SOVEREIGN DEBT CRISIS:

CONCEPTUAL AND EMPIRICAL

ANALYSIS

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Abstract

This paper investigates the determinants of sovereign debt crises by using cross-country data from 1977 to 2010. In particular, I focus on the structure of sovereign debt by analysing the debt composition (domestic versus external), maturity structure (short-term versus long-term), composition type (bank loans versus bond) and currency denomination (domestic currency versus foreign currency) of debts. I also assess whether the previous history of banking and currency crises affect the likelihood of a sovereign debt crisis. The results suggest that both the structures of debt and the past history of other financial crises are important determinants of debt crises. The results are robust when using alternative measures to understand the risks of sovereign debt. I also investigate the impacts of debt structure and past financial crises history on the levels and changes of foreign and local currency long-term debt credit ratings.

1   Introduction

The global financial crisis of 2007-2008 which began in the United States, had a huge global impact. The burst of the U.S. housing bubble posed an unprecedented impact to the U.S. financial sector and then spread to financial markets overseas. The contagion effect and a combination of factors, such as high debt levels, inflexibility of monetary policy, and the loss of investors' confidence led to the European debt crisis.[1] However, the global financial shock had an asymmetric effect across the Eurozone. The cross-border financial flow dried up in late 2008, and investors repatriated funds to their home markets.[2] Countries with an over-reliance on external funding were badly affected. For example, the banking system in Ireland collapsed because of its reliance on international short-term funding. Similarly, market indicators in many other developed countries dropped significantly during the crisis.[3]

The global financial crisis also exposed the risk of sovereign default in many developed economies. It is widely known that many countries' governments have been issuing sovereign debt to finance their budgets. Even governments in developed countries have issued huge debts to

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[1] Lane (2012) points out that while France and Germany had stable debt/GDP ratios at around 60 percent in the decade prior to the onset of the financial crisis, both Italy and Greece had debt/GDP ratios above 90 percent during that period.

[2] See Milesi-Ferretti and Tille (2011) for the analysis of the patterns of the retrenchment in international capital flows during the global financial crisis.

[3] See Constancio (2012).

stimulate their economies since the outbreak of the global financial crisis. For example, the United Kingdom, which historically had low levels of public debt, experienced a surge in the debt-to-GDP ratio to 85 percent in 2010 from 42 percent in 2007.[4] Iceland, one of the original members of the Organisation for Economic Co-operation and Development (OECD), also experienced both banking and currency crises in 2008 following the U.S. financial crisis. Its debt-to-GDP ratio was only 23 percent in 2007 but sharply increased to 87 percent in 2009. However, investors generally believed that there was no risk in holding government bonds of developed countries. Thus, it is imperative to understand the risks involved with issuing sovereign debt.

Sovereign debt crises have been one of the most popular research areas in international finance, especially since the widespread incidence of debt crises in Latin America in the 1980s (see Figure 1). Yet we systematically fail to understand or predict the risk of sovereign debt crises. In a speech, Rudiger Dornbusch (1997) noted, *"The crisis takes a much longer time coming than you think, and then it happens much faster than you would have thought, and that's sort of exactly the Mexican story. It took forever and then it took a night."* In this research, I aim to explore the determinants of sovereign debt crises by focusing on factors that have been somewhat over-looked in the literature. In particular, I focus on the

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[4] The data is retrieved from the OECD library.

role of debt structure in understanding the risk of a sovereign debt crisis. In Section 2, I describe in detail why different debt structures matter and how they posit different risks for debt crises. I also focus on both external and domestic debt crises and analyse them with a broader set of countries, including some developed countries. This, to my knowledge, has not been carefully considered in the literature.

Most researchers have focused on external debt crises in emerging markets. Until recently, studies focusing on developed countries as well as domestic debt problems were scarce. The debt-to-GDP ratio in developed countries has steadily increased since the mid-1970s and began to rise rapidly with the start of the global financial crisis. (see Figure 2.)[5] Additionally, Figure 2 shows that the same ratio for non-OECD countries reached a peak around 1990 and trended downward since then, with a few spikes in-between. This trend suggests that many emerging market countries have become more financially prudent in the last two decades than the developed countries.[6]

Figure 2 also shows that the OECD countries have higher ratios of the central government debt-to-GDP since the mid-2000s. For instance, the Japanese government has accumulated more than 200 percent of the

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[5] Nelson (2013) indicates that the government debt per GDP ratios in the G7 countries have increased rapidly since 2008.

[6] For an explanation of the trends in the debt-to-GDP ratios of emerging markets and developed countries, see Das et al. (2010).

country's GDP as debt, and it incurs debt servicing cost every year even under the current historically low interest rate conditions.[7] Accordingly, once interest rates start to increase, the government's debt burden will also increase. Hence, Japanese debt is not sustainable in the long run.[8] However, the Japanese government bond yield and CDS have been at a very low level compared to other government bonds.[9] This indicates that the market perceives Japanese government debt to be less risky compared to the government debt issued by many other countries. On the other hand, some Caribbean countries with a much lower debt-to-GDP ratio than Japan and a higher trade-to-GDP ratio over a period of time have experienced debt restructurings since the global financial crisis.[10] Examples include debt restructurings in Ecuador in 2008, Jamaica in 2010, and Belize and Grenada in 2012.[11] What is the explanation? Is the government debt-to-GDP ratio a good predictor of a debt crisis?

One critical difference between Japanese government debt and sovereign debt of other countries, such as the Caribbean countries or Greece, is the debt structure. Most Japanese government debt is owned domestically

[7] General government debt per GDP in Japan was 228 percent in 2011(source: the OECD library).

[8] For the sustainability of the Japanese government's debt, see Doi, Hoshi and Okimoto (2011) and Ito (2011).

[9] Japanese 10- year government bond yield is 0.59, whereas the same bond yield for the U.K. and the U.S. are 2.81 and 2.74, respectively, on February 17, 2014 (source: http://www.bloomberg.com/markets/).

[10] Trade- to-GDP of Caribbean and Non-Caribbean countries is illustrated in Figure 3.

[11] See Durant (2012) for the debt situation in the Caribbean countries.

and is denominated in local currency, i.e. Japanese yen. Since developed countries usually issue their debts in their local currency, the currency risk of holding these debts is much lower (e.g. huge currency depreciation in the short period), compared to developing countries' debts, which are primarily denominated in foreign currencies. It is thus very important to understand these differences in the debt structure to understand the risk of debt crises in different countries.

Understanding debt crises is also important, as it is often related to banking or currency crises – the infamous "twin currency" phenomenon. In many countries, syndicated banks are the main creditors of the governments, and therefore, the linkage of these two crises is very important. Laeven and Valencia (2012) state that banking crises usually result in larger output losses and higher increases in government debt in advanced economies due to deeper banking systems. Another potential cause of the twin crises - debt and currency crisis – is that the developing countries usually issue their debts in foreign currency. For example, Uruguay experienced large depreciation of its currency in 2002, and as a result, the government decided to restructure its international bonds in 2003.[12] Thus the relationship between bank loans and the bond markets is an important issue for understanding debt crises.

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[12] For Uruguay's experience, see Sturzenegger and Zettelmeyer (2006).

This research reveals the impact of the debt structure on the risk of sovereign debt crisis in both developed and developing countries. Specifically, this study addresses the differences in external versus domestic debt; currency composition of debt; type of borrowing between bank loans and bond financing; and the maturity structure of debt to understand the risks of sovereign debt crises. I also investigate the relationship among financial, banking, and debt crises to appreciate the causes of the latter. I believe that understanding these phenomena helps both academics and policy makers make prudent macroeconomic policies and reduce the likelihood of a debt crisis.

2   Sovereign Debt Crisis: Theoretical Issues

This section addresses in detail the theoretical issues regarding sovereign debt crises. The aim of this section has been to conceptually discuss the theoretical issues with sovereign debt without explicitly modelling it. To investigate the determinants of sovereign debt crises, it is essential to answer some fundamental questions: What is sovereign debt and in what way is it different from corporate debt? Why do investors buy government debt? What are the risks of buying it? Why do sovereign debt crises occur? Understanding these answers will help in resolving the fundamental issues of sovereign debt crises.

2.1   Why do sovereigns repay their debt?

Sovereign debt is an accumulation of government's annual deficits financed by bonds. It is important for governments to borrow money if they do not have enough money for their expenditures, because countries want to smooth their consumptions (Kletzer & Wright, 2000). Mankiw (1987) and Trehan and Walsh (1990) also argue that governments want to smooth their revenue as marginal social costs increase by raising the tax rate. Why do countries choose to issue debt in the financial markets and not simply print more money? Economic theories and history indicate that abusing the power of printing money results in hyperinflation. For example, the German government printed unlimited currency to pay its resolution payments of World War I. As a result, Germany experienced a monthly inflation rate of 29,500 percent in October 1923 (Hanke & Krus, 2012).[13] Thus, governments usually finance their debts through issuing bonds in the domestic and international markets or borrowing from syndicated banks.

Sovereign debt is different from corporate debt, because creditors of sovereign debt cannot force repayment in the same manner as the creditors

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[13] Hanke and Krus (2012) provide examples of 56 episodes of hyperinflations including the start and end date of each episode, and the peak month of hyperinflation as well as the highest monthly inflation rate. Hungary experienced the world's worst hyperinflation with its highest monthly inflation rate of 4.19×10^{16} percent in July 1946. More recently, Zimbabwe recorded its highest monthly inflation rate of 7.96×10^{10} percent in mid-November 2008.

of corporate debt.[14] A seniority structure does not exist in sovereign debt.[15] There is no international law to enforce repayment, and therefore, its creditors cannot avoid risks of compulsory rescheduling, interest rate reduction and even repudiation. Then, why do sovereigns repay their debt? It is generally believed that a loss of credibility, which makes it more difficult for a country to borrow in the future, is a reason for the repayment. In their seminal paper, Eaton and Gersovitz (1981) analyse borrowing of countries in the international capital market. They explain that the risk of permanent exclusion from the market when borrowers repudiate provides incentives for countries to repay their debt. This reputation-motivated argument was challenged by Bulow and Rogoff (1989). They argued that reputation cannot sustain repayment in equilibrium and explained that it was the ability to punish the debtor country that was important. Their explanation was based on creditors' ability to impose a threat like direct sanctions, which provided incentives for countries to repay debt.[16] In another paper, Kletzer and Wright (2000) show that the reputation argument could be sustained in a model of inter-temporal barter, because most relationships of sovereign debt continue through renegotiation. Their arguments are based on consumption-smoothing and punish the cheater.

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[14] See Nelson (2013) for the differences between sovereign and private debts.

[15] The difficulty in providing a seniority structure in sovereign debt has been discussed by Bolton and Jeanne (2009).

[16] Rose (2005) had empirically tested this argument and found debt renegotiation led to significant decline in bilateral trade between a debtor and its creditors. The decline in bilateral trade is approximately eight percent a year and persists for around fifteen years.

However, many countries have defaulted multiple times and the average period of exclusion of the defaulted country from the international capital markets is only 5.7 years.[17] Thus, the threat of the loss of credibility in the international financial market or direct sanctions cannot be sufficient reasons for countries to repay their debt. There may be other aspects of sovereign debt which we need to understand better.

2.2   Why is the debt structure important?

Figures 4 through 9 provide some examples of the differences in the debt structure around the crisis period for several countries. The term, *debt structure* is generally used to describe different characteristics of debts such as maturity (short-term or long-term), type (bank loans or bonds), and currency composition (local-currency or foreign-currency). In the 90s, the emerging markets experienced a rapid growth of bond issuance as the primary source of finance, which during the 70s was dominated by the banks. At the same time, the role of banks in mediating capital flow to emerging markets did not completely vanish. On the contrary, the Asian countries had been relying heavily on the syndicate bank loans as the major source of borrowing in the period leading up to the 1997-1998 financial crises. So bank loans and bonds clearly compete in the

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[17] According to Richmond and Dias (2007), partial access to the international capital market is regained after 5.7 years on average, but it takes 8.4 years on average to regain full access.

international market. This issue is important for numerous reasons. The composition of sovereign debt and how it affects debt restructuring negotiations in the event of financial distress has become a central policy issue in recent years. Over the past decade, the share of sovereign bonds and the greater dispersion of ownership of these bonds have made sovereign debt difficult to renegotiate and restructure. Zettelmeyer (2005) provides evidence on the recent restructuring episodes of different countries. He finds that there has been differential treatment of claims that were not legally prioritised in most debt restructurings that have taken place over the last 25 years. Restructurings under the Brady Plan in the late 1980s and 1990s, Russia and Ukraine during 1998-2000, Pakistan in 1999, Ecuador in 2000, Uruguay in 2003 and the never-ending Argentine restructuring are some examples.

Differential treatment has two forms: first, defaulted instruments were often restructured on quite different terms. Second, governments have defaulted selectively on some classes of claims but not on others. For example, the "Brady Deals" that settled the debt crises of the 1980s restructured bank loans but not international bonds. Russia and Ukraine's restructurings involved domestic debt, bilateral official debt and bank loans, but not Eurobonds. Pakistan restructured bilateral official debt, bank claims and, for the first time, Eurobonds, but not domestic debt. Ecuador restructured domestic debt, bilateral official debt and

international bonds (both Eurobonds and Brady bonds), but not bank loans. Uruguay restructured both domestic and external bonds, but neither bank loans nor official bilateral loans.

Eichengreen, Hausmann and Panizza (2002) note that emerging market countries tend to have a larger portion of foreign currency denominated and short-maturity debts than developed countries. This makes their economies vulnerable to changes in the exchange rate. Thus it is important to understand the different structures of debt.

2.2.1   Domestic versus External Debt

External debt is usually thought to be riskier compared to domestic debt since the government has the power to tax its residents. This means that domestic debt is a transfer of resources within the country. The Japanese government debt was 204 percent of its GDP in 2011, which is much higher than that of Greece or Italy. However, Japan still has not defaulted and its Credit Default Swap (CDS) rate and government bond yields are still very low.[18] One possible reason for this is that more than 90 percent of Japanese debt is owned domestically. So, this composition seems to be important. Reinhart and Rogoff (2009) indicate that defaults and

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[18] 41.975 basis points for 5 years CDS and 0.72% for 10 years government bond in 07/01/2014 (source: CNBC http://www.cnbc.com/id/38451750).

restructurings of domestic debt are more common than those of external debt. Moreover, domestic debt has been of a greater proportion to total debt since the late 1940s (see Figure 10). However, the literature has focused more on external debt crises episodes (Das et al., 2010).

2.2.2   Short term versus Long term debt

Maturity is the date on which a debt becomes due for payment. Maturity matters because in theory, short term liabilities are more vulnerable to changes in market conditions. It is also subject to liquidity problems due to the necessity of more frequent repayment, and has a rollover risk because it needs to be rolled over in the short term. We know that rational investors tend not to invest in long term debts in emerging market countries. Alfaro and Kanczuk (2006) examine the sovereign debt structure focusing on indexation and maturity, and conclude that long maturity and issuance of non-indexed debt are not sustainable in emerging market countries. This means that such countries generally have a higher proportion of the short term maturity debt which leads to a higher risk of the debt default. Bussièrea, Fratzschera and Koeniger (2004) state that having a large share of foreign currency denominated debt creates a currency mismatch, which can worsen a maturity mismatch. Borensztein et al. (2005) argue that the debt structure of countries is very

important. They explain that emerging market countries, in particular, rely on short term and/or foreign currency debt too much, and this exposes them to a high risk of rollover and rapid increase in the debt level resulting from depreciations of their domestic currencies. However, they note that debt structures towards foreign currency denominated or short term debt are necessary for the policy makers in emerging market countries. Consequently, these risky debt structures are a symptom rather than cause of countries' inability to have good policies, which may result from weak domestic institutions.

