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ABSTRACT

The recent debt crises in Europe and the U.S. states feature similar sharp increases in spreads on government debt but also show important differences. In Europe, the crisis occurred at high government indebtedness levels and had spillovers to the private sector. In the United States, state government indebtedness was low, and the crisis had no spillovers to the private sector. We show theoretically and empirically that these different debt experiences result from the interplay between differences in the ability of governments to interfere in private external debt contracts and differences in the flexibility of state fiscal institutions.

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1 Introduction

At the end of the first decade of the 21st century, the members of two advanced monetary and economic unions, the nations of the Eurozone and the U.S. states, experienced debt crises with spreads on government borrowing rising dramatically: in a short period of time, Californian spreads rose six-fold, Italian rose ten-fold, Illinois fifteen-fold, and Portuguese twenty-five-fold. Despite the similar behavior of spreads on public debt, these crises were fundamentally different in nature. In Europe, the crisis occurred after a period of significant increases in government indebtedness from levels that were already substantial, whereas in the United States, state government borrowing was limited and remained roughly unchanged. Moreover, whereas the most troubled nations of Europe experienced a sudden stop in private capital flows and private sector borrowers also faced large rises in spreads, there is little evidence that private borrowing in U.S. states was differentially affected by the creditworthiness of state governments. In this sense, we can say that the US states experienced a *public debt crisis*, whereas the nations of Europe experienced an *external debt crisis* affecting both public and private borrowers.

Why did Europe experience an external debt crisis and the U.S. states only a public debt crisis? And why did the members of other economic unions, such as the provinces of Canada, not experience a debt crisis at all despite high and rising provincial public debt levels? In this paper, we argue that these different experiences result from the interplay between the ability of governments to interfere in the private external debt contracts of their citizens and the flexibility of state fiscal institutions. The governments of U.S. states, for example, are less fiscally flexible than the members of other economic unions as a result of state and federal limitations on their ability to change taxes and borrow, but are prevented by the U.S. Constitution from interfering in private contracts. Together, these factors result in public debt intolerance and yet also limit the likelihood of an external debt crisis affecting private sector borrowers within the state. Eurozone nations are more fiscally flexible but have a greater ability to interfere with the contracts of their citizens, particularly if one of them exits the eurozone, which together allows for more public borrowing but also raises the likelihood for external debt crises occurring together with public debt crises. Canadian provincial governments are both fiscally flexible and limited in their ability to interfere in private contracts, which both allows for more public borrowing and limits the likelihood that either a public or an external debt crisis will occur.

We establish this argument both empirically and theoretically. Empirically, we document variation in both possibilities for government interference in private contracts and

fiscal flexibility across economic unions. We show that interference in private contracts—which can include direct interference such as moratoria on repayments of external debt or the imposition of controls on capital outflows, as well as indirect interference such as deposit freezes which hinder the ability of private borrowers to repay their external debts—is a common occurrence in debt crises. We also show that ratings agencies incorporate the risk of sovereign interference when rating private sector bonds in both emerging markets and in Europe, but do not consider the risk of state and provincial government interference when rating private borrowers in the United States and Canada. We next show that fiscal flexibility of the governments of members of economic unions—the ability to vary their tax rates and levels of public expenditure in response to economic shocks—also varies across unions.

Theoretically, we model the decisions of a benevolent government to spend, tax, borrow, default on public debts, and interfere in private debt contracts in a world where the private sector can also issue external debt but cannot independently default on its own debts. In our economy, the efficient benchmark under full commitment and full fiscal flexibility has the country borrowing externally to smooth both public and private consumption, and setting public expenditures to equate the marginal utilities of public and private expenditures within each period. We examine how governments with limited commitment to repay public debt and to refrain from interfering in private debts, and facing potential constraints on fiscal flexibility, might find themselves and their citizens unable to borrow enough to smooth consumption over time and across the public and private sectors.

First, we show that if the government is fiscally flexible in the sense that it is unconstrained in its ability to vary taxes and if it can commit to not interfere with private contracts (which we think of as the Canadian case), then neither public debt crises nor external debt constraints can bind. In equilibrium, the citizens of the country and the government can raise the resources they need to smooth consumption, regardless of the government's ability to commit to repay its public debts. The reason no public debt crisis can occur is that, if the government can vary taxes, it prefers to close fiscal gaps with taxes rather than with default on domestically held public debt. As a result, the government can commit to repay its domestically held public debts and hence can implement its optimal borrowing strategy domestically, whereas the private sector does the required borrowing externally. With commitment not to interfere in private external debt contracts, this private external borrowing is unconstrained.

Second, we show that if the government can tax flexibly but cannot commit to refrain from interfering in private debt contracts (the European case), all crises are external debt

crises that affect both the private sector and the public sector simultaneously. As in the Canadian case, with tax flexibility, governments can credibly borrow from their own private sector. Hence, the government should not find itself constrained in its borrowing unless the private sector is also constrained from borrowing externally. In contrast to the Canadian case, if the government is tempted to interfere with private external debt contracts, the external borrowing of the country may be constrained. If this occurs, the country is constrained in both its public and external borrowing.

Third, and finally, we show that when taxes are inflexible but the government can commit to not interfere in private contracts (the American case), it is possible to have a public debt crisis without an external debt crisis. The reason is that, when taxes are inflexible, the government may be tempted to default on domestically held public debts so as to finance the desired level of public expenditure. As a result of this risk of default on all forms of public debt, the public sector may be constrained in its borrowing even when the private sector faces no constraint on its external borrowing.

The spillovers of the public debt crisis in Europe on the private sector have sparked a recent literature focused on the role of the banking system in generating spillovers between private external and public debts.[1] We view such mechanisms as complementary to our theory based on the risk of government interference and in fact are closely related, since many examples of government interference with private debt contracts, such as deposit freezes and capital controls, are applied to the banking sector. For example, many observers see the recent drain of deposits from the Greek banking system as being driven by a fear that a deposit freeze and/or capital controls may be imposed. In this context, a banking union may be beneficial for Europe not only to protect banks' balance sheets but also to remove the temptation of governments to interfere with private debt contracts during times of fiscal distress.

The rest of this paper is organized as follows. Section 2 documents our claims about the different experiences of Eurozone members, the U.S. states, and the members of other economic unions such as Canada. Section 3 presents our empirical and institutional evidence on the occurrence of sovereign interference, and Section 4 discusses fiscal flexibility. Section 5 presents our model, and Section 6 concludes. References to the literature are discussed as they arise throughout the text.

[1] Bocola (2015) develops a model where public debt crises hurt the balance sheets of banks that hold sovereign debt and lead them to tighten private loans. Farhi and Tirole (2014) consider a similar mechanism and add government bailouts to banks. They argue that these feedback loops between banks and the government are important for the recent Eurozone crisis.

2 Debt Crises in the Eurozone and U.S. States

In this section we document the debt crises in the Eurozone countries and U.S. states during the late 2000s. We show that during these crises, the governments faced increases in spreads on their borrowing related to default risk. We document that this increase in spreads occurred even though current public debt levels for U.S. states are quite low relative to those observed in European nations and Canadian provinces. We also show that U.S. states did not increase their public borrowing during the crisis. In contrast, Canadian provinces did not experience debt crises and were able to increase their public borrowing at low spreads. We also show that in the Eurozone, the debt crisis was external because these countries experienced reversals in their international private capital inflows and significantly increased spreads on private sector external borrowing.

2.1 Spreads

During late 2008, countries in the Eurozone including Greece, Ireland, Italy, Portugal, and Spain experienced increases in the yields and spreads at which they were borrowing reflecting perceptions of a higher probability of default. Figure 1(a) plots the 10-year spreads for these five countries. The spreads peaked in 2012, reaching for example 500 basis points for Spain. Greece actually defaulted in 2012 on its public debt.

U.S. states and Canadian provinces are similar to Eurozone countries in that there is no bankruptcy process for handling state defaults. U.S. state governments are sovereign in that they can repudiate their debts without recourse for creditors.[2] Historically, in the 1840s many U.S. states did repudiate their debts, but no U.S. states have defaulted on their general obligation debts since the Great Depression.[3]

Several U.S. states, such as California, Illinois, and Michigan, have experienced a debt crisis since 2008 in the sense that they face spreads on the general obligation debt of the state government similar to those faced by several Eurozone sovereign borrowers. Figure 1(b) shows the 5-year credit default swaps (CDS) spreads on the debts of California, Illinois, Michigan, Virginia, and New York from 2008 through 2014. The CDS spreads on the debts of California, for example, reached about 500 basis points and have been high for much of this period.[4] Although these CDS spreads for California are not as high as

[2]The Eleventh Amendment of the U.S. Constitution restricts suits in federal courts against states. In contrast, municipalities, such as Detroit, can undergo a court-supervised bankruptcy process under Chapter 9 of the U.S. bankruptcy code.

[3]See Mysak (2010) for a description of Arkansas' default on its debt during the Great Depression.

[4]As shown in the case of Virginia, this was not the case for all U.S. states. The spreads shown for Virginia are relatively low and stable.

the peak sovereign spreads shown for Eurozone countries in Figure 1(a), these spreads are still sizable.[5]

In contrast to the experiences of the Eurozone countries and U.S. states, Canadian provinces did not experience a debt crisis during the Great Recession. Figure 1(c) shows the 10-year bond spreads on the debts of British Columbia, Ontario, and Quebec, which are the three most populous provinces in Canada. These spreads have been quite stable since 2008, with modest rises in 2009 and 2013. As discussed in Bird and Tassonyi (2003) and Wong and Raimes (2013), Canadian provincial governments have a great deal of fiscal autonomy from the Canadian central government, no central restrictions on their borrowing, and broad responsibilities for social services in the province, making them a good comparison group with Eurozone countries and U.S. states. Thus, the Canadian provinces appear to serve as examples of relatively independent regional governments in a monetary union that have been able to avoid a public debt crisis.

2.2 Debt Levels: U.S. States are Debt Intolerant

Many U.S. state governments faced high sovereign spreads during the debt crisis despite very low levels of indebtedness. We argue that these U.S. state governments are *public debt intolerant*: the thresholds of public debt to GDP at which the public debt is considered safe by the market are extraordinarily low in comparison with public debt levels for the governments of Eurozone countries and the regional governments of Canadian provinces, even after including obligations for employee pensions and health care.[6] Moreover, the fiscal response of U.S. states to the Great Recession was strikingly different from the fiscal responses of the provincial governments of the largest Canadian provinces. U.S. states did not increase their level of borrowing whereas Canadian provinces increased their level of borrowing substantially.

The first panel of Table 1 reports the 2012 ratio of net debt to state GDP for the 10 most populous U.S. states. These public debt to GDP ratios lie in a narrow range from a little over 1% for Texas to a little under 5.5% for New York. The second panel of the table reports the net debt for the most populous Canadian provinces. Net debt to GDP ratios in Canada are on average 8 times larger than in the U.S. states, reaching 48% for

[5]Ang and Longstaff (2013) perform a more systematic comparison of the levels and comovements of the sovereign spreads for U.S. states and Eurozone countries. This observation of high credit spreads for U.S. state governments is not unique to the financial crisis of 2008. California, in particular, has had a history of budgetary difficulties reflected in heightened credit spreads in 2003 and 2004, for example.

[6]Reinhart et al. (2003) introduced the term *Debt Intolerance* to describe the combination of high spreads at low external debt to GDP levels observed for many emerging market economies. We borrow this term here to refer to the combination of high spreads at low public debt to GDP levels observed for several U.S. state governments.

Quebec. The third panel reports net debt to GDP ratios for countries in the Eurozone, and these ratios are 10-20 times larger than is the case for U.S. state governments. As shown in the fourth column of Table 1, the debts for Canadian provinces and Eurozone countries relative to government revenues are also larger than for U.S. states by a factor of 2 or more in many cases.

The creditworthiness of governments is affected by their total level of indebtedness measured on a comprehensive basis, including explicit and implicit liabilities for employees' pensions and health care. The second column of Table 1 reports the total level of debt for U.S. states, Canadian provinces, and Eurozone countries, taking into account estimates for unfunded liabilities including employee pension liabilities and employee health care obligations.

For U.S. states, these unfunded liabilities increase the ratio of debt to GDP by a factor of 3 on average. Nevertheless, we see that for most states, with the exception of Illinois, the total debt including unfunded liabilities is relatively modest, averaging 10%. The pension and health care liabilities for Canadian provinces and Eurozone countries are substantially larger than those for most U.S. state governments. For Canadian provincial governments, estimates indicate that the total liabilities are typically on the order of three times the net indebtedness of the provincial government. In Figure 2 we summarize these findings by plotting the net debt (with and without unfunded liabilities) to GDP ratio of selected Eurozone countries, U.S. states, and Canadian provinces. As is evident in the figure, U.S. states have remarkably low levels of total liabilities when compared with these other regional and national governments.

The Great Recession of 2008 had an important fiscal impact on almost all of the regional and national governments discussed in this paper. The fiscal response of the U.S. state governments was to adjust revenue and expenditures on a year-by-year basis without increasing outstanding debt. In the first panel of Table 2, we show the history of the ratio of state net debt to personal income over the period 2008-2012 for U.S. states. As is clear in the table, these indebtedness levels are little changed. By way of contrast, in the second panel of Table 2, we show that the provincial governments in Canada responded to the fiscal crisis by issuing substantial additional debt relative to GDP, particularly in the case of Ontario.

