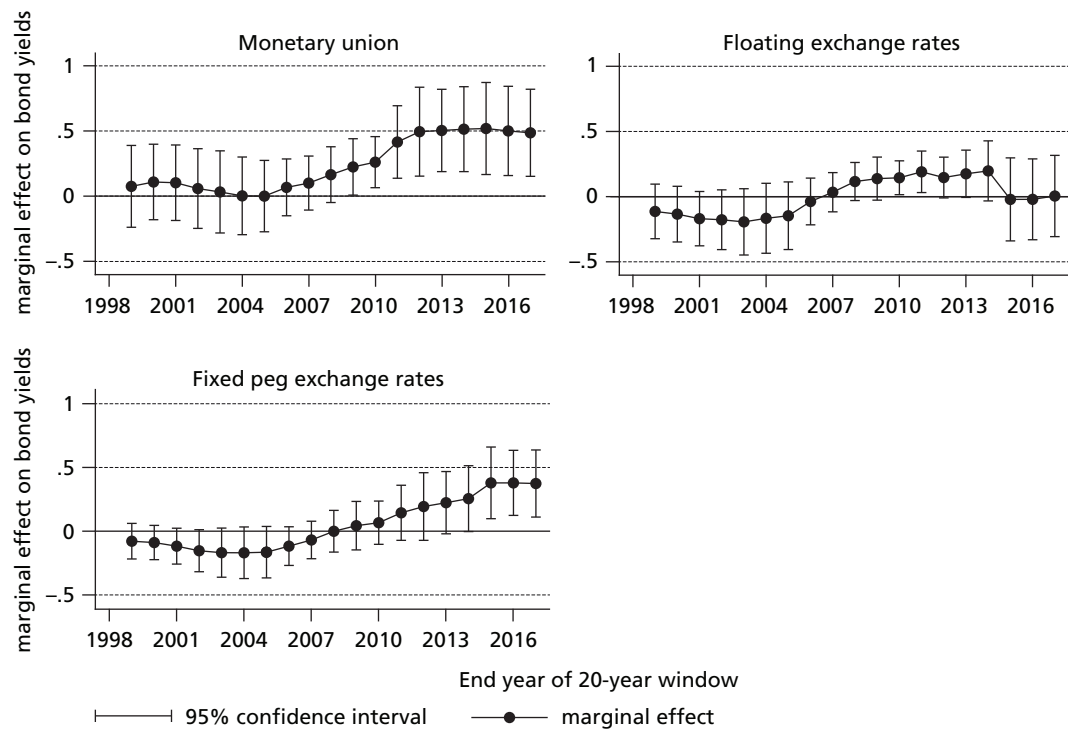


Figure C.5 The impact of entitlement spending on bond yields by exchange rate regime





## Appendix D Results for crawling peg exchange rate regime

Figure D.1 The impact of inflation on bond yields for countries in crawling pegs

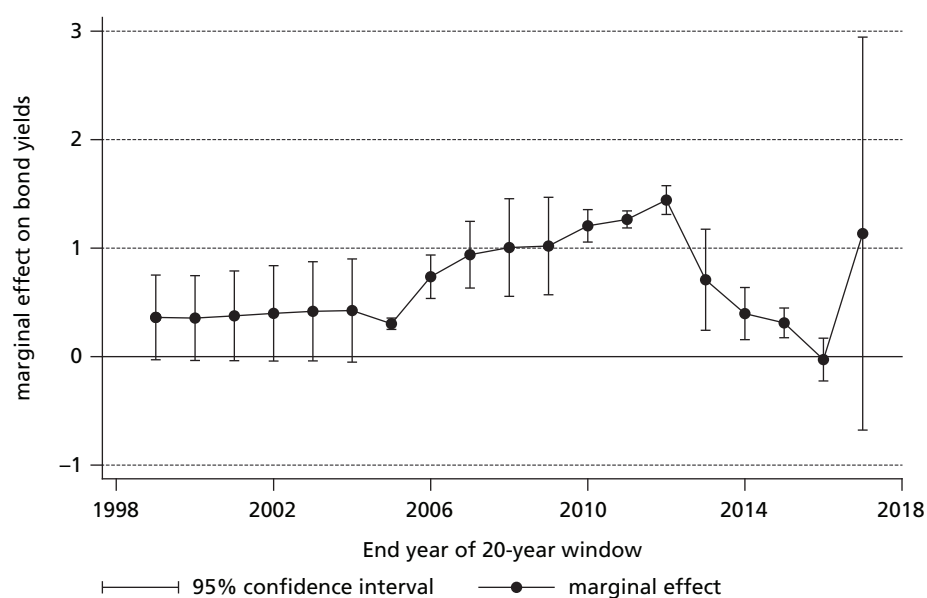


Figure D.2 The impact of government debt on bond yields for countries in crawling pegs

