MASTER IN ECONOMY: GENERAL

Sovereign debt defaults and restructurings : what consequences fordebtor countries and their new commitments?

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Award date:
2017

Awarding institution:
University of Namur

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UNIVERSITÉ DE NAMUR

Sovereign debt defaults and restructurings

What consequences for debtor countries and their new commitments?

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Academic year **2016-2017**

Master en Sciences Economiques, orientation générale, à finalité spécialisée

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Acknowledgments

First of all, I would like to sincerely thank my supervisor, Alain de Crombrugghe, for his guidance, his availability, and his valuable suggestions throughout my journey.

I owe a debt of gratitude to Patrick Foissac for the spelling, grammar and syntax correction, and for offering me advice.

I am also very grateful to the Catholic University of Louvain-la-Neuve and the University of Namur for having welcomed me during my 5 academic years, as well as all my professors and assistant professors for their teaching. In particular, I would like to thank Alain de Crombrugghe, Gregory de Walque, François Libois, and Paul Reding, for giving me a taste for economics, and for encouraging me to continue along this path.

Finally, to my family and friends, thank you for listening, encouraging me in all of my pursuits, and supporting me emotionally me throughout this entire process.

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I. INTRODUCTION

In recent years, the issue of public debt and sovereign default has been propelled to the forefront again. In 2010, one could read in a leading economics journal "*Greek debt has ballooned (...). Portugal's borrowing costs jumped. Spain's debt was downgraded, along with Portugal's and Greece's, and Italy came worryingly close to a failed debt auction. European stockmarkets have slumped and the euro itself fell to its lowest level in a year against the dollar*" (The Economist, 2010). Financial instability and plausible inability to service the debt of the PIIGS[1] have made the Euro Area tremble, raising the threat of its disintegration and implying a high degree of uncertainty. The high risk of contagion of debt defaults and feedback effects between the financial and public sectors also raised concerns. Seven years later, the Eurozone is still standing. Strict measures and austerity plans have been imposed to the troubled countries by the creditors, the European Union, and the IMF, in exchange for financial support. However, the debt levels of the PIIGS still remain very high (IMF, 2015).

This situation is far from being unique (Lepine, 2011). To take but one example, the eighties were called "the lost decade" of Latin America (but also numerous of African countries, a majority of Eastern Europe as well as few Asian countries). Inflows of easy money in the seventies due to the petrodollars recycling combined with bad management and often corruption of borrowing countries in a context of high interest rates making debt service unsustainable were identified as the contributing factors that led to that debt crisis. One can highlight a lot of comparison points with the current situation. Private lenders-mainly composed of bankers-holding large parts of sovereign debt which cannot financially cope with defaults; an established inability of some governments to service their debts; domino effects between countries; substantial interventions of the IMF and of governments of creditor banks; local populations reluctant to austerity plans imposed by the IMF as well as rich States in case of troubles but also an unjust enrichment of some countries brought by their belonging to Euro are some examples that might be mentioned.

Therefore, it seems that episodes of sovereign debt default and restructuring are far from trivial. The objective of this thesis, as its title indicates, is to provide inputs to the debate about the consequences of sovereign debt defaults and restructurings. The methodology of much of this thesis has been guided towards exploitation from the abundant literature on sovereign defaults

[1] Acronym for "Portugal, Ireland, Italy, Greece and Spain".

and restructurings. Indeed, lots of works on the subject have been published by very active economists; such as Bulow, Reinhart, Rogoff, Trebesch, Tomz, and Wright, just to mention a few of them. Reading the literature made it possible to answer a series of questions that could be asked.

The first question this thesis tends to address is "why does a government generally repay its debts?" Abundant literature indicates that there are many different types of costs of sovereign debt defaults. It is imperative to understand these different costs and how they interact in order to estimate the total cost of an episode of sovereign debt default as accurately as possible. The second question is "what are the benefits of a restructuring for the debtor country?" It might be thought that the restructuring reduces the default costs cited above. In addition the literature suggests that restructuring can impact inefficiencies and generate value. Restructurings could therefore improve the debtor's situation. Since the repayment of creditors is strongly related to the debtor's situation, the combination of costs of default and gains of restructuring also raises the question "why does a creditor enter into a restructuring?" An additional question deserves to be raised, "what is the impact of the restructuring on investors' losses?"

The empirical analysis presented in this thesis focuses on this last question. Based on a large sample of 164 episodes of restructuring between 1978 and 2013, the analysis focuses on the impact of the timing of a restructuring on losses incurred by the creditor. On the one hand, a broader restructuring facilitates the return to a balanced budget. On the other hand, such a restructuring increases the likelihood that the default will be considered to be strategic by the creditors, which negatively affects the reputation of the debtor country. The literature highlights that the timing of sovereign debt restructuring plays a key role in the policy debate on sovereign debt and default. The IMF (2013 a) recommends such restructurings to the possible extent. The hypothesis that will be tested through the empirical analysis is the following: "a pre-emptive sovereign debt restructuring results in lower losses incurred by creditors than a post-default restructuring". Several specifications confirmed this hypothesis, and other parameters also appear to have a significant impact on the scale of the restructuring. Examples include, but are not limited to: the conditions of global refinancing, the level of indebtedness of the debtor country or the cyclical position of the world economy.

The thesis will be structured as follows: chapter II introduces and defines the main notions of the study, that is, the sovereign debt default and the sovereign debt restructuring. Chapter III analyses the costs incurred by the debtor country in the event of default, while chapter IV

focuses on the gains from a restructuring. Finally, chapter V presents the methodology and the results of the empirical analysis. The conclusion highlights the possible gains from early restructurings in the broader context of the costs and benefits for the debtor country and its creditors.

II. OVERVIEW AND CONCEPTS: SOVEREIGN DEFAULT AND DEBT RESTRUCTURING

This chapter presents the two main concepts of this thesis, namely sovereign debt default and restructuring. Section 1 defines some key notions. Section 2 establishes an historical review of sovereign default and restructuring episodes. Finally, section 3 discusses the main criteria that characterize the different types of defaults and restructurings.

1. Definitions

Sovereign debt can be defined as "*debt issued or guaranteed by the government of a sovereign state*" (Das et al., 2012 a). This financial asset was one of the first ever traded. Nowadays, sovereign debt continues to comprise a considerable share of global financial assets (Tomz and Wright, 2013).

According to the IMF (2003), a **debt default** is a "*failure to meet a debt obligation payment, either principal or interest*". A borrower who failed to make the promised payment by the terms and conditions of the debt obligation is thus, "in default". Therefore, an event of **sovereign default** can be defined as a failure of a government to meet its legal obligations of repayment of a debt. In literature however, authors do not always agree on the different criteria that practically define an event of default.

Debt defaults can have a significant impact on the debtor's financial stability. Given the intrinsic nature of sovereign debt, sovereign default can affect the stability of the international financial markets. Minimizing these adverse effects requires a "*timely and efficient restructuring of the debt*" (Daniels and Ramirez, 2007). A **sovereign debt restructuring** can be defined as "*an exchange of outstanding sovereign debt instruments, such as loans or bonds, for new debt instruments or cash through a formal process*". However, according to Das et al. (2012 a), there is no universally accepted definition of the debt restructuring. Still according to those authors, there are two main debt restructuring methods: the debt rescheduling aims at "*lengthening of maturities of the old debt, possibly involving lower interest rates*", the debt reduction consists in reducing the "*face (nominal) value of the old instruments*". Both methods imply a haircut, that is, a loss in the present value of the creditor claims (see section 3). The different mechanisms by which a country can reduce its external debt will be discussed in chapter IV.

One can emphasize on the close relationship that exists between default events and debt restructurings. Given the absence of international bankruptcy laws[2], a defaulting country and its lenders generally renegotiate over debt reduction in order to resolve a debt crisis (Yue, 2010). Frequently, debt restructurings occur after events of default, i.e. post-default restructurings, but in recent years, several debt restructurings were held before defaults occuring, i.e. pre-emptive restructurings (IMF, 2013 a). This distinction will be discussed in more details in chapter V. Finally, it is important to keep in mind that a default can be resolved, or "cured", without a debt restructuring (Das et al., 2012).