The choice by the governments of U.S. states to refrain from issuing more debt in response to their fiscal crisis following the Great Recessions was not due solely to their self-imposed legal fiscal constraints on state borrowing.[7] Instead, many U.S. states were

[7]See, for example, Henning and Kessler (2012). On top of restrictions on debt, many states have restrictions on expenditures and revenues. In the case of California, these are seen as being particularly

charged considerable spreads on their debts once the crisis began.[8]

2.3 External Debt Crisis in Eurozone

The public debt crises in Eurozone countries and U.S. states documented above were associated with strikingly different responses in private sector external borrowing. We document that in several Eurozone countries, private capital markets experienced a *sudden stop*, defined as a sharp reversal of private capital inflows.[9] We also document strong comovement in private and sovereign spreads. In sharp contrast to the experience of Eurozone countries, we are aware of no evidence linking the borrowing costs of private borrowers domiciled in California (or any other state) to the borrowing costs of the state government. In this sense, we argue that several U.S. state governments have had a public debt crisis without facing an external debt crisis.

As discussed in Lane (2013), the introduction of the euro was associated with a large increase in the volume of cross-border capital flows among the Eurozone countries, leading to the accumulation of large gross and net stocks of international indebtedness. With the crisis that started in 2007-2008, there was a dramatic reduction in both the gross and net volume of private capital flows. We now document the disparate impact of this reversal of private capital flows on different Eurozone countries.

In Figure 3, taken from Pisani-Ferry et al. (2013), we show the cumulative net capital flows into Greece, Portugal, Spain, and Italy over the period 2002-2012 as a percentage of 2007 GDP. The solid lines in each frame of the figure show the total cumulative net capital inflow into these countries. For both Greece and Portugal, the cumulative net capital inflow over this decade rose to over 70% of 2007 GDP, and for Spain, this cumulative inflow rose to over 50% of 2007 GDP. The red bars in each frame of the figure show the cumulative total net private capital inflow. For each of these countries, in the earlier part of this time period, the cumulative net capital inflows were primarily private. Since the crisis began, however, in each case, this private capital has been withdrawn (as indicated by the diminished height of the red bars) and has been replaced by official net capital inflows from the European Central Bank (ECB) and other official programs. In the case of Greece and Portugal, the cumulative net private capital flow over the 2002-2012 time period is essentially zero, and these countries are left with external indebtedness to official

binding. See, for example, Wong and Raimes (2013).

[8]This recent experience is consistent with the earlier findings of Bayoumi et al. (1995). They estimate the spreads charged on debt of U.S. state governments over the period 1981-1990 as a function of various determinants including the overall debt level. They estimate a Laffer curve for levels of state indebtedness with a peak at indebtedness of 8.7% of state GDP.

[9]See Calvo (1998) for a discussion of the genesis of this term.

lenders well over 70% of GDP. In the case of Spain and Italy, the withdrawal of private capital since the crisis began is substantial as well. As noted in IMF (2012), in the 12 months from June 2011 to June 2012, Spain experienced a net private capital outflow of 27% of 2011 GDP, and Italy experienced a net private capital outflow of 15% of 2011 GDP.[10]

We now discuss the comovement of sovereign and private bond spreads. Gilchrist and Mojon (2014) document a strong comovement by constructing indices of nonfinancial corporate spreads in the four largest Eurozone countries.[11] These are bonds issued by large nonfinancial corporates in European securities markets. We reproduce these data in Figure 4(a). We can see that for the period from mid-2006 to 2009, these bond markets appear to be tightly integrated in that the nationality of the bond issuer does not appear to have an impact on its spread. This was true even though, as shown in Figure 1(a), sovereign spreads for these countries began to diverge in 2009. In contrast, however, the heterogeneity in the movement in private nonfinancial spreads is readily evident in the figure after mid-2010. This heterogeneity in private spreads was tightly linked to the heterogeneity in sovereign spreads. For example, the comovement of non-financial corporate credit spreads, measured using either bond spreads or CDS spreads, with sovereign CDS spreads in Italy and Spain starting in 2011, can be seen in our Figures 4(b) and 4(c) reproduced from Gilchrist and Mojon (2014).[12]

In contrast to the experience of Eurozone countries, for the United States, we are aware of no evidence linking the borrowing costs of private borrowers domiciled in a state to the borrowing costs of the state government. We illustrate this disconnect by comparing the ample borrowing possibilities for Los Angeles County in July 2009, at the same time that the state of California experienced very high borrowing costs. As described in Taylor (2009), the state of California regularly engages in substantial short-term borrowing over the course of its fiscal year (July 1 - June 30) to deal with the regular seasonal pattern of cash outflows in the first part of the fiscal year and cash inflows due to tax collections late in the fiscal year. Starting in the fall of 2008, the gap between cash inflows and outflows turned out to be much larger than expected due to the dramatic decline in tax revenues for the state. For the 2008-2009 fiscal year, the state's expenditures exceeded

[10] See also IMF (2012) and de Sola Perea and Van Niewenhuyze (2014) for further decomposition of these flows.

[11] These authors construct indices of credit spreads in Eurozone countries using data on a comprehensive panel of bonds issued by both financial and nonfinancial firms in Germany, France, Italy, and Spain over the period 1999-2013. We focus on bonds issued by nonfinancial firms.

[12] Klein and Stellner (2014), Bedendo and Colla (2013) and Bai and Wei (2014) also find similar evidence on the comovement of private and sovereign CDS spreads in both Eurozone countries and emerging markets after adding many controls.

revenues by $17.9 billion (roughly 1% of state GDP and 17% of 2007-2008 state revenues). The state faced tremendous difficulty raising the cash necessary to fund this gap. The state controller resorted to a 30-day delay of $4.2 billion in payments in February and issuing registered warrants (IOUs) in lieu of state payments that were not redeemed until September 2009. In July of 2009, the *Los Angeles Times* estimated that California would have had to pay over 5% tax free for further short-term borrowing, while at the same time Los Angeles County was able to borrow short term at 0.8% and short-term Treasury bills paid 0.5%.[13]

In summary, many of the Eurozone member countries experienced an external debt crisis with sudden stops of net private capital inflows and rising spreads on both sovereign and private debt. The debt crisis in the U.S. states, and especially California, was distinct because it was restricted to public debt.

3 Government Interference with Private Contracts

We now review evidence that the perceived risk of sovereign interference with domiciled private debt contracts plays an important role in linking private and public borrowing in Eurozone countries. We also review the institutional environment that governs protections against government interference, contrasting the strong protections embodied in the United States and Canadian constitutions with the much weaker protections available in Europe.

We start by documenting that the credit ratings agencies cite the risk of sovereign interference as an important factor in rating private borrowers in emerging markets economies and now in Eurozone countries as well. They do so because, in practice, episodes of sovereign interference with private contracts, which have imposed substantial haircuts for creditors, are correlated with public default. We review this history of episodes and document how these concerns for Eurozone countries have risen. We document that the sovereign rating is, in fact, binding as a ceiling on the private credit ratings and has economic impact by affecting the cost and availability of international credit for private borrowers in both emerging market and Eurozone economies.

We then review how the contract clause in the U.S. Constitution has insulated private borrowers and creditors in U.S. states from the impact of public debt crises of state governments. We provide a historical account of various rulings that have repeatedly upheld the protection of private creditors against potential cases of sovereign interference,

[13]Tom Petruno, "Wall Street awaits California's short-term borrowing plans," *Los Angeles Times*, July 3, 2009.

and contrast this experience with the widespread government interference that occurred prior to ratification of the Constitution. We also show how similar protections are available to creditors in the Canadian provinces, while pointing to the weaknesses in European protections.

3.1 The Sovereign Credit Ceiling

The term *sovereign credit ceiling* refers to the policies of the main credit rating agencies to restrict the credit ratings that they give to private borrowers to be no greater than the credit rating of the sovereign government of the country in which the private borrower is located. The sovereign credit ceiling has long been a feature of credit ratings for private borrowers in emerging market economies. More recently, it has become a feature of credit rating agency policies for credit ratings for private borrowers in Eurozone countries.[14]

The three credit rating agencies, Fitch Ratings, Moody's Investors Service, and Standard and Poor's, typically invoke three reasons for their policies of linking sovereign and private credit ratings.[15] The first reason is that both sovereign and private borrowers face common macroeconomic shocks. The second is that a sovereign default would lead to (or coincide with) a financial crisis that would affect the terms of credit available to private borrowers.[16]

The third reason, and the focus of our analysis, is the *risk of sovereign interference with private contracts.* These credit rating agencies point to a long history of experience with sovereign interference with private debt contracts in emerging market economies. The interference has typically taken the form of imposition of bank deposit freezes and/or capital or exchange controls in a public or external debt crisis. Because deposit freezes and capital controls directly interfere with a private borrower's ability to transfer the foreign exchange necessary to service his or her external debt, this risk of sovereign interference is often termed *transfer and convertibility risk.* This concept captures the risk that a

[14]As described in Borensztein et al. (2013), prior to 1997, this sovereign credit ceiling was applied to all private borrowers in emerging market countries. During the mid-2000s, this policy was somewhat relaxed, and, in the case of Eurozone countries, it was removed altogether in 2005 by both Standard and Poor's and Moody's Investors Service. See, for example, Beers et al. (2005), Truglia (2005), and Cavanaugh and Feinland-Katz (2009), as well as Stendevad (2007). As we discuss in this section, the main credit rating agencies reconsidered this policy of relaxing the sovereign credit ceiling for private borrowers in Eurozone countries following the recent concerns about possible exit of countries from the euro.

[15]See, for example, Fox and Renwick (2014), Gates et al. (2012), and Feinland-Katz and Chu (2013). See Loh and Frey (2011) and Chu (2014) for discussions of the impact of the Eurozone sovereign credit crisis on the ratings for structured finance transactions.

[16]There is a large literature on the linkage between sovereign debt spreads and financing difficulties for banks in both emerging market economies and the Eurozone. See, for example, Reinhart and Rogoff (2013).

foreign creditor might not get paid on his or her loan to a private borrower because the government of the borrower's country enacts policies that make it difficult for the private borrower to obtain the foreign exchange necessary to repay his or her debts. In the past several years, the credit rating agencies have pointed to the risk that a Eurozone member country would enact such policies upon exiting the euro as a significant risk restricting the ratings offered to private borrowers in several Eurozone countries.[17]

The three main ratings agencies make an effort to quantitatively evaluate the impact of sovereign interference in private contracts on the ratings given to private entities separately from the risk of the sovereign's default. Standard and Poor's, for example, provides a *Transfer and Convertibility Rating* to each country in addition to a sovereign credit rating for both the local currency and foreign currency debt of the sovereign government to attempt to measure the likelihood of sovereign interference with private contracts as distinct from the likelihood of a default on domestic and external public debts. This transfer and convertibility rating is incorporated into the ceiling that Standard and Poor's applies to the credit ratings given to private borrowers in the relevant country. Likewise, Moody's Investors Service and Fitch Ratings provide *Country Ceilings* which are similar to Standard and Poor's Transfer and Convertibility Ratings in that they "capture the risk of capital and/or exchange controls being imposed that would prevent or materially impede the private sector's ability to convert local currency into foreign currency and transfer the proceeds to non-resident creditors—transfer and convertibility (T&C) risk. Country Ceilings are not ratings but rather a key analytical input and constraint on the ratings of entities and transactions originating in the sovereign's jurisdiction."[18]

Cavanaugh (2013) provides a history of Standard and Poor's sovereign credit ratings for domestic and foreign currency debt as well as their transfer and convertibility ratings for a large number of countries over the past several decades. In most instances, the transfer and convertibility rating is aligned with the sovereign credit rating. There are, however, several instances in this historical record of countries with a higher transfer and convertibility rating than sovereign foreign currency ratings, indicating that Standard and Poor's assessment of the risk of sovereign interference with private contracts is lower than their assessment of the risk of default on the government's foreign currency debt.[19]

[17]See, for example, IMF (2012), page 39.

[18]See Fox and Renwick (2014) and Moody's (2009)

[19]For a discussion of this point, see, for example, Cavanaugh and Feinland-Katz (2009) and Heinrichs and Stanoeva (2013).

3.1.1 Transfer and Convertibility Risk in Emerging Markets

There is a substantial historical record of sovereign interference with private debt contracts in emerging market economies. In Duggar (2008), Moody's Investors Service surveys the post-1960 history of sovereign bond defaults and the extent to which sovereign defaults have been accompanied by government interference with domiciled borrowers' foreign currency debt service.

This Moody's survey covers 38 episodes of sovereign bond defaults. It finds 27 episodes of deposit freezes, with all but two of these (Korea 1998 and Ukraine 2004) accompanied by a sovereign bond default. It finds that "the most frequent deposit interference measure employed has been the imposition of prolonged deposit freezes, with several freezes lasting one year or longer, followed by outright deposit expropriations, forced deposit conversions into bonds, and forced deposit conversions into local currency." Depositor losses in a freeze have been severe, with haircuts often as high as 70%.