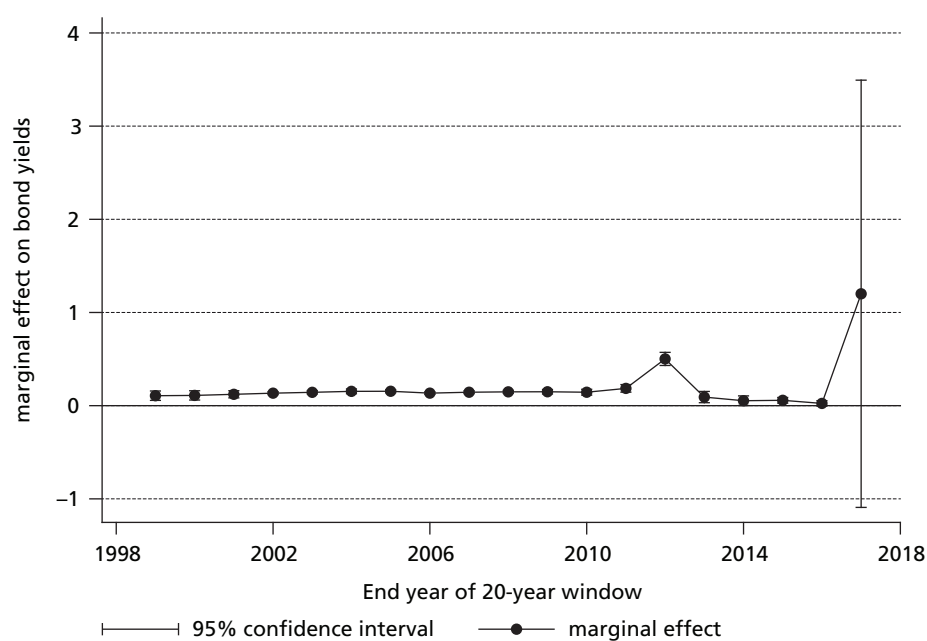


Figure D.3 The impact of fiscal deficits on bond yields for countries in crawling pegs

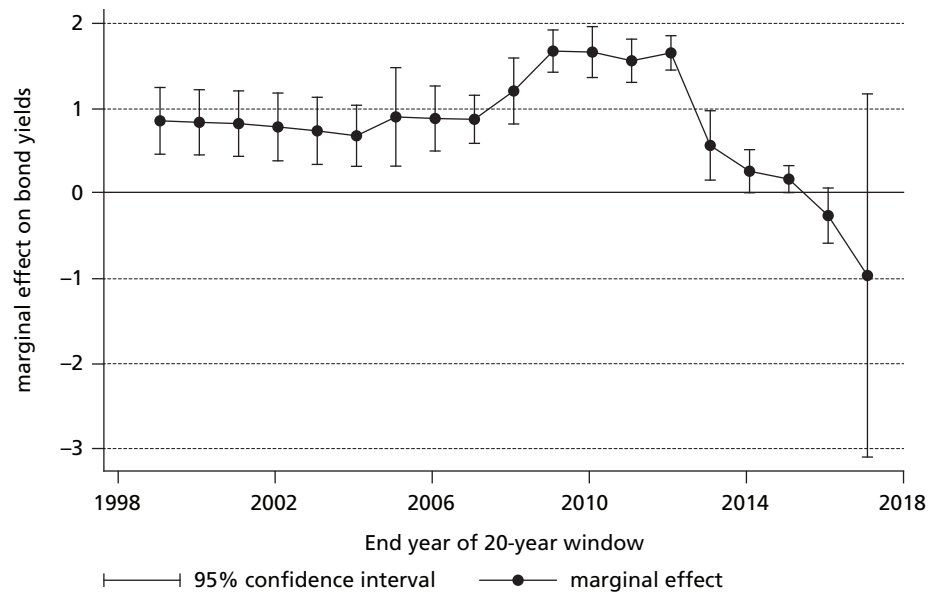


Figure D.4 The impact of social spending on bond yields for countries in crawling pegs