2. Historical review

"*Lightening may never strike twice in the same place, but the same cannot be said of sovereign* default" (Reinhart and Rogoff, 2004). This section establishes an historical review of sovereign debt default and restructuring episodes, in order to assess the frequency of such events.

As introduced in the previous section, authors in the economic literature do not always agree on the criteria that define sovereign debt defaults and restructurings (Manasse et al., 2003). Furthermore, debtor countries' choices and plans are not limited to the two most extreme options, which are "*full compliance*" or "*complete abrogation*" of the debt contract (Tomz and Wright, 2013). There exists a wide range of possible behaviours between those two options. A defaulting borrower can decide to "*make a partial or delayed repayment, with or without the consent of creditors*". If some economists do not consider a debt rescheduling to be a default in its own right, others choose not to distinguish between different types of default. For instance, Tomz and Wright (2013) decide to make "*no difference between default and repudiation; between defaults on interest and defaults on principal; or between defaults that covered only part of a sovereign's debts, versus defaults that affects all debts*". Another source of disagreement in the criteria that define sovereign default event is its time structure. A number of authors consider that two default episodes occurring at intervals of two or three years constitute only one default (Reinhart and Rogoff, 2008).

Despite these divergences, the literature generally admits that debt defaults and restructurings are not uncommon events. A broad analysis conducted by Reinhart and Rogoff (2008) identifies

[2] If a company defaults on its debts, a system of corporate bankruptcy or insolvency law regulates the relationship between the debtor (the company) and the creditor(s). On the contrary, if a sovereign state defaults on its debts, there exists no legal system to regulate the relationship between the debtor (the State) and the creditor(s) (Schwarcz, 1999).

250 sovereign debt defaults on external debt and 70 on domestic debt in 66 countries over the last two centuries. Most of these events occurred in Latin America. According to Reinhart and Rogoff (2008), "*serial default remains the norm, with international waves of defaults typically separated by many years, if not decades*". Serial default is therefore considered as a "*universal rite of passage through history*" for almost all countries as they transform themselves from emerging markets to advanced economies. Argentina is one of the most famous serial defaulters: the country has defaulted five times since its birth in the 1820s. However, this record is surpassed by many sovereigns in the New World, i.e. Brazil, Liberia, Mexico, Uruguay, Venezuela and Ecuador, and in the Old World, i.e. France, Germany, Portugal, Spain and Turkey (Reinhart and Rogoff, 2004). European economies were not spared before the twentieth century, so that today's emerging markets did not invent serial default.

In conclusion, episodes of sovereign debt default and restructuring are far from trivial. Given the number and the length of such events, it would appear that their negative consequences are not that catastrophic, neither for the debtor nor for the creditors. The costs and the gains associated with default and sovereign debt restructuring events will be discussed in more depth respectively in chapter III and in chapter IV.

3. Typology

The previous section points out that there is no single type of sovereign debt default and restructuring. Section 3 gives an overview of the main criteria that characterize them. Based on the economic literature on sovereign defaults and debt crises, four criteria were selected. These criteria would help in explaining and understanding the costs and the gains from defaults and debt restructurings developed in the two next chapters.

3.1.Excusable default or unjustifiable repudiation?

The literature highlights the (in) voluntary nature of sovereign debt default. A country can default on its debt because either it is unwilling or it is unable to repay its debt. It is important to distinguish both types of default because one can suppose it will affect the reaction of the creditors (Grossman and Van Huyck, 1989). It seems logical that the creditors will be less lenient towards a debtor country that deliberately decides not to serve its debt, even though it was quite capable of doing so. The (in) voluntary nature of sovereign debt default is closely linked to the concept of the asymmetry of information among individuals. Information is imperfectly shared between the debtor and its creditors and the behaviour of the former affects the probability distribution of the outcome.

On the one hand, a country can be unwilling to service its debt. Based on an inter-temporal optimization calculus, the debtor country voluntarily decides to default. This is referred to as an unjustifiable repudiation. As already discussed, no supranational authority has the power to force a country to serve its debt. That is an essential aspect of sovereignty. According to Grossman and Van Huyck (1989), under the assumptions of rational lenders and borrowers, and reputational constraints, sovereign debt is never repudiated but it will be restructured.

On the other hand, a country can be unable to repay its debt because it faces a solvency or a liquidity[3] problem (Manasse et al., 2003). This is referred to as an excusable default. The inability of the borrower to service its debt can be due to several factors: hidden characteristics, hidden actions or negative and inevitable exogenous shocks. Hidden characteristics refer to the insolvability of the borrower at the time of signing the contract (*ex ante*). Hidden actions consist of the misuse of loan funds by the borrower (*ex post*) (de Crombrugghe, 2016). Negative and inevitable exogenous shocks can be a term of trade shock (oil price increase for an oil importer or oil price fall for an exporter), a world interest rate shock (higher US interest rate), a natural disaster (a flood or an earthquake), a political shock (a change of government or an election; not fully exogenous but relevant for moral hazard in de Crombrugghe 2016) etc.

*Table **2.1**: The borrower is unable to pay – summary*

Cause	Concept
Hidden characteristics	Adverse selection
Hidden actions	Moral hazard
Exogenous adverse shocks	Intrinsic risk

Source: Alain de Crombrugghe (2016)

3.2.How large are creditors' losses?

As already introduced, a sovereign debt default generally does not lead to the abrupt termination of the borrower-lender relationship, as frequently observed in the case of private bankruptcy (Kletzer and Wright, 1998). In case of default, or of threat of default, it can be in both parties' interests to renegotiate the terms of the contract and to avoid 'hold outs', i.e. investors who hope to get more by waiting or by letting others reduce their part of the claims (Daniels and Ramirez, 2007). In the event of debt restructuring, creditors may lose some of their investments

[3] A solvent but illiquid country can face rollover/liquidity crises: the country is close to default on its debt because the investors do not accept to roll over short-term debts coming to maturity (Manasse et al., 2003).

but (almost) never all of it. Consequently, a debt restructuring can be considered as a partial default (Reinhart and Rogoff, 2008).

Events of sovereign default can be differentiated according to the extent of the loss they generate for creditors. The size of creditors' losses depends on the severity of negative and inevitable exogenous shocks that hit the borrower (Edwards, 2015).

3.2.1. Defining investors' losses

In case of sovereign debt restructuring, old debt in default is usually swapped for a new debt contract (Cruces and Trebesch, 2013, Tomz and Wright, 2013). The losses imposed on lenders in case of default or debt restructuring can be measured by 'haircuts', which compare the value of the old securities to the settlement offer.

Cruces and Trebesch (2013) mentioned two approaches to calculate haircuts. The first approach, the market approach, compares the present value of the new debt instruments with the face value of the old debt in default. "*For a country i that exists defaults at time t and issues new debt in exchange for old debt, and which faces an interest rate* r_t^i *at the exit from default*", this approach computes haircuts (H_M) as follow:

$$H_{Mt}^i = 1 - \frac{Present\ Value\ of\ New\ Debt\ (r_t^i)}{Face\ Value\ of\ Old\ Debt} \qquad \textbf{(2.1)}$$

The second approach, proposed by Strurzenegger and Zettelmeyer (2008), takes unmatured old debt instruments at present value and discounts those old instruments at the same rate as the new one. This approach to calculate haircuts is

$$H_{SZt}^i = 1 - \frac{Present\ Value\ of\ New\ Debt\ (r_t^i)}{Present\ Value\ of\ Old\ Debt\ (r_t^i)} \qquad \textbf{(2.2)}$$

The face value of old debt in equation (2.1) was the nominal value of the old issues, that is, the present value at the interest rate of the time of issue if held to maturity. This face value of old debt is equal to the present value of old debt if the interest rate renegotiated is equal to the initial interest rate of old debt for the same payments. If, in addition, the new debt has the same payments, in amount and in timing, as the old one, then the haircut is zero and both formulas (2.1 and 2.2) are identical. If the interest rate used changes, and nothing else, then equation (2.1) generates a haircut (especially if r rises), but equation (2.2) doesn't. If payments change and interest doesn't, then both equations generate a haircut. If both interest and payments

change, then equation (2.2) generates a haircut, but (2.1) may be affected by contradictory effects of the interest and of the payments.