Moody's also finds that since 1960, about 26% of public bond defaults have been accompanied by controls on private sector debt service payments, with all but one of these also coinciding with a deposit freeze. Of these events of controls on private debt service payments, 44% were full moratoria in which either all external private sector payments were explicitly banned, or purchases of foreign currency were blocked (e.g., Peru 1985, Venezuela 1994, Russia 1998). Another 28% of these events included a selective moratorium in which the ability to make private sector external debt payments was limited to favored sectors or companies, or required a case-by-case authorization by the central bank and/or the ministry of finance (e.g., Costa Rica 1981, the Philippines 1983, Brazil 1990, Argentina 2001). The other 28% of events included the imposition of exchange controls or regulations that have severely affected external private sector payments and that have encouraged, implicitly or explicitly, the rescheduling of private foreign debt payments (Mexico 1982, Argentina 1982).

3.1.2 Transfer and Convertibility Risk in the Eurozone

Prior to the most recent financial crisis in the Eurozone, the three main credit ratings agencies had essentially eliminated the sovereign credit ceiling for private borrowers in Eurozone countries.[20] As described in Cavanaugh and Feinland-Katz (2009) and Fox and Renwick (2014), writing for Standard and Poor's and Fitch Ratings, respectively, prior to this crisis, all countries in the Eurozone were assigned either a Transfer and Convertibility rating or a Country Ceiling of "AAA", indicating that considerations of

[20] See, for example, Beers et al. (2005) and Truglia (2005).

transfer and convertibility risk were not relevant in constraining the credit ratings for private entities in the Eurozone. The thinking expressed in these documents was that the legal structure of the European Union and the Eurozone in particular would make it difficult for a sovereign to interfere with cross-border private debt contracts. In the wake of the recent sovereign debt crisis in the Eurozone, and in particular, in the wake of events in Iceland, Greece, and Cyprus, all three of the main credit ratings agencies have revised their ratings methodology to reflect heightened perceptions of transfer and convertibility risks for Eurozone countries.[21]

As discussed in Feinland-Katz (2013), Standard and Poor's has since revised its assessment of the link between sovereign and private credit ratings in the Eurozone to recognize that the transfer and convertibility risk for several Eurozone countries is higher than they previously thought.[22] Pitman (2012) indicates that Moody's also reassessed the risk of sovereign interference with private external debt contracts in Eurozone countries. Focusing on the potential for transfer and convertibility risk associated with a Eurozone exit, Moody's pointed to a number of legal acts that would likely be required of an exiting country including a deposit freeze, the imposition of capital controls, and the redenomination of financial obligations. As described in Pitman (2012), in June of 2012, Moody's lowered the ceiling for private borrowers in Greece to "Caa2" because of the risk that creditors would not receive payments in the originally contracted currency.[23] Moody's

[21]Thinking about the legal basis for sovereign interference with private contracts in the Eurozone is rapidly evolving. Slaughter and May (2012) present a summary of the legal issues a company operating in the Eurozone would face in the wake of a sovereign default crisis and possible euro exit. Pykett et al. (2013) provide a discussion of the legal foundations for capital and exchange controls for Eurozone countries following the imposition of such controls in Cyprus. In its press release regarding the imposition of capital controls in Cyprus on March 28, 2013, the European Commission noted that "Member States may introduce restrictions on capital movement, including capital controls, in certain circumstances and under strict conditions on grounds of public policy or public security. In accordance with the case law of the European Court of Justice, measures may also be introduced for overriding reasons of general public interest." It noted furthermore that "Such restrictions may include bank holidays, limits on withdrawals, freezing of assets, prohibition of terminating fixed term deposits, prohibition on certain payment orders, restrictions in using credit/debit/prepaid cards, restrictions on other banking operations as well as execution of certain transactions subject to the approval of the Central Bank and other measures." See European Commission (2013).

[22]As described in Fox and Renwick (2014), Fitch Ratings has also revised its procedure for setting Country Ceilings for Eurozone Countries.

[23]To illustrate the application of this country ceiling, on page 5 of Pitman (2012), Moody's reprints its press release describing the impact of this rating change for the Hellenic Telecommunications Organisation, S.A. (OTE plc), a private borrower located in Greece. As indicated in this release, the legal uncertainty surrounding a Eurozone exit is considerable.

> The terms of the rated instruments issued through OTE plc contain a choice of English law, submission to the courts of England, a clear definition of 'euro' as the single currency and payment provisions that were not tied to Greece. However, OTE itself is the borrower under a bank facility governed by Greek law that we consider as being at significant risk of redenomination. The size of the facility relative to the OTE family's total debt outstanding

also describes the downgrades of the country ceilings for Spain and Italy in August 2012 for similar reasons (Pitman (2012), page 6).

3.1.3 Does the sovereign credit ceiling bind ratings?

A large body of empirical work examines the interaction of sovereign credit ratings with private credit ratings and credit terms both in emerging markets and in the Eurozone.[24] The first finding in this literature is that the credit rating agencies' policies of imposing a sovereign credit ceiling does, in fact, constrain the distribution of private credit ratings assigned by the rating agencies. Borensztein et al. (2013) and Almeida et al. (2014) both examine the empirical distribution of the gap between nonfinancial corporate credit ratings and the associated sovereign credit rating for a large number of emerging market and Eurozone foreign bonds.[25] Both papers find a striking spike in the distribution of ratings gaps at zero (i.e., with the private firm and the respective sovereign having the same rating), with very few firms rated higher than the sovereign (that is, with positive ratings gaps) relative to the number of firms rated below the sovereign (negative ratings gaps). This finding is illustrated in our Figure 5, which reproduces the distribution of ratings gaps between corporate and sovereign ratings shown in Almeida et al. (2014). More specific to the recent developments in the Eurozone, Klein and Stellner (2014) examine a sample of 897 bonds from Eurozone countries all denominated in Euros covering the period March 2006 through June 2012. Figure 3 in that paper confirms that the vast majority of these private sector bonds in the Eurozone carry ratings that are below the rating of the sovereign.

The second finding in this literature is that changes in sovereign ratings appear to drive changes in the associated private ratings. To evaluate the impact of changes in sovereign ratings on private bond ratings, Borensztein et al. (2013) run regressions of

> was sufficiently material to justify the risk of a default for redenomination being reflected in OTE's rating. As a consequence, whilst we positioned the corporate family rating one notch above the Greek country ceiling at Caa1(negative) — reflecting (amongst other factors) a lower expected loss for the debt issued by OTE plc — the exposure of the bank facility to a change in currency pushed OTE's probability of default rating to the Greek country ceiling of Caa2 (negative).

[24] See, for example, IMF (2012) Chapter 2, Special Feature B, on page 85 of ECB (2014), and Adelino and Ferreira (2014).

[25] Borensztein et al. (2013) put together a data set of sovereign and private credit ratings as well as accounting data for every publicly traded nonfinancial corporate borrower with a rating from Standard and Poor's as of June 2005. The final sample is an unbalanced panel of 478 non-financial corporations from 29 countries, including 14 developed and 15 emerging economies for the time period 1995-2009. Almeida et al. (2014) examines a sample of bonds of nonfinancial firms from 80 countries over the 1990-2012 time period. Their sample has 3,605 unique firms with a credit rating.

individual firms' bond ratings on the country rating, a vector of firm-specific controls using accounting data, a vector of country-specific macroeconomic variables, and time, country, and industry dummies. They find a significant correlation of sovereign credit rating changes with changes in the credit ratings of private borrowers even after controlling for these other factors, particularly for borrowers in emerging market economies. Klein and Stellner (2014) find the same result in their sample of Eurozone bonds using a similar methodology. Almeida et al. (2014) take a nonparametric approach to establishing this point. In Figure 2 of their paper (reproduced here in Figure 6), these authors show that when a sovereign downgrade occurs, a large fraction of firms that are initially rated at or above the sovereign receive a downgrade of the same number of steps as the sovereign either in the same month as the sovereign or one month later, whereas only a very small fraction of firms initially rated below the sovereign experience the same downgrade. They argue that this asymmetry of responses is indicative of a causal impact of the sovereign downgrade on the highly rated firms in that country.

The third and fourth findings in this literature are that the price of private external borrowing tends to rise, whereas the quantity of private external borrowing tends to fall, when sovereign credit spreads rise and/or ratings fall. In addition, there is evidence, chiefly for emerging market economies, that sovereign downgrades also reduce firm investment (see Areta and Hale (2008) and Das et al. (2010)). Almeida et al. (2014) look to identify the impact of sovereign downgrades on private firm investment by taking advantage of their observation that it is those private firms that are rated at or above the sovereign that get downgraded when the sovereign is downgraded whereas those that are rated below the sovereign typically are not downgraded when the sovereign is downgraded. By dividing firms into treatment and control groups based on their rating gap with the sovereign at the time of the sovereign downgrade and comparing the responses of firm investment, they argue that sovereign downgrades have a substantial negative impact on firm investment for firms initially rated at the same level of the sovereign in comparison to firms initially rated substantially below the sovereign.

3.2 Institutional Constraints on Government Interference

The governments of sovereign states have a long history of interfering in private financial contracts, particularly in relation to contracts between the citizens of the state and non-citizens. Such interference can take a variety of forms ranging from the extremes of nationalization and expropriation through changes in legal tender for the payment of debts (redenomination risk) to the imposition of capital and exchange controls (transfer

and convertibility risk). In this section, we review the limits placed on the ability of a government to interfere in private contracts, placing these limits within the context of previous attempts at interference in the histories of the U.S. states, Canadian provinces, and Eurozone nations.

We make two main points. First, we show that the legal institutions protecting debtors and creditors from government interference in their contracts is far weaker in Europe than among the U.S. states or the Canadian provinces. Second, we argue that these institutional constraints are frequently binding, even in the United States and Canada, by documenting this history of attempted government interference in both countries.

3.2.1 United States

In the United States, the ability of state governments to interfere in the contracts signed by their citizens is limited by a number of clauses within the U.S. Constitution. The first is The Commerce Clause (Article I, Section 8, Clause 3), which gives Congress the power "to regulate commerce ... among the several states" and hence prevents state governments from introducing capital controls. The second is The Takings Clause (the last clause in the Fifth Amendment), which limits the power of state governments to expropriate private property without "just compensation."[26]

The third and arguably the most important set of protections is contained in The Contract Clause (Article I, Section 10, Clause 1), which reads in full:

> No State shall enter into any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; coin Money; emit Bills of Credit; make any Thing but gold and silver Coin a Tender in Payment of Debts; pass any Bill of Attainder, ex post facto Law, or Law impairing the Obligation of Contracts, or grant any Title of Nobility.

This clause serves to limit redenomination risk by preventing the state governments from issuing coins or paper money ("bills of credit") and making them (or anything else) legal tender in the repayment of debts. The clause also limits the risk of a range of other forms of government interference by preventing state governments from impairing the obligations of private debt contracts.

The Contract Clause was explicitly drafted as a counter to the long history of state (and colonial) government interference in private contracts prior to the passage of the U.S.

[26]The Takings Clause was not initially intended to apply to state governments. However, in 1897 the federal court in *Chicago, B. & Q. Railroad Co. v. Chicago* (1897) held that the Fourteenth Amendment extended the effects of that provision to the states.

Constitution. Some of the earliest examples arose during the War of Independence and took the form of colonial laws that seized the real property of British loyalists. Following the Revolution, the new state governments widened their interference in private debt contracts by passing debtor relief laws that took one of four basic forms. The first were changes that made paper money, often significantly depreciated, legal tender in the repayment of debts. The colonial governments had experimented with issuing paper money, in the form of bills of credit, since at least 1690 when the Commonwealth of Massachusetts began issuing bills of credit—debts intended to circulate as media of exchange—and made them legal tender in the payment of taxes. New Hampshire, Rhode Island, Connecticut, New York, and New Jersey all quickly followed suit, with South Carolina, Pennsylvania, Maryland, Delaware, Virginia, and Georgia doing likewise at various points over the next half century (Dewey (1902), pp.21-24).

Following the Revolutionary War, this practice arose again. In one of the best known cases, Rhode Island issued paper money in 1786 and made it legal tender for the repayment of debts. The money soon traded between 25% to 50% of par and had fallen to 1/12 of par by 1789. In response, Massachusetts and Connecticut legislated to prevent Rhode Island residents from collecting debts owed by their own residents (Nevins (1924), pp.539-40, 571). Similar acts occurred in other states: in 1785 North Carolina issued paper money that was used to repay debts in sterling at a 50% discount (Nevins (1924), p.524); in 1786, both New Jersey and Georgia issued paper money and made it legal tender for all private and public debts (Nevins (1924), pp.523-524).[27]

The second form of debtor relief law were changes that made commodities or land legal tender in the repayment of debts, often on terms quite unfavorable to creditors. The most famous of these was South Carolina's Pine Barren Act of 1785, which permitted debtors to tender property to discharge debts. The land was to be appraised and could be used to repay debts at two-thirds of the land's value. However, the lands tendered were often very distant from creditors, making it difficult to challenge their appraised value. South Carolina also allowed payment in kind (such as cattle), with the creditor to pay the costs of driving the animals to market (Ely (2008), p.37, Nevins (1924), pp.404-5, 525-6). Likewise, in 1782 Massachusetts passed a law allowing payment of debt in cattle and other commodities, and in 1785 New Hampshire allowed debtors to repay debts in either real or personal property (Nevins (1924), p.537).

[27]In cases in which the state legislatures refused to issue paper money as legal tender in repaying debts, popular uprisings prevented the execution of judgments against debtors. A prominent example is Shays's Rebellion in western Massachusetts in 1786-1787, when farmer protests closed courts in the western part of state in order to prevent executions of judgments against debtors, after having unsuccessfully petitioned the state government to issue paper currency for the repayment of debts (Ely (2008), p.39).