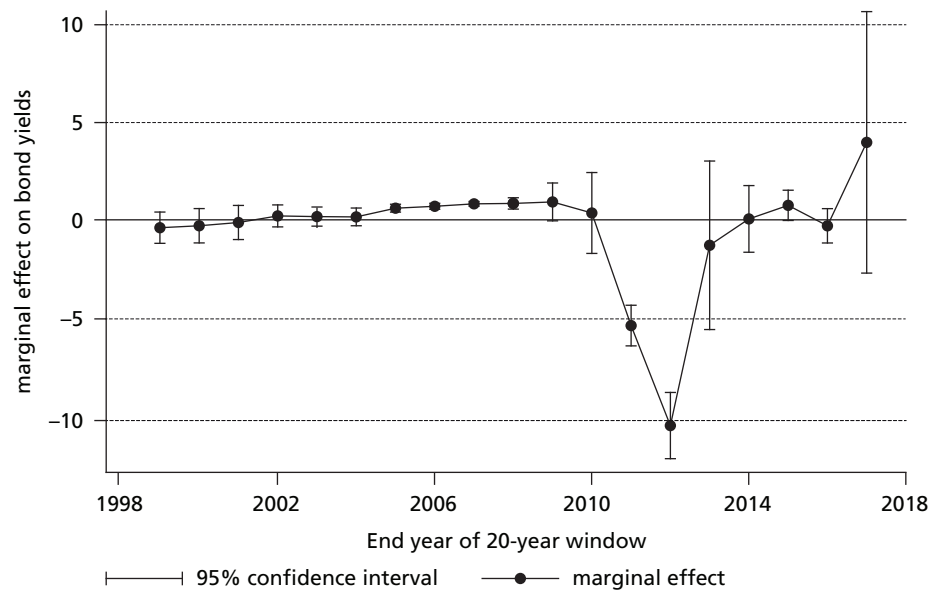
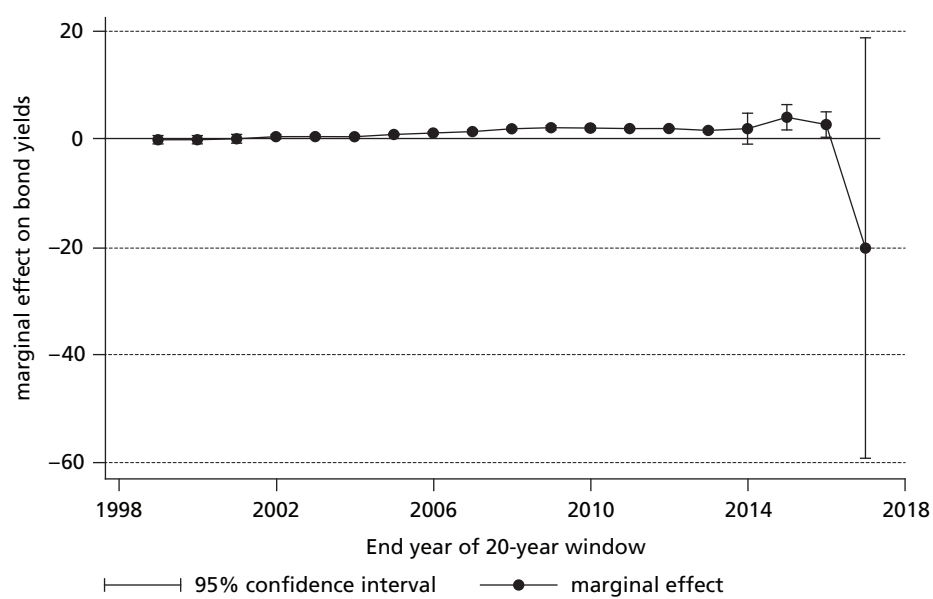


Figure D.5 The impact of entitlement spending on bond yields for countries in crawling pegs