In line with Sturzenegger and Zettelmeyer, Cruces and Trebesch favour the second approach. According to the latter, H_{SZ} tends to capture the degree of pressure exerted on creditors to accept a given exchange proposition[4]. They also argue that Sturzenegger and Zettelmeyer's approach provides a better measure, compared to the market approach, of the cumulative losses incurred by investors in a sequence of exchange of the same debt as H_{SZ} explicitly accounts for debt that was restructured earlier[5].

3.2.2. Empirical literature

Between 1997 and 2013, Edwards (2015) analyses 24 sovereign bond default and debt restructuring episodes. The losses incurred by creditors in these events were frequently large as well as the variation around the average sovereign loss. Considering Sturzenegger and Zettelmeyer's approach, Edwards finds that haircuts varied within a 5-95 percent range.

It is likely that creditors' reactions will not be the same in the case of default resulting in a loss of 5 percent as in the case of default resulting in a loss of 95 percent of their investment. Consequently, it will be important to take this parameter into consideration and to study its impact when we get to the heart of this work.

3.3.Duration of the default episode

Another important characteristic to differentiate sovereign debt default episodes is their duration: "*debt rescheduling is not a discrete event, but rather a process*" write Arteta and Hale (2006). Benjamin and Wright (2009) identify a positive correlation between the duration of an event of default and its associated haircuts: the longer the episode, the larger the losses on creditors. One may reasonably suppose that costs and gains from default vary according to the duration.

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[4] Strurzenegger and Zettelmeyer haircut compares "*the value of the new and the old debt instruments in a hypothetical scenario. In this scenario, the debtor county continued servicing old debt that are not tendered in the exchange on a pari passu basis with the new debt*" (Stuzenegger and Zettelmeyer, 2008).

[5] Cruces and Trebesch (2013) present a simple example to illustrate their argument: "*if a country restructured old debt at time t but the new debt is renegotiated again soon after, say at time t+N, then* H_M *will depend on the product* $\frac{PV\ New_t}{FV\ Old_t}\frac{PV\ New_{t+N}}{FV\ Old_{t+N}}$ *which will tend to overestimate the cumulative loss of investors since in general* $\frac{PV\ New_t}{FV\ Old_{t+N}} < 1$ *especially when the debt is long term. Under* H_{SZ}*, this latter ratio would be* $\frac{PV\ New_t}{PV\ Old_{t+N}}$ *which under normal conditions is much closer to 1*".

The duration of an event of sovereign default is conditional on the default definition used by the researcher (Tomz and Wright, 2013). According to the famous American rating agency Standard & Poor's, an event of default ends when "*a settlement occurs and... no further near-term resolution of creditors' claim is likely*" (Beers and Chambers, 2006). Based on that definition, Tomz and Wright (2013) identify the mean length of an event of default across their entire sample of 248 defaults to be 9.9 years, or 7.8 years if they focus only on the recent period (since 1970). However, the authors highlight that this mean is substantially affected by a small number of long lasting default episodes, such as the repudiation that occurred in Russia in 1917. To get rid of this influence, they compute the median, which is 6.5 years over the entire sample. Furthermore, Tomz and Wright point out the large variation in the observed durations of defaults, with a standard deviation of 10.5 years.

Other research conducted by Reinhart and Rogoff (2008)[6] shows that the median length of default episodes decreased by half between the period 1800-1945 and the post-World War II one (3 years versus 6 years). Similarly, Bordo and Eichengreen (2001) find that the number of years separating default events tends to diminish over time. A charitable explanation of this decrease is the improvement of crisis resolution mechanisms since the period of gun-boat diplomacy. A more cynical interpretation suggested by the Reinhart and Rogoff (2008) is that, when bail-outs are supervised by institutions such as the International Monetary Fund (IMF), investors may be more lenient towards their serial-defaulting clients.

3.4.Who are the creditors affected?

3.4.1. Private or public

Debts issued by sovereign can be owed either to official creditors or to private sector creditors, i.e. commercial banks and bond holders (Wright, 2010). Morais and Wright (2008) identify 297 restructurings of debt to official creditors and 130 of debt to private sector creditors over the post-war period.

Wright (2010) finds that the average duration of a sovereign default on debt owed to private sector creditors is longer than the average duration of a sovereign default on debt owed to official creditors. According to the author, defaults on sovereign debts owed to private sector creditors seem to be most difficult to resolve in practice. In the same vein, more important

[6] In their definition of an event of default, they include default of payment of debt obligations, repudiation and "*the restructuring of debt into terms less favorable to the lender than those in the original contract*" (REINHART and ROGOFF, 2008).

consequences of sovereign defaults involving private creditors were also suggested by Das, Papaioannou and Trebesch (2010). It may be explained by the fact the sole objective of the latter is to minimize its losses, by taking into account only its personal interests. This is not the case for official creditors, such as the IMF or sovereign states, which also incorporate political or equity notions in restructuring negotiations. For the record, the primary mission of the IMF is to prevent default episodes in order to avoid them from spreading through financial support. In some specific cases, the institution has to admit that the default is inevitable. In those cases, its role consists in restoring the country's solvency as soon as possible, through an effective restructuring of its debt (IMF, 2013 a). The assistance offered by such organizations in the event of default, or threat of default, can be seen as a form of insurance for countries. Being insured, one could imagine that sovereigns may be encouraged to take more risks, i.e. moral hazard (IMF, 2002 a). To prevent such opportunistic behaviours, there are many conditions to be eligible for IMF assistance. IMF support should be considered essential for the implementation of the adjustment program. Furthermore, the institution requires that the defaulting country shows good will by taking political measures to ensure its viability (IMF, 2013 a).

Private creditors and the collective action problems

Sovereign debt is often owed to a large number of private sector creditors and restructuring negotiations can therefore be more difficult. On the one hand, communication with a dispersed group of creditors is costly. On the other hand, there exist collective action problems. Wright (2010) identifies three collective action problems. The first collective action problem concerns the public good nature of debt relief: there is a free-rider problem. If one private sector lender diminishes its claims on a sovereign, the value of all other creditors' claims may increase. Aware of this, some creditors may decide not to reduce their claims in the hope that they can free ride on the debt relief offered by other lenders. The second collective action problem relates to the role of litigious private sector creditors engaging in holdout. Thanks to various innovations in the field of legal strategies for encouraging repayment, such holdouts have become increasingly common over the recent years. Furthermore, high returns earned by creditors engaging in such a strategy strongly encourage investors to hold out from the regular debt restructuring process (Singh, 2003). The last collective action problem is that collective action clauses, which aim at imposing common settlement terms on creditors[7], seem to be useful

[7] Consequently, collective action clauses reduce the extent of discriminatory settlements, which are usually used to compensate the creditors who take the lead in restructuring negotiations and by consequence bear these heavy costs. Collective action clauses are likely to remove the ability of creditors to hold out for full reimbursement but

to reduce but not eliminate delays in negotiations to restructure sovereign debts. According to many economists, asymmetry of information between parties, that is, neither party knows the value the other party places on agreeing to a settlement, is one of the most popular explanations for delays in bargaining (Wright, 2010; de Crombrugghe, 2016).

3.4.2. Domestic or foreign

It can be relevant to differentiate sovereign default on domestic and external debt because the consequences are not identical. According to Panizza (2008), there are three possible definitions of external, and thus domestic, debt. These definitions focus respectively on the currency in which the debt is issued, on the residence of the creditor and on the place of issuance as well as the legislation that regulates the debt contract. The second definition, which defines external debt as debt owed to non-residents, is officially adopted by the main compilers of statistical information on sovereign debt.

Until recently, domestic debt was totally ignored by multilateral institutions: neither the IMF nor the World Bank consistently collected such data. Contrary to a lot of contemporary opinions, Reinhart and Rogoff (2008) consider domestic debt as an important share of government debt in most countries and decide to study this topic in depth. Over a sample of 66 countries, the authors find that domestic debt represents, on average, more than 50 percent of total debt and that an important share of this kind of debt is long-term maturity. In their paper, they suggest that domestically issued debt does not seem to be junior to external debt, even if one takes into account that a government is able to default via inflation.