The third form of debtor relief laws were stays in the repayments of debts, or alterations in the timing of required repayments. As one example, South Carolina passed a stay law in 1782 that remained in place until 1786 when only one-quarter of the outstanding debt became payable (Nevins (1924), p.525). The fourth and final form of debtor relief laws involved the closure of the courts to suits by creditors, or the diminution of the penalties for default. For example, in 1783 North Carolina passed a law suspending suits against debtors (Nevins (1924), p.386). Likewise, in 1781, while repealing laws that had made paper money legal tender in the repayment of debts, South Carolina prohibited suits for the recovery of debts until the next general assembly (Nevins (1924), p.390). Maryland passed a law in 1787 allowing insolvent debtors to pass through bankruptcy without prison (Nevins (1924), p.532).

The history of state interference in debt contracts framed the thinking of delegates to the Constitutional Congress. The Founding Fathers objected to these debtor relief laws not only out of a concern about property rights per se but also, in light of the Rhode Island paper money dispute, because it had the potential to generate interstate conflict. On the former, James Madison wrote in *The Federalist No. 44* that "Bills of attainder, ex post facto laws, and laws impairing the obligation of contracts, are contrary to the first principles of the social compact, and to every principle of sound legislation." On the latter, writing in *The Federalist No. 7*, Alexander Hamilton argued that "Laws in violation of private contracts, as they amount to aggressions on the rights of those States whose citizens are injured by them, may be considered as another probable source of hostility."[28]

Support for the clause was widespread. There was no debate on the contract clause for the first three months of the Congress and, notwithstanding some modifications by the Style Committee, no amendments to the clause were ever proposed (Wright (1938), pp.9,12,15). There was also very little debate on the clause as part of state ratification proceedings. Even in the ratification proceedings for South Carolina, which had frequently interfered in private contracts, most views were positive, with Charles Pinckney trumpeting that "no more shall paper money, no more shall tender-laws, drive their commerce from our shores, and darken the American name in every country where it is known,"while David Ramsey argued that the contract clause and the prohibition of state-issued paper money "will doubtless bear hard on debtors who wish to defraud their creditors, but it will be a real service to the honest part of the community" (Ely (2008), p.50).

[28]Madison expressed similar sentiments when describing the importance of a strong union in *The Federalist No. 10*: "a rage for paper money, for an abolition of debts, for an equal division of property, or for any other improper and wicked project, will be less apt to pervade the whole body of the union than a particular member of it."

In the years following ratification, state government interference in private contracts was greatly reduced. Debtor relief legislation occasionally arose in response to financial panics, and the courts vigorously applied the contract clause to strike down this legislation. [29] The panic of 1837 led to similar efforts to relieve debtors that were also struck down because of their retrospective application. In both Illinois and Alabama, laws allowing a debtor to redeem previously foreclosed property were struck down (*Bronson v. Kinzie*, 1843; *Howard v. Bugbee*, 1860). A similar fate befell Illinois and Indiana legislation that prohibited the sale of mortgaged property at prices below some fraction of its appraised value (*McCracken v. Hayward*, 1844; *Lessee of Gantley v. Ewing*, 1845; see also Wright (1938), p.70).

The largest wave of debtor relief laws was passed during the Great Depression; in an 18 month period between 1933 and 1934, mortgage foreclosure moratorium legislation was enacted in 27 states. Concerned about the constitutionality of these laws, the statutes were designed to be qualitatively different from previous debt relief laws. The most famous example concerned a 1933 Minnesota statute that came before the U.S. Supreme Court in *Home Building and Loan Association v. Blaisdell*, 1934. In this case, a 5-to-4 majority of the Supreme Court ruled that a 1933 Minnesota statute imposing a limited moratorium on the foreclosure of farm mortgages was constitutional. The court described in some detail what made this statute qualitatively different from previous debtor relief legislation that had been ruled unconstitutional. First, it was temporarily enacted in response to an emergency: the law was set to expire once the emergency was over, and in no case later than 1935. Second, it was a conditional moratorium subject to judicial review: debtors in need were allowed to appeal to state courts to have the existing period of redemption from foreclosure sales extended. Finally, it placed limits on the losses imposed on creditors; debtors were required to pay rents to creditors while they remained in possession (see Wright (1938) and Olken (1993)). The special nature of the statute at issue in the *Blaisdell* case was emphasized in succeeding cases that struck down debtor relief laws that applied indefinitely and did not discriminate on the basis of the needs of the debtor (*W.B. Worthen Company v Thomas*, 1934).

Following the recession of the early 1980s, foreclosure moratorium acts were struck down by the Oklahoma Supreme Court (*Federal Land Bank of Wichita v. Story*, 1988), the Kansas Supreme Court (*Federal Land Bank of Wichita v. Bott*, 1987), and the Iowa Supreme Court (*Federal Land Bank of Omaha v. Arnold*, 1988). Only modest debtor

[29] State and federal courts struck a 1791 Rhode Island law granting debtors exemptions from attachments for a period of three years (*Champion and Dickason v. Casey*, 1792), a South Carolina law suspending the execution of judgments against debtors (*Jones v. Crittendon*, 1814), and even a modest change to bankruptcy law that applied retroactively (*Sturges v. Crowninshield*, 1819).

relief laws, such as those requiring mediation between debtors and creditors, have been upheld (Walsh (2011)). In the recent crisis, legislation was passed in 11 states affecting the mortgage foreclosure process, but in each case the laws served only to require some form of meeting between the borrower and lender before foreclosure. California, Indiana, Massachusetts, Michigan, and Oregon all now require a pre-foreclosure conference between the debtor and lender aimed at mitigating losses. Connecticut, Maine, Maryland, Nevada, New York, and Vermont now require some form of mediation between the borrower and the lender.

Together, these strong protections from government interference are why, in contrast to the case for private borrowers in emerging markets and in the Eurozone, credit rating agencies impose no linkage between the local sovereign rating and that for private borrowers in U.S. states.[30] Much the same rationale exists for private sector borrowers in Canada, which, as we will see next, enjoy similar protections from provincial government interference as their U.S. counterparts.

3.2.2 Canada

Protections against provincial government interference in private contracts in Canada are similar to those available in the United States and stem from a similar place: the Canadian Constitution. Paragraph 91 of the *Constitution Act, 1982* (formerly the *British North America Act, 1867*) vests in the Parliament of Canada the exclusive legislative authority over the regulation of trade and commerce, currency and coinage, the issuance of paper money, bills of exchange and promissory notes, legal tender, and bankruptcy and insolvency. That is, like U.S. states, Canadian provinces cannot change legal tender, issue money, nor interfere in interprovincial (and international) trade and commerce.

However, paragraph 92 of the Constitution Act, 1982 does vest the provincial governments with the exclusive legislative authority over property rights within their own province. More than a century of jurisprudence has interpreted this expansively to include laws regarding contracts resulting in some overlap between federal and provincial laws regarding the treatment of debts.[31] As a result, although the provinces have no *de jure* power over interprovincial debts, they were able to exercise some *de facto* power over such debts and often used this power to favor local creditors over creditors from other provinces, creating a form of transfer and convertibility risk.

[30]Moody's rationale for this delinking of private and U.S. state government credit ratings is explained in Wilson (2014), Appendix B. We also verified that US state government credit ratings are not a constraint on private credit ratings for US corporates with S&P personnel in private communication.

[31]In *Citizen's Insurance Co. v. Parsons,* 1881, a case that involved insurance contracts, the Privy Council ruled that the property and civil rights clause included the power to regulate contracts.

In the early years of the Dominion, the Parliament of Canada attempted to impose a federal insolvency law guaranteeing equal treatment of creditors both within and across provinces.[32] The Insolvency Acts of 1869 and 1875 prohibited an "unjust preference" made in "contemplation of insolvency" with the required proof being an intention to prefer one creditor over another. However, courts interpreted payments made following a creditor's request for repayment as involuntary and hence not an unjust preference (see Telfer (2014)). As a result, there existed a de facto, if not de jure, preference in favor of local creditors—often family members and friends—who first observed signals of a debtors distress and could submit early requests for repayment. The rights of creditors from other provinces worsened with the repeal of the federal Insolvency Act in 1880 which led to a period in which a common law "race to courthouse" governed insolvent debtors, a situation that typically favored local creditors who could often initiate and obtain judgments before more distant creditors were informed of the debtor's distress. The provincial governments were slow to legislate to restrict the granting of preferences (New Brunswick only passed legislation in 1895, and Nova Scotia took until 1898) and the resulting legislation was often regarded as ineffectual (e.g., Ontario's law of 1880).

With the passage of the federal Bankruptcy Act of 1919, any de facto or de jure preference in favor of local debtors was eliminated. This situation remains in force today.

3.2.3 European Union

Compared with the legal protections against state and provincial government interference available to private creditors in the United States and Canada, the protections offered among the nations of the European Union are typically substantially weaker. One exception that holds only for those members in the Eurozone is in regard to changes in legal tender; Article 128 (1) of the Treaty on the Functioning of the European Union (TFEU) makes euro-denominated banknotes and coins, and only such notes and coins, legal tender. [33] Hence, short of abandoning the euro—a possibility that appears to be explicitly ruled out in the TFEU—the members of the Eurozone are unable to change legal tender.[34]

Other protections from government interference in European treaties and conventions are typically weakened by the presence of clauses allowing any such protection to be

[32]Much of our discussion of the history of Canadian insolvency and bankruptcy law is drawn from Telfer (2014) and Telfer (1999).

[33]Strictly, the TFEU concerns only euro banknotes, whereas Article 11 of Regulation EC/974/98 on the introduction of the euro applies to euro coins.

[34]The TFEU refers to the irrevocable fixing of exchange rates in Articles 46(3), 49, and 140(3). However, there is a provision in Article 50 of the TFEU that envisages a member state leaving the European Union altogether.

suspended whenever it is in the public interest. For example, Articles 63 and 65 of the TFEU, although designed to limit the use of capital controls by member states, allow capital controls that are "justified on grounds of public policy or public security", as well as the case law of the European Court of Justice allowing interventions "for overriding reasons of general public interest"(see European Commission (2013)).[35]

The only other potential source of protection against government interference comes from Article 1 of Protocol to the Convention for the Protection of Human Rights and Fundamental Freedoms (CPHRFF). However, this clause does not prohibit government interference in private contracts *per se*; rather, it simply requires that such interference be "in the public interest"and subject to legal principles: "Every ... person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by law and by the general principles of international law."Moreover, Article 15 of CPHRFF allows any government to suspend any human right or fundamental freedom in the event of a public emergency:

> In time of war or other public emergency threatening the life of the nation any High Contracting Party may take measures derogating from its obligations under this Convention to the extent strictly required by the exigencies of the situation, provided that such measures are not inconsistent with its other obligations under international law.

In summary, investors in Europe lack the extensive protections against government interference enjoyed by investors in the U.S. states and Canadian provinces today. Moreover, the experience of investors in emerging markets today, as well as in the U.S. states and Canadian provinces throughout history, indicates that governments can be expected to interfere in contracts each time some public emergency, such as a debt crisis, allows them to justify interference "in the public interest."

4 Fiscal Flexibility

We now briefly review the theoretical and empirical literatures on the link between fiscal flexibility and public debt sustainability. We first discuss the theoretical literature's finding that a government's decision to raise taxes as opposed to default on debt as a way of filling fiscal gaps is determined by the range of tax instruments available to it. We

[35]With the imposition of capital and exchange controls in Cyprus, the European Commission proactively issued the opinion that both controls were lawful as a result of both the "public policy"exemption.

then discuss the empirical literature on debt sustainability, which relies on estimates of a government's ability to vary primary surpluses in response to debt levels and macroeconomic shocks, and the widespread finding that U.S. states are less fiscally flexible than Canadian provinces or European nations. Lastly, we turn to a discussion of how ratings agencies assess fiscal flexibility when rating the debt of U.S. state and Canadian provincial governments.

Following the theoretical work of Kydland and Prescott (1977) and Lucas and Stokey (1983), we see the sustainability of public debt as being determined by a government's ability to commit to use taxes and spending to generate the primary surpluses needed to repay the public debt rather than choose to default on that debt. In much of the literature, the trade-off the government faces when public debt is due is between the costs of current distortions connected with adjusting tax rates or levels of public expenditure with the reputational and/or resource costs of default on the public debt. This literature has found that whether or not that trade-off leads to a default on public debt depends on the range of tax instruments available to the government. If the government has access to taxes that impose only small distortions on the economy, then it will not be tempted to default on public debt held by domestic agents because closing fiscal gaps through increased taxation will generally be preferable to doing so through costly default on public debt. In contrast, if tax instruments are limited, then default on public debt can become a more attractive option, even if such a default is costly.[36] In this sense, this literature has emphasized a strong connection between fiscal flexibility as measured by the range of tax instruments available and the incentives to default on public debt.