2.2.3   Bank loans versus Bond financing

Hale (2007) investigates the choice of bank loans or bonds, and finds that macroeconomic fundamentals affect this choice for private borrowers, but not for sovereigns. However, the cost of default is higher for bonds, because they usually have multiple creditors and hence, they are much more difficult to restructure. The issue becomes even more difficult if the bonds were issued under a Unanimity Action Clause (UAC) and not under a Collective Action Clause (CAC).[19] Liquidity is another issue. Bank loan contracts often have terms that allow banks to stop their financing on relatively short notice. Therefore, we can expect that the

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[19] See Kletzer (2004) to know more on these clauses.

countries that mainly rely on bank loans have more risks of experiencing a debt roll-over problem. However, Berger et al. (2005) look at the effects of asymmetric information on debt maturity and find that borrowing from banks can be a sign of smaller risk of default because banks may have advantages in gathering information, renegotiating loans, and enforcing other restrictive covenants compared to public markets. Similarly, De Fiore and Uhlig (2005) study the difference between bank finance and bond finance and find that the Euro area has a larger share of bank finance than the U.S. since there is not enough public information about firms' credit worthiness, and banks have a greater advantage in obtaining this kind of information. Table 1.1 provides an example of the differences in the market instruments and bond and notes among high income countries, emerging markets and developing countries. The table also provides examples across different geographical locations.

2.2.4   Local currency versus Foreign currency debt

Currency composition is important, because if the debt is denominated in local currency, it can be eliminated through inflation (Reinhart & Rogoff, 2011a). Since developed countries can issue debt in their local currencies, they have much less possibility of default. Eichengreen, Hausmann and Panizza (2002) have termed this as a problem of "original sin". They

showed that 68.3 percent of debt in the major financial centres (US dollar, Euro, Yen, Pound and Swiss Franc) was denominated in their own currencies in 1999-2001, but the same number for developing countries was only 2.7 percent. A depreciation of the domestic currency will increase the value of the country's debt denominated in foreign currency. Therefore, it is not difficult to see why the composition of the currency significantly affects the probability of a debt crisis. For example, the public debt-to-GDP ratio in Pakistan increased from 50 percent in 1975 to 75 percent in 1992 due to the country's primary fiscal deficits. Since half of its debt was denominated in foreign currency, the impact of the 1997 Asian financial crisis (and the economic sanctions for the country's nuclear tests imposed by the G8) in 1998 were critical. As a result, Pakistan had to restructure both its bank loans and international bonds in 1999.[20] Table 1.2 shows that more than 60 per cents of the debts issued by the OECD and European countries were denominated in their local currency as of December 2001, but the same ratio for the emerging economies was only 1.2 percent.

This is probably one of the main reasons why most researchers are interested in developing countries. However, the European sovereign debt crisis warned us that the group of developed countries is not completely free from the risk of sovereign default. Figure 2 shows that

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[20] For more details of the debt crisis in Pakistan, see Sturzenegger and Zettelmeyer (2006).

the public debt-to-GDP ratio in the OECD countries has an upward trend, but that ratio in other countries has a downward trend.

2.2.5   Domestic versus External debt

Sovereign debt crisis refers to economic and financial problems caused by either perceived or actual inability of independent countries to meet their liabilities when they become due. The perception of governments' liabilities is often treated differently by the characteristics of debts. Reinhart and Rogoff (2011b) distinguish sovereign debt crises based on which laws apply to these debts. If domestic laws are applied, these debts are domestic debts for that government; otherwise the debts are external debts for that government. They define external debt crises as a failure to meet a principal or interest payment on the due date including rescheduling which results in less favourable terms than the original obligation. In addition, domestic debt crises involve the freezing of bank deposits and a forcible conversion to local currency in order to cover the events of these virtual domestic debt crises. Accordingly, under this definition a domestic debt crisis is more closely associated with a banking crisis. Governments generally have the power to enforce such things during crisis situations. Thus the structure of debt might have different implications for external or domestic crises.

2.2.6 Sovereign debt crisis and its linkage with other financial crises

Governments need to borrow money from financial markets instead of printing money as discussed earlier, and the banking sector has an important role in these settlements. These facts emphasize the importance of studying sovereign debt crises in conjunction with the occurrence of other financial crises. Candelon and Palm (2010) examine the relationship between banking and sovereign debt crises since banking crises leads to a deterioration of the government's budget balance. In addition, banks are often the main creditors of governments, and therefore, financial problems of the banks can affect governments.[21] However, Candelon and Palm (2010) find that the empirical evidence supporting this linkage is weak.

Contagion effects from currency crisis to debt crisis are theoretically easy to understand because currency depreciation increases the debt burden of the government's debt denominated in foreign currency. Dreher, Herz and Karb (2004) review theoretical linkages between currency and debt crises, and argue that there are some common factors that cause both. First, a negative shock to a country's demand can cause depreciation pressure on its currency. Since a country with a fixed or pegged exchange rate has to sell its foreign reserves or raise the interest rate as a defence, it worsens the recession, and motivates a government to terminate the peg.

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[21] See Paoli, Hoggarth and Saporta (2006).

Rational investors expect the occurrence of this currency devaluation and start withdrawing their capital from the country, and this accelerates the currency devaluation. In addition, decreasing demand leads to output and employment losses in that country and makes the government's budget balance worse. This increases the probability of debt crisis. Second, a rise in the international interest rate implies that debtor countries have to increase their interest payments under free capital mobility in order to avoid capital outflows.[22] A rise in domestic interest rates can decrease investments and consumption in the country, and thus lead to a recession, which worsens a government's budget. Third, a political or structural problem can lead to investors reassessing the risks of their investments and withdrawing their capital or requiring high risk premiums. This results in currency devaluation and financial distress for the government.

3   Literature Review

Studies examining the determinants of sovereign debt crises have looked at external debt, and most of these studies focus on emerging markets or European countries. Some papers have looked at macroeconomic indicators to understand the determinants of debt crises. For example, Min (1998) looks at the yield spread of the 11 emerging market countries

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[22] See Obstfeld and Rogoff (1995) for underlying international finance theories.

from 1991 to 1995 and finds that macroeconomic indicators, such as debt-to-GDP ratio, reserves-to-GDP ratio, domestic inflation rate, terms of trade, and real exchange rates are important.[23] Similarly, Catao and Sutton (2002) find that higher volatility of terms of trade and fiscal policy variables lead to a higher risk of sovereign debt default. Some other papers suggest that political stability is an important factor for sovereign debt crisis. Baldacci, Gupta and Mati (2011) investigate the key determinants of country risk premiums using panel data of 46 emerging market countries from 1997 to 2008 and conclude that fiscal vulnerability and political risk are important factors.[24] Kohlscheen (2010) studies both domestic and external debt crises for 53 emerging market countries from 1980 to 2005. He finds that the previous year's GDP growth, debt service per exports, and parliamentary democracy are significant determinants of debt defaults. Haugh, Ollivaud and Turner (2009) analyse sovereign bonds' yield spreads in European countries and find that fiscal performance variables such as expected fiscal balance and debt service to tax receipts ratio are significant factors.

Some studies have looked at the issue of public debt management, debt structure and sustainability of debt. Jeanne and Guscina (2006)

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[23] Hilscher and Nosbusch (2004) research yield spreads in 32 emerging market countries from 1994 to 2002, and they argue that the debt-to-GDP ratio is only meaningful in time series and not in the cross section.

[24] They measure the fiscal vulnerability by the overall fiscal balance as a share of GDP and the public investment ratio to GDP. The political risk variables are retrieved from the World Bank and the Heritage Foundation.

investigate the structure of government debt for both domestic and external debt in 19 emerging market countries, focusing on debt maturity, currency composition and indexation of governments' debt. Their research indicates that debt structures are important variables and that the debt structure of Asian countries and advanced economies are similar. Das et al. (2010) explain the importance of debt management and structure. Their research finds a significant relationship between public debt management and financial stability. They argue that debt management is more important for emerging market countries, but it has now become more relevant in many developed countries with high public debt levels since 2008. Contessi (2012) studies sovereign debt sustainability and finds that it is potentially unsustainable if the difference between long term interest rate and GDP growth rate is positive.[25]

Some studies have used alternative techniques or proxy variables such as credit ratings to investigate the risk of debt crises. Using survival analysis, Roa, Garcia and Bonilla (2009) investigate 78 countries from 1995 to 2001 and find that credit rating changes are explained by monetary and exchange rate regime variables. They find that crisis depends on financial system stability, potential economic growth and domestic political support to the government and its policies. These factors affect the

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[25] He considers the structure of debt and the rollover risk in maintaining a short maturity structure of the debt.

effectiveness of the country's monetary policy and affect debt crises by putting pressure on exchange rates. Similarly, political and financial instability increase risk premiums of sovereign debt because of higher uncertainty and reduce the willingness and ability of countries to repay its debt. Hence, this worsens the country's financial conditions.

Researchers have investigated the link between debt crises and other financial crises. Laeven and Valencia (2012) find that 19 out of 66 debt crises have occurred within three years of banking crises; and 37 out of 66 crises were within three years of currency crises, including 8 episodes that record the occurrence of all three crises together within that period.[26] This surprisingly high proportion of twin crises indicates a strong relationship among debt, currency and banking crises. Dreher, Herz and Karb (2004) empirically analyse the relationship between currency and debt crises by estimating the determinants of each type of crisis separately, and then testing for the causality. They find a significant contagion effect from currency to debt crises in the same period, but a negative effect of lagged (three years) currency crises on debt crises. However, Bauer, Herz and Karb (2007) argue that this twin currency and debt crises have to be distinguished from both pure currency and pure debt crises, and find that this separation improves their model significantly and predicts 75 per cent of all debt crises.

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[26] Frequencies of the banking and currency crises are shown in Figures 11 and 12, respectively. Historical occurrences of the combinations of financial crises are also demonstrated graphically in Figure 13.

Other studies have used alternative estimation techniques. For example, Hansen (2011) and Tong (2010) use a threshold model to understand debt crises. Manasse and Roubini (2009) apply a Classification and Regression Tree (CART) model to find the thresholds of variables in sovereign debt crisis events using a dataset of 47 emerging market countries from 1970 to 2002. They find that most debt crises can be classified as episodes of insolvency (debt unsustainability), illiquidity or macro and exchange rate weakness. [27] Fioramanti (2008) uses non-parametric methods based on an Artificial Neural Network (ANN) for predicting sovereign debt crises. Using panel data of 46 emerging countries between 1980 and 2004, he finds that total external debt and GDP growth rate are significant determinants of debt crises.[28] He argues that the ANN methodology shows a good performance for forecasting sovereign debt crisis, but does not offer straightforward implications for policy makers. These studies find critical values of their variables and have achieved relatively high predictability for the out-of-sample crisis events. However, these models lack direct implications, as there are no coefficients in these models. Hence, direct implications for each determinant are hard to obtain.

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[27] For details of the CART model, see Timofeev (2004).

[28] This paper uses data on external debt only.

To summarise, most of the empirical papers find some significant macroeconomic factors, but the debt structure variables have not been examined carefully in the literature. In this research, I aim to bridge this gap. I investigate the impact of different debt structures on the risk of debt crises by controlling for the macroeconomic and political variables that have been found to be important in the literature.

4   Data and Methodology

In this section, I explain in detail the variables, the data sources and the methodology to investigate the determinants of debt crisis.

4.1   Variables

As the exact definition of default will always involve some degree of arbitrariness, I have collected several measures of debt default and debt crises (10 in total) from previous studies. All of these cover different time periods and countries, and the definitions of defaults/crises vary among these measures. In my results, I report the evidence using the domestic and external debt default measures from Reinhart and Rogoff (2011b). This measure has a wider coverage of countries and time periods, has

separate measures for domestic and external crises, is consistent with the definitions, and has been used widely in the literature. Hence I view it as the best measure. However, I have tested my results with a couple of alternative measures as well.[29] *Domestic debt crisis* is defined as the failure of repayment of principal or interest on the due date for the debt issued under domestic legal jurisdiction, and also includes debt restructuring which has worse terms than the original terms for creditors, deposit freezes and forcible conversion of foreign currency deposits into local currency. The *external debt crisis* involves outright default on payment of debt obligations incurred under foreign legal jurisdiction, including non-payment, repudiation, or the restructuring of debt into terms less favourable to the lender than in the original contract. These two debt crises data in Reinhart's database covers 70 countries and the time period is from 1970 to 2010.[30]

To measure the differences in the debt structure, I consider three variables: maturity of debt, which captures the differences in short term versus long term borrowing; the type of debt, which measures the government's borrowing of bank loans vis-à-vis bond financing; and the country's borrowing power overseas, which captures the country's power of financing in the international finance market using its local currency.

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[29] These results are not reported for the sake of brevity, but are available upon request.

[30] Classifications of total observations are shown in Table 1.3.

There are some limitations of the debt structure variables. The data on short term borrowing is only available for total external debt and not for government external debt, which means that external debt of private sectors are included in this variable. On the other hand, the data on bank loans and bonds are available for governments. However, there is no distinction between external and domestic creditors. *Borrowing power overseas* is calculated by the total debt in international debt market issued in that country's local currency divided by the country's total external debt.[31] Banking crisis and currency crisis data are retrieved from Laeven and Valencia (2012). These data cover 168 countries from 1970 to 2011.

The control variables used in the analysis are lag of GDP growth, lag of inflation, and trade (as a country's export plus import) per GDP. I use lagged values of GDP growth and inflation, because debt crisis may have occurred at the beginning of the corresponding year. I also control for the exchange rate regimes and political stability.[32] The exchange rate regime variable takes values from 1 to 15. The higher the value, the more flexible is the regime. The political stability index is calculated from democracy and autocracy levels of the countries. The value for this index runs from -10 to 10, and a higher number means that the country is more

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[31] This calculation is the same as the calculation of "INDEXB" in Eichengreen, Hausmann and Panizza (2002), except for the fact that this borrowing power ratio is subtracted from 1 in their paper.

[32] Correlations between explanatory variables are provided in Table 1.4.

politically stable. The definitions of all the variables are provided in Appendix A1.

Tables 2.1 and 2.2 show the summary statistics of all the variables for the non OECD and OECD countries. The mean and the standard deviation are calculated using one country-year pair as one observation. The means of domestic and external debt crises for the OECD countries are much smaller than those of the non OECD countries. However, the means of the banking crisis are not very different between these two groups. Table 2.3 provides the differences of means test (t-test) for all the variables for these two groups. For example, the first row of the table 2.3 indicates that the t-statistics 9.882 is sufficiently large to reject the null hypothesis of no difference in means between the two groups at the 1 percent level (p-value = 0.000). The results indicate that except for debt maturity and banking crisis, the means of explanatory variables are significantly different across the two groups of countries. These results describe the differences in the characteristics between non OECD and OECD countries. I find that the OECD countries have lower GDP growth, inflation, central government debt per GDP and bank loans per bonds as well as a lower risk of domestic and external debt crisis and currency crisis on average. In addition, the OECD countries have higher political stability and borrowing power overseas.

Similarly, Tables 3.1 and 3.2 provide the summary statistics of all explanatory variables for the sample countries that have not experienced domestic debt crisis and for those that have experienced it, respectively. As shown in Table 3.2, both the mean and the standard deviation of the lag of inflation are extremely high for the samples with domestic debt crisis. Table 3.3 suggests that the country that experienced domestic debt crisis in the year has lower GDP growth in a previous year, lower short term maturity loans, smaller proportion of government bank loans per bonds, and lower borrowing power overseas in the same year. It also has higher inflation in previous year and central government debt per GDP in the same year, and the exchange rate regime is more flexible compared to the countries did not experience domestic debt crisis. These results are significant at the 5 per cent level, and are supported by the theories discussed earlier. Table 3.3 indicates that shifting towards short term external debt seems to reduce the risk of the domestic debt crisis. This could be due to the fact that it increases the risk of external debt crisis instead of the risk of domestic debt crisis. Higher government bank loans per bonds are also associated with the lower risk of the domestic debt crisis. This supports the theory of Berger et al. (2005), which suggests that the banks have an advantage in collecting information and hence are better informed to distinguish between illiquidity and insolvency.