## Appendix E Results excluding heavily indebted EMU countries (Belgium, Greece, and Italy)

Figure E.1 The impact of inflation on bond yields by exchange rate regime

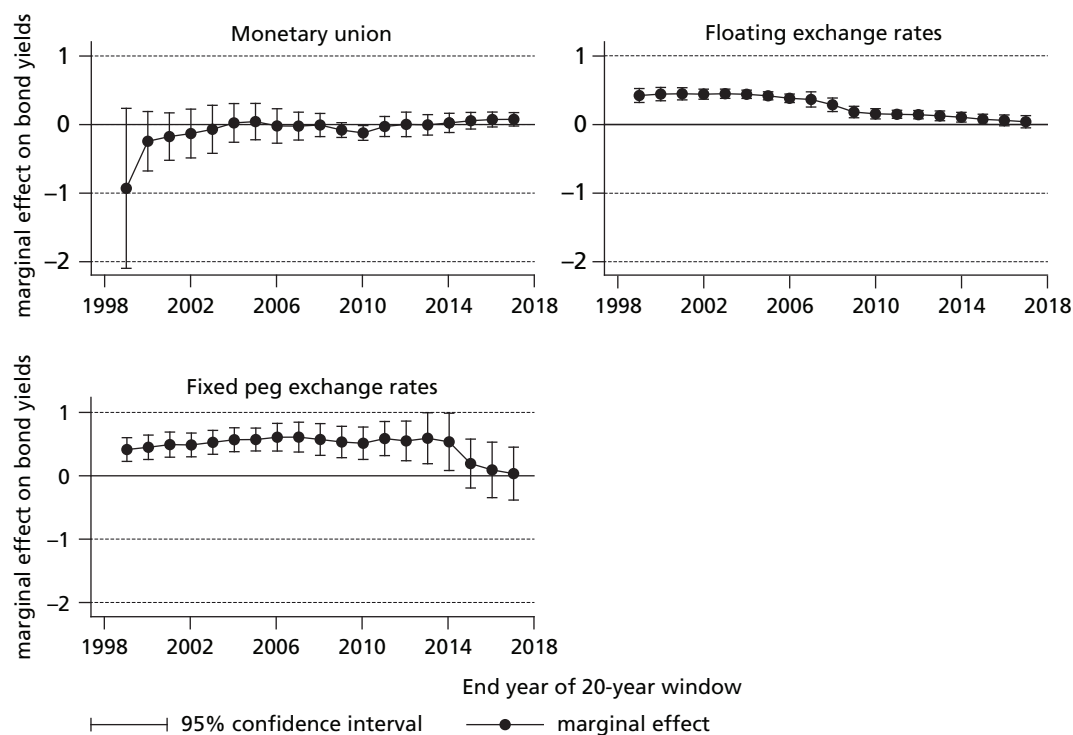


Figure E.2 The impact of government debt on bond yields by exchange rate regime