This theoretical literature has led to a large recent literature on the sustainability of public debt that uses empirical estimates of the response of primary surpluses to debt levels and macroeconomic shocks as a reduced form measure of the ability of governments to adjust primary surpluses to repay public debts that can be an input in debt sustainability calculations.[37] Along this dimension, there is considerable evidence that U.S. states have a strongly procyclical fiscal response to macroeconomic shocks, suggesting fiscal rigidities caused by the nature of fiscal institutions in these states. For example, Poterba (1994), Bohn and Inman (1996), and Aizenman and Gunnarsson (2014) among others examine the impact of fiscal restrictions in U.S. states on their fiscal adjustment to macroeconomic shocks. More relevant for our thesis, Poterba and Rueben (1999), Lowry and Alt (2001), Poterba and Rueben (2001), and Johnson and Kriz (2005) estimate the extent to which

[36]Pouzo and Presno (2014) examine the role of fiscal inflexibility in generating optimal default in a stochastic closed economy in which a government is restricted to proportional taxes and uncontingent debt.

[37]See, for example, Bohn (1998) and Ghosh et al. (2013).

legal restrictions on increasing revenue raise the cost of U.S. state borrowing, both in terms of overall levels and in response to fiscal shocks. These modern findings complement the findings of historical studies of public debt in the United States. For example, Sargent (2012) discusses the role of fiscal inflexibility in shaping public debt crises in early U.S. history. Similarly, Wallis (2000) discusses the importance of flexible revenue sources for determining the equilibrium level of public debt at the local, state, and federal levels of U.S. government throughout American history. He shows how changes in institutions restricting the revenue sources available to local, state, and federal levels of U.S. government have had a dramatic impact on these governments' abilities to sustain public debt at different points in history.

In practice, considerations of fiscal flexibility are also an important part of credit ratings agencies' methodologies for the general obligation bonds issued by U.S. states. When rating U.S. states, Moody's makes an assessment of the role of constitutional constraints in reducing what they call the "financial flexibility" of each state. They argue that "[t]he constitutions of some states include provisions that limit financial flexibility and weaken the institutional governance framework. The initiative and referendum process can particularly constrain flexibility over time. California, Oregon, and Washington are among the states with the most active voter initiative processes, and in all three there have been long-run budgetary effects. Some states are constitutionally blocked from increasing revenues unless they put a referendum to the voters. Those states often can only look to the expenditure side of their budgets to close deficits when a two-pronged approach would offer more flexibility" (Raimes (2013)). Similarly, Standard and Poor's provide each U.S. state with a "revenue structure score" that reflects both institutional constraints and the track record of state policymakers with regard to raising revenue, which they use in their ratings.

Considerations of relative fiscal flexibility also play a major role in determining the relative credit ratings of U.S. states relative to Canadian provinces. As Moody's explains, "California's legal and political environment creates obstacles to timely budget management and revenue raising, which restricts its freedom of action relative to other US states and some sub-sovereigns, including Ontario. Constitutional constraints on budgeting flexibility continue in California, although modest governance changes have helped the state achieve three years of on-time budget passage. California's reliance on highly progressive income taxes creates recurring revenue volatility and financial pressure and constrains California's rating. In comparison, Ontario has relatively stable revenues and like other Canadian provinces, has strong fiscal flexibility, on both the revenue and expenditure sides of the ledger" (Wong and Raimes (2013)).

The finding that U.S. states are less fiscally flexible than Canadian provinces and the subnational units of other federal systems is widespread. Rodden and Wibbels (2010) study seven federal systems and conclude that U.S. states engage in far less expenditure smoothing than do the provinces of Canada, as well as the subnational governments of several other countries. Looking at the most recent business cycle, Jonas (2012) also concludes that "[e]ven though a similar procyclical fiscal tightening has been observed at the subnational level during the latest crisis in a number of advanced economies, the U.S.'s tightening appears to have been among the most pronounced." In contrast to the United States, Canada is viewed as one of the most decentralized countries in the world in which the provinces "have a virtual free hand in levying taxes" (Bird and Tassonyi (2003)). The extent of expenditure smoothing for U.S. states documented by Rodden and Wibbels (2010) also seems low relative to estimates computed for members of the European Union in Hallerberg and Strauch (2002).

5 Model

We now present a theory of external debt constraints and public debt constraints based on the interaction of the risk of sovereign interference with private debt contracts and fiscal flexibility. We use a simple two period model to illustrate our main points.

5.1 Environment

Consider a model of a small open economy with two time periods, $t = 1, 2$. This small open economy has access to opportunities to borrow from risk neutral international creditors. These international creditors have a time discount factor equal to one, and hence the equilibrium (net) international riskless interest rate is equal to zero. This small open economy consists of a representative household, domestic financial intermediaries, and a government that chooses policies to maximize the welfare of the representative household.

The household has utility over private consumption C_t and public expenditure G_t of the form

$$u(C_1) + u(G_1) + u(C_2) + u(G_2).$$

The household is endowed with Y_t units of the consumption good at time $t = 1, 2$, with $Y_1 < Y_2$. This assumption, combined with zero discounting by households and international creditors, ensures that agents in this economy have a motivation to borrow from

the international creditors in period $t = 1$ so as to smooth private and public expenditure over time. Specifically, given an international gross interest rate of one, the unconstrained optimal allocation would equate private consumption and public expenditure in all periods such that

$$C_t^* = G_t^* = \frac{1}{4}(Y_1 + Y_2). \tag{1}$$

To implement this unconstrained optimal allocation, this small open economy would incur external debt $D^* = \frac{1}{2}(Y_2 - Y_1)$ in period $t = 1$ and repay this amount of external debt in period $t = 2$. In the unconstrained optimal allocation, the households' intertemporal marginal rate of substitution for private consumption $u'(C_1^*)/u'(C_2^*)$ is equal to the international riskless (gross) interest rate of 1. The same is true of households' intertemporal marginal rate of substitution for public consumption $u'(G_1^*)/u'(G_2^*)$.

Borrowing and Default Costs: The government borrows from international creditors D^g and from domestic financial intermediaries B^g. Households borrow from domestic financial intermediaries B^p. Domestic financial intermediaries borrow from international creditors D^p. We refer to the sum of public and private external debt $D^g + D^p$ as the external debt of the country and to the sum of domestic and foreign public debt $B^g + D^g$ as the public debt of the country. In all cases this notation refers to the principal and interest due in period 2. Resources borrowed in period 1 are equal to these amounts times the price of these debts in period 1.

Domestic financial intermediaries and households can commit to repay their debts unless the government interferes with private debt contracts. The government, in contrast, is unable to commit to repay its external and domestic debts and not to interfere with private external debt contracts.

We assume that government default or interference with private external debt contracts imposes a resource cost on the economy in terms of reducing Y_2. The costs of default on external public debt D^g is $\Delta^{dg} \geq 0$; the costs of default on domestic public debt B^g is $\Delta^{bg} \geq 0$; and the costs of government interference with private external debt contracts D^p is $\Delta^p \geq 0$.[38]

Note that we consider the possibility that the government would make separate default decisions on its domestically held and external public debts. In some cases, governments

[38] As discussed in Wright (2006), a conceptual issue arises in modeling competitive equilibria when there is a disconnect between the decentralized decision of individual borrowers and the collective decision to interfere with those debts made by the government. Wright (2006) decentralizes such equilibria with individual specific borrowing constraints; Kehoe and Perri (2004) assume individual borrowers always repay and the government induces the desired allocation with asset taxes; Kim and Zhang (2012) assume there are no private capital markets. In a previous version of this paper, we introduced oligopolistic domestic financial institutions. In the current version, we do not take a stand on the specific decentralization.

are able to make these separate default decisions because the different types of debt it owes are governed by different laws: domestic and foreign. Alternatively, a government may implement differential default on its externally held public debts and its domestically held public debts (or, at least, those public debts held by domestic financial intermediaries) by defaulting on all of its public debts and then using government funds to bail out domestic financial intermediaries. This is the interpretation that we follow here.

These resource costs of default on public debt and interference with private external debt contracts are potentially stochastic. We denote the realized value of these costs in period 2 by the vector $\Delta = (\Delta^{dg}, \Delta^{bg}, \Delta^{p})$. We assume that the cumulative distribution function of these costs is given by $F(\Delta)$. These stochastic costs imply that in equilibrium private and public consumption in period $t = 2$ are also potentially stochastic.

Binding Debt Constraints: In what follows, we will say that the country faces no binding debt constraints, external or public, if it is able to implement the unconstrained optimal allocation (1) in equilibrium. If it is not able to implement the unconstrained optimal allocation in equilibrium, then we say that it faces a binding external or public debt constraint depending on the equilibrium intertemporal marginal rate of substitution of private and public expenditures, respectively.

The commitment problem on the part of the government in our model leads to the households facing a *binding external debt constraint* in equilibrium if $u'(C_1) > Eu'(C_2)$. That is, we say that the country faces a binding external debt constraint if households are constrained from doing the borrowing needed to finance the unconstrained optimal timing of consumption. Taking the household's intertemporal marginal rate of substitution $Eu'(C_2)/u'(C_1) = 1/R$ as the inverse equilibrium domestic riskless interest rate in this small open economy, we then have, equivalently, that the households face a binding external debt constraint if the equilibrium domestic riskless interest rate in this small open economy exceeds the international riskless interest rate.

In parallel, we say that the commitment problem on the part of the government leads to the government facing a *binding public debt constraint* in equilibrium if, in that equilibrium, $u'(G_1) > Eu'(G_2)$. In this case, household welfare would be increased if the government were able to raise more resources in period $t = 1$ to finance increased government expenditure relative to the government expenditure in period $t = 2$.

Government Policy: We consider two possible regimes restricting the government's choice of taxes in both periods τ_1 and τ_2 to be paid by households. In the first regime, which we term the *flexible tax regime*, we assume that the government can choose taxes

freely. In the second regime, which we term the *inflexible tax regime*, we assume that taxes are predetermined as parameters that cannot be altered.

In period 1 the government chooses public expenditure G_1, and domestic and external public indebtedness B^g and D^g due in period 2. The prices paid for these public debts in period 1 are determined endogenously and reflect the risk of government default and interference. In equilibrium, these prices are functions of private external debts and public domestic and external debts $D = (D^p, B^g, D^g)$. The government also chooses taxes τ_1 in the flexible tax regime. Government policies in period 1 must satisfy the budget constraint

$$G_1 = \tau_1 + q^{bg}(D)B^g + q^{dg}(D)D^g, \tag{2}$$

where $q^{bg}(D)$ and $q^{dg}(D)$ are the prices for domestic and external public debt respectively.

In period $t = 2$, the government chooses whether to repay domestic debt ($I^{bg} = 1$) or not ($I^{bg} = 0$); whether to repay external public debt ($I^{dg} = 1$) or not ($I^{dg} = 0$); and whether to interfere with private external debt contracts ($I^p = 0$) or not ($I^p = 1$), taking the outstanding debts due $D = (D^p, B^g, D^g)$ and the realized costs of default and/or interference Δ as given. For simplicity, we assume that default and interference can be partial by allowing $I^j \in [0, 1]$ for $j = bg, dg, p$. The resource costs of partial default and/or interference are partial and in proportion to the default and/or interference.

The government then chooses public expenditures G_2 and, in the flexible tax regime, taxes τ_2 contingent on these default and interference decisions. We let $I = (I^{bg}, I^{dg}, I^p)$ denote the government's default and interference decisions. We write government policy in period $t = 2$ as functions of private and public debts D and the realized resource costs of default and interference with private external debt contracts Δ as needed. The government's budget constraint in period 2 is given by

$$G_2(D, \Delta) = \tau_2(D, \Delta) - I^{bg}(D, \Delta)B^g - I^{dg}(D, \Delta)D^g. \tag{3}$$

Pricing of External Debts: International creditors take as given government default and interference decisions as functions of the country's aggregate indebtedness D and the default costs Δ and set prices for external borrowing by the government $q^{dg}(D)$ and the domestic private agents $q^p(D)$ to ensure that they receive expected gross return of one on their lending to the public and private sector in this country. Thus, these prices for external borrowing are given by

$$q^{dg}(D) = \int I^{dg}(D, \Delta) dF(\Delta) \tag{4}$$

and

$$q^p(D) = \int I^p(D, \Delta) dF(\Delta). \tag{5}$$

We then define the spread on public external debt as $S^{dg}(D) = 1/q^{dg}(D) - 1$ and the spread on private external debt as $S^p(D) = 1/q^p(D) - 1$.

The Decision to Default or Interfere with Debts with Flexible Taxes

In period 2, the government chooses its decisions to default on public debts or interfere with private external debts together with taxes τ_2 to maximize the welfare of the representative household taking as given outstanding debts due $D = (D^p, B^g, D^g)$ and the realized costs of default and/or interference $\Delta = (\Delta^{dg}, \Delta^{bg}, \Delta^p)$. It is straightforward to show that with flexible taxes, the government's decision to default on its public debts and its decision to interfere with private external debts are made based on a simple comparison of the size of these debts relative to the resource costs of default or interference. In contrast, government will not default on its domestic public debts B^g regardless of how small the costs of such a default might be. Moreover, taxes are set to equate public and private consumption.

Lemma 1: With flexible taxes, the government will default on its public external debt D^g iff $D^g > \Delta^{dg}$; it will interfere with private external debts iff $D^p > \Delta^p$; and it will not default on its domestic public debt B^g for any value of $\Delta^{bg} > 0$.

Proof:

Household welfare in period 2 is given by

$$u(C_2(D, \Delta)) + u(G_2(D, \Delta)).$$

Government provision of the public good $G_2(D, \Delta)$ is given as a function of debt and policies by equation (3).