A sovereign can issue debt (domestic or external) either in local currency or in foreign currency. Typically, external debt is denominated in foreign currencies while domestic bonds are issued in local currency, even if some share of the external debt of the advanced economies is partially denominated in domestic currency (Reinhart and Rogoff, 2003). For a debtor country, it is easier to default on its debt denominated in local currency and it can be tempted to do so in order lighten to the burden of public debt. Champ, Freeman and Haslag (2016) define the government's budget constraint measured in domestic currency at t, in nominal terms, as follows:

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encourage them to free ride on negotiation costs. Pitchford and Wright (2010) empirically show that these costs are very large, more than 3 percent of the value of the restructuring in some cases. They also provide evidence that these costs are sometimes difficult to verify and therefore to compensate through repayment of the expenses.

$$p_t N_t g_t + R_{t-1} D_{t-1} = p_t N_t \tau_t + [M_t - M_{t-1}] + D_t \quad \textbf{(2.3)}$$

This budget constraint connects the expenditures and the revenues of a government at a given period t. Champ et al. assume that, at each period t, the government buys public goods[8] ($p_t N_t g_t$ with p_t, N_t and g_t respectively the price level, the population and public goods expenditures in real terms at t) and makes principal and interest payments on debt issued in the previous period ($R_{t-1} D_{t-1}$ with $R_{t-1} = (1 + r_{t-1}).R_{t-1}, r_{t-1}$ and D_{t-1} respectively the gross and the net nominal interest rate on national debt and the level of debt issued at t-1). Government expenditures at time t in nominal terms are represented by the left hand side of equation (2.3). The authors also suppose that, at each period t, the government collects taxes ($p_t N_t \tau_t$ with τ_t the lump-sum tax raised on each people at t), gets revenues from seigniorage[9] ($[M_t - M_{t-1}]$ with M_t the money supply at t) and borrows the remainder (D_t the total national debt at t) so that the constraint (2.3) is satisfied in each period. Government revenues at time t in nominal terms are represented by the right hand side of equation (2.3).

This budget constraint can be expressed in real terms, by diving both sides of the equation by p_t:

$$N_t g_t + \frac{R_{t-1} D_{t-1}}{p_t} = N_t \tau_t + \frac{[M_t - M_{t-1}]}{p_t} + \frac{D_t}{p_t} \quad \textbf{(2.4)}$$

In order to satisfy its budget constraint, a government can reimburse its debt by decreasing public good expenditures, raising taxes or by issuing new money that is by increasing the amount of money in circulation.

Default via inflation

Theoretically, a government can print enough fiat money to buy up all its national debt, provided that monetary creation is not anticipated by economic agents in the previous period. Suppose that, in period t, the government decides to print new money at an unanticipated rate. Inflation was not anticipated by the agents in the previous period and therefore cannot have had an impact on the variables determined at t-1 (R_{t-1}, D_{t-1}). For unchanged values of these variables, an increase in the current price level (p_t) leads to a reduction of the real value of the principal and interest on national debt issued during the previous period the ($\frac{R_{t-1} D_{t-1}}{p_t}$). The

[8] In this configuration, the primary spending is exogenous. It consists of public consumption and investment.

[9] *"Increasing the stock of fiat money represents a form of revenue for the government. Seignoriage is the name given to the value of resources collected by the government from money creation"* (CHAMP, FREEMAN and HASLAG, 2016).

decrease in the real value of the old national debt reduces government expenditures at time t in nominal terms (left-hand side of the equation). To summarize, by increasing the stock of fiat money, the government raises the price level, which lowers the real value of the national debt. The government can therefore reduce taxes or buy more public goods, which increases the wealth of domestic agents resulting in an increase in their consumption. The government reduces, or even eliminates, its debt obligations at the expense of the bond holders. Some claim that, given its ability to print fiat money, the government never needs to default on its national debt. However, unanticipated printing money, that is, unanticipated inflation, is exactly equivalent to a default. The correlation between sovereign defaults and inflation seems to be positive and countries are increasingly inclined to use hyperinflation to cope with the fall in their revenues, as recently observed in Latin America and in Germany and other central European nations after World War I. Since 1980, episodes of hyperinflation have occurred in Bolivia, Argentina, Tajikistan, Yugoslavia and Zimbabwe (Hanke and Krus, 2012). Obviously, these episodes of hyperinflation are far from cost-free to an economy.

The unanticipated nature of inflation is determinant in this mechanism. Suppose now that agents anticipated in period t-1 that the government will increase the growth rate of money supply in the next period. Having rational expectations, economic agents will incorporate their anticipations of inflation in their information set, and take their decisions accordingly: if agents in t-1 anticipate inflation in t, they will require a higher nominal rate of return (R_{t-1}) to accept to hold bonds. Anticipated inflation is already included in the nominal rate of return and it does not affect the real value in period t of the public debt issued by the government in t-1.

Considering agents are rational, governments need to convince them that they will not use monetary creation to reduce the real value of the public debt in order to avoid inflationary spirals. A high degree of independence from the central bank and its pursuit of a goal of price stability are crucial to achieve this objective. Creditors may also require debt to be denominated in a foreign currency to avoid default via inflation. Issuing debt in foreign currency presumably decreases borrowing costs but makes the sovereign vulnerable to exchange rate risk (Tomz and Wright, 2013). One may suppose that creditors require repayment in foreign currencies from countries with a history of inflation. However, researchers quite surprisingly pointed out poor relationship between issues of debt denominated in foreign currencies and measures of inflation or currency depreciation (Eichengreen and Hausmann, 1999; Eichengreen et al., 2005).

While domestic and external debt have divergent characteristics, they are nevertheless strongly interrelated. Given payments on domestic debt necessarily come from the same revenue stream as those on external debt, the size of domestically issued debt can be quite relevant in assessing the ability of a country to honour its foreign debt payments. Furthermore, most sovereigns are not able to track, at every moment, the residence of the ultimate holders of the debt they issued (Panizza, 2008; Tomz and Wright, 2013). That makes them unable to reimburse domestic creditors[10] only. Typically, countries classify as 'external debt' all debt issued on international markets, and as 'domestic debt' all debt issued on their domestic market. Bonds issued by governments are then exchanged on very deep secondary bond markets. Bonds originally issued on international markets may be bought back by domestic agents on secondary bond markets, as pointed out by Broner et al. (2006). Thereby the governments have no way of knowing the nationality of their creditors. Finally, there exist *pari passu* clauses, which obligate governments to treat all their creditors equally (Tomz and Wright, 2013). It would also appear that the courts frequently prevent sovereigns from discriminating among their creditors (Broner and Ventura, 2006).

[10] If this was not the case, it is very likely that defaulting government would spare its domestic banks (Gennaioli et al., 2010).

III. COSTS FROM SOVEREIGN DEBT DEFAULT

Why do governments generally repay their debts? As Bulow and Rogoff (1989) point out, assets that can be seized by foreign creditors in the event of a sovereign default are generally negligible. According to Schumacher, Trebesch and Enderlein (2014), sovereigns hold most of their assets domestically, which prevents foreign creditors from seizing them, unlike domestic creditors[11]. Furthermore, a wide range of economic literature recognizes that creditors cannot prevent a borrowing country from defaulting on its own debt, Bulow and Rogoff (1989) and Eaton and Gersovitz (1981) among others. Up to now, no supranational authority has the power to force a country to serve its debt. Considering these elements, how can sovereign debt issues and exchanges be explained? How is it possible that most countries continue to be willing to serve their debts? By what mechanisms can debt contracts be enforced?

First of all, the academic literature points out that a government generally services its debts in order to avoid exclusion from international capital markets. This approach was first explored by Eaton and Gersovitz (1981) but have been adopted by many others since. However, such theories have been called into question, in particular by Bulow and Rogoff (1989). The latter claim that it is the fear of direct punishments, such as trade sanctions, that prompts governments to reimburse its creditors. On their side, Cole and Kehoe (1988) study the deterrent effect of reputational spillovers. Other authors such as Gennaioli, Martin and Rossi (2010) to mention just a few, focus on the adverse effects of defaults on domestic banks and the financial sector. Reinhart (2002) also highlights the link between currency and default crises in advanced economies. Another cost of default, more controversial but worth mentioning, is that of military intervention. All these potential costs will be discussed in details in this chapter.