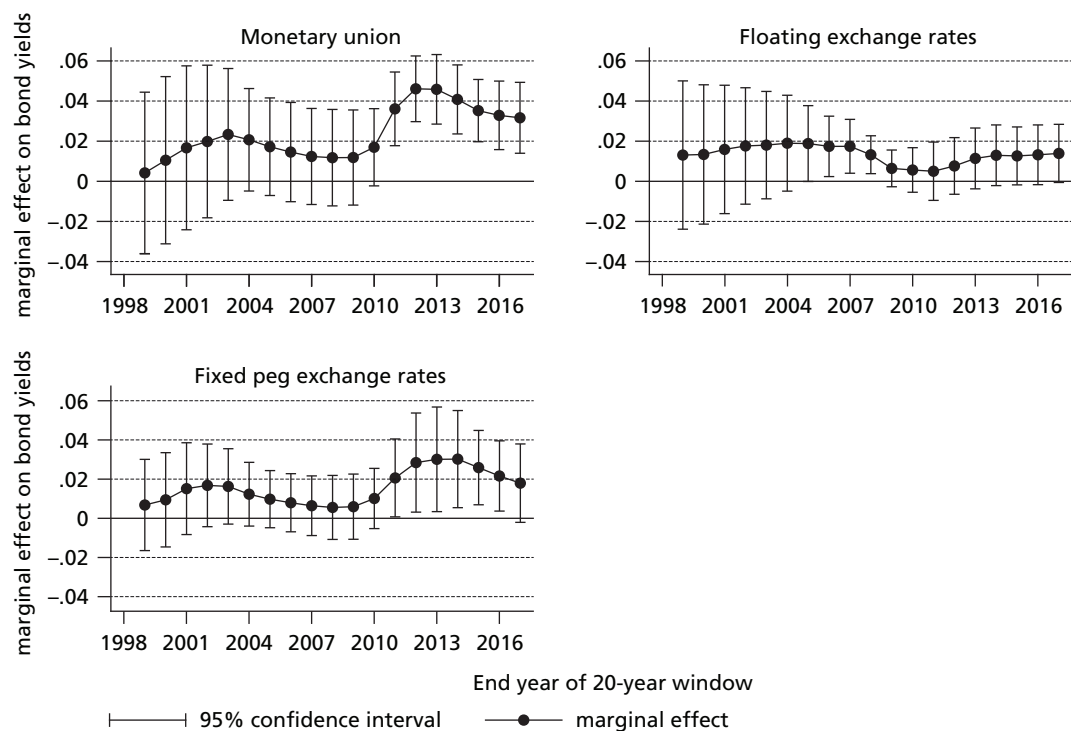


Figure E.3 The impact of fiscal deficits on bond yields by exchange rate regime

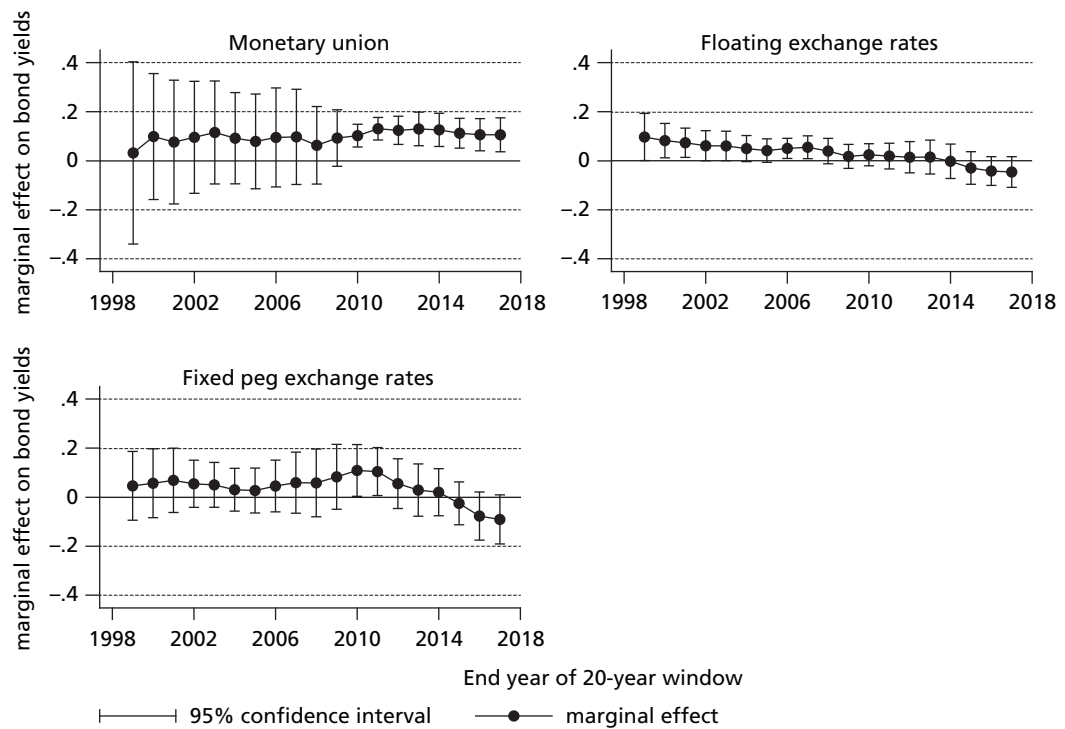


Figure E.4 The impact of social spending on bond yields by exchange rate regime

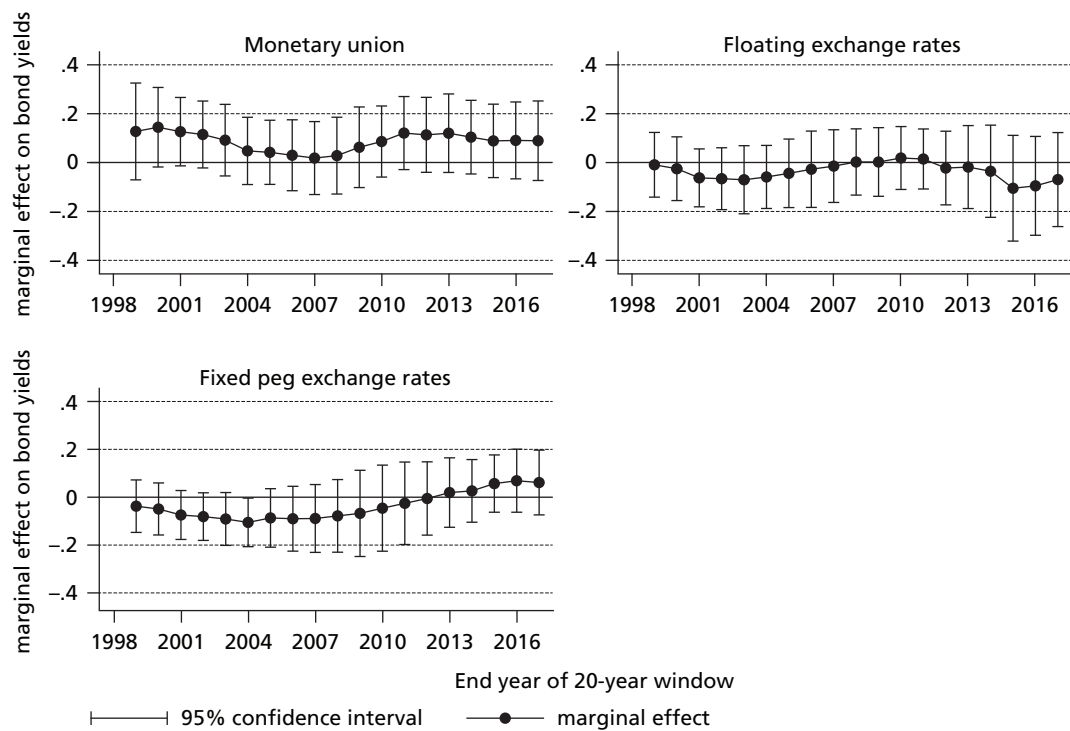
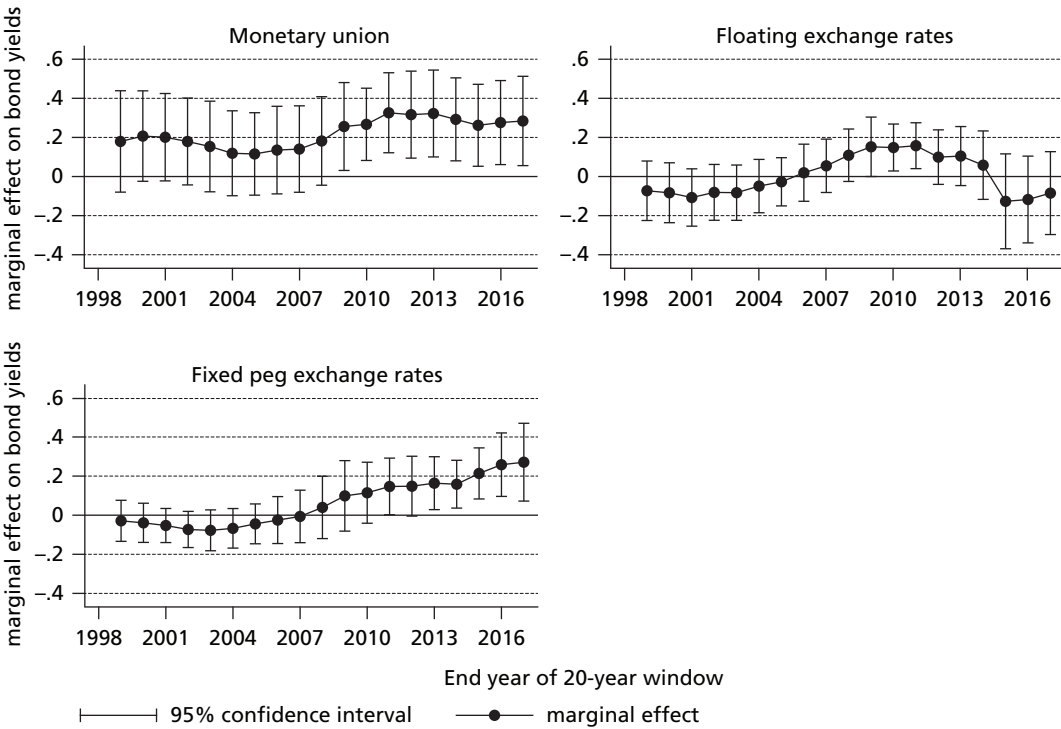