Tables 4.1 through 4.3 provide summary statistics and tests for the differences in means across the same groups of countries for the external debt crisis. For example, the mean of the inflation and central debt per GDP look much higher for the countries that have experienced external debt crisis, but their standard deviations are also very high. Table 4.3 shows that the countries that experienced external debt crises in the year have lower GDP growth in a previous year, lower trade per GDP, political stability, short term per long term external debt, and borrowing power overseas in the same year. However, they have higher inflation in a previous year, total central government debt per GDP in the same year, and have more flexible exchange rate regimes. These results are significant at the 0.1 per cent level.

4.2   Data Sources

Data on debt maturity and types of debt (bank loans and bonds) has been obtained from the Institute of International Finance (IIF) database for the period 1978 to 2010. The currency composition data was obtained from the Bank for International Settlements (BIS) database, and is calculated by the method used in Eichengreen, Hausmann and Panniza (2002). The data on banking and currency crises is from Laeven and Valencia (2012). The data on domestic debt crisis and external debt crisis events are from

Reinhart and Rogoff (2011b). The definitions of domestic and external debt crises used in their paper are also consistent with internationally recognised definitions such as Standard and Poor's. The government debt-to-GDP and exchange rate regime data have been taken from Reinhart and Rogoff (2011b), and the former has been supplemented with data from the OECD library and the WDI. Political stability data was obtained from the Polity IV project. The detailed definitions of the data can be found in Appendix A1.[33]

4.3   Empirical Methodology

To measure the risks of the sovereign debt crisis, I estimate a model with the commonly used logit regression analysis. The logit regression analysis is suitable when a dependent variable takes a binary form; which in this case, 'default' or 'no default'. Since the propensity to default is an unobserved variable Y^* such that

$$Y^* = \beta'X + \varepsilon$$

where ε is the error term that follows a logistic function and X is the set of independent variables. We do not observe the propensity to default for

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[33] Appendix A2 provides the list of countries and number of observations used in this research.

a country, only whether the country has defaulted or not. Therefore, the observation is

$$Y = 1 \ if \ Y^* > 0$$

$$Y = 0 \ if \ Y^* \leq 0$$

The probability that $Y = 1$ is

$$Prob(Y^* > 0) = Prob(\beta'X + \varepsilon > 0)$$

$$= F(\beta'X)$$

In a logit model, the grouped data usually consists on counts or proportions. The observed dependent variable consists of the proportion P_i of the N_i countries who respond with $Y_{it} = 1$, i.e. an occurrence of a crisis in year t described by the following equation. The observed P_i is an estimate of the population quantity $\pi_i = F(\beta'X_i)$. From the logistic function, we have

$$\pi_i = \frac{exp(\beta'X_i)}{1 + exp(\beta'X_i)}$$

and,

$$ln(\frac{\pi_i}{1 - \pi_i}) = \beta'X_i$$

The logit function is estimated by the maximum likelihood procedure and the log-likelihood function is given by

$$\log L = \sum_{i=1}^{n} N_i \left[P_i \log F(\beta' X_i) + (1 - P_i) \log(1 - F(\beta' X_i)) \right]$$

The logistic distribution has slightly flatter tails than the normal distribution. Since a sovereign debt crisis is a rare event, the distribution will be skewed towards right. Hence, the logit analysis is preferable to the probit analysis as the distribution is more likely to be a logistic distribution rather than the standard normal. Thus, the logit regression is more appropriate for analysing sovereign debt crises.[34]

5   Results and Implications

The regression results are explained in two different sections. Section 5.1 discusses results of the domestic debt crisis, and Section 5.2 explains the results for the external debt crisis.

5.1   Results for Domestic Debt Crisis

Table 5.1 shows the result of regressions for the domestic debt crisis. Column 1 is a baseline model where the domestic debt crisis variable is

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[34] Alternatively, some studies have used survival analysis to predict sovereign debt crisis. However, I have not considered survival analysis in this research.

regressed on the different macroeconomic variables. Column 2 reports the regression results of the debt maturity on domestic debt crisis. Column 3 reports the results of government bank loans per bonds, which describe the type of government debt. Column 4 represents the results of the country's borrowing power overseas that measures the country's financing power in domestic currency internationally. Since the number of observations varies significantly across the columns, one must be cautious in interpreting and comparing the results between the columns.

All debt structure variables are significant at the 10 percent level. The currency composition variable is significant at the 1 percent level. Column 2 shows the negative effects of the ratio of short term to long term debt on the domestic debt crisis. This implies that the risk of debt crisis declines as the maturity of debts shifts towards short term lending. Since the maturity variables are obtained only for external debt crisis, increasing external short term debt increases the risk of the external debt crisis. This may lead to a lower probability of the occurrence of the domestic debt crisis. Alternatively, the external short term debt burden may be reduced when a country experiences a domestic debt crisis. This result is significant at the 10 percent level, and the coefficient suggests that a 100 percent increase in the short term to long term debt ratio reduces the risk of domestic debt crisis by approximately 5 per cent on average, holding all other variables constant.

In Column 3, the regression of the total government bank loans to government bonds ratio indicates significance at the 5 percent level. An increase in bank loans compared to bonds may suggest a lower risk of the government's debt because banks monitor the risk of their borrowers carefully and finance only when the borrowers appear to be solvent. The coefficient implies that a 100 percent increase in total government bank loans to bond ratio results in approximately 0.2 per cent decrease in the chance of the domestic debt crisis on average. This may suggest that the bank loans are economically not significant.

The result of the borrowing power overseas variable is reported in Column 4. The variable is significant at the 1 percent level. The coefficient suggests that an increase in the ratio of borrowing power reduces the risk of the domestic debt crisis. As the borrowing power of the country using its local currency increases, the risk of the debt crisis should decrease due to the government's power of taxation on its residents and issuance of its own currency. The coefficient of the borrowing power is considerably small due to the high variation of the values in the sample countries. For example, the borrowing power of Switzerland is 203.11 in 1993, but that of Brazil is only 0.0002 in 1999. Even though the result supports the theory, the results do not seem to be economically significant.

Table 5.2 reports regression results of the debt structure variables with interaction terms. Interactions of maturity and type (bank loans versus bonds), maturity and currency composition (borrowing power overseas), and type and currency composition are examined. Column 1 shows the effects of the interaction term of maturity and debt type on the domestic debt crisis. The results suggest that both short term to long term debt ratio and total government bank loans to bonds ratio are negative and have a stronger effect than in Table 5.1. The interaction term is positive and significant. This implies that shifting towards short term debt or bank loans reduce the risk of domestic debt, but higher ratio of holding short term bank loans increase the risk of the crisis. Since bank loans are relatively easy to be terminated, or since refinancing is more sensitive to the changes in market conditions, relying on short term bank loans suggests that the government has a higher rollover risk. This is consistent with some of the debt crises phenomena during the 1990s.

Column 2 is the regression of the interaction of maturity and currency composition terms. The result indicates that the borrowing power overseas has a significantly negative effect at the 10 percent level. This suggests that the currency composition is an important determinant of the risk of the domestic debt crisis. A 100 percent increase in the variable reduces the risk of domestic debt crisis by 8 percent on average. Column 3 shows the regression result of the interaction between the type and

currency compositions of the debts. I find that the variable is not significant at the 10 percent level.

Table 5.3 includes the "Banking crisis in previous 2 years" dummy variable as an additional control variable. The results of regressions are slightly different when the banking crisis experience is taken into account. Column 2 indicates that debt maturity and type of debt are both statistically significant with correct signs. However, Column 4 shows that the borrowing power overseas is not significant in the regressions. This suggests that a country's borrowing power overseas is less important if the country has a recent history of banking crises since countries might be unable to borrow in their domestic currency. However, maturity and composition of debt get much more attention. The banking crisis itself has a positive significant effect in all specifications except in Column 4. Experiencing a banking crisis within the past two years increases the risk of the domestic debt crisis by 5 to 11 percent on average.

Similar results are obtained in Table 5.4 when controlled for the previous history of the currency crisis. The borrowing power has no significant effect when the previous currency crisis experience is considered. However, the maturity of debt has stronger negative effects. Shifting towards bank loans has a smaller impact than before, which is similar to the result with the banking crisis experience.

Since the sample countries in this research include both developed and developing countries, separating these countries can provide us a better understanding of the determinants of the risks of the debt crisis. Table 5.5 presents regression results of debt structure variables with an OECD dummy variable. The results indicate that the OECD countries have a significantly lower risk for domestic debt crisis in most specifications.

Table 5.6 shows the effects of debt structure with an OECD dummy variable and its interaction with banking and currency crises. [35] The conclusion is the same. The OECD countries have a lower risk for domestic debt crisis, and these effects are significant at the 1 percent level.

5.2   Results for External Debt Crisis

This section focuses on the determinants for external debt crisis. Table 5.7 shows the impact of the debt structure on the external debt crisis. The results suggest that the effects of the debt structure variables on the external debt crisis are different from the effects on the domestic debt crisis. The maturity and the type of debt variables are not significant factors in determining the risks of external debt crisis, but borrowing

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[35] Turkey is the only OECD country in the sample that had experienced either domestic or external debt crisis.

power overseas is a significant factor. Its negative coefficient means that increasing the borrowing power overseas reduces the probability of external debt crisis. If the local currency borrowing power of a country increases, the risk of an external debt crisis is reduced. This analysis supports the fact that very few developed countries have experienced external debt crisis. The maturity variable is not significant, and its sign is opposite to that of the domestic debt case. This proves the validity of the hypothesis made in the previous section. An increase in the external short term debt reduces the risk of the domestic debt crisis.

Table 5.8 examines the impact of the interaction terms of the debt structure variables. Even though the signs of the interaction terms are as predicted, none of the terms turn out to be significant. The results in Tables 5.9 and 5.10 show the impact of the previous banking and currency crises on external debt crises. The borrowing power overseas variable is negative and significant at the 1 percent level in both tables. The banking crises and the currency variables are positive and statistically significant in most specifications.

I investigate the differences between the OECD and non OECD countries in Tables 5.11 and 5.12. Although the OECD dummy variable is significant at the 1 percent level in all specifications in Table 5.11, the debt structure variables are not significant except for the interaction term

of the OECD and the maturity of the debt in Column 2. This indicates that a shift towards short term debt increases the risk of the external debt crisis when the country is an OECD member. Table 5.12 suggests that the OECD countries have a lower risk of the external debt crisis, and previous currency crisis is more important than banking crisis in these countries.

From these results, it is evident that the debt structure and the previous experience of the banking and currency crises are significant determinants of debt crises. The results also show that the debt structure variables are more important for domestic debt crises than the external crises. A detailed summary of all the results are provided in Table 7.

6 Robustness Analysis

Since most of the debt crises are observed in developing countries, there is an argument that using crisis as a dependent variable causes some biases.[36] For example, if all debt crises are observed in the developing countries, the results of regressions reflect the impact on developing countries more than on the developed countries. To resolve this issue, I use credit ratings as a new dependent variable as a proxy for the risk of

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[36] See King and Zeng (2001) for the issues regarding the use of rare events as a dependent variable.

debt crises. Using credit ratings as a dependent variable allows a greater time series variation for changes in the risk level. This helps to overcome the issue of the shortage of events in developed countries.

First, I use the level of the foreign currency long term (FCLT) credit ratings from Standard & Poor's from 1978 to 2010 as the dependent variable. The ratings are transformed to numerical values from 0 (SD) to 20 (AAA), and only the ratings at the end of each year are measured.[37] Accordingly, the ratings in the observations of this study do not capture the change if a country experienced upgrading at the beginning of one year and downgrading to the original rating by the end of that year. I use OLS with White's heteroscedasticity correction for all the tables. The explanatory variables used in the debt structure regressions are lagged values of the following variables: GDP growth, inflation, trade-to-GDP, exchange rate regime, political stability, and central government debt per GDP.[38] The results of the level of credit ratings are explained in Section 6.1. In Section 6.2, the same effects are reported when the dependent variable is the change in the credit ratings.

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[37] The numerical value assigned to each rating is available in Appendix A3.

[38] See Cantor and Packer (1996) for additional details.

6.1 Effects of debt structure on the level of credit ratings

Table 6.1 shows the impact of debt structure variables on the level of foreign currency long term (FCLT) debt credit ratings. I use one year lag of all control and debt structure variables. Since credit ratings can be observed any time during the year, one year lag variables are appropriate to use to avoid the arguments of causality.[39] Table 6.1 shows that all debt structure variables are positive and statistically significant, especially maturity and borrowing power overseas, which are significant at the 1 percent level. This indicates that short term maturity, bank loans and higher borrowing power overseas improve the credit ratings of the FCLT debt. The results show that debt structure has a strong impact on the credit ratings of the FCLT debt.

Tables 6.2 and 6.3 are the regressions with banking crisis and currency crisis experience, respectively. Significance patterns of the debt structure variables are similar to those of Table 6.1. All debt structure variables are significant and have positive coefficients. In addition, both banking and currency crisis experience variables are significant. In particular, the currency crisis experience indicates that it has an extreme impact on the FCLT debt.

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[39] Generally, credit ratings are reviewed by the factors listed in the explanatory variables, and therefore, there are some time lags for those factors to be reflected in the ratings.

Tables 6.4 through Tables 6.6 present the regressions results for the level of credit ratings for local currency long term (LCLT) debt. In Table 6.4, the borrowing power overseas variable is significant at the 1 percent level and type of debt at the 5 percent level. These results suggest that maturity structure is less important for the LCLT debt compared to the FCLT debt, but the type of debt and the borrowing power are important in both cases. When regressions include banking and currency crisis experience, the type of debt, as expected, seems to be less important. The borrowing power overseas still remains significant at the 1 percent level. Past experiences of banking crises are less important for the LCLT debt. However, currency crisis experience is still significant at the 1 percent level.

Overall, the results support the fact that the debt structure variables and previous crises history are important determinants of risk of sovereign debt for a country as measured by FCLT debt or LCLT debt.

6.2   Effects of debt structure on the change of credit ratings

In this section, I explain the results of debt structure on the changes in credit ratings as an alternative specification for robustness. Tables 6.7 through 6.9 report the results for the FCLT debt. The results indicate that the maturity structure is the most important determinant of FCLT

changes. I also find that the banking crisis variable is a significant determinant of these changes.

Tables 6.10 through 6.12 report the results for the changes in credit ratings for local currency long term (LCLT) debt. The results suggest that the borrowing power overseas variable is the most significant determinant of the LCLT changes. Table 6.11 indicates that the type of debt is important when previous banking crises are taken into account. Having higher bank loans relative to bonds leads to a downgrading of the LCLT debt. These results imply that a higher proportion of bank loans positively affect the level of the LCLT debt when the country is in a normal situation, but it has negative effects when a banking crisis occurs.

The banking crisis experience also has negative coefficients in all specifications in Table 6.11, and all of them are significant at the 1 percent level. Hence, the banking crisis experience in the past two years significantly downgrades the LCLT debt. This effect is similar to the effect on FCLT debt (Table 6.8), but the significance is higher in the LCLT debt. Table 6.12 suggests that previous currency crisis experience does not significantly affect the probability of downgrading the LCLT debt.

Overall, I find strong evidence that debt structure affects the level of both FCLT and LCLT debts, but weak evidence of the effects on the changes in credit ratings.

7 Conclusion

Theoretical studies of sovereign debt crisis suggest the importance of analysing different debt structures to understand the inherent risks. In this research, the impact of the maturity (short term versus long term), the composition type (bank loans versus bonds), and the currency compositions (local versus foreign currency) are empirically examined using the samples of both developed and developing countries. The results indicate that all the debt structure variables have significant effects on the domestic debt crisis. I find that the borrowing power overseas, which is employed as a measure of the currency composition, is a strong indicator of both domestic and external debt crises. Higher borrowing power overseas significantly reduces the risk of both types of debt crises in our samples. These results are robust to using the levels and changes of the S&P's FCLT and LCLT debt credit ratings as alternative dependent variables.