Private consumption in period 2 is given by the household budget constraint in the second period

$$C_2(D, \Delta) = Y_2 - \sum_{j=bg,dg,p} (1 - I^j(D, \Delta))\Delta^j - \tau_2(D, \Delta) + \Pi(D, \Delta) - B^p, \tag{6}$$

where $\Pi(D, \Delta)$ are the profits that the households receive as owners of the domestic financial intermediaries and $\sum_{j=bg,dg,p}(1 - I^j(D, \Delta))\Delta^j$ are the realized resource costs of the government's default and/or interference decisions.

The aggregate profits of domestic financial intermediaries in period 2 are given by

$$\Pi(D,\Delta) = B^p + I^{bg}(D,\Delta)B^g - I^p(D,\Delta)D^p, \tag{7}$$

since these intermediaries enter the period with assets comprising of loans to the domestic households B^p and loans to the government B^g and liabilities comprising of borrowings from abroad D^p.

By plugging equation (7) for the aggregate profits of domestic financial intermediaries into the period 2 budget constraint of households, we have that private consumption in period 2 is given by

$$C_2(D,\Delta) = Y_2 - \sum_{j=bg,dg,p} (1 - I^j(D,\Delta))\Delta^j - \tau_2(D,\Delta) + I^{bg}(D,\Delta)B^g - I^p(D,\Delta)D^p. \tag{8}$$

Finally, using equation (3) to solve for taxes $\tau_2(D,\Delta)$ and plugging this expression into (8), we get

$$C_2(D,\Delta) + G_2(D,\Delta) = Y_2 - \sum_{j=bg,dg,p} (1 - I^j(D,\Delta))\Delta^j - I^{dg}(D,\Delta)D^g - I^p(D,\Delta)D^p. \tag{9}$$

Because the government has full flexibility in setting $\tau_2(D,\Delta)$, it can choose these taxes to implement any combination of private and public second period consumption that satisfies this joint constraint (9). Thus, with flexible taxes, it is clear that the government maximizes welfare by setting taxes to equate public and private consumption $C_2(D,\Delta) = G_2(D,\Delta)$ and defaulting on external public debt D^g or interfering with private external debt D^p whenever such debts exceed the resource costs of default or interference. In contrast, there is no benefit to default on domestically held public debt because such a default imposes a cost Δ^{bg} reducing resources available for private and public consumption that does not need to be incurred if taxes rather than domestic default is used to finance government expenditures. Hence, the government always chooses to honor domestically held public debts. □

We now derive our key results regarding equilibrium in the version of the model in which the government is free to choose taxes fully flexibly.

Canadian Provinces: Neither External nor Public Borrowing Constraints Bind
We first show that with flexible taxes, if the government can commit not to interfere with private external debt contracts, then neither the external nor the public debt constraint can bind in the first period. That is, as long as the costs of sovereign interference with

private contracts are large enough, then the country is able to achieve the unconstrained first best allocation borrowing abroad privately as necessary. This result holds independently of the resource costs Δ^{bg} and Δ^{dg} of defaulting on domestic and external public debt. We interpret this result as characteristic of Canadian provinces.

Proposition 1: Assume that $\Delta^p \geq \frac{1}{2}(Y_2 - Y_1)$ with probability 1 and taxes are fully flexible. Then neither the external nor the public debt constraints binds.

Proof: We prove this result by showing that the unconstrained optimal allocation in equation (1) can be implemented as an equilibrium. Recall that $D^* = \frac{1}{2}(Y_2 - Y_1)$ denotes the level of external debt needed to fund the unconstrained optimal allocation for the country. By assumption, we have that $Prob(\Delta^p \geq D^*) = 1$ so that $I^p(D^*, \Delta) = 1$ for all realizations of Δ and hence, from equation (5), the domestic financial intermediaries are able to borrow the unconstrained optimal level of external debt D^* abroad privately at the international riskless interest rate of 1.

To show that the unconstrained socially optimal allocation (1) can actually be implemented as an equilibrium allocation, we must show that the government is able to obtain the resources it needs in each period to pay for the optimal level of public good provision $G_1^* = G_2^* = \frac{1}{4}(Y_1 + Y_2)$. If we assume that the government has no constraints on its choice of taxes, then this can be accomplished simply by setting taxes $\tau_1 = \tau_2 = (Y_1 + Y_2)/4$ and having the government run a balanced budget with $G_1 = \tau_1$ and $G_2 = \tau_2$. With a balanced budget, it is clear that both domestic and external public debt are equal to zero ($B^g = D^g = 0$). Thus, we have that the government has no incentive to default on public debts.

Note that with these taxes, the household then has after-tax wealth of $(Y_1 + Y_2)/2$ and faces a domestic interest rate equal to the international interest rate, so $R = 1$. In equilibrium, the household then consumes the socially optimal levels of private consumption $C_1 = C_2 = (Y_1 + Y_2)/4$ and borrows internationally through the domestic financial intermediaries $D^p = C_1 + \tau_1 - Y_1 = (Y_2 - Y_1)/2$. Note since the domestic interest rate $R = 1$ and the price at which the domestic financial intermediaries are able to borrow from abroad is $q^p(D) = 1$, the equilibrium profits of these intermediaries are $\Pi = 0$. Thus this allocation can be implemented as an equilibrium. □

Our proof of this proposition uses a particularly strong argument based on the fact that, with flexible taxes, government can change the timing of taxes as needed to balance its budget every period and look to the private sector to do whatever external borrowing is needed to finance the first best allocation of consumption. Such a strong argument is not, in fact, required. The government does not need to run a balanced budget to implement the unconstrained socially optimal allocation when the government can commit not to

interfere with private external debt contracts ($\Delta^p \geq \frac{1}{2}(Y_2 - Y_1)$ with probability 1) and taxes are fully flexible. Instead, as we have shown above, the government can credibly commit not to default on domestic public debt regardless of the costs of such a default. As a result, as we show in the next proposition, the equilibrium satisfies a particular form of Ricardian equivalence with regard to domestically issued public debt.

Proposition 2: Assume that $\Delta^p \geq \frac{1}{2}(Y_2 - Y_1)$ with probability 1 and that taxes are flexible. Then it is possible to implement the unconstrained socially optimal allocation as an equilibrium with any values of government borrowing from domestic financial intermediaries $B^g \leq \frac{1}{4}(Y_1 + Y_2) = G_1^*$ even if the costs of defaulting on public debt Δ^{dg} and Δ^{bg} are arbitrarily low.

Proof: The proof of this proposition relies on the observation from Lemma 1 that, in period 2, default on domestically held public debt has the equivalent impact on the resources available for private and public expenditure as an increase in taxes, except that it entails a reduction in resources available for private and public consumption in period 2 of Δ^{bg}. Thus, as long as the costs of default on public debt $\Delta^{bg} > 0$, the government will strictly prefer to raise taxes to repay domestically held public debt rather than choosing to default on that debt. Even if these costs are zero, the government will weakly prefer to use taxes rather than default on domestic debt in period $t = 2$ to finance government expenditure. □

Note that our Ricardian equivalence result applies only to public *domestic* borrowing and not public *external* borrowing. That is, if low realizations of the resource cost Δ^{dg} are possible, then public external borrowing may lead to costly default in equilibrium, which would imply that it would not be possible to implement the unconstrained socially optimal allocation.

We interpret Propositions 1 and 2 as appropriate for Canadian provinces with commitment not to interfere with private debt contracts and flexible taxes. We argue that these provincial governments are able to issue a substantial amount of public debt held by domestic residents with little apparent risk of binding external or public debt constraints.

Eurozone Countries: Binding External and Public Borrowing Constraints We now turn to consider the case in which the costs of interfering with private contracts may be low enough such that the government does wish to interfere with these contracts for at least some realizations of Δ^p. We show that if the resource costs of sovereign interference and default Δ are deterministic and taxes are flexible then, if the public constraint is binding, the external debt constraint is binding as well. We interpret this case as characteristic of Eurozone countries.

Proposition 3: Assume that the resource costs of sovereign interference and/or default Δ are deterministic. If the government has full flexibility in setting taxes then, in any equilibrium, if the public debt constraint is binding in period 1 then the external debt constraint is binding as well.

Proof: Using the results of Lemma 1, we have that when the costs of default are deterministic, the equilibrium price of private external debt is then $q^p(D) = 1$ if $D^p \leq \Delta^p$ and zero otherwise because default does not occur in equilibrium. Likewise, the equilibrium price of public external debt is $q^{dg}(D) = 1$ if $D^g \leq \Delta^{dg}$ and zero otherwise. Thus, the total combined amount of resources that this country can borrow from abroad in period 1 is $q^p(D)D^p + q^{dg}(D)D^g \leq \Delta^p + \Delta^{dg}$. If this limit on external debt $\Delta^p + \Delta^g > D^*$, then it will be possible to implement the unconstrained socially optimal allocation as an equilibrium outcome, as we discussed for the case of Canadian provinces.

Now consider the case in which the limit on external debt $\Delta^p + \Delta^g < D^*$ so that it is not possible to implement the unconstrained optimal allocation. In this case, we must have that the sum of public and private consumption in period 1, $C_1 + G_1$, is less than the sum of the unconstrained optimal levels of public and private consumption, $C_1^* + G_1^*$. Likewise, because there are no resource costs of default in equilibrium, we also have that private and public consumption in period 2 both exceed their optimal levels $C_2 = G_2 > C_2^* = G_2^*$. Thus, we must have that either the public or the external debt constraint is binding, or they are both binding.

To show that both the public and the external debt constraints must bind at the same time, we must use the assumption that the government chooses fiscal policy in period 1 to maximize welfare subject to its limited power of commitment. What the government would like to do in period 1 to maximize welfare is to choose taxes τ_1 and/or domestic public borrowing B^g to equate private and public consumption $C_1 = G_1$ in period 1 as well as in period 2. Given the constraint on overall external borrowing given by $\Delta^p + \Delta^g < D^*$, this means that in an equilibrium in which financial and fiscal policies are chosen optimally in period 1 as well as in period 2, we have

$$C_1 = G_1 = \frac{1}{2}\left(Y_1 + \Delta^p + \Delta^{dg}\right),$$

$$C_2 = G_2 = \frac{1}{2}\left(Y_2 - \Delta^p - \Delta^{dg}\right),$$

so that both the external and public debt constraints are binding. □

In this case with deterministic costs of sovereign interference and default, it is straightforward to find the constrained optimal equilibrium because no default occurs in equilib-

rium. In the case with stochastic default costs Δ, the government faces the additional consideration in choosing its fiscal policy in period 1 that its choice of policies impacts both domestic and public external borrowing and hence the equilibrium probability of resource costs in period 2 due to default and/or interference with private external debt. Hence, in this case, the government may wish to constrain its period 1 expenditures (choose $G_1 < C_1$) to reduce the need for private and/or public external borrowing. Such a government might also wish to implement ex-ante controls on private external borrowing in period 1 to avoid the temptation to interfere with that borrowing in period 2. Of course, such ex-ante capital controls would be inconsistent with the free movement of capital envisioned for countries in the Eurozone.

California: Public Debt Constraints with Inflexible Taxes We now consider a modified version of this economy in which the government has constraints on its ability to set taxes. In particular, assume that τ_1 and τ_2 are fixed at given levels. We now show that when the government is unable to alter taxes in period $t = 2$ to finance its desired level of public expenditures, then it may be tempted to default on outstanding public debts, both external and domestic, as a substitute for taxation for raising revenue. This temptation arises when public expenditure is constrained by rigid low taxes relative to private consumption. This incentive to default on both domestic and external public debts in period 2 can lead to a binding public debt constraint in period 1, with the government unable to raise additional resources through public borrowing either domestically or abroad, even if the private sector is unconstrained in its external borrowing. We interpret this outcome as characteristic of California.

Consider the government's incentives to default on its public debts in period $t = 2$ when taxes are rigid at τ_2. As in the case in the economy with flexible taxes, public and private consumption are given by equations (3) and (8). But now, since taxes τ_2 are inflexible, the choices of public and private expenditure that can be implemented are restricted to those combinations that satisfy equation (9) together with inequalities $G_2(D, \Delta) \leq \tau_2$ and $C_2(D, \Delta) \geq Y_2 - \sum_{j=bg,dg,p}(1 - I^j(D, \Delta))\Delta^j - \tau_2$ because the government cannot alter taxes. Because of these restrictions on the choice of public and private consumption in period $t = 2$, now the government may be tempted to default on domestically held public debt even if such a default entails a resource cost that reduces private expenditure over and above the reduction due to the default on the debt itself. This is because, with inflexible taxes, the government has no alternative means of raising revenue other than default on its public debts. Thus, in this environment with fiscal inflexibility, in contradiction to the case with fiscal flexibility, it is possible for the country to face a binding public debt

constraint without facing a binding external debt constraint.

We can understand these incentives for the government to default on its domestically public debts as follows. Given realized values of (D, Δ), the government's equilibrium default decisions on domestically and externally held public debt are the choices of I^{bg} and I^{dg} in the interval $[0, 1]$ that maximize welfare $u(C_2) + u(G_2)$ with public and public consumption given by (3) and (8) with taxes τ_2 fixed.