1. Exclusion from international capital markets

Most models of sovereign debt default assume that default is punished by disruption of international capital markets access. Empirical evidence from the past two centuries suggests that defaulting countries temporarily lose access to capital markets and pay higher interest rates when they resume borrowing (Tomz and Wright, 2013). The reputational model developed by Eaton and Gersovitz in 1981 is one of the most popular sovereign debt models that deal with

[11] Kletzer and Wright (1998) provide evidence suggesting that the lack of collateral has not meant that foreign investors did not recover their principal on average. Historian economists show that loans to sovereigns have been very profitable overall and that average returns on these loans are quite comparable to those on domestic debt issued in lender nations (KLETZER and WRIGHT, 1998).

international capital markets exclusion. Subsection 1.1 presents this reputation for repayment model in a simplified way. Subsection 1.2 provides an overview of the 'direct punishments' bargaining-theoretic theory, an alternative approach to the reputational one, developed by Bulow and Rogoff (1988, 1989 c), while subsection 1.3 compares both of these approaches. Subsection 1.4 provides stylized facts and determining factors of capital markets exclusion; and finally, subsection 1.5 summarizes the findings of the section.

1.1.Eaton and Gersovitz's model

The line of research of Eaton and Gersovitz's approach, which is part of reputation-for-repayment theories, holds that a small less-developed country is able to attract foreign investors only if it can maintain a reputation for repaying its loans. They argue that if a borrowing country ever defaults on its debt, its reputation will be negatively impacted and this country risks being excluded from international capital markets in the future (Bulow and Rogoff, 1989). The threat of (a momentary) financial markets exclusion is therefore a sufficient incentive for deterring a government from repudiating its external debt. It is important to keep in mind that this approach relies on some assumptions, such as agents are perfectly rational, there is no uncertainty, and the level of debt does not exceed a certain credit ceiling. Assuming that creditors have no legal rights, the appeal of such pure reputation theories is that they seem to be robust to institutional details (Bulow and Rogoff, 1989). Before presenting Eaton and Gersovitz's model, it seems sensible to introduce the context of this approach.

A country excluded from international capital markets can no longer borrow in order to smooth its consumption over time. Under the assumption that production cannot be stored, i.e. no saving potential, the consumption of each period corresponds exactly to the production of this period. If a country has not defaulted, under Eaton and Gersovitz's assumptions[12], it can borrow in 'bad periods' with the obligation to repay its debt in 'good periods'. In other words, the government consumption of each period must be less than or equal to the production of the corresponding period plus the new debt issued during that period minus the repayment of the debt issued in the previous period. Under these assumptions, the level of indebtedness at the end of the period is determined only by the issue of bonds during the same period. At each period, the government's decision to default, or not, on its debt arises from the arbitration between the long-term costs of the default, identified in this approach as the permanent impossibility of

[12] No saving potential and the maturity of sovereign bonds issued is only one period.

contracting new borrowings for future periods, and short-term gains from it, that is, the non-repayment of the debt issued in the previous period.

1.1.1. Assumptions

Besides general assumptions, i.e. net output in each period is random, output is not storable and debt matures in one period, the authors make several assumptions about lenders and borrowers.

Assumptions about borrowers

First of all, Eaton and Gersovitz make an assumption about borrower behaviour: in each period t, the borrowing country has to make two choices. Firstly, the government has to decide on the amount it wishes to borrow in period t, b_t, based on a set of amounts B_t available in that period. Secondly, it has to choose the amount of the debt issued in the previous period it wishes to reimburse. Eaton and Gersovitz do not take into account the possibility of partial default (see chapter II section 3). Consequently, the government has only two options: to fully repay its debt or to default. If the government chooses the first option, in period t, it has to repay $p_t = (1 + r_{t-1}) * b_{t-1}$, where p_t corresponds to debt-service payments in period t, r_{t-1} represents interest rates set in the previous period and b_{t-1} is the amount borrowed in the previous period. In this case, $p_t = d_t$, d_t being debt-service obligation in period t. If it chooses the second option, in period t, $p_t = 0$. As a result, the country can no longer borrow at period t and $B_t = 0$.

The authors then define the value of the objective function, conditional upon the borrower's decision to default or not on its debt. In both cases, the borrower's objective function is, with U bounded from above,

$$E[\sum_{t=0}^{\infty} \beta^t U(c_t - P_t)] \tag{3.1}$$

Where $U' > 0$, $U'' < 0$ and $0 < \beta < 1$ (discount rate). P_t represents the penalty imposed for defaulting in addition to the exclusion from the international capital markets. These additional costs will be discussed later in this chapter. For instance, one can already mention the decline of international trade. c_t corresponds to the absorption.

The absorption is a function of the net output y_t, the borrowing b_t and the debt-service payments p_t of the period:

$$c_t = y_t + b_t - p_t \tag{3.2}$$

If the debtor decides to default in period t, the value of the objective function in t is the following:

$$V^D(y_t) = E[\sum_{\tau=t}^{\infty} \beta^{\tau-t} U(y_\tau - P_\tau)] \tag{3.3}$$

This function depends on the present and future income that the government generates, the discount factor and the different costs of default P_t, except exclusion from the capital markets.

If the debtor chooses not to default in period t, the value of the objective function in t is given by:

$$V^R(y_t, d_t) = sup_{b_t \epsilon B_t} \{U(y_t + b_t - d_t) + \beta E max[V^R(y_{t+1}, d_{t+1}), V^D(y_{t+1})]\} \tag{3.4}$$

This function depends again on the income generated by the government but also on full debt service in period t d_t and on the future utility of the government. The latter maximizes its future utility function either by defaulting or by servicing its debt again.

The borrower's decision in each period t depends of values on the objective functions in both cases. Default in t is optimal if and only if:

$$V^D(y_t) > V^R(y_t, d_t) \tag{3.5}$$

The probability λ of default in period t as anticipated during the previous period $t-1$ is given by $\lambda(d_t)$ where:

$$\lambda(d_t) = \Pr[V_t^D > V_t^R] \tag{3.6}$$

To conclude this section devoted to assumptions about borrowers, Eaton and Gersovitz establish their first theorem, *"the probability of default in period t increases monotonically with debt service obligations d_t in period t"*.

Assumptions about lenders

The authors characterize the behaviour of lenders by four assumptions. Firstly, they assume that lenders are competitive. Creditors are risk neutral or, in other words, the risk of an individual default is uncorrelated with market risk. This assumption allows perfect diversification of default risk. Secondly, investors can lend to alternative borrowers safely, i.e. whose probability of default is nil, at the safe interest rate. Thirdly, they know the probability of default function $\lambda(d_t)$. Finally, the amount that creditors can lend is limited by their wealth. This constraint can be expressed as follows:

$$W_t < \infty \; so \; that \; B_t \leq W_t \tag{3.7}$$

1.1.2. A model of borrowing equilibrium

Eaton and Gersovitz define a competitive borrowing equilibrium that is characterized by the function $V^*(y_t, d_t)$ and by the functions $B^*(y_t, d_t)$ and $R^*(b_t)$ for $b_t \in B^*$ which maximizes $V^*(y_t, d_t)$ subject to the following constraint:

$$[1 - \lambda^*(R^*(b_t))]\, R^*(b_t) = (1+\bar{r})b_t \quad \forall b_t \in B^* \tag{3.8}$$