Furthermore, the connection between a sovereign debt crisis on the one hand and banking and currency crises on the other are examined. The

results suggest the existence of strong relationships between these crises, particularly between the domestic debt and banking crises, and the external debt and currency crises. This supports the theories and the arguments in previous studies. The significance of these relationships is also robust in most of the specifications employed in this paper.

8   Limitations

There are some limitations of this research. The data of the maturity and the type of debts are only available from 1978 to 2007, and the exact currency compositions of each country are limited to a considerably small number of countries. Hence, the borrowing power overseas is calculated as a proxy of the currency compositions. Since this variable has no separations for the issuance of the debt securities by country, this measure is only a proxy of the currency compositions of the country, which reflects the country's potential power to borrow in the international financial markets. [40] Additionally, compositions of the country's debt are also scant for a broad range of countries. Data on domestic debt are not available in the financial databases as noted by Reinhart and Rogoff (2011b).

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[40] This proxy measure is also limited to the period from 1993 to 2010 and to 29 countries. The list of these samples is introduced in Appendix A4.

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Tables and Graphs

Figure 1: Frequency of Domestic and External Debt Crises
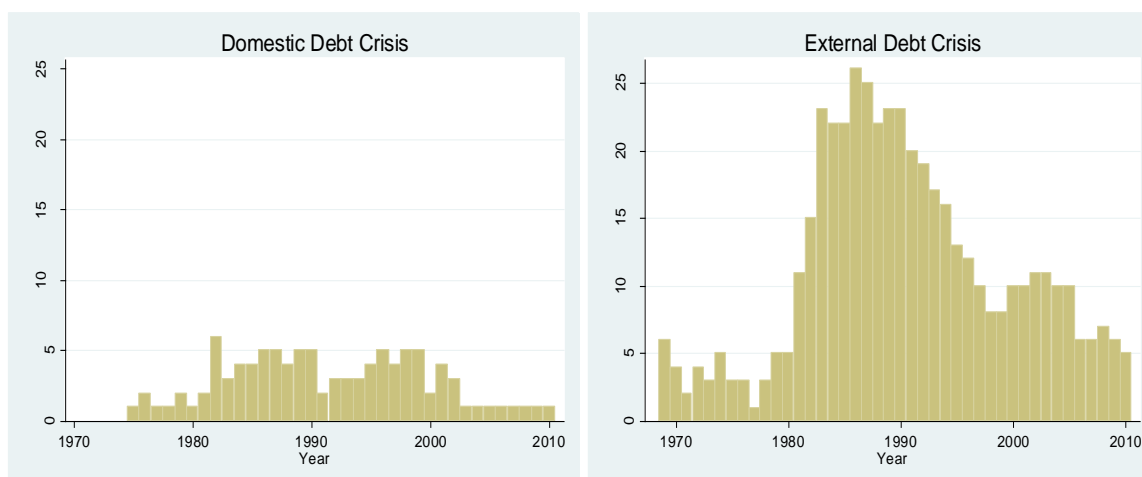
Note: The y-axis shows the frequency of each crisis

Source: Reinhart and Rogoff (2011b)

Figure 2: Central Government Debt-to-GDP for OECD and Non-OECD countries
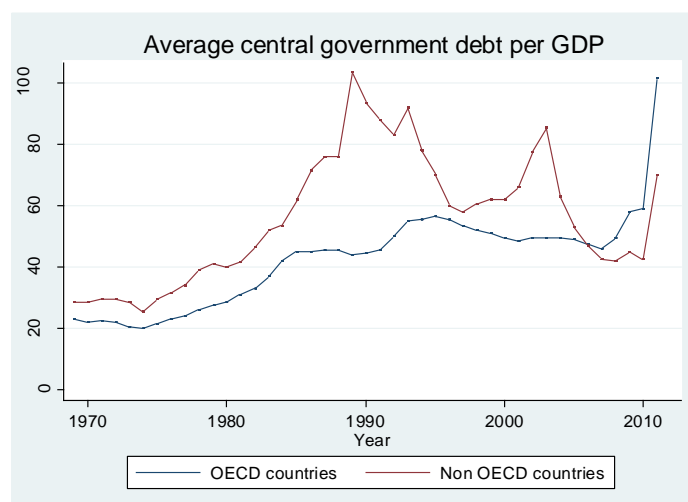
Note: The y-axis shows the percentage of central government debt to GDP

Source: WDI

Figure 3: Trade-to-GDP of Caribbean and Non-Caribbean countries
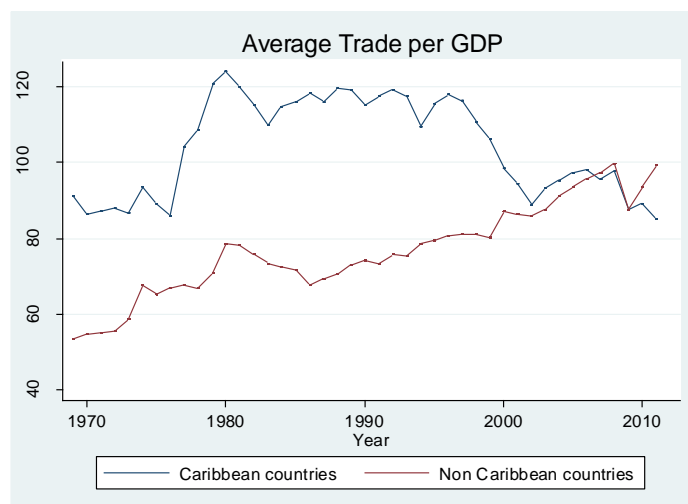
Note: The y-axis shows the percentage of trade to GDP

Source: WDI

Figure 4: Domestic Debt Crisis and Maturity of External Debt
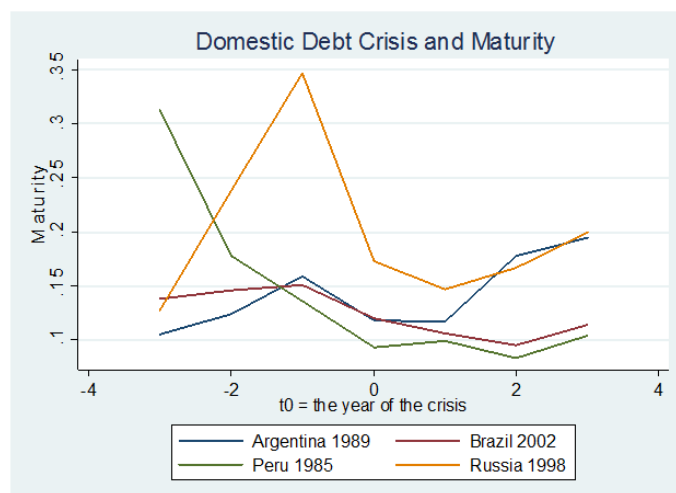
Source: Reinhart and Rogoff (2011b) and IIF

Figure 5: External Debt Crisis and Maturity of External Debt
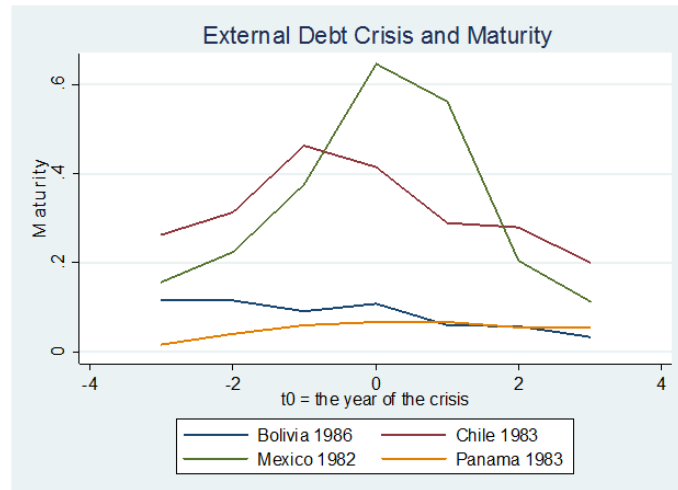
Source: Reinhart and Rogoff (2011b) and IIF

Figure 6: Domestic Debt Crisis and Type of Debts
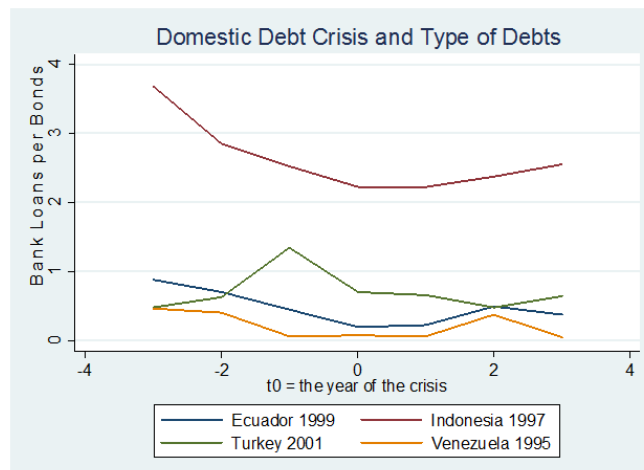
Source: Reinhart and Rogoff (2011b) and IIF

Figure 7: External Debt Crisis and Type of Debts
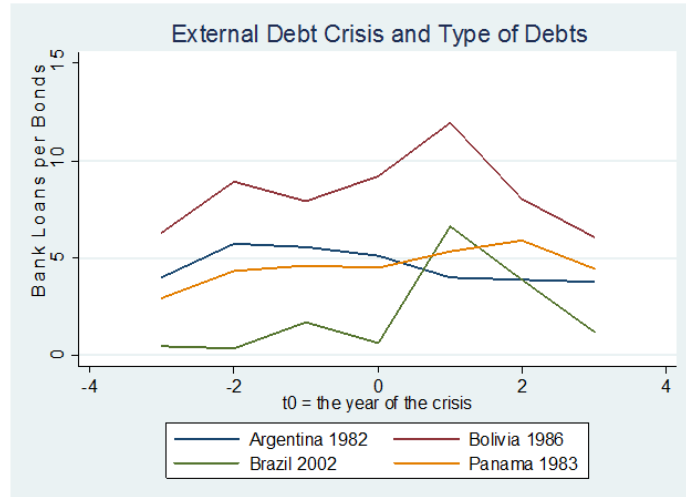
Source: Reinhart and Rogoff (2011b) and IIF

Figure 8: Domestic Debt Crisis and Borrowing Power Overseas
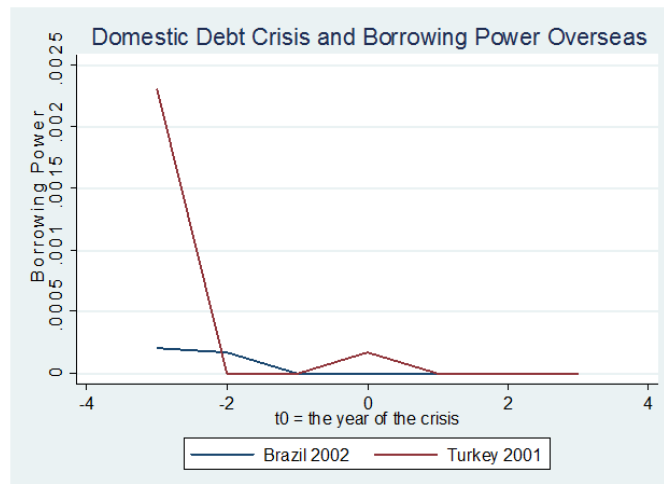
Source: Reinhart and Rogoff (2011b) and IIF

Figure 9: External Debt Crisis and Borrowing Power Overseas
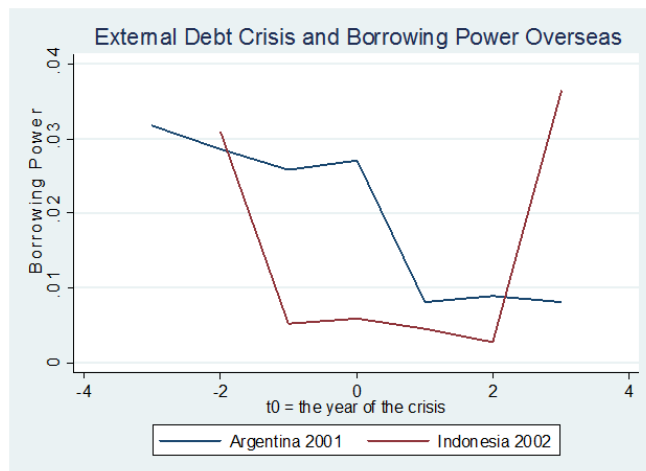
Source: Reinhart and Rogoff (2011b) and IIF

Figure 10: Total Debt/GDP and Domestic Debt/GDP from 1900 - 2010
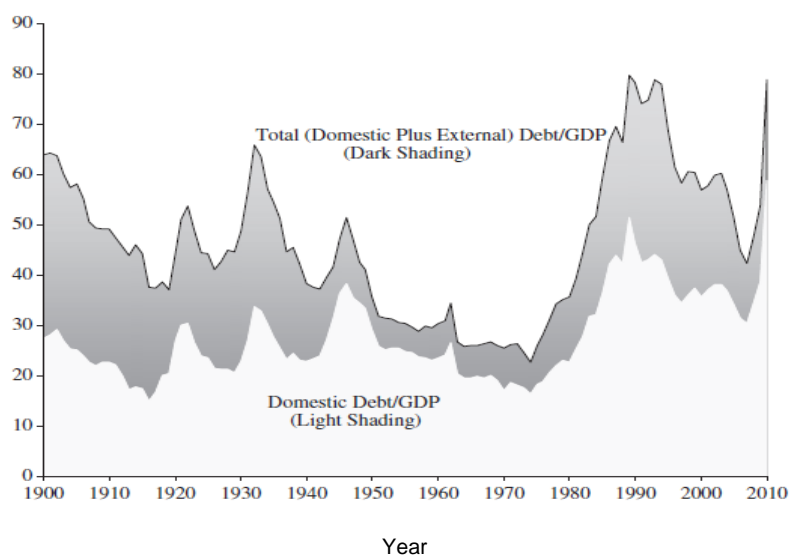
Note: The y-axis shows the percentage of each debt to GDP

Source: Reinhart and Rogoff (2011a)

Figure 11: Frequency of Banking Crisis from 1970 - 2011
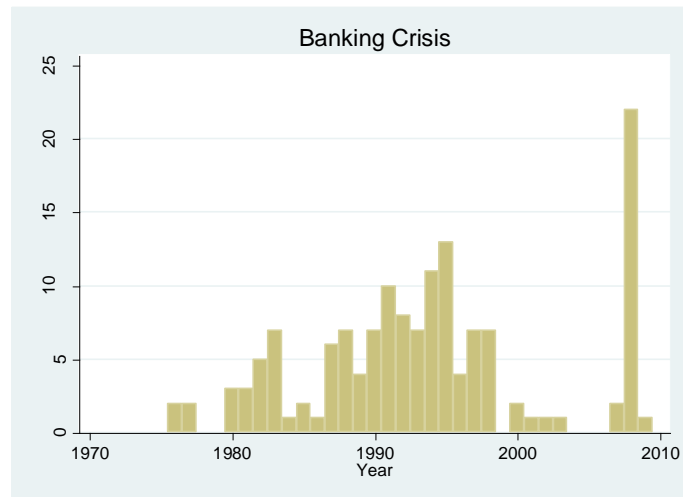
Note: The y-axis shows the frequency of banking crisis

Source: Laeven & Valencia (2012)