Consider first the government's decision to default on its external public debts. Such a default is optimal if the value of the debt, in utility units, exceeds the value of the default resource cost, also in utility units, or

$$u'(G_2)D^g > u'(C_2)\Delta^{dg}.$$

This result is a simple generalization of the default rule on external public debts with flexible taxes since, with flexible taxes, $G_2 = C_2$, and hence, $I^{dg}(D, \Delta) = 0$ if $D^g > \Delta^{dg}$ and 1 otherwise. Here we see that if taxes are rigid and constrained to be low, so that, in equilibrium, $G_2 < C_2$, then the government will default on external debts D^g even if the costs of such a default Δ^{dg} are somewhat in excess of the amount D^g owed on these debts because, in this case, the marginal social utility of public expenditures strictly exceeds the marginal social utility of private expenditures.

The same logic also can be used to understand the government's decision to default on domestically held public debts. Now the necessary condition for optimality of the default decision requires that default occurs when

$$u'(G_2)B^g > u'(C_2)(B^g + \Delta^{bg}).$$

Note that this condition cannot be satisfied in the economy with flexible taxes because, with flexible taxes, $G_2 = C_2$ and hence $u'(G_2) = u'(C_2)$. This logic delivered us the result that a government with flexible taxes could credibly commit to repay its domestically held public debts in period $t = 2$ regardless of the costs of default on these debts. With rigid taxes, however, it is possible that in equilibrium, we have that $G_2 < C_2$ because τ_2 is set low and hence we may have that in equilibrium, the marginal social utility of public expenditures strictly exceeds the marginal social utility of private expenditures. In this case, we have that government will wish to default on its domestically held public debts whenever those debts are large enough relative to the costs of default.

To develop an example economy in which the government does in fact face a binding public debt constraint in equilibrium with inflexible taxes, assume that default costs Δ

are deterministic and satisfy

$$\Delta^{bg} + \Delta^{dg} < Y_2 - 2\tau_2. \tag{10}$$

This inequality (10) implies that $C_2(D) > G_2(D)$ for all values of D even if the government defaults on all of its public debt both domestic and external.

In this case, the government is able to raise up to $\bar{D}^g$ in external public debts in period 1 at price $q^{dg}(D) = 1$ for $D^g \leq \bar{D}^g$ and zero otherwise, where

$$\bar{D}^g = \frac{u'(Y_2 - \tau_2 - \Delta^{bg} - \Delta^{dg})}{u'(\tau_2)} \Delta^{dg}.$$

Furthermore, as long as inequality (10) is satisfied, the government is able to raise domestically held public debts up to $\bar{B}^g$ at price $q^{bg}(D) = 1$ for $B^g \leq \bar{B}^g$ and zero otherwise, where $\bar{B}^g$ solves

$$\frac{\bar{B}^g}{\bar{B}^g + \Delta^{bg}} = \frac{u'(Y_2 - \tau_2 - \Delta^{bg} - \Delta^{dg})}{u'(\tau_2)}.$$

The government then faces a binding public debt constraint in period 1 if the implied public debt limit $\bar{B}^g + \bar{D}^g$ together with the rigid taxes τ_1 in period 1 are not large enough to finance public expenditure $G_1 = G_2$.

Note that if the cost of interference with private external debt contracts Δ^p is high, then it will be possible for the households to borrow abroad as desired to implement optimal private consumption

$$C_1 = C_2 = \frac{1}{2}(Y_1 - \tau_1 + Y_2 - \tau_2)$$

by borrowing abroad privately $D^p = C_1 + \tau_1 - Y_1$ at the international riskless interest rate of 1. We interpret such an equilibrium as corresponding to California.

6 Conclusions

When the member countries of the Eurozone established their monetary union, neither academics nor policymakers anticipated that member states might experience external debt crises.[39] Policymakers' optimism is nicely captured in the European Commission's One Market, One Money report (1990) which posits that "a major effect of EMU is that balance-of-payments constraints will disappear [...]. Private markets will finance all viable borrowers, and savings and investment balances will no longer be constraints at

[39]See, for example, Blanchard and Giavazzi (2002), who spoke of the end of the Feldstein-Horioka puzzle.

the national level." As described in Merler and Pisani-Ferry (2012) policymakers made no explicit provisions for addressing external debt crises among Eurozone member states. Rather, policymakers focused on constraining public debt through provisions in the Maastricht Treaty. As a result of this lack of attention to external debt, solutions to the current crisis have had to be improvised.

The academic literature has not provided clear cut guidance on how to address external debt crises within the Eurozone. In part this is because the literature is typically segmented. Most models of the risk of default on external debt consider the domestic government and private sector as a unified actor, whereas most models of the sustainability of public debt are conducted within closed economies. Our contribution to this literature is to integrate the analysis of default incentives on external and public debt in a simple unified model.

What lessons for addressing debt crises within the Eurozone do we draw from our analysis? First, the experiences of Canada and the United States indicate that stronger institutional foundations are needed to mitigate the risk of government interference with private contracts. The freedom of private capital flows within the United States and Canada benefits from a strong legal foundation of protection under constitutional law together with federal bankruptcy law and uniform laws governing securities markets. The freedom of these capital flows has also been enhanced over time, particularly in the United States, by the development of stronger federal foundations underpinning the banking system. Although we have not discussed banking explicitly in this paper, the development of an integrated continent wide banking system in the United States has been a gradual process carried out over two centuries marked by repeated crisis and reform. In contrast, as discussed in Bordo and Rockoff (2015), Canada has had a strong nationwide banking system from relatively early on in its history and has been largely free of banking crises. Of course, one often noted potential benefit of establishing a stronger banking system in the Eurozone would be to reduce the risk of member government interference with private contracts in times of crisis.

Second, the institutional features governing fiscal flexibility for state and provincial governments in the United States and Canada also provide lessons for the development of new fiscal institutions in Europe. As described in Sargent (2012) and Henning and Kessler (2012), U.S. states have chosen somewhat distinctive fiscal institutions that result in equilibrium in relatively tight constraints on state government borrowing. In contrast, Canadian provincial governments enjoy much greater fiscal flexibility and as a result are able to sustain substantially higher levels of public debt. These starkly different outcomes suggest that Europe should carefully consider the implications of restrictions on the fiscal

flexibility of member states for the future sustainability of public debt.

7 Epilogue: An Unfolding Tale of Two Sovereign Defaults

In late June of 2015, after this paper was written, the leaders of the governments of Greece and Puerto Rico nearly simultaneously announced that it was likely that they would default on their respective public debts.[40] These two public debt crises share many aspects in common. In both Greece and Puerto Rico, the governments' fiscal condition has been exacerbated by very large and prolonged recessions.[41] Both governments face high and rising costs of further borrowing, making it infeasible for them to roll over their existing debts. For both governments, the legal structure to support a rescheduling of their debts is fraught with all the uncertainty surrounding a sovereign default.[42]

But there is one dimension in which these two public debt crises differ—the extent to which this public debt crisis has spilled over to the private sector. In the case of Greece, the public debt crisis has been accompanied by a run on Greek banks that has led the government to interfere in private debt contracts by declaring a bank holiday, limiting deposit withdrawals, and imposing controls on capital outflows. On June 29, in response to these measures, Standard and Poors downgraded the counterparty credit ratings of the four main Greek banks to 'SD' (selective default) and the ratings of their senior unsecured debt to 'CCC-'. Standard and Poors (2015a) summarizes the outlook for these Greek banks as follows:

> We view the banks' liquidity positions as having weakened further after these recent events, which we see as constraining the banks' ability to meet their upcoming financial obligations, when due. We therefore believe the default of the Greek banks is a virtual certainty unless unexpected additional external support materializes.

Standard and Poors (2015b) has also begun downgrading the credit ratings of Greek non-financial corporations.

[40] The announcement by the Governor of the Commonwealth of Puerto Rico that their public debt is unsustainable was immediately met by announcements from the White House and Congress that there would be no Federal bailout of these debts.

[41] Puerto Rico's fiscal and economic conditions are analyzed in the report by Krueger et al. (2015)) recommending the restructuring of Puerto Rico's General Obligation Debts.

[42] The Commonwealth of Puerto Rico is specifically exempted from Chapter 9 of the U.S. Bankruptcy Code, so the government does not have access to the same legal structure Detroit and other municipalities have used to reschedule their debts.

In contrast, while the recession and public debt crisis in Puerto Rico has implications for the credit ratings of that island's banks, the impact of this public debt crisis on these banks is more limited than in Greece due to the legal certainty that the Commonwealth of Puerto Rico is not able to interfere with private external debt contracts.[43] Specifically, on June 29th, Standard and Poors (2015c) downgraded the general obligation bonds of Puerto Rico to 'CCC-' and wrote "The downgrades are based on our view that a default, distressed exchange, or redemption of the commonwealth's debt appears to be inevitable within the next six months absent unanticipated significantly favorable changes in the issuers' circumstances." The credit rating agencies' views on Puerto Rican banks, however, are more measured, even given the likelihood of a default on the public debt. For example, in February of 2015, Moody's (2015) affirmed its ratings of three of the largest Puerto Rican banks writing

> The bank rating affirmations take into account Puerto Rico's current economic conditions, which, although very weak, remain within Moody's expectations for the banks' liquidity and capital profiles. The affirmations were in contrast to the downgrade of Puerto Rico's GO bond rating, which reflected not only the commonwealth's continued economic weakness, but also its reduced liquidity, which has increased the probability of default on central government debt over the next two years. Moody's said the three banks' ratings already incorporate risks stemming from Puerto Rico's broader economic and fiscal challenges, including the high probability of a public-sector default.

It remains to be seen how the macroeconomic implications of the public debt crises in Greece and Puerto Rico will play out. Clearly, in Greece, the public debt crisis has also morphed into an external debt crisis, largely due to sovereign interference with private debt contracts. In Puerto Rico, while there is no risk of such sovereign interference with private contracts, the overall uncertainty surrounding a public debt default is also likely to have an important impact on the private economy. Only time will tell what the resolution of these two public debt crises will look like.

[43] Of course, the fact that bank deposits in Puerto Rico are insured by the FDIC also plays an important role in insulating the finances from the Commonwealth of Puerto Rico from bank failures. The FDIC closed three banks in Puerto Rico in 2010 and closed Doral Bank, the third largest bank in Puerto Rico, in the spring of 2015.

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Table 1: Indebtedness in the United States, Canada, and the Eurozone 2012

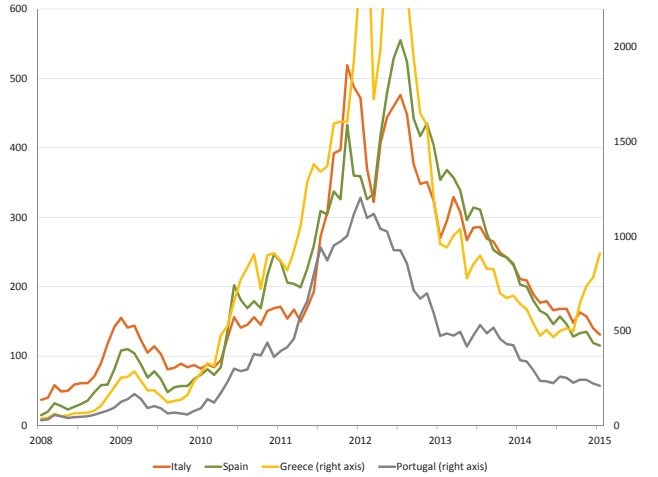
	Liabilities to GDP			
	Net Debt	Plus Unfunded	Rating	Revenue/GDP
United States				
California	5%	11%	A1	9%
Texas	1%	11%	Aaa	7%
New York	5%	7%	Aa2	11%
Florida	3%	6%	Aa1	8%
Illinois	5%	32%	A2	9%
Pennsylvania	3%	14%	Aa2	10%
Ohio	3%	6%	Aa1	10%
Georgia	3%	5%	Aaa	8%
Michigan	2%	6%	Aa2	12%
North Carolina	2%	5%	Aaa	9%
Mean	**3%**	**10%**		**9%**
Canada				
Ontario	40%	102%	Aa2	17%
Quebec	48%	197%	Aa2	19%
British Columbia	17%	73%	Aaa	19%
Alberta	2%	68%	Aaa	19%
Mean	**27%**	**110%**		**19%**
Europe				
Greece	170%	229%	Caa1	44%
Italy	111%	131%	Baa2	52%
Ireland	92%	147%	Baa1	34%
Portugal	119%	171%	Ba1	44%
Spain	61%	134%	Baa2	38%
Mean	**110%**	**162%**		**42%**

Sources: United States: Larson (2013), Table 5, for net debt. Lombardi and Van Wagner (2014), Tables 3 and 7, for pension liabilities and government revenues. Moody's (2013) for ratings. Europe: IMF (2014) for net debt and government revenues. IMF (2014), Table 23a for pensions. Wilson (2014) for ratings, which are for 2014. Canada: Moody's (2013) for net debt and ratings. Palacios et al. (2014) for pensions liabilities. Government/GDP series from fiscal reference tables (Department of Finance Canada).