The borrower maximizes the value of its objective function $V^*(y_t, d_t)$ that depends on a certain level of indebtedness b_t and on the service of its debt in the future $R^*(b_t)$, while knowing that the utility of the current period is increasing in $b^*$and that the future utility is decreasing in b^*. On the one hand, the level of indebtedness $b_t$is a negative function of government's income defined by y_t, and a positive function of the level of debt it must serve at the same period, d_t. On the other hand, the service of its debt in the future $R^*(b_t)$ is determined by the amount of debt issued in period t. The constraint of the maximization indicates that investors will only grant loans if the expected return on the risky investment is equal to or greater than the return on the risk-free loan. The expected return on the risky loan and the expected return of the risk-free one are given respectively by the left-hand side and the right-hand side of the equation (3.8), where $\bar{r}$ represents the risk-free rate. Under the assumption of competition among lenders, both hand sides of the equation will be equal. In order to measure the expected return of the risky loan, lenders have to compute the probability of default λ^*. For the record, this probability is a function of the level of indebtedness beyond which the debtor's temptation to repudiate its debt dominates the deterrent effect of exclusion from the international capital markets. This level defines the largest amount available $\bar{b}$, or in other words the credit ceiling, that depends on the (short-term) utility of the borrower as the result of the default and its (long-term)

disutility following its exclusion from the international capital markets. The zero expected profit condition implies:

$$b_t \leq \bar{b_t} = [1 - \lambda(\overline{d_{t+1}})]\overline{d_{t+1}}/(1 + \bar{r}) \quad \textbf{(3.9)}$$

If the level of indebtedness is superior to the largest amount available, there exists no repayment obligation which will encourage creditors to lend funds to the debtor. In other words, no loans in excess of the largest amount available will be granted. Once $\bar{b}$ is determined, the investors will offer a loan included in the interval $[0, \bar{b}]$. If the borrower wishes to obtain funds for an amount greater than $\bar{b}$, it is rationed. In this case, the government will borrow the largest amount available. Actual borrowing b_t is defined by the following condition:

$$b_t = \min(b_t^*, \bar{b_t}) \quad \textbf{(3.10)}$$

1.1.3. A deterministic model of borrowing

Eaton and Gersovitz discuss two models of borrowing: a deterministic model and a stochastic one. In the deterministic case, the authors assume that creditors are aware of the cyclical situation the debtor will be facing in the following period. For the record, countries generally experience periods of high and low income relative to the trend. During bad periods, i.e. low income, and under the condition that it has not defaulted, a government can borrow with the obligation to repay its debt in good periods, i.e. high income. Therefore, the probability of default depends on the economic situation that the borrower is facing.

The creditors being rational and knowing the value of the objective function of the borrower, they will propose a loan defined by equations (3.9) and (3.10). As already mentioned, the credit ceiling is a function of the economic situation the debtor will be facing in the next period. Eaton and Gersovitz conclude that the deterministic model of borrowing is characterized by the absence of default: if lenders restrict their loans to the credit ceiling, debts will always be repaid in full. As the authors point out, misperception by the creditors of debtors' characteristics could lead to default and threaten the market stability.

1.1.4. A stochastic model of borrowing with default

Besides the misperception by the lenders of the borrowers' characteristics, Eaton and Gersovitz propose an alternative reason to default. They introduce uncertainty about the debtors' situation in which loans must be repaid. In the stochastic case, countries experience bad and good periods with a probability of ½. The borrower repays its debt only in periods of high income. There

exists an interest rate R for which, regardless of the value of the income, the value of the objective function of the borrower in t in case of repayment of its debt is greater than the value of its objective function in case of default. For an interest rate $R' > R$, the lenders will agree to extend the credit above the ceiling, even if there is a positive probability of default. In that case, that is, the loan exceeds the credit ceiling, the debtor governement will default when income is low for two consecutive periods.

In conclusion, in Eaton and Gersovitz's model, a default can occur for two reasons: either the threat of the creditors is not credible, or the credit market is not complete due to the risk of default. In the latter case, the allocation of resources is not made by prices and there exists a credit ceiling beyond which, for some realizations of income, the default can occur. Risky loans, i.e. larger amounts than the credit ceiling, will nevertheless be made at an interest rate that offsets the risk, for risk-neutral creditors.

1.1.5. Empirical literature

There exists a wide-range empirical literature on trying to estimate the Eaton and Gersovitz reputational approach. Many authors assume that countries face temporary or permanent exclusion from international capital markets and/or an increase in their borrowing costs in the aftermath of a sovereign debt default[13] (Das et al., 2012 b). Nevertheless, this proposition is controversial. Some recent empirical contributions show that default premiums in sovereign credit markets are negligible, especially in the medium and long run. Borensztein and Panizza (2009) provide evidence suggesting that a sovereign default impacts risk spreads only in the first and second year after the restructuring. Furthermore, duration of exclusion from international capital markets tends to decrease over years (Dias and Richmond, 2008). Empirical regularities about duration will be discussed in the next subsection. According to Das et al. (2010), these recent findings have led many to conclude that banks and bondholders have very short memories.

As in all similar consumption smoothing models, it is not easy to obtain large costs of international capital markets exclusion and therefore most models include a direct punishment cost (see the following subsection). Aguiar and Gopinath (2006) seem to be the first to follow that direction. The direct punishment generally sets the sovereign debt limits. However, it may be possible to test theoretically whether changes in a debtor country's reputation for repayment

[13] See, amongst other, Aguiar and Gopinath, 2006; Amador, 2009; Arellano, 2008; Mendoza and Yue, 2008; Tomz and Wright 2007; and Yue, 2010.

can explain variations in sovereign debt capacity or fluctuations in risk premiums. As already mentioned in the beginning of the section, the reputation for repayment theory is attractive because it only requires modelling skills rather than complex institutional knowledge to participate. Besides the problem of rationalising realistically large costs, this approach suffers a number of fundamental empirical flaws (see subsection 1.3) (Bulow and Rogoff, 2015).

1.2.Bulow and Rogoff's punishment approach

This subsection presents the 'direct punishments' bargaining-theoreticical approach developed by Bulow and Rogoff. Similar to Eaton and Gersovitz model, Bulow and Rogoff (1988, 1989 c) assume that foreign lenders have no legal rights to repayment in the debtor country's courts. In contrast to pure reputational models, Bulow and Rogoff approach (1988, 1989 c) assumes creditors to have rights in foreign creditor-country courts. This hypothesis is justified by the fact that the critical legal decision in sovereign debt contract occurs almost always in foreign courts[14] and that those contracts are typically concluded with specific waivers of sovereign immunity.

Consequently, in a direct punishment model, debt repayment depends on creditors legal rights, instead of being enforced by a 'supergame' equilibrium[15]. Legal rights of creditors enable other forms of commercial sanction, such as making trade more difficult and/or interfering with trade credit or trade insurance, which disrupts a country's gains from trade (Bulow and Rogoff, 2015). Such commercial sanctions will be discussed in the next section. Nevertheless, the approach points out that the lenders must bear considerable costs to undertake such actions. Therefore, the ability of a creditor to make the threat credible can be called into question. An empirical review about direct punishments models focusing on trade sanction is presented in section 2.

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[14] For the record, the most popular jurisdictions for sovereign debt contracts are New-York and London (Bulow and Rogoff, 2015). Argentina experiences it recently (2014) with its unilateral default accepted by most creditors. The 'hold outs', i.e. non-participating creditors, went to a court in New-York to block payments by US banks to participating creditors on the basis of non-discrimination. The New-York judge accepted and nobody was paid as long as some disagreed (de Crombrugghe, 2016).

[15] The authors provide a short example: "*if Argentina defaults on a loan to Citibank, and then proceeds to borrow from Bank of America, the later lender risks having any repayment claimed by the prior lender. Thus, countries that default will have an incentive to settle old debts as a prelude to borrowing again*".

1.3.Differences between reputation and direct punishments approaches

Although, at first glance, the reputation approach discussed in the previous section and the 'direct punishments' bargaining-theoretic approach presented above might seem to offer similar predictions, Bulow and Rogoff (2015) highlight some very fundamental differences.

As already mentioned in the previous subsection, Bulow and Rogoff emphasize the legal rights of creditors. They illustrate the relevance of the governing law of debt with Greek and Argentinian experiences. During the Greek debt restructuring of 2012, the IMF, the ECB, and the European Commission forced a haircut on Greece's private creditors and imposed a 53.5 percent write-down on debt governed by Greek law. The very large debt relief achieved by using a combination of new legal techniques shows the importance of jurisdiction. Moreover, Bulow and Rogoff (1989 a) mention that, under the assumption of no legal recourse for creditors, the borrowing country can earn the market rate of return by putting savings abroad rather than repaying its creditors. They conclude that "*the existence of this option leads to unravelling of any purely reputational equilibrium*". As a result, creditors will agree to make loans only if they have legal rights which enable them to disrupt a sovereign's trade or to seize its financial assets abroad.