Figure 12: Frequency of Currency Crisis from 1970 – 2011
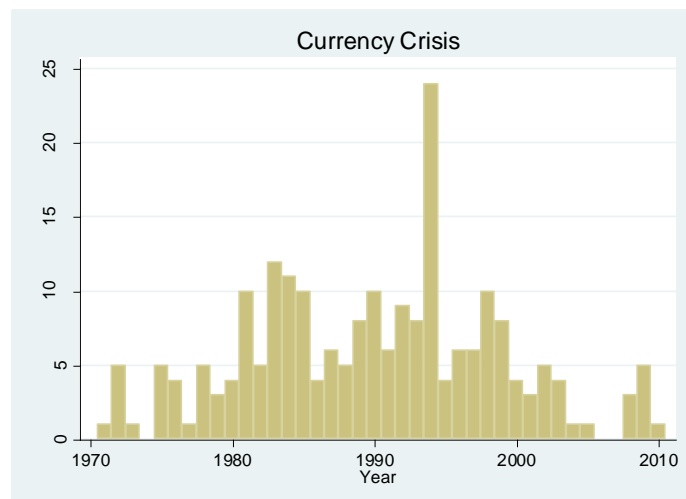
Note: The y-axis shows the frequency of currency crisis

Source: Laeven & Valencia (2012)

Figure 13: Debt Crises, Currency Crises, and Banking Crises
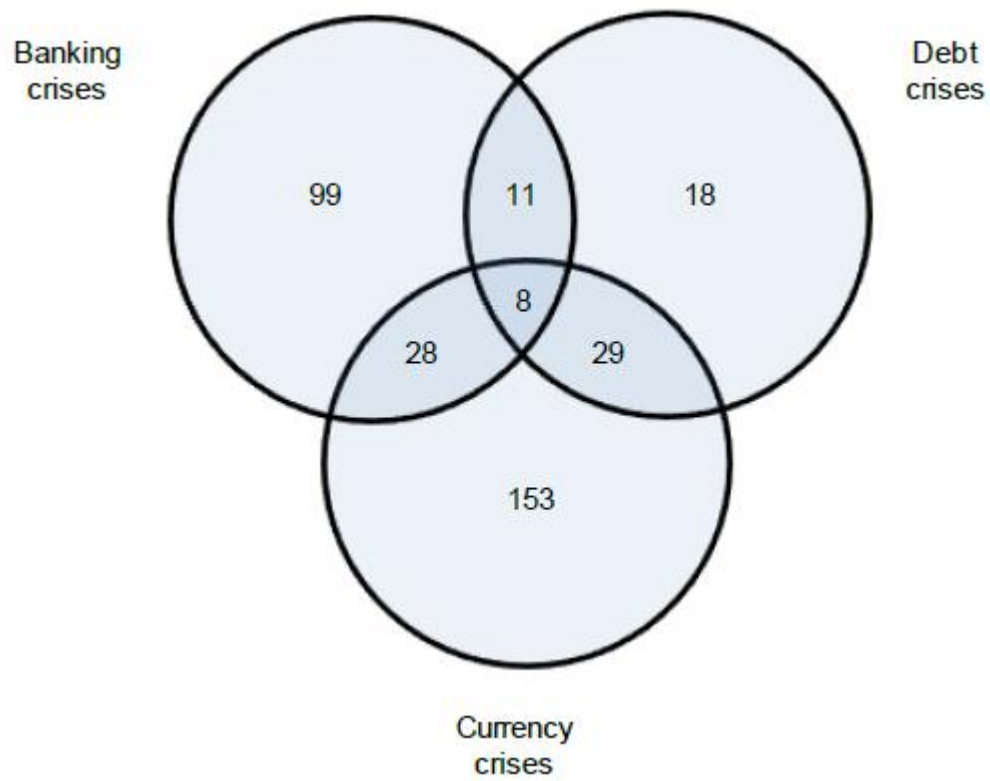
Source: Laeven & Valencia (2012)

Table 1.1: Type of Debt issued in international markets in 2001

Group of countries	Bonds and Notes	Money Market Instruments
By Income		
High Income	94.2%	5.8%
High Income OECD	94.2%	5.8%
European Monetary Union	92.0%	8.0%
High Income Non OECD	94.4%	5.6%
Upper Middle Income	99.5%	0.5%
Middle Income	99.1%	0.9%
Lower and Middle Income	98.5%	1.5%
Other Categories		
Advanced	94.9%	5.1%
Emerging Economies	99.0%	1.0%
By Region		
Latin America and Caribbean	95.5%	4.5%
East Asia and Pacific	89.2%	10.8%
Europe and Central Asia	91.5%	8.5%
Middle East and North Africa	99.4%	0.6%
South Asia	100.0%	0.0%
Sub-Saharan Africa	100.0%	0.0%

Source: Bank of International Settlements

Emerging countries include: Argentina, Brazil, Chile, Mexico, Venezuela, China, India, Indonesia, Malaysia, Philippines, Thailand, Poland, Russia, South Africa, Hungary, Turkey

South Asia economies include India, Pakistan and Sri lanka

Source: Alfaro and Kanczuk (2006)

Table 1.2: Currency Composition of Debt issued in international markets in 2001

Group of countries	Local currency-denoiminated Debt	Foreign currency-denoiminated Debt
By Income		
High Income	58.0%	42.0%
High Income OECD	63.1%	36.9%
European Monetary Union	61.2%	38.8%
High Income Non OECD	0.3%	99.7%
Upper Middle Income	1.2%	98.8%
Middle Income	1.1%	98.9%
Lower and Middle Income	1.0%	99.0%
Other Categories		
Advanced	64.0%	36.0%
Emerging Economies	1.2%	98.8%
By Region		
Latin America and Caribbean	0.4%	99.6%
East Asia and Pacific	17.7%	82.3%
Europe and Central Asia	51.1%	48.9%
Middle East and North Africa	0.3%	99.7%
South Asia	0.0%	100.0%
Sub-Saharan Africa	0.0%	100.0%

Source: Bank of International Settlements
Emerging countries include: Argentina, Brazil, Chile, Mexico, Venezuela, China, India,
  Indonesia, Malaysia, Philippines, Thailand, Poland, Russia, South Africa, Hungary, Turkey
South Asia economies include India, Pakistan and Sri lanka

Source: Alfaro and Kanczuk (2006)

Table 1.3: Classifications of Total Observations

OECD	Observations	Percent
0	1,501	63.98
1	845	36.02
Total	2,346	100.00

Note: A country is a member of OECD = 1

Domestic Debt Crisis	Observations	Percent
0	2,247	95.78
1	99	4.22
Total	2,346	100.00

Note: A country experienced Domestic Crisis in that year = 1

External Debt Crisis	Observations	Percent
0	1,905	81.20
1	441	18.80
Total	2,346	100.00

Note: A country experienced External Crisis in that year = 1

Table 1.4: Correlations between Explanatory Variables

	Lag GDP g	Lag inflation	Trade / GDP	Exc regime	Political stab	Debt per GDP	ST / LT debt	Banks / bonds	Borr power	Bank crisis	Curr crisis
Lag of GDP growth	1.0000										
Lag of inflation	-0.1250*	1.0000									
	0.0000										
Trade per GDP	0.1139*	-0.0186	1.0000								
	0.0000	*0.3749*									
Exchange rate regime	-0.0073*	0.0707*	-0.1692*	1.0000							
	0.0002	*0.0008*	*0.0000*								
Political stability	-0.1258*	-0.0080	-0.0073	-0.0632*	1.0000						
	0.0000	*0.7060*	*0.7287*	*0.0028*							
Total central government debt per GDP	-0.1964*	0.5104*	0.1058*	-0.0119	-0.0673*	1.0000					
	0.0000	*0.0000*	*0.0000*	*0.6164*	*0.0052*						
Short term / Long term total external debt	0.0111	-0.0227	-0.1000*	0.1088*	-0.0089	-0.3797*	1.0000				
	0.0000	*0.0000*	*0.0000*	*0.0021*	*0.7997*	*0.0000*					
Total government bank loans / bonds	0.0112	-0.0127	-0.0120	-0.0342	-0.2087*	-0.0453	0.0567	1.0000			
	0.7544	*0.5248*	*0.7607*	*0.3794*	*0.0000*	*0.2770*	*0.1424*				
Borrowing power overseas	-0.1003*	-0.0211	-0.0181	-0.0193	0.0965*	-0.0697	0.1870*	-0.0555	1.0000		
	0.7750	*0.6288*	*0.6770*	*0.6672*	*0.0289*	*0.1160*	*0.0025*	*0.4126*			
Banking crisis in previous 2 years	-0.1841*	0.0965*	-0.0413*	0.0008	0.0066	0.1068*	0.0221	-0.0566	-0.0263	1.0000	
	0.0212	*0.0000*	*0.0484*	*0.9677*	*0.7523*	*0.0000*	*0.5307*	*0.1433*	*0.5457*		
Currency crisis in previous 2 years	-0.1789*	0.0660*	-0.1024*	0.2644*	-0.1173*	0.125*	0.0166	0.0196	-0.0463	0.1733*	1.0000
	0.0000	*0.0016*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.6371*	*0.6131*	*0.2870*	*0.0000*	

Significance level is shown in italic under each row (* < 0.05)

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Table 2.1: Summary statistics for Non OECD countries

	Obs.	Mean	Stdev.	Min	Max
Domestic Debt Crisis (1 = crisis)	1501	0.065	0.247	0	1
External Debt Crisis (1 = crisis)	1501	0.291	0.454	0	1
Lag of GDP growth (%)	1448	3.759	4.732	-26.479	22.593
Lag of inflation (%)	1447	76.397	608.247	-27.049	13611.630
Trade per GDP (%)	1445	70.346	56.540	0.309	460.471
Exchange rate regime	1445	8.556	4.049	1	15
Political stability	1486	1.800	6.637	-9	10
Total central government debt per GDP (%)	1066	62.909	78.874	3.194	1209.303
Short term / Long term total external debt	731	0.284	0.432	0.011	7.469
Government bank loans / bonds	600	7.277	17.915	0.007	218.952
Borrowing power overseas	252	0.146	0.314	0	1.692
Banking crisis in previous 2 years	1501	0.108	0.310	0	1
Currency crisis in previous 2 years	1501	0.155	0.362	0	1

Table 2.2: Summary statistics for OECD countries

	Obs.	Mean	Stdev.	Min	Max
Domestic Debt Crisis (1 = crisis)	845	0.001	0.034	0	1
External Debt Crisis (1 = crisis)	845	0.005	0.069	0	1
Lag of GDP growth (%)	838	2.621	2.599	-8.539	10.917
Lag of inflation (%)	838	7.617	12.720	-6.382	137.965
Trade per GDP (%)	842	66.722	31.932	9.102	183.430
Exchange rate regime	845	8.160	4.246	1	14
Political stability	798	9.630	1.230	-5	10
Total central government debt per GDP (%)	705	46.436	29.622	4.475	189.141
Short term / Long term total external debt	79	0.298	0.175	0.110	1.103
Government bank loans / bonds	70	0.981	1.008	0.028	5.490
Borrowing power overseas	279	3.491	16.318	0	203.113
Banking crisis in previous 2 years	845	0.096	0.295	0	1
Currency crisis in previous 2 years	845	0.062	0.240	0	1

Table 2.3: Test of difference in means for Non OECD and OECD countries

	T-stat	Pr (T < t)	Pr (|T| > |t|)	Pr (T > t)
Domestic Debt Crisis (1 = crisis)	9.882	1.000	0.000	0.000
External Debt Crisis (1 = crisis)	23.937	1.000	0.000	0.000
Lag of GDP growth (%)	7.416	1.000	0.000	0.000
Lag of inflation (%)	4.300	1.000	0.000	0.000
Trade per GDP (%)	1.959	0.975	0.050	0.025
Exchange rate regime	2.190	0.986	0.029	0.014
Political stability	-44.091	0.000	0.000	1.000
Total central government debt per GDP (%)	6.191	1.000	0.000	0.000
Short term / Long term total external debt	-0.541	0.294	0.589	0.706
Government bank loans / bonds	8.495	1.000	0.000	0.000
Borrowing power overseas	-3.424	0.000	0.001	1.000
Banking crisis in previous 2 years	0.934	0.825	0.350	0.175
Currency crisis in previous 2 years	7.505	1.000	0.000	0.000

Table 3.1: Summary statistics for the sample that has not experienced domestic debt crisis

	Obs.	Mean	Stdev.	Min	Max
Lag of GDP growth (%)	2190	3.414	3.975	-26.479	22.593
Lag of inflation (%)	2189	35.688	359.190	-27.049	12338.660
Trade per GDP (%)	2189	69.300	49.425	0.309	460.471
Exchange rate regime	2201	8.321	4.118	1	15
Political stability	2185	4.554	6.640	-9	10
Total central government debt per GDP (%)	1688	54.790	52.779	3.194	898.607
Short term / Long term total external debt	777	0.290	0.421	0.011	7.469
Government bank loans / bonds	637	6.784	17.462	0.007	218.952
Borrowing power overseas	515	1.962	12.117	0	203.113
Banking crisis in previous 2 years	2247	0.097	0.296	0	1
Currency crisis in previous 2 years	2247	0.111	0.314	0	1

Table 3.2: Summary statistics for the sample that has experienced domestic debt crisis

	Obs.	Mean	Stdev.	Min	Max
Lag of GDP growth (%)	96	1.698	6.391	-24.700	11.200
Lag of inflation (%)	96	404.256	1598.786	-3.648	13611.630
Trade per GDP (%)	98	62.554	36.831	6.320	178.994
Exchange rate regime	89	10.596	3.713	1	15
Political stability	99	4.131	4.672	-8	9
Total central government debt per GDP (%)	83	88.109	177.076	15.202	1209.303
Short term / Long term total external debt	33	0.178	0.133	0.051	0.646
Government bank loans / bonds	33	3.433	4.099	0.049	17.201
Borrowing power overseas	16	0.014	0.012	0	0.053
Banking crisis in previous 2 years	99	0.253	0.437	0	1
Currency crisis in previous 2 years	99	0.364	0.483	0	1

Table 3.3: Test of difference in means for the samples with and without domestic debt crisis

	T-stat	Pr (T < t)	Pr (|T| > |t|)	Pr (T > t)
Lag of GDP growth (%)	2.608	0.995	0.011	0.005
Lag of inflation (%)	-2.256	0.013	0.026	0.987
Trade per GDP (%)	1.744	0.958	0.084	0.042
Exchange rate regime	-5.639	0.000	0.000	1.000
Political stability	0.862	0.805	0.390	0.195
Total central government debt per GDP (%)	-1.711	0.046	0.091	0.955
Short term / Long term total external debt	4.039	1.000	0.000	0.000
Government bank loans / bonds	3.372	1.000	0.001	0.001
Borrowing power overseas	3.648	1.000	0.000	0.000
Banking crisis in previous 2 years	-3.508	0.000	0.001	1.000
Currency crisis in previous 2 years	-5.155	0.000	0.000	1.000

Table 4.1: Summary statistics for the sample that has not experienced external debt crisis

	Obs.	Mean	Stdev.	Min	Max
Lag of GDP growth (%)	1874	3.721	3.621	-12.900	22.593
Lag of inflation (%)	1874	13.332	70.429	-27.049	2545.452
Trade per GDP (%)	1876	70.571	51.686	0.979	460.471
Exchange rate regime	1886	8.246	3.925	1	15
Political stability	1854	5.201	6.415	-9	10
Total central government debt per GDP (%)	1516	47.934	30.196	3.194	190.980
Short term / Long term total external debt	611	0.309	0.451	0.011	7.469
Government bank loans / bonds	487	6.744	19.648	0.007	218.952
Borrowing power overseas	507	1.993	12.210	0	203.113
Banking crisis in previous 2 years	1905	0.092	0.289	0	1
Currency crisis in previous 2 years	1905	0.084	0.277	0	1