Figure E.5 The impact of entitlement spending on bond yields by exchange rate regime





## Appendix F Results excluding EMU countries with the lowest sovereign credit ratings prior to the crisis (Greece, Italy, and Portugal)

Figure F.1 The impact of inflation on bond yields by exchange rate regime

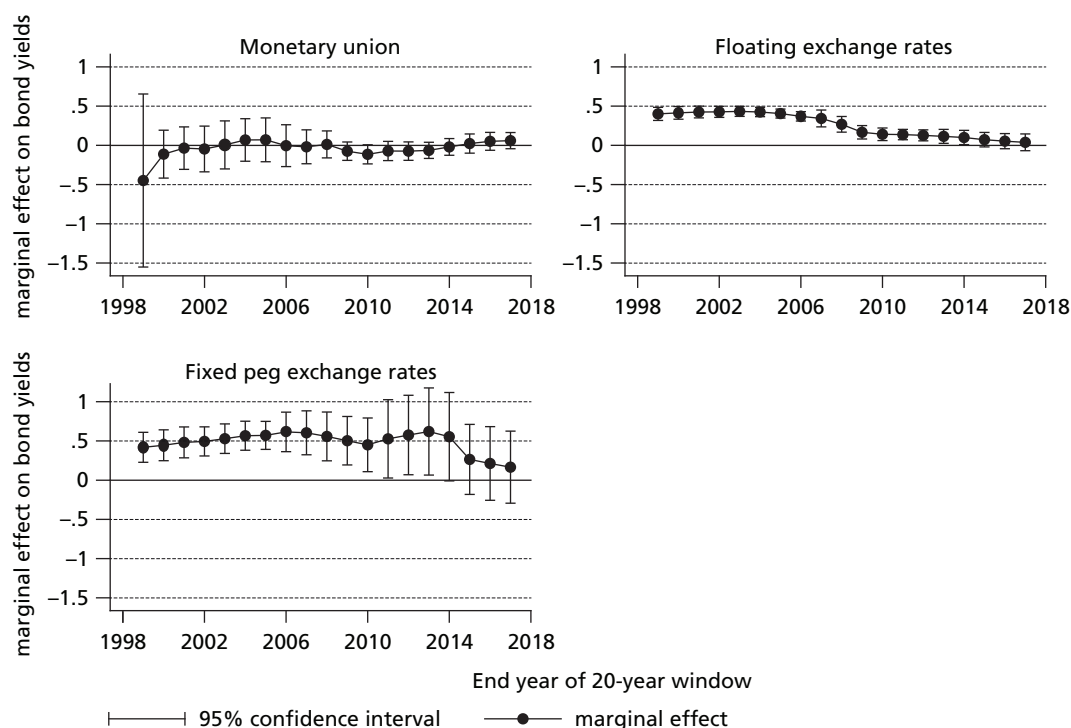


Figure F.2 The impact of government debt on bond yields by exchange rate regime

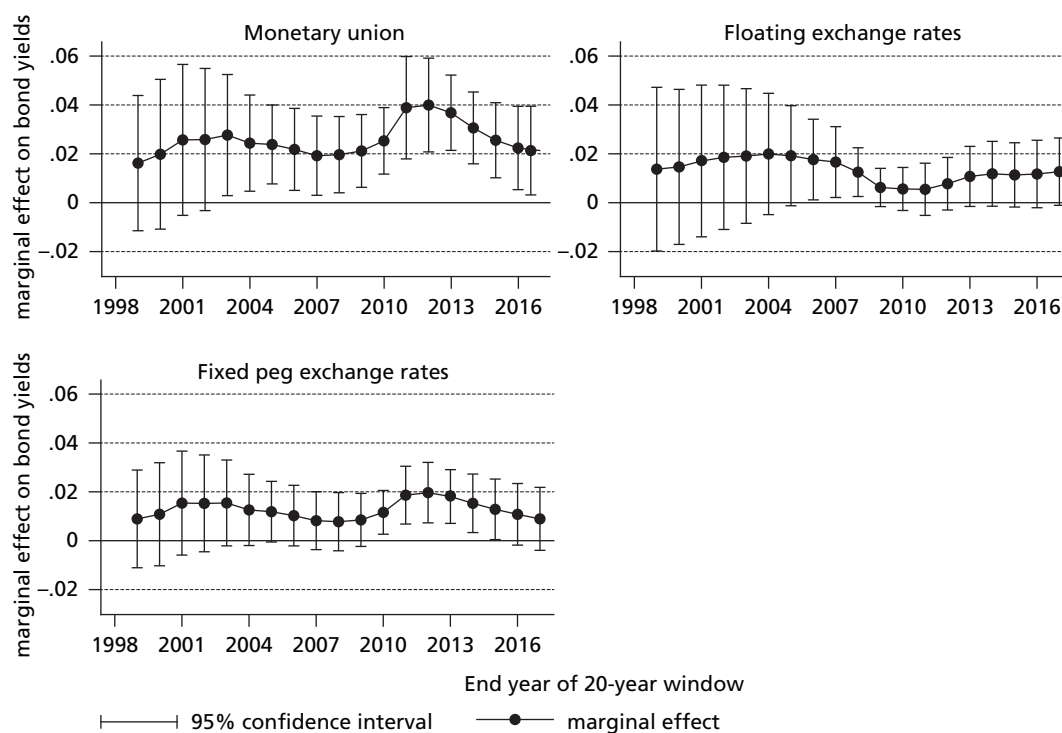


Figure F.3 The impact of fiscal deficits on bond yields by exchange rate regime

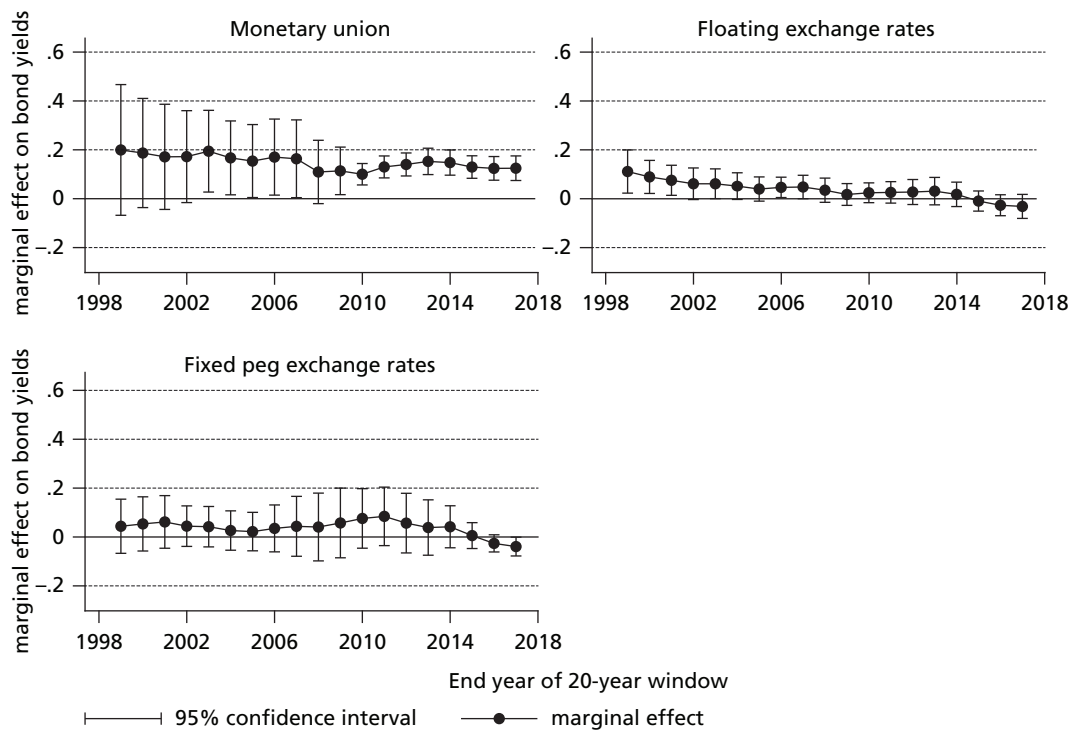