Afterwards, Bulow and Rogoff (2015) address the moral hazard issue. They suggest that the defaulting country and its creditors can extract side-payments because third parties can be impacted by extensive debt restructurings, but standard reputation for repayment models do not take their interests and welfare into account. In principle, moral hazard can be embedded in a reputation for the repayment model but the whole approach is not fundamentally falsifiable. Therefore, they conclude that reputation approach is not appropriate to analyse debt reduction schemes that fall outside the usual borrower-lender relationship. They illustrate their point by using the example of debt buybacks. Bulow and Rogoff (1988) show how such issues can be analysed with a direct punishments model while it requires more complex assumptions in a reputation for repayment model.

Next, creditors' particular concerns do not really matter in standard reputation models, which focus on unilaterally decided write-downs. Nevertheless, the authors concede that this does not seem to coincide with experience. Furthermore, the creditor's identity does not matter. In reputation for repayment models a debtor's reputation is determined simply by whether or not it repays its debt. However, if private sector lenders only care about getting their money back, official creditors tend to have broader goals (see chapter II section 3). Therefore, borrowing

countries are better off when their debts are held by the latter, which is not incorporated in standard reputation models.

Finally, as already discussed, reputation for repayment models consider that debtors borrow in bad periods and re-pay their debts in good periods, in order to smooth their consumption. Under these assumptions, if a default may occur in a good period, since the country has to reimburse its debt. In reality, numerous debtors borrow as much as they can whenever they can (Bulow and Rogoff, 2015). In good times, creditors feel that the country has a greater potential to repay its debt so they agree to lend more. On the contrary, in bad times, lenders may decide to reduce their loan exposure and debt defaults may take place. Bulow and Rogoff also highlight that, in a consumption smoothing model, the volatility of the income of a country increases its ability to borrow money, while in a direct punishment model it is easier to borrow against stable income.

1.4.Stylized facts and determining factors about international capital markets exclusion

Empirical literature about capital markets exclusion highlights that the duration of such an exclusion varies from case to case. To illustrate this point, one can contrast the market experiences of two recent defaulters in Latin America. The first case to look at is the recent sovereign default of Argentina. Although this default took 3.5 years to be resolved and investors were forced to realize very large haircuts, Argentina seems to have immediately regained access to international capital markets (Dias and Richmond, 2008). The second interesting case concerns the default of Ecuador. Although its default was resolved quickly, Ecuador has been excluded from international capital markets for a long time period.

Based on empirical regularities on duration of exclusion from international capital markets between 1980 and 2005, Dias and Richmond (2008) investigate the following question: "*why are some countries able to access international capital markets immediately after resolving a default, while others seem to be punished and are forced to remain on market sidelines?*" The authors distinguish between partial and full market reaccess[16]: partial reaccess is defined as "*the first year in which there are positive net bond and bank transfers to the public or private* sector"

[16] For the record, Dias and Richmond define market access to be "*the first of either of the following events taking place post sovereign default exit: (i) positive net transfers in the form of bonds and commercial bank loans to the public or publicly guaranteed sector; or (ii) positive net transfers from bonds and commercial bank loans to the private sector*".

while full reaccess is determined as "*the first year of positive net bond and bank transfers to the private of public sector greater than 1.0% of GDP*".

Dias and Richmond identify important empirical regularities about the length of exclusion from capital markets. Some of these stylized facts are directly or indirectly linked to the typology of sovereign debt default discussed in chapter II.

Countries are excluded from capital markets for a long period of time. In fact, a defaulting country regains partial market access after 5.7 years and full market access after 8.4 years, on average. This stylized fact tends to prove that defaulting countries are actually punished by markets.

There are regional differences to the length of market exclusion. Dias and Richmond find that this duration is the longest for Middle Eastern and African defaulting debtors and the shortest for Latin America and Caribbean countries (in terms of both partial and full market access).

Larger countries regain market access faster. Indeed, the authors prove that larger countries regain both partial and full market access faster. Two measures are used to estimate the size of a country: the nominal USD GDP and the population. The results are similar with both measures of the country size.

Countries with larger haircuts are excluded for longer periods of time. This result supports Benjamin and Wright's (2009) conclusions. As already discussed in chapter II, the latter find a positive relationship between the length of default and the extent of haircuts. Although large haircuts should improve debt servicing position in the aftermath of default, Benjamin and Wright conclude that defaulting countries experiencing larger haircuts are punished by creditors for having realised a write-down.

Defaulters in the 1980s take the longest to regain market access. As already discussed in chapter II, the length of debt renegotiations tends to decrease over the years.

Favourable external market conditions generate shorter exclusion periods. The authors measure external market conditions by the spread between US Treasury yields and US high yield bonds. They are respectively used as proxies for the risk-free rate and for emerging market assets and risk levels. A small spread between those two rates reflects a very liquid market and a strong investor risk appetite. Dias and Richmond find a positive relationship between the duration of the exclusion from international capital markets and the spread between US Treasury yields and US high yield bonds.

The existence of an IMF program does not significantly shorten market exclusion periods. Even if such programs may be linked to the decrease over the years of the duration of debt defaults and restructurings (Reinhart and Rogoff, 2008), Dias and Richmond do not find significant different exclusion periods between defaulting countries with and without IMF-supported programmes.

Higher credit ratings result in shorter exclusion periods. This stylized fact is in line with Reinhart's (2002 a) view. According to the latter, credit ratings play "*a crucial role in determining the terms and the extent to which countries have access to international capital markets*".

Political risk does not significantly impact exclusion periods. The political stability of a country is assessed by the political risk rating. Dias and Richmond find no significant relationship between a country's political risk and the duration of exclusion from international capital markets.

Eventually, Dias and Richmond conclude that partial market access depends primarily on external demand for risk whereas full market access depends mostly on good domestic behaviour and market expectations.

1.5.Conclusion

Given the different conclusions presented in this section, it is doubtful whether the threat of capital markets exclusion is sufficiently large and credible to justify the service of sovereign bonds. Other costs of sovereign debt default pointed out in the economic literature will be reviewed in the next sections.

2. Output contraction and international trade decline

The economic literature agrees that debt crises are associated with a drop in GDP between 2 percent and 5 percent per year (Das et al., 2012 b). De Paoli et al. (2009) show that such losses can be observed up to ten years after a default episode. Their findings suggest that the size of the output contraction is positively correlated with the duration of the debt crisis and depends on whether it occurs simultaneously with banking and/or currency crises, "twin" or "triple" crises being associated with larger output losses than debt crisis alone. Interestingly, Levy-

Yeyati and Panizza (2011)[17] conclude that events of default tend to follow, and not precede, drops in GDP.

Beyond losing access to international debt markets, Tomz and Wright (2013) mention a decline in international trade as another cost of default. The first subsection introduces the transmission channels as identified by Tomz and Wright. The second subsection provides a brief empirical review about trade sanctions in case of default, which can be included in direct punishments models presented in the previous section.

2.1. Transmission channels

Tomz and Wright (2013) identify at least three reasons that explain why trade could suffer in case of sovereign debt default.

Firstly, lenders could use tariff and nontariff barriers in order to hinder trade with the defaulting debtor. Rose (2005) and Borensztein and Panizza (2010) find that countries defaulting on official Paris Club debt face a drop in trade. However, reasons for such a decline remains unclear (Tomz and Wright, 2013). Trade sanctions, which can be included in the direct punishment approach such as that of Bulow and Rogoff (see previous section), may explain the drop in trade, but it would imply that trade with creditor countries decline faster than trade with other countries. Martinez and Sanderlis (2011) show that default disproportionately affected trade with non-creditors countries while Agronovsky and Trebesch (2009) provide evidence suggesting that exports to creditor countries tend to rise in the aftermath of debt restructuring. The doubts about the trade sanctions hypothesis are therefore real (Tomz and Wright, 2013).

Secondly, according to Kohlscheen and O'Connell (2007), default could lead to the crash of trade credit, which increases the costs of trade for the defaulting country. Again, the evidence is ambiguous. Zymek (2012) finds that commercial credit deteriorates following a default, but Borensztein and Panizza (2009) conclude that the decline in trade credit is not sufficient to explain the total degradation of trade.