Table 4.2: Summary statistics for the sample that has experienced external debt crisis

	Obs.	Mean	Stdev.	Min	Max
Lag of GDP growth (%)	412	1.617	5.556	-26.479	18.287
Lag of inflation (%)	411	223.710	1119.021	-23.479	13611.630
Trade per GDP (%)	411	61.890	32.991	0.309	198.767
Exchange rate regime	404	9.173	4.892	1	15
Political stability	430	1.667	6.447	-9	10
Total central government debt per GDP (%)	255	106.397	143.507	18.493	1209.303
Short term / Long term total external debt	199	0.213	0.257	0.022	1.919
Government bank loans / bonds	183	6.287	6.271	0.065	35.662
Borrowing power overseas	24	0.008	0.009	0	0.031
Banking crisis in previous 2 years	441	0.154	0.362	0	1
Currency crisis in previous 2 years	441	0.283	0.451	0	1

Table 4.3: Test of difference in means for the sample with and without external debt crisis

	T-stat	Pr (T < t)	Pr (|T| > |t|)	Pr (T > t)
Lag of GDP growth (%)	7.353	1.000	0.000	0.000
Lag of inflation (%)	-3.810	0.000	0.000	1.000
Trade per GDP (%)	4.302	1.000	0.000	0.000
Exchange rate regime	-3.572	0.000	0.000	1.000
Political stability	10.250	1.000	0.000	0.000
Total central government debt per GDP (%)	-6.481	0.000	0.000	1.0000
Short term / Long term total external debt	3.733	1.000	0.000	0.000
Government bank loans / bonds	0.456	0.676	0.649	0.324
Borrowing power overseas	3.662	1.000	0.000	0.000
Banking crisis in previous 2 years	-3.379	0.000	0.001	1.000
Currency crisis in previous 2 years	-8.902	0.000	0.000	1.000

Table 5.1 Debt Structure and Domestic Debt Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.002470**	-0.001980	-0.002060	-5.06e-13
	(-2.25)	(-1.47)	(-1.36)	(-0.38)
Lag of inflation (%)	0.000002	-0.000004	-0.000003	-6.77e-14
	(0.56)	(-0.92)	(-0.78)	(-0.86)
Trade per GDP (%)	-0.000247**	-0.000179	-0.000173	-4.05e-13**
	(-2.17)	(-0.82)	(-0.63)	(-2.10)
Exchange rate regime	0.004130***	0.003930**	0.003650*	3.78e-12
	(3.27)	(2.09)	(1.76)	(1.54)
Political stability	-0.000449	-0.000035	-0.001350	-1.65e-12
	(-0.98)	(-0.04)	(-1.34)	(-1.49)
Total central government debt per GDP (%)	0.000087**	0.000198	0.000422***	3.56e-13***
	(2.50)	(1.45)	(2.84)	(2.94)
Short term / Long term total external debt		-0.052100*		
		(-1.88)		
Total government bank loans / bonds			-0.002330**	
			(-2.11)	
Borrowing power overseas				-1.21e-10***
				(-4.00)
Log likelihood	-300.20	-104.00	-100.20	-34.22
Pseudo R squared	0.07	0.14	0.13	0.39
AIC	614.40	223.90	216.30	84.44
Number of observations	1712	692	576	489

Notes: Marginal effects are shown; t statistics in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

For explanation of the coefficients of Column 4, refer to Section 5.1

Table 5.2: Debt Structure with interaction terms

Explanatory variables	(1)	(2)	(3)
Lag of GDP growth (%)	-0.001470	-0.000485	-0.000264
	(-1.11)	(-0.39)	(-0.48)
Lag of inflation (%)	-0.000003	-0.000079	-0.000036
	(-0.79)	(-0.88)	(-0.89)
Trade per GDP (%)	-0.000156	-0.000282	-0.000139
	(-0.70)	(-1.24)	(-1.26)
Exchange rate regime	0.003860**	0.003320**	0.001080
	(2.36)	(2.06)	(1.47)
Political stability	-0.001350	-0.001310	-0.001240
	(-1.56)	(-1.18)	(-1.53)
Total central government debt per GDP (%)	0.000264*	0.000256	0.000197
	(1.76)	(1.64)	(1.47)
Short term / Long term total external debt (A)	-0.075100***	-0.024400	
	(-2.66)	(-1.08)	
Total government bank loans / bonds (B)	-0.003170***		-0.003430
	(-2.67)		(-1.53)
Borrowing power overseas (C)		-0.079800*	-0.037800
		(-1.78)	(-1.36)
(A) x (B)	0.003790***		
	(2.97)		
(A) x (C)		0.066900	
		(0.85)	
(B) x (C)			0.015900
			(1.07)
Log likelihood	-96.40	-32.94	-26.76
Pseudo R squared	0.16	0.31	0.42
AIC	212.80	85.89	73.52
Number of observations	576	246	207

Notes: See Table 5.1

Table 5.3: Debt Structure and Domestic Debt Crises with Banking Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.001820*	-0.000668	-0.000406	5.54e-10
	(-1.76)	(-0.83)	(-0.40)	(0.23)
Lag of inflation (%)	0.000001	-0.000002	-0.000002	-4.98e-13
	(0.36)	(-1.08)	(-0.74)	(-0.05)
Trade per GDP (%)	-0.000223**	-0.000101	-0.000032	-2.20e-10
	(-2.14)	(-0.74)	(-0.17)	(-0.21)
Exchange rate regime	0.003940***	0.00264**	0.00291**	1.50e-09
	(3.37)	(2.19)	(1.99)	(0.22)
Political stability	-0.000325	-0.000247	-0.000897	-6.76e-10
	(-0.75)	(-0.46)	(-1.38)	(-0.20)
Total central government debt per GDP (%)	0.000077**	0.000063	0.000204*	2.21e-10
	(2.34)	(0.67)	(1.83)	(0.21)
Short term / Long term total external debt		-0.048300**		
		(-2.08)		
Total government bank loans / bonds			-0.001760*	
			(-1.94)	
Borrowing power overseas				-3.83e-08
				(-0.23)
Banking crisis in previous 2 years (d)	0.046300***	0.085600***	0.107000***	7.92e-08
	(2.68)	(2.70)	(2.98)	(0.20)
Log likelihood	-294.70	-90.72	-87.26	-27.42
Pseudo R squared	0.09	0.25	0.24	0.51
AIC	605.30	199.40	192.50	72.84
Number of observations	1712	692	576	489

Notes: Marginal effects are shown; t statistics in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p < 0.10, ** p < 0.05, *** p < 0.01
For explanation of the coefficients of Column 4, refer to Section 5.1

Table 5.4 Debt Structure and Domestic Debt Crisis with Currency Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.001480	-0.001030	-0.001100	-8.38e-11
	(-1.35)	(-1.01)	(-0.81)	(-0.11)
Lag of inflation (%)	0.000004	-0.000001	-0.000001	-4.25e-11
	(1.14)	(-0.30)	(-0.15)	(-0.16)
Trade per GDP (%)	-0.000236**	-0.000152	-0.000149	-1.85e-10
	(-2.05)	(-0.87)	(-0.57)	(-0.15)
Exchange rate regime	0.002740**	0.002080	0.001960	3.71e-10
	(2.44)	(1.55)	(1.17)	(0.16)
Political stability	0.000025	-0.000070	-0.001060	-5.23e-10
	(0.05)	(-0.10)	(-1.14)	(-0.15)
Total central government debt per GDP (%)	0.000057*	0.000147	0.000363***	1.02e-10
	(1.66)	(1.25)	(2.66)	(0.16)
Short term / Long term total external debt		-0.060400**		
		(-2.27)		
Total government bank loans / bonds			-0.001970*	
			(-1.92)	
Borrowing power overseas				-2.64e-08
				(-0.17)
Currency crisis in previous 2 years (d)	0.057900***	0.056000**	0.059900**	7.13e-08
	(3.11)	(2.40)	(2.44)	(0.15)
Log likelihood	-292.10	-97.70	-95.32	-28.72
Pseudo R squared	0.10	0.19	0.17	0.49
AIC	600.20	213.40	208.60	75.45
Number of observations	1712	692	576	489

Notes: See Table 5.3

Table 5.5: Debt Structure and Domestic Debt Crisis with OECD dummy

Explanatory variables	(1)	(2)	(3)
Lag of GDP growth (%)	-0.000840*	-0.00174	-0.00182
	(-1.80)	(-1.39)	(-1.32)
		-	-
Lag of inflation (%)	-1.45e-08	0.00000349	0.00000311
	(-0.01)	(-0.92)	(-0.76)
Trade per GDP (%)	-0.000106*	-0.000140	-0.0000892
	(-1.88)	(-0.72)	(-0.34)
Exchange rate regime	0.00168**	0.00399**	0.00387*
	(2.06)	(2.27)	(1.94)
Political stability	0.000799**	0.000113	-0.00104
	(2.25)	(0.15)	(-1.11)
Total central government debt per GDP (%)	0.0000250*	0.000144	0.000347**
	(1.67)	(1.17)	(2.43)
OECD (d) (A)	-0.0644***	0.00281	-0.0211*
	(-7.09)	(0.10)	(-1.72)
Short term / Long term total external debt (B)		-0.0442*	
		(-1.88)	
Total government bank loans / bonds (C)			-0.00232**
			(-2.17)
(A) x (B)		-0.141**	
		(-2.36)	
(A) x (C)			-0.00658
			(-1.36)
Log likelihood	-261.4	-102.6	-98.84
Pseudo R squared	0.191	0.148	0.140
AIC	538.7	225.1	217.7
Number of observations	1712	692	576

Notes: See Table 5.3

Table 5.6: Financial Crises and Domestic Debt Crisis with OECD dummy

Explanatory variables	(1)	(2)
Lag of GDP growth (%)	-0.00000989*	-0.00000680
	(-1.73)	(-1.36)
Lag of inflation (%)	-6.98e-10	7.14e-09
	(-0.04)	(0.49)
Trade per GDP (%)	-0.00000145**	-0.00000115*
	(-2.25)	(-1.70)
Exchange rate regime	0.0000247***	0.0000143*
	(3.02)	(1.84)
Political stability	0.0000118***	0.00000921*
	(2.81)	(1.90)
Total central government debt per GDP (%)	0.000000330*	0.000000205
	(1.81)	(1.34)
OECD (d) (A)	-0.106***	-0.0830***
	(-7.17)	(-6.94)
Banking crisis in previous 2 years (d) (B)	0.000215*	
	(1.79)	
Currency crisis in previous 2 years (d) (C)		0.000148
		(1.48)
(A) x (B)	0.993***	
	(121.41)	
(A) x (C)		0.996***
		(182.40)
Log likelihood	-255.5	-255.4
Pseudo R squared	0.209	0.210
AIC	530.9	530.8
Number of observations	1712	1712

Notes: See Table 5.3

Table 5.7: Debt Structure and External Debt Crises

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.009070***	-0.014900***	-0.012100**	-1.11e-15
	(-3.40)	(-3.36)	(-2.23)	(-0.47)
Lag of inflation (%)	0.001150	0.000865	0.000987	4.13e-16
	(0.90)	(0.63)	(0.64)	(1.56)
Trade per GDP (%)	-0.000605***	-0.000841	-0.000159	-1.24e-15**
	(-3.10)	(-1.25)	(-0.19)	(-2.01)
Exchange rate regime	0.011800***	0.017300***	0.019600***	1.14e-14*
	(4.04)	(3.11)	(2.88)	(1.72)
Political stability	-0.005190***	0.002250	-0.004800	-3.36e-15
	(-3.55)	(0.71)	(-1.39)	(-1.34)
Total central government debt per GDP (%)	0.002820***	0.005540***	0.007430***	1.00e-15***
	(3.84)	(3.57)	(3.59)	(3.24)
Short term / Long term total external debt		0.045100		
		(0.68)		
Total government bank loans / bonds			-0.000118	
			(-0.12)	
Borrowing power overseas				-4.10e-13***
				(-5.06)
Log likelihood	-542.40	-274.20	-226.80	-41.13
Pseudo R squared	0.25	0.27	0.31	0.53
AIC	1098.80	564.40	469.50	98.25
Number of observations	1712	692	576	489

Notes: See Table 5.1

Table 5.8: External Debt Crises with interaction terms

Explanatory variables	(1)	(2)	(3)
Lag of GDP growth (%)	-0.012100**	-0.000288	-0.000499
	(-2.22)	(-0.38)	(-0.47)
Lag of inflation (%)	0.000996	0.000118	0.000170
	(0.64)	(0.78)	(0.88)
Trade per GDP (%)	-0.000153	-0.000277	-0.000551
	(-0.18)	(-1.15)	(-1.58)
Exchange rate regime	0.019200***	0.003670**	0.003960*
	(2.83)	(2.09)	(1.66)
Political stability	-0.004840	-0.000896	-0.002720*
	(-1.40)	(-1.16)	(-1.76)
Total central government debt per GDP (%)	0.007520***	0.000214	0.000585
	(3.49)	(1.37)	(1.52)
Short term / Long term total external debt (A)	0.026100	-0.045100	
	(0.32)	(-1.15)	
Total government bank loans / bonds (B)	0.000051		-0.001350
	(0.03)		(-0.44)
Borrowing power overseas (C)		-0.092600	-0.113000
		(-1.31)	(-1.26)
(A) x (B)	-0.000493		
	(-0.16)		
(A) x (C)		0.038800	
		(0.31)	
(B) x (C)			-0.005930
			(-0.10)
Log likelihood	-226.70	-38.99	-36.00
Pseudo R squared	0.31	0.46	0.47
AIC	473.40	97.98	92.00
Number of observations	576	246	207

Notes: See Table 5.1

Table 5.9: Debt Structure and External Debt Crises with Banking Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.007950***	-0.012600***	-0.009630	6.69e-14
	(-2.99)	(-2.70)	(-1.56)	(0.53)
Lag of inflation (%)	0.001130	0.000954	0.001090	3.02e-14**
	(0.93)	(0.66)	(0.67)	(2.02)
Trade per GDP (%)	-0.000578***	-0.000844	-0.000048	-6.74e-14***
	(-3.02)	(-1.26)	(-0.05)	(-2.71)
Exchange rate regime	0.011500***	0.016600***	0.019400***	5.10e-13**
	(4.06)	(3.04)	(2.88)	(1.97)
Political stability	-0.005020***	0.002370	-0.004840	-1.43e-13
	(-3.47)	(0.74)	(-1.40)	(-1.33)
Total central government debt per GDP (%)	0.002770***	0.005620***	0.007420***	5.40e-14***
	(3.93)	(3.49)	(3.54)	(2.64)
Short term / Long term total external debt		0.055900		
		(0.81)		
Total government bank loans / bonds			0.000054	
			(0.05)	
Borrowing power overseas				-1.67e-11***
				(-3.69)
Banking crisis in previous 2 years (d)	0.066200*	0.120000*	0.123000	6.20e-12
	(1.91)	(1.76)	(1.53)	(0.11)
Log likelihood	-540.00	-271.80	-225.00	-37.92
Pseudo R squared	0.25	0.27	0.31	0.56
AIC	1096.00	561.60	468.10	93.84
Number of observations	1712	692	576	489