Figure F.4 The impact of social spending on bond yields by exchange rate regime

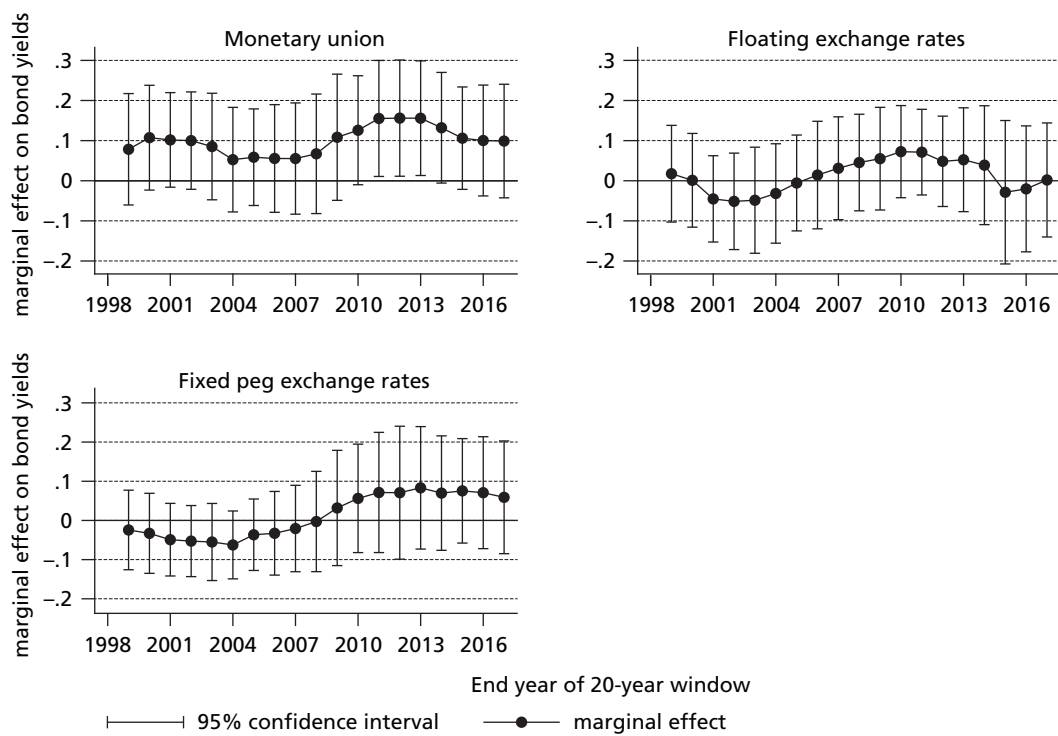
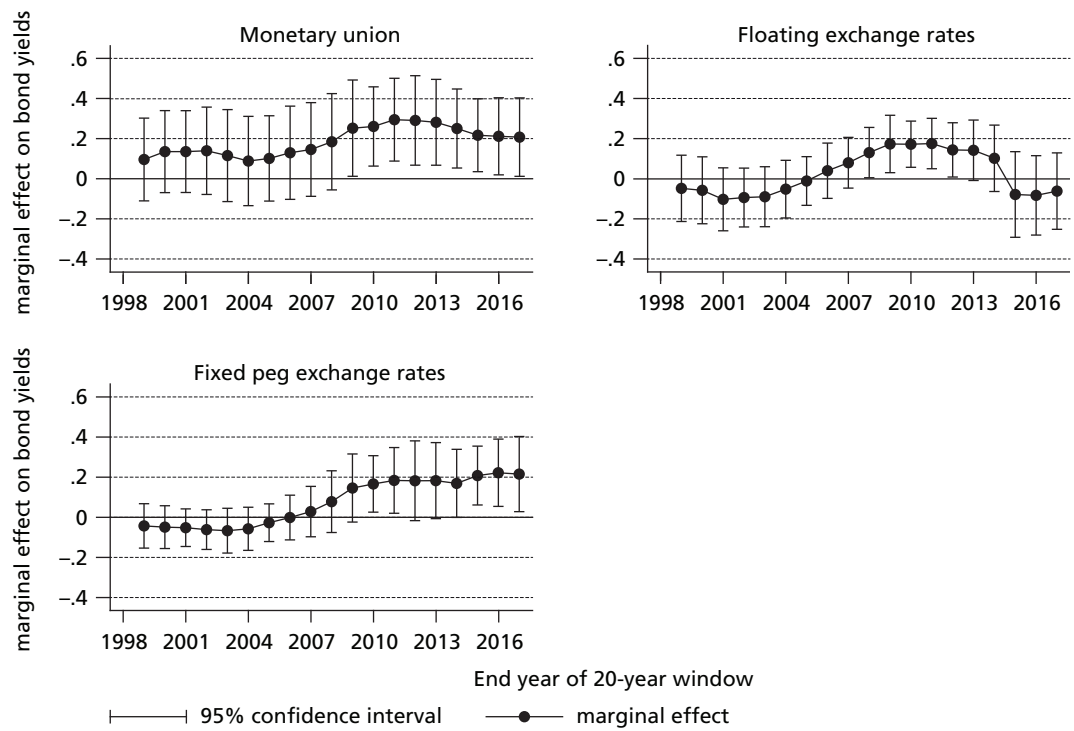


Figure F.5 The impact of entitlement spending on bond yields by exchange rate regime



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