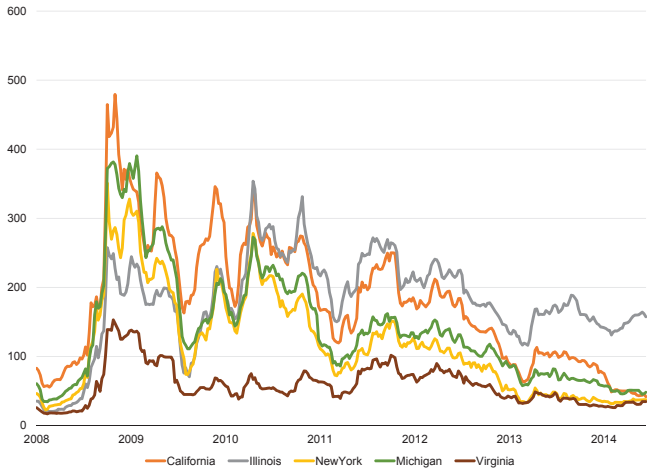
Table 2: Net Debt to Income in U.S. States and Canadian Provinces, 2008-2012

State	2008	2009	2010	2011	2012
California	4.3%	4.4%	5.6%	6.0%	6.0%
Texas	1.4%	1.4%	1.4%	1.6%	1.5%
New York	6.3%	6.3%	6.5%	6.7%	6.6%
Florida	2.8%	2.9%	2.9 %	3.0%	3.0%
Illinois	5.2%	4.6%	4.4%	5.7%	6.0%
Pennsylvania	2.4%	2.5%	2.4%	2.7%	2.8%
Ohio	2.9%	2.8%	2.6 %	2.8%	2.8%
Georgia	3.0%	3.0%	3.3%	3.3%	3.1%
Michigan	2.2%	2.2%	2.1%	2.2%	2.2%
North Carolina	2.8%	2.5%	2.3%	2.3%	2.3%
Canada					
Alberta	0.6%	2.1%	2.1%	2.1%	2.4%
British Columbia	13.4%	14.7%	14.9%	15.6%	16.8%
Ontario	27.4%	34.0%	36.1%	37.8%	40.4%
Quebec	43.4%	45.4%	47.2%	47.7%	48.3%

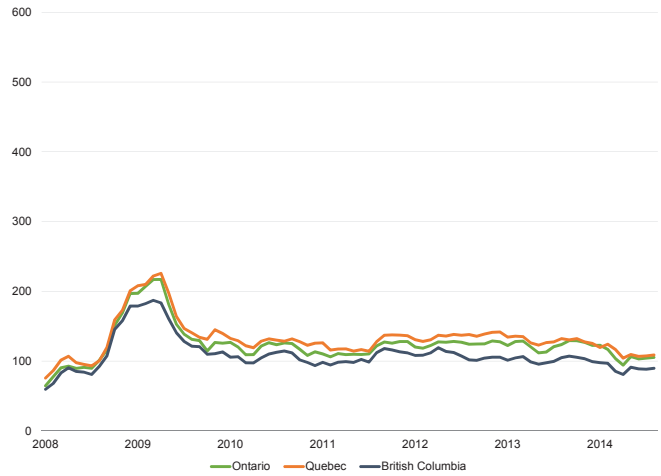
Sources: Larson (2013) and Moody's (2013). Data on U.S. states are relative to personal income. Data on Canadian provinces are relative to gross domestic product.



(a) Spreads for Eurozone Countries



(b) Spreads for U.S. States



(c) Spreads for Canadian Provinces

Figure 1: Government Spreads in Europe, U.S. States, and Canadian Provinces

Notes: Europe: Spreads are calculated as the difference between the 10-year government bond yield and each country and the German 10-year yield using monthly data; source: Global Financial Database. U.S.: Spreads are from credit default swaps; source: Markit. Canada: Spreads are calculated as the difference between the 10-year provincial government bond yield and the Canadian 10-year yield using monthly data. Source: Bank of Canada.

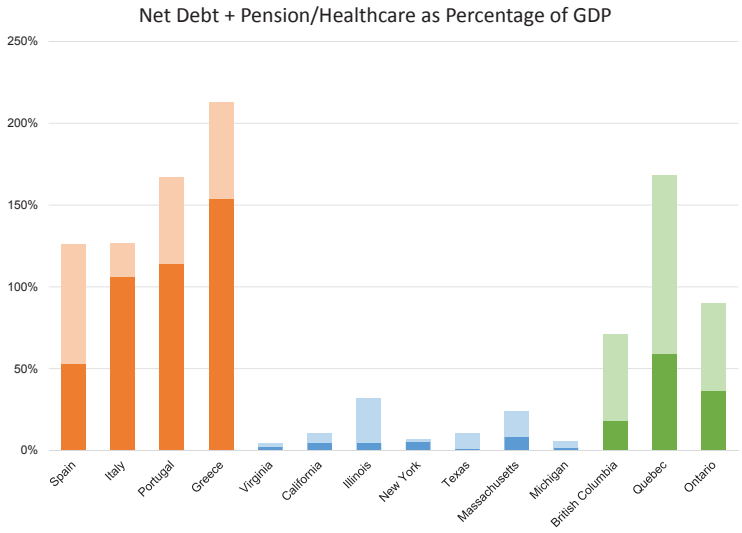


Figure 2: Net Debt and Pension/Health care Liabilities to GDP

Notes: See Table 1.

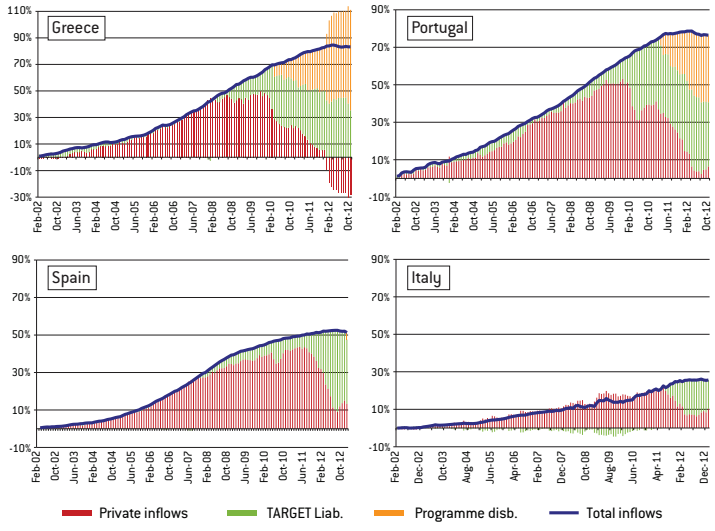
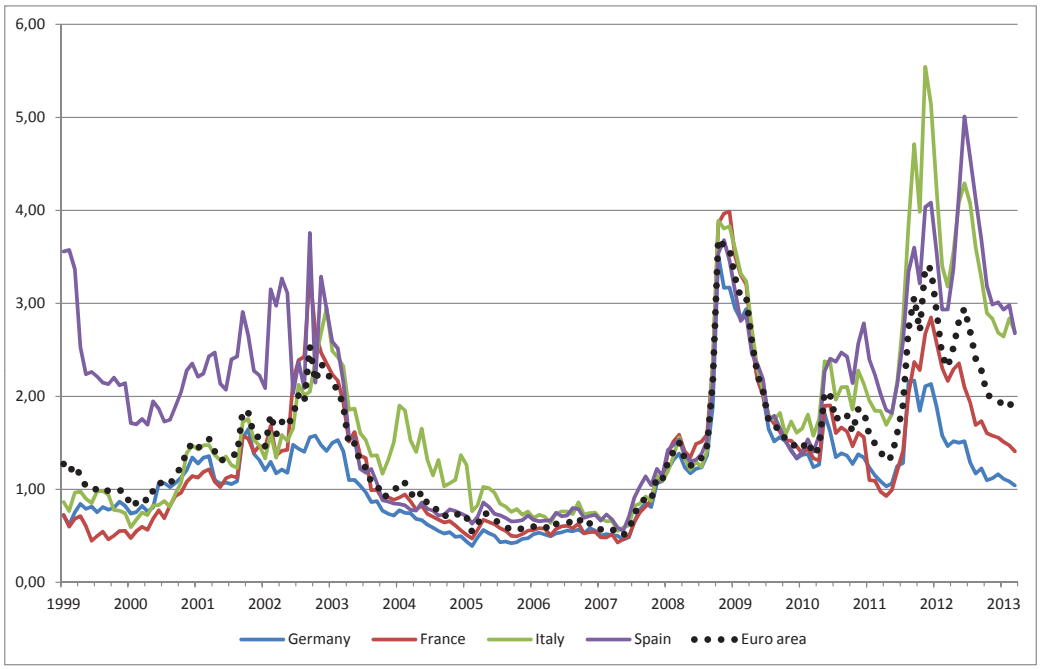
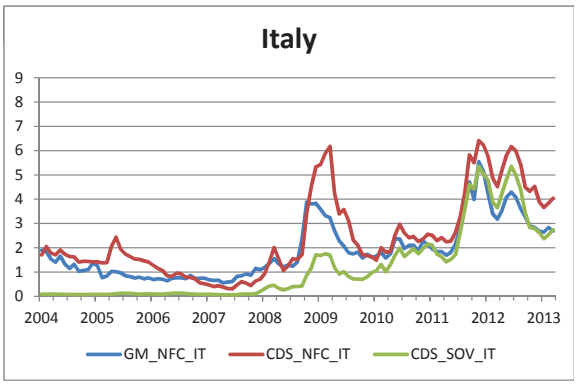


Figure 3: Private Capital Flows, Programme Financing, and Eurosystem Financing, Greece, Portugal, Italy, and Spain, 2002-12 (% of 2007 GDP)

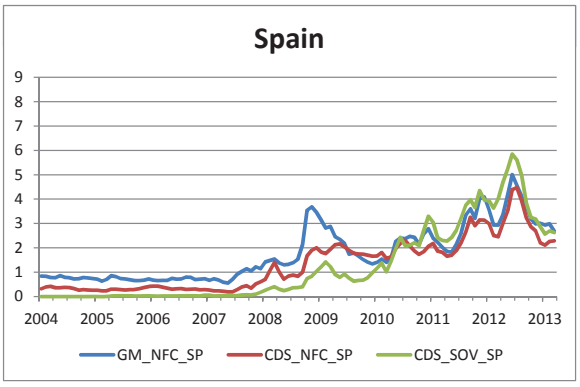
Source: Pisani-Ferry et al. (2013), Figure 1.



(a) Nonfinancial Corporate



(b) Italy Sovereign and Nonfinancial Corporate



(c) Spain Sovereign and Nonfinancial Corporate

Figure 4: Euro Area Credit Spread

Source: Gilchrist and Mojon (2014), Figure 1 and Figure 6

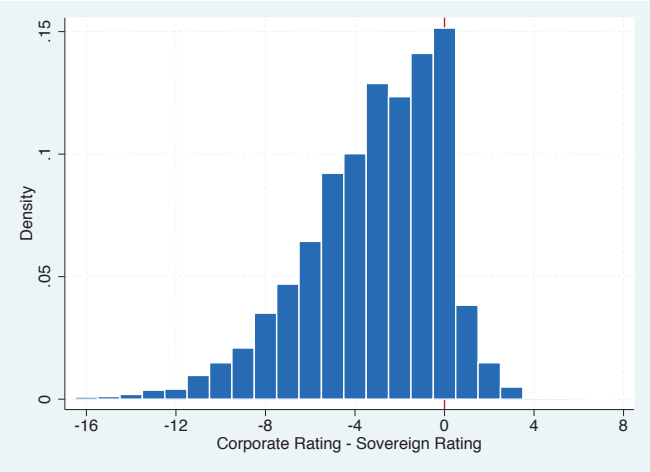


Figure 5: Distribution of Gaps between Corporate and Sovereign Ratings

Source: Almeida et al. (2014)

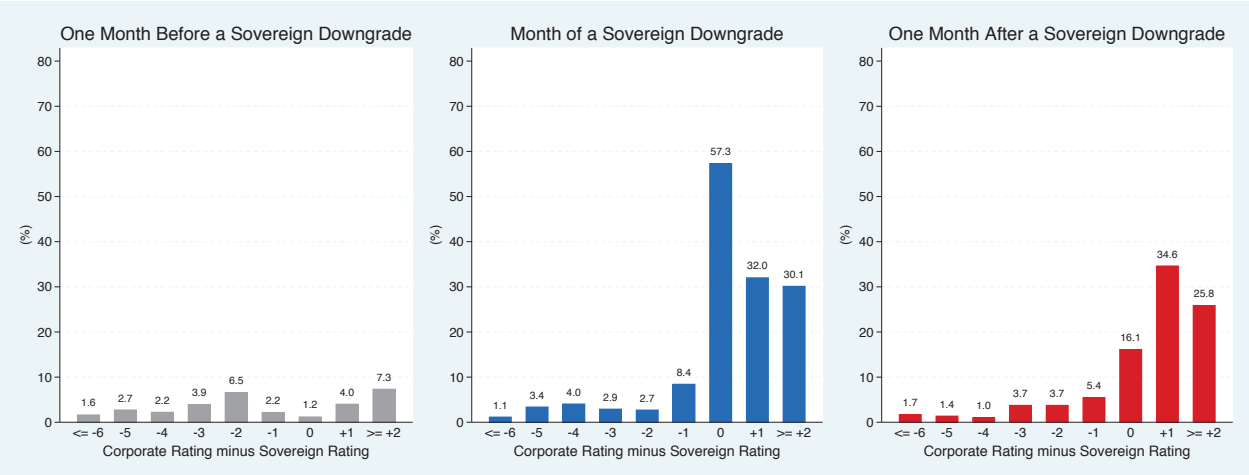


Figure 6: Proportion of Corporate Rating Changes around a Sovereign Downgrade

Source: Almeida et al. (2014)