Notes: See Table 5.3

Table 5.10: Debt Structure and External Debt Crises with Currency Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.006050**	-0.010800**	-0.007860	-1.61e-14
	(-2.36)	(-2.37)	(-1.36)	(-0.60)
Lag of inflation (%)	0.000956	0.000845	0.000971	4.48e-15*
	(0.96)	(0.71)	(0.72)	(1.71)
Trade per GDP (%)	-0.000575***	-0.000873	-0.000173	-1.72e-14**
	(-2.86)	(-1.37)	(-0.21)	(-2.34)
Exchange rate regime	0.007280***	0.012200**	0.013900**	9.12e-14
	(2.69)	(2.19)	(2.08)	(1.16)
Political stability	-0.003980***	0.002490	-0.004590	-3.61e-14
	(-2.79)	(0.80)	(-1.38)	(-1.39)
Total central government debt per GDP (%)	0.002650***	0.005600***	0.007500***	1.04e-14***
	(4.32)	(3.83)	(3.85)	(3.42)
Short term / Long term total external debt		0.026800		
		(0.43)		
Total government bank loans / bonds			-0.000153	
			(-0.17)	
Borrowing power overseas				-4.14e-12***
				(-3.82)
Currency crisis in previous 2 years (d)	0.191000***	0.200000***	0.217000***	1.25e-12
	(4.28)	(3.09)	(2.95)	(0.07)
Log likelihood	-525.90	-267.70	-221.20	-38.58
Pseudo R squared	0.27	0.29	0.33	0.56
AIC	1067.80	553.40	460.40	95.17
Number of observations	1712	692	576	489

Notes: See Table 5.3

Table 5.11: Debt Structure and External Debt Crisis with OECD dummy

Explanatory variables	(1)	(2)	(3)
Lag of GDP growth (%)	-0.00512***	-0.0147***	-0.0102**
	(-3.46)	(-3.28)	(-2.09)
Lag of inflation (%)	0.000251	0.000851	0.000864
	(0.74)	(0.58)	(0.60)
Trade per GDP (%)	-0.000363***	-0.000366	0.000799
	(-2.99)	(-0.56)	(0.93)
Exchange rate regime	0.00550***	0.0214***	0.0243***
	(3.09)	(3.57)	(3.11)
Political stability	0.00180**	0.00361	-0.00197
	(2.08)	(1.15)	(-0.68)
Total central government debt per GDP (%)	0.00116***	0.00482***	0.00602***
	(3.45)	(3.21)	(3.14)
OECD (d) (A)	-0.220***	-0.247***	-0.256***
	(-6.36)	(-3.06)	(-3.17)
Short term / Long term total external debt (B)		0.00791	
		(0.13)	
Total government bank loans / bonds (C)			-0.000551
			(-0.60)
(A) x (B)		0.680*	
		(1.77)	
(A) x (C)			-0.0440
			(-1.20)
Log likelihood	-454.0	-264.3	-212.2
Pseudo R squared	0.368	0.294	0.354
AIC	924.0	548.5	444.4
Number of observations	1712	692	576

Notes: See Table 5.3

Table 5.12: Financial Crises and External Debt Crisis with OECD dummy

Explanatory variables	(1)	(2)
Lag of GDP growth (%)	-0.00423***	-0.00287**
	(-3.01)	(-2.34)
Lag of inflation (%)	0.000223	0.000155
	(0.76)	(0.76)
Trade per GDP (%)	-0.000316***	-0.000249**
	(-2.70)	(-2.21)
Exchange rate regime	0.00481***	0.00276**
	(2.84)	(2.08)
Political stability	0.00163**	0.00134**
	(1.98)	(2.02)
Total central government debt per GDP (%)	0.00103***	0.000796**
	(3.15)	(2.49)
OECD (d) (A)	-0.234***	-0.226***
	(-6.41)	(-6.93)
Banking crisis in previous 2 years (d) (B)	0.0187	
	(1.26)	
Currency crisis in previous 2 years (d) (C)		0.0369*
		(1.88)
(A) x (B)	0.177	
	(1.05)	
(A) x (C)		0.493**
		(2.02)
Log likelihood	-451.0	-440.7
Pseudo R squared	0.373	0.387
AIC	921.9	901.5
Number of observations	1712	1712

Notes: See Table 5.3

Table 6.1: Debt Structure and the Level of Credit Ratings (FCLT)

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.0966**	0.104**	0.102**	-0.0260
	(-2.03)	(2.54)	(2.38)	(-0.38)
Lag of inflation (%)	-0.154***	-0.0402***	-0.0392***	-0.142***
	(-8.48)	(-5.65)	(-5.77)	(-5.97)
Lag of trade per GDP (%)	0.0203***	0.0289***	0.0327***	0.0207***
	(8.57)	(11.00)	(8.62)	(9.09)
Lag of exchange rate regime	0.133***	0.128***	0.158***	0.315***
	(3.60)	(2.65)	(3.20)	(4.01)
Lag of political stability	0.399***	-0.0542**	0.00642	0.239***
	(13.63)	(-2.57)	(0.28)	(5.04)
Lag of total central government debt per GDP (%)	-0.0275***	-0.0388***	-0.0603***	-0.0185***
	(-5.87)	(-5.18)	(-6.60)	(-2.81)
Lag of short term / long term total external debt		2.718***		
		(4.60)		
Lag of total government bank loans / bonds			0.0291**	
			(2.42)	
Lag of borrowing power overseas				0.0478***
				(3.18)
Constant	11.69***	8.618***	9.253***	9.827***
	(19.48)	(12.38)	(12.60)	(10.40)
Log likelihood	-3026.2	-907.4	-772.7	-1290.9
R squared	0.298	0.443	0.438	0.372
AIC	6066.3	1830.8	1561.3	2597.8
Number of observations	1041	399	336	464

Notes: t statistics in parentheses,   * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.2. Debt Structure and the Level of Credit Ratings (FCLT) with Banking Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.140***	0.0431	0.0524	-0.0963
	(-2.93)	(1.09)	(1.25)	(-1.45)
Lag of inflation (%)	-0.153***	-0.0396***	-0.0394***	-0.140***
	(-8.71)	(-6.46)	(-6.54)	(-6.27)
Lag of trade per GDP (%)	0.0205***	0.0287***	0.0311***	0.0202***
	(8.77)	(11.37)	(8.39)	(9.13)
Lag of exchange rate regime	0.126***	0.119**	0.148***	0.276***
	(3.39)	(2.56)	(3.03)	(3.49)
Lag of political stability	0.389***	-0.0661***	-0.00864	0.216***
	(13.34)	(-3.49)	(-0.43)	(4.87)
Lag of total central government debt per GDP (%)	-0.0284***	-0.0398***	-0.0607***	-0.0210***
	(-6.13)	(-5.27)	(-6.56)	(-3.18)
Lag of short term / long term total external debt		2.906***		
		(5.29)		
Lag of total government bank loans / bonds			0.0233*	
			(1.95)	
Lag of borrowing power overseas				0.0445***
				(2.99)
Banking crisis in previous 2 years	-1.495***	-1.948***	-1.533***	-1.762**
	(-2.85)	(-4.05)	(-2.96)	(-2.55)
Constant	12.15***	9.287***	9.991***	11.01***
	(19.78)	(13.07)	(13.09)	(11.19)
Log likelihood	-3021.1	-894.2	-766.3	-1286.5
R squared	0.305	0.479	0.459	0.384
AIC	6058.1	1806.4	1550.5	2590.9
Number of observations	1041	399	336	464

Notes: See Table 6.1

Table 6.3: Debt Structure and the Level of Credit Ratings (FCLT) with Currency Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.180***	0.0267	0.0334	-0.0975*
	(-4.20)	(0.72)	(0.84)	(-1.66)
Lag of inflation (%)	-0.125***	-0.0297***	-0.0302***	-0.119***
	(-8.61)	(-5.05)	(-5.10)	(-6.35)
Lag of trade per GDP (%)	0.0208***	0.0309***	0.0321***	0.0208***
	(9.60)	(13.97)	(9.16)	(10.37)
Lag of exchange rate regime	0.164***	0.169***	0.195***	0.333***
	(4.75)	(3.91)	(4.34)	(4.66)
Lag of political stability	0.369***	-0.0647***	-0.00865	0.202***
	(13.34)	(-3.60)	(-0.45)	(4.91)
Lag of total central government debt per GDP (%)	-0.0268***	-0.0378***	-0.0588***	-0.0182***
	(-6.31)	(-6.09)	(-7.32)	(-3.26)
Lag of short term / long term total external debt		3.002***		
		(5.53)		
Lag of total government bank loans / bonds			0.0250**	
			(2.02)	
Lag of borrowing power overseas				0.0444***
				(3.16)
Currency crisis in previous 2 years	-5.528***	-3.174***	-2.956***	-4.977***
	(-8.33)	(-7.47)	(-6.43)	(-5.84)
Constant	12.00***	8.687***	9.577***	10.32***
	(20.90)	(13.86)	(14.20)	(11.90)
Log likelihood	-2985.0	-873.7	-749.0	-1269.1
R squared	0.351	0.530	0.512	0.428
AIC	5986.1	1765.4	1515.9	2556.2
Number of observations	1041	399	336	464

Notes: See Table 6.1

Table 6.4: Debt Structure and the Level of Credit Ratings (LCLT)

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.107*	0.119**	0.0986**	-0.0283
	(-1.93)	(2.46)	(2.07)	(-0.40)
Lag of inflation (%)	-0.240***	-0.0809***	-0.0697***	-0.226***
	(-9.25)	(-4.22)	(-3.73)	(-9.30)
Lag of trade per GDP (%)	0.0183***	0.0296***	0.0285***	0.0186***
	(8.53)	(8.53)	(6.02)	(8.28)
Lag of exchange rate regime	0.180***	0.362***	0.384***	0.327***
	(4.62)	(6.56)	(7.10)	(4.34)
Lag of political stability	0.266***	-0.158***	-0.0333	0.246***
	(8.15)	(-4.57)	(-0.83)	(4.63)
Lag of total central government debt per GDP (%)	-0.0191***	-0.0684***	-0.0873***	-0.0247***
	(-3.55)	(-7.40)	(-9.07)	(-3.87)
Lag of short term / long term total external debt		0.268		
		(0.35)		
Lag of total government bank loans / bonds			0.0206**	
			(2.16)	
Lag of borrowing power overseas				0.0269***
				(3.20)
Constant	12.86***	11.43***	11.03***	11.88***
	(18.30)	(11.60)	(10.79)	(10.41)
Log likelihood	-2249.7	-753.9	-614.4	-1119.5
R squared	0.292	0.477	0.518	0.433
AIC	4513.5	1523.9	1244.9	2255.1
Number of observations	783	312	255	430

Notes: See Table 6.1

Table 6.5: Debt Structure and the Level of Credit Ratings (LCLT) with Banking Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.132**	0.0337	0.00221	-0.0665
	(-2.39)	(0.73)	(0.05)	(-0.98)
Lag of inflation (%)	-0.236***	-0.0687***	-0.0574***	-0.218***
	(-8.90)	(-3.94)	(-3.44)	(-8.71)
Lag of trade per GDP (%)	0.0186***	0.0301***	0.0270***	0.0185***
	(8.54)	(9.01)	(5.98)	(8.39)
Lag of exchange rate regime	0.176***	0.340***	0.360***	0.306***
	(4.42)	(6.26)	(6.66)	(4.19)
Lag of political stability	0.265***	-0.168***	-0.0522	0.238***
	(8.13)	(-5.17)	(-1.47)	(4.60)
Lag of total central government debt per GDP (%)	-0.0198***	-0.0718***	-0.0917***	-0.0260***
	(-3.62)	(-8.21)	(-9.94)	(-4.04)
Lag of short term / long term total external debt		0.742		
		(1.15)		
Lag of total government bank loans / bonds			0.0149	
			(1.64)	
Lag of borrowing power overseas				0.0255***
				(3.04)
Banking crisis in previous 2 years	-0.712	-2.278***	-2.509***	-0.935
	(-1.24)	(-3.40)	(-3.54)	(-1.55)
Constant	13.07***	12.23***	12.29***	12.43***
	(18.23)	(13.04)	(12.73)	(11.25)
Log likelihood	-2248.8	-744.9	-605.4	-1118.0
R squared	0.294	0.506	0.551	0.437
AIC	4513.6	1507.8	1228.7	2254.0
Number of observations	783	312	255	430

Notes: See Table 6.1

Table 6.6: Debt Structure and the Level of Credit Ratings (LCLT) with Currency Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	-0.196***	0.00516	-0.0148	-0.0868
	(-3.82)	(0.12)	(-0.34)	(-1.34)
Lag of inflation (%)	-0.202***	-0.0588***	-0.0484***	-0.193***
	(-7.95)	(-3.42)	(-2.87)	(-7.71)
Lag of trade per GDP (%)	0.0190***	0.0326***	0.0284***	0.0189***
	(9.09)	(10.06)	(6.36)	(8.85)
Lag of exchange rate regime	0.196***	0.375***	0.398***	0.327***
	(5.31)	(7.26)	(7.80)	(4.61)
Lag of political stability	0.246***	-0.167***	-0.0557*	0.223***
	(7.96)	(-5.50)	(-1.72)	(4.59)
Lag of total central government debt per GDP (%)	-0.0186***	-0.0652***	-0.0829***	-0.0244***
	(-3.79)	(-8.14)	(-9.38)	(-4.39)
Lag of short term / long term total external debt		0.764		
		(1.26)		
Lag of total government bank loans / bonds			0.0137	
			(1.35)	
Lag of borrowing power overseas				0.0251***
				(3.13)
Currency crisis in previous 2 years	-4.487***	-3.546***	-3.676***	-3.306***
	(-4.94)	(-5.39)	(-5.14)	(-3.55)
Constant	13.16***	11.55***	11.56***	12.24***
	(19.60)	(13.03)	(12.72)	(11.56)
Log likelihood	-2228.8	-734.3	-597.4	-1108.6
R squared	0.329	0.539	0.579	0.461
AIC	4473.5	1486.6	1212.7	2235.2
Number of observations	783	312	255	430

Notes: See Table 6.1

Table 6.7: Debt Structure and the Change of Credit Ratings (FCLT)

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	0.0458***	0.0639***	0.0729***	0.0379**
	(3.93)	(2.81)	(2.93)	(2.18)
Lag of inflation (%)	0.00401	0.00338	0.00326	0.00195
	(1.01)	(0.71)	(0.66)	(0.33)
Lag of trade per GDP (%)	0.000462	0.00127	0.00266	0.000257
	(1.02)	(0.80)	(1.34)	(0.42)
Lag of exchange rate regime	0.0160**	0.0447*	0.0496*	0.0206
	(2.02)	(1.83)	(1.88)	(0.86)
Lag of political stability	0.0129	0.00922	0.00492	0.0172
	(1.62)	(0.77)	(0.31)	(1.08)
Lag of total central government debt per GDP (%)	0.00178	0.00332	0.00726**	0.00247
	(1.56)	(1.23)	(2.12)	(1.45)
Lag of short term / long term total external debt		-0.691*		
		(-1.65)		
Lag of total government bank loans / bonds			-0.00185	
			(-0.29)	
Lag of borrowing power overseas				0.000629
				(0.57)
Constant	-0.536***	-0.792**	-1.282***	-0.567
	(-3.02)	(-2.04)	(-2.78)	(-1.64)
Log likelihood	-1340.9	-613.7	-536.1	-659.5
R squared	0.0340	0.0718	0.0723	0.0227
AIC	2695.7	1243.3	1088.2	1334.9
Number of observations	999	374	315	461

Notes: See Table 6.1

Table 6.8: Debt Structure and the Change of Credit Ratings (FCLT) with Banking Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	0.0279**	0.0354	0.0405	0.00800
	(2.18)	(1.38)	(1.44)	(0.38)
Lag of inflation (%)	0.00514	0.00453	0.00402	0.00357
	(1.25)	(0.89)	(0.77)	(0.57)
Lag of trade per GDP (%)	0.000513	0.00116	0.00161	0.0000743
	(1.16)	(0.76)	(0.80)	(0.13)
Lag of exchange rate regime	0.0130	0.0397	0.0425	0.00430
	(1.65)	(1.63)	(1.61)	(0.19)
Lag of political stability	0.00835	0.00232	-0.00665	0.00765
	(1.19)	(0.21)	(-0.46)	(0.54)
Lag of total central government debt per GDP (%)	0.00137	0.00254	0.00671*	0.00145
	(1.23)	(0.90)	(1.92)	(0.85)
Lag of short term / long term total external debt		-0.608		
		(-1.62)		
Lag of total government bank loans / bonds			-0.00526	
			(-0.78)	
Lag of borrowing power overseas				-0.000686
				(-0.62)
Banking crisis in previous 2 years	-0.612***	-0.933**	-1.016**	-0.732**
	(-3.02)	(-2.31)	(-2.15)	(-2.37)
Constant	-0.340**	-0.453	-0.777*	-0.0744
	(-2.03)	(-1.11)	(-1.67)	(-0.24)
Log likelihood	-1321.7	-603.4	-527.1	-647.9
R squared	0.0703	0.121	0.124	0.0705
AIC	2659.4	1224.8	1072.3	1313.8
Number of observations	999	374	315	461

Notes: See Table 6.1

Table 6.9: Debt Structure and the Change of Credit Ratings (FCLT) with Currency Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	0.0383***	0.0523**	0.0617**	0.0323*
	(3.36)	(2.23)	(2.49)	(1.86)
Lag of inflation (%)	0.00711*	0.00549	0.00526	0.00413
	(1.67)	(1.08)	(0.99)	(0.64)
Lag of trade per GDP (%)	0.000512	0.00160	0.00262	0.000278
	(1.13)	(1.03)	(1.30)	(0.46)
Lag of exchange rate regime	0.0185**	0.0500**	0.0548**	0.0220
	(2.39)	(2.11)	(2.12)	(0.93)
Lag of political stability	0.0100	0.00720	0.00178	0.0144
	(1.41)	(0.66)	(0.12)	(1.05)
Lag of total central government debt per GDP (%)	0.00185	0.00355	0.00758**	0.00250
	(1.60)	(1.30)	(2.18)	(1.44)
Lag of short term / long term total external debt		-0.643		
		(-1.59)		
Lag of total government bank loans / bonds			-0.00232	
			(-0.37)	
Lag of borrowing power overseas				0.000403
				(0.35)
Currency crisis in previous 2 years	-0.474	-0.451	-0.454	-0.361
	(-1.61)	(-1.35)	(-1.21)	(-0.92)
Constant	-0.508***	-0.786**	-1.232***	-0.533
	(-2.90)	(-2.00)	(-2.65)	(-1.56)
Log likelihood	-1334.6	-611.6	-534.5	-657.9
R squared	0.0461	0.0820	0.0815	0.0294
AIC	2685.1	1241.2	1087.0	1333.8
Number of observations	999	374	315	461

Notes: See Table 6.1

Table 6.10: Debt Structure and the Change of Credit Ratings (LCLT)

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	0.0415***	0.0748***	0.0891***	0.0419**
	(3.09)	(2.89)	(3.02)	(2.42)
Lag of inflation (%)	0.0131**	0.0169**	0.0146**	0.0145**
	(2.22)	(2.45)	(2.00)	(2.16)
Lag of trade per GDP (%)	0.000499	0.00129	0.00192	0.000879
	(0.86)	(0.68)	(0.78)	(0.89)
Lag of exchange rate regime	0.0233***	0.0711***	0.0711***	0.0528**
	(2.94)	(2.63)	(2.64)	(2.04)
Lag of political stability	0.0201	0.0211	0.0257	0.0333
	(1.60)	(1.11)	(0.87)	(1.15)
Lag of total central government debt per GDP (%)	0.000897	0.00294	0.00635	0.00219
	(0.65)	(0.76)	(1.59)	(1.33)
Lag of short term / long term total external debt		-0.888		
		(-1.30)		
Lag of total government bank loans / bonds			-0.00694	
			(-1.17)	
Lag of borrowing power overseas				0.00205*
				(1.79)
Constant	-0.689***	-1.236**	-1.697***	-1.206**
	(-3.01)	(-2.40)	(-2.81)	(-2.35)
Log likelihood	-1046.3	-439.5	-372.7	-530.9
R squared	0.0408	0.126	0.131	0.0747
AIC	2106.5	894.9	761.5	1077.8
Number of observations	733	286	233	416

Notes: See Table 6.1

Table 6.11: Debt Structure and the Change of Credit Ratings (LCLT) with Banking Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	0.0163	0.0248	0.0301	0.0124
	(1.26)	(1.03)	(1.19)	(0.73)
Lag of inflation (%)	0.0183***	0.0276***	0.0257***	0.0212***
	(2.89)	(3.54)	(2.92)	(2.95)
Lag of trade per GDP (%)	0.000725	0.00156	0.000967	0.000832
	(1.25)	(0.87)	(0.42)	(0.92)
Lag of exchange rate regime	0.0176**	0.0513**	0.0485**	0.0350
	(2.34)	(2.23)	(2.15)	(1.52)
Lag of political stability	0.0186	0.0146	0.0124	0.0274
	(1.63)	(0.89)	(0.53)	(1.06)
Lag of total central government debt per GDP (%)	0.000298	0.000627	0.00344	0.00127
	(0.22)	(0.16)	(0.78)	(0.77)
Lag of short term / long term total external debt		-0.616		
		(-1.06)		
Lag of total government bank loans / bonds			-0.00963*	
			(-1.72)	
Lag of borrowing power overseas				0.000943
				(0.88)
Banking crisis in previous 2 years	-0.732***	-1.373***	-1.549***	-0.747***
	(-3.29)	(-2.97)	(-2.74)	(-2.89)
Constant	-0.480**	-0.710	-0.865**	-0.771*
	(-2.48)	(-1.64)	(-2.07)	(-1.91)
Log likelihood	-1029.4	-422.2	-357.5	-517.4
R squared	0.0839	0.225	0.237	0.133
AIC	2074.7	862.4	733.0	1052.7
Number of observations	733	286	233	416

Notes: See Table 6.1

Table 6.12: Debt Structure and the Change of Credit Ratings (LCLT) with Currency Crisis

Explanatory variables	(1)	(2)	(3)	(4)
Lag of GDP growth (%)	0.0299**	0.0566**	0.0717**	0.0335*
	(2.26)	(2.09)	(2.53)	(1.87)
Lag of inflation (%)	0.0197***	0.0225***	0.0199**	0.0205**
	(2.91)	(2.88)	(2.19)	(2.37)
Lag of trade per GDP (%)	0.000609	0.00185	0.00193	0.000957
	(1.03)	(0.98)	(0.77)	(0.97)
Lag of exchange rate regime	0.0251***	0.0717***	0.0718**	0.0519**
	(3.10)	(2.62)	(2.59)	(1.98)
Lag of political stability	0.0176	0.0197	0.0221	0.0309
	(1.52)	(1.12)	(0.83)	(1.16)
Lag of total central government debt per GDP (%)	0.000967	0.00351	0.00705*	0.00226
	(0.68)	(0.89)	(1.68)	(1.34)
Lag of short term / long term total external debt		-0.788		
		(-1.28)		
Lag of total government bank loans / bonds			-0.00774	
			(-1.30)	
Lag of borrowing power overseas				0.00180
				(1.53)
Currency crisis in previous 2 years	-0.637*	-0.623	-0.619	-0.498
	(-1.72)	(-1.30)	(-1.00)	(-1.15)
Constant	-0.655***	-1.228**	-1.617***	-1.160**
	(-2.96)	(-2.35)	(-2.79)	(-2.35)
Log likelihood	-1039.5	-436.4	-370.7	-527.7
R squared	0.0583	0.144	0.146	0.0891
AIC	2095.0	890.9	759.4	1073.3
Number of observations	733	286	233	416

Notes: See Table 6.1

Table 7: Overview of the Signs and Significances of the Debt Structure

Debt Crises

Domestic Debt Crisis			with Banking Crisis		with Currency Crisis	
	sign	significance	sign	significance	sign	significance
Short term / Long term total external debt	_	10%	_	5%	_	5%
Total government bank loans / bonds	_	5%	_	10%	_	10%
Borrowing power overseas	_	1%				

External Debt Crisis			with Banking Crisis		with Currency Crisis	
	sign	significance	sign	significance	sign	significance
Short term / Long term total external debt						
Total government bank loans / bonds						
Borrowing power overseas	_	1%	_	1%	_	1%

Level of the Credit Ratings

FCLT			with Banking Crisis		with Currency Crisis	
	sign	significance	sign	significance	sign	significance
Short term / Long term total external debt	+	1%	+	1%	+	1%
Total government bank loans / bonds	+	5%	+	10%	+	5%
Borrowing power overseas	+	1%	+	1%	+	1%

LCLT			with Banking Crisis		with Currency Crisis	
	sign	significance	sign	significance	sign	significance
Short term / Long term total external debt						
Total government bank loans / bonds	+	5%				
Borrowing power overseas	+	1%	+	1%	+	1%

Change of the Credit Ratings

FCLT			with Banking Crisis		with Currency Crisis	
	sign	significance	sign	significance	sign	significance
Short term / Long term total external debt	–	10%				
Total government bank loans / bonds						
Borrowing power overseas						

LCLT			with Banking Crisis		with Currency Crisis	
	sign	significance	sign	significance	sign	significance
Short term / Long term total external debt						
Total government bank loans / bonds			–	10%		
Borrowing power overseas	+	10%				

Appendix

A1: Definitions and Sources of Variables

Variables	Definitions
Domestic Debt Crisis	Domestic debt crisis is the case when principal or interest of domestic debts are not repaid on due date, or are restructured in the terms which are worse for creditors than original terms. It also includes forcible conversion of foreign currency deposit into local currency and deposit freezes. Domestic debt refers to public debts issued under domestic law. Source: Reinhart & Rogoff (2011a), Reinhart & Rogoff (2011b), and Reinhart's database (http://www.carmenreinhart.com/data/)
External Debt Crisis	Outright default on payment of external debt obligations including non-payment, repudiation, or the restructuring of debt into terms less favourable to the lender than in the original contract. External debt refers to public debts issued under foreign legal jurisdiction. Source: Reinhart & Rogoff (2011a), Reinhart & Rogoff (2011b), and Reinhart's database (http://www.carmenreinhart.com/data/)
Lag of GDP growth (%)	Previous year of the annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Source: WDI
Lag of inflation (%)	Previous year of the inflation as measured by the annual percentage growth rate of the GDP implicit deflator, which shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency. Source: WDI

Trade per GDP (%)	The sum of exports and imports of goods and services measured as a percentage share of GDP. All in current US dollars. Source: WDI
Exchange rate regime	Exchange rate regime is classified from 1 to 15. The higher the numbers, more floating exchange rate regime is applied in a country. Details of each classification are provided in Appendix A5. Source: Reinhart's database (http://www.carmenreinhart.com/data/)
Political stability	Use POLITY2 index of Polity IV Project. POLITY2 is a modified version of POLITY score which is calculated by subtracting autocracy score from a democracy score. However, simple sum contains observations such as -66 and -88 in case of foreign interruption and transition period. POLITY2 score converts these numbers to conventional polity scores (from -10 to 10). Source: Polity IV Project
Total central government debt per GDP (%)	Use "Total (domestic plus external) gross central government debt/GDP" in Reinhart's database. Then, this data is supplemented by "Total central government debt % of GDP" in the OECD library and "Central government debt, total (% of GDP)" in the WDI. Source: Reinhart's database (http://www.carmenreinhart.com/data/), the OECD library, and the WDI
Short term / Long term total external debt	This is calculated as short term total external debt divided by medium/long term total external debt. Source: The Institute of International Finance (IIF)
Total government bank loans / bonds	This is calculated as commercial banks of general government debt divided by other private creditors of general government debt. Underlying assumption is that most of the other private creditors are bonds. Source: The Institute of International Finance (IIF)

Borrowing power overseas	This is calculated as securities issued in local currency of a country divided by total international debt of that country. For example, if a country issues all debts in foreign currency, this ratio becomes zero Source: The Bank for International Settlements (BIS), and Eichengreen, Hausmann and Panizza (2002) *Note: Eichengreen, Hausmann and Panizza (2002) subtracts this ratio from one*

Banking crisis in previous 2 years	Defined as a banking crisis if it meets two conditions:
	    1. Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations).
	    2. Significant banking policy intervention measures in response to significant losses in the banking system.
	For more details, see Laeven & Valencia (2012)
	This variable takes the value of 1 in the year if the country experiences this banking crisis in that year or previous two years, otherwise takes the value of 0.
	Source: Laeven & Valencia (2012)

Currency crisis in previous 2 years	Defined as a currency crisis if a nominal depreciation of the country's currency vis-à-vis the U.S. dollar is at least 30 per cent, and also that is at least 10 percentage points higher than the rate of depreciation in the year before. This variable takes the value of 1 in the year if the country experiences this currency crisis in that year or previous two years, otherwise takes the value of 0. Source: Laeven & Valencia (2012)

A2: List of Countries and Number of Observations

Country	Number of Observations		Country	Number of Observations
Algeria	34		Korea, Rep.	34
Angola	34		Malaysia	34
Argentina	34		Mauritius	34
Australia	34		Mexico	34
Austria	34		Morocco	34
Belgium	34		Myanmar	34
Bolivia	34		Netherlands	34
Brazil	34		New Zealand	34
Canada	34		Nicaragua	34
Central African Republic	34		Nigeria	34
Chile	34		Norway	34
China	34		Panama	34
Colombia	34		Paraguay	34
Costa Rica	34		Peru	34
Cote d'Ivoire	34		Philippines	34
Denmark	34		Poland	34
Dominican Republic	34		Portugal	34
Ecuador	34		Romania	34
Egypt	34		Russian Federation	34
El Salvador	34		Singapore	34
Finland	34		South Africa	34
France	34		Spain	34
Germany	34		Sri Lanka	34
Ghana	34		Sweden	34
Greece	34		Switzerland	34
Guatemala	34		Thailand	34
Honduras	34		Tunisia	34
Hungary	34		Turkey	34
Iceland	34		United Kingdom	34
India	34		United States	34
Indonesia	34		Uruguay	34
Ireland	34		Venezuela	34
Italy	34		Zambia	34
Japan	34		Zimbabwe	34
Kenya	34		Total	2,346

A3. Classifications of the Standard & Poor's credit ratings

Numerical value	Credit ratings
AAA	20
AA+	19
AA	18
AA-	17
A+	16
A	15
A-	14
BBB+	13
BBB	12
BBB-	11
BB+	10
BB	9
BB-	8
B+	7
B	6
B-	5
CCC+	4
CCC	3
CCC-	2
CC	1
SD	0

A4: Number of Observations for Borrowing Power Overseas by Country

Country	Number of Observations
Argentina	18
Australia	18
Brazil	18
Canada	18
Chile	18
China	18
Colombia	18
Denmark	18
Egypt	10
Hungary	18
Iceland	18
India	18
Indonesia	18
Japan	18
Korea, Rep.	18
Malaysia	18
Mexico	18
New Zealand	18
Norway	18
Philippines	18
Poland	17
Russian Federation	18
Singapore	18
South Africa	18
Sweden	18
Switzerland	18
Thailand	18
Turkey	18
United Kingdom	18
United States	18
Total	531

A5: Classifications of the Exchange Rate Regime

The classification codes of the exchange rate regime are:

1 • No separate legal tender
2 • Pre announced peg or currency board arrangement
3 • Pre announced horizontal band that is narrower than or equal to +/-2%
4 • De facto peg
5 • Pre announced crawling peg
6 • Pre announced crawling band that is narrower than or equal to +/-2%
7 • De factor crawling peg
8 • De facto crawling band that is narrower than or equal to +/-2%
9 • Pre announced crawling band that is wider than or equal to +/-2%
10 • De facto crawling band that is narrower than or equal to +/-5%
11 • Moving band that is narrower than or equal to +/-2% (i.e., allows for both appreciation and depreciation over time)
12 • Managed floating
13 • Freely floating
14 • Freely falling
15 • Dual market in which parallel market data is missing.

Source: Reinhart and Rogoff (2011b)