Finally, creditors could seize the borrower's foreign assets, including tradable goods (Tomz and Wright, 2013). However, the evidence of asset seizures in the aftermath of default is scarce. Sovereign immunity prevents creditors from filling a lawsuit against defaulting countries in

[17] Levy-Yeyati and Panizza (2011) obtain such results by using quarterly data for defaults between 1982 and 2003, instead of annual data used in previous analyses (Das et al., 2012).

foreign courts, and even if lenders could win such a lawsuit, most sovereigns do not own a lot of assets in foreign jurisdictions.

2.2.Empirical literature

Many authors empirically study direct sanctions associated with sovereign debt defaults. Rose (2005)[18] finds that the volume of bilateral trade is reduced by almost 8 percent per year in the aftermath of default and that this phenomenon lasts approximately 15 years. He also provides evidence that trade of a defaulting country is more penalized with companies from creditor countries than with non-creditors.

The argument of direct punishments, as studied by Bulow and Rogoff (see previous section), was challenged by English in 1996. The latter claims that direct sanctions are too small to support debt. English (1996) conducts a historical analysis based on American state debts in the 1840's. Some may think that its conclusions are based on a specific[19] and very old case. However, direct punishments recently became more controversial due to the work of some authors as Martinez and Sanderlis. Martinez and Sanderlis (2011) argue that Rose did not control for the 'general' effect, which skews the variable measuring the consequences of the default on bilateral trade. This variable captures part of the effect of sovereign default on global trade. Taking this effect into account in their analysis, Martinez and Sanderlis show that trade with creditor countries affected by the default, i.e. bilateral effect, as well as with creditor countries not affected by the default, i.e. multilateral effect, does not fall any more than that with non-creditor or debtor countries, i.e. general effect. The authors conclude that at equilibrium, if the discount factor and the number of punitive periods are high enough, then the borrowing country will never default.

3. Reputational spillover

Cole and Kehoe (1988) suggest that standard reputation models are partial in the sense that they do not take reputational spillover into account. Such pure reputation approaches, such as the one developed by Eaton and Gersovitz, assume that actions of agents in one arena impact

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[18] Rose relies on game theory to explain how a creditor can deter his debtor from defaulting by the threat of a restriction on bilateral trade. For more information see Rose (2005).

[19] English's analysis and conclusions rely on the defaults by U.S. states in the 1840's. States debts are seen as sovereign debts both because "*the United States Constitution precludes suits against states to enforce the payment of debts and because most of the state debts were held by residents of other states and other countries*". The U.S states were protected from direct sanctions because they were part of a powerful union of states. Free trade between states made trade sanctions very difficult to apply. Moreover, applying trade sanctions to the entire United States in order to punish a defaulting state would have been very expensive (English, 1996).

reputation in that arena only. In order to address this issue, Cole and Kehoe develop a general model of reputation in which default could lead to costs in other spheres of international relations (Tomz and Wright, 2013).

3.1.Cole and Kehoe model

The basic idea of this approach is that "*if a government is viewed as untrustworthy in one relationship, this government will be viewed as untrustworthy in other relationships*" (Cole and Kehoe, 1988). In this context, the calculation of the benefits of maintaining a good relationship in one arena must take the ramifications in a variety of other arenas into account, even though at first sight, these arenas may not seem to be directly linked to the one where misbehaviour occurs. Therefore, an event of default could send a double signal to the creditors: the debtor government is untrustworthy in debt but also in international affairs more generally. Tomz and Wright (2013) suggest that it may be an incentive for foreigners not to "*make direct investments or enter into trade agreements, environmental pacts and military alliances with the offending state*".

3.2.Empirical literature

The concept of reputational spillovers has been empirically tested by few authors. Nevertheless, some recent contributions deserve to be discussed. Fuentes and Saravia (2010) study how foreign direct investments are impacted by sovereign default. A crucial point of their analysis is the distinction they made between those flows coming from creditor countries and others. They find that the decay in foreign direct investment inflows in the aftermath of default are significantly concentrated on flows coming from creditor countries. This conclusion tends to confirm the existence of reputational spillovers, even if the size of the restructuring would not seem to matter. Furthermore, Fuentes and Saravia specify that the decline of foreign direct investment flows tend to be higher in the years closer to the default date. Eventually, they estimate a positive relationship between the contraction of such flows and the number of default episodes a country has faced.

Rose and Spiegel (2009) also address the issue of reputational spillovers but from the point of view of non-economic partnerships. Their study suggests that countries more deeply involved in such partnerships, i.e. international environmental arrangements, find it easier to engage in economic exchanges with the rest of the world. They provide evidence suggesting that default might spill over to impact non-economic relationships.

4. Banks and financial sector distress

As already introduced in chapter II, Daniels and Ramirez (2007) point out that a sovereign default can strongly affect the financial stability of the debtor country. This view is shared by many other authors (see amongst other, Borensztein and Panizza, 2009; Reinhart and Rogoff, 2009; Das et al., 2012 b; Cruces and Trebesch, 2013; Luck and Schempp, 2014; Edwards, 2015). It goes without saying that bank and financial sector distress has far-reaching consequences for the domestic economy. According to Gennaioli, Martin and Rossi (2010), a dislocation of the financial system poses many problems since banks will have to restrict access to private credit (for businesses and individuals), hampering consumption, investments and therefore economic growth. Luck and Schempp (2014) also highlight that financial sector distress impacts the ability of the government to levy taxes, which amplifies the default.

The relationship between banking and sovereign debt crises is mainly due to the connections between public and financial sectors. Debt defaults impact holders of the government papers, especially banks, pension funds and insurance companies (Das et al., 2012 b). However, many authors agree that caution is needed when determining the causal relationship between banking and sovereign debt crises (Levy-Yeyati and Panizza, 2011; Das et al., 2012 b; Luck and Schempp, 2014; to name but a few). Das, Papaioannou and Trebesch (2012 b) claim that, while bank bailouts put pressure on sovereign debt, debt defaults may also lead to disruptions in the banking sector, causing bank failures and bank runs[20].

Sovereign debt defaults can impact banks and financial institutions in a variety of ways (Das et al., 2012 b). Subsection 1.1 presents the transmission channels between banking and sovereign debt crises. Subsection 1.2 tries to understand why banks hold government bonds and, finally, subsection 1.3 focuses on the relationship between public and banking sectors in advanced economies.

4.1. Transmission channels

On the basis of the IMF (2002 b) report, Das, Papaioannou and Trebesch (2012 b), identify three main transmission mechanisms through which debt defaults affect the banking sector. Firstly, on the asset side of the balance sheet, banks are directly exposed to sovereign default because they hold a portion of the public debt. Secondly, on the liability side, the banking sector

[20] According to Laeven and Valencia's (2013) estimations, only 1% of the banking crises are preceded within 3 years by a crisis of the sovereign debt, while 5% of the banking crises are followed within 3 years by a crisis of the sovereign debt.

can face massive deposit withdrawals following a confidence crisis of the domestic agents towards the financial system. This refers to the concept of self-fulfilling expectations (Levy-Yeyati and Panizza, 2011). Deposit withdrawals can hinder the ability of banks to mobilize necessary resources at a time of stress. An historical analysis shows that defaults may also boost interest rates. Interest rates hikes lead to an increase in the financing cost of the banking sector, which deteriorates their income position. Indeed, required risk premiums are positively correlated to creditors' expectations of sovereign default. If these premiums increase, this reduces the value of bonds held by banks. Thirdly, Das, Papaioannou and Trebesch point out that some debtor countries have a large retail base among investors in sovereign debt. Default episodes may therefore impact household savings too. Eventually, other mechanisms are also studied by the IMF, such as a strong exposure of a bank's balance sheet to currency risk, a deterioration in the interbank market, etc. (IMF, 2002 b).

Das, Papaioannou and Trebesch (2012 b)[21] use the Russian example of 1998 to illustrate the link between sovereign debt crises and bank and financial sector distress. Over the years prior to 1998, Russian public debt was mainly held by domestic banks and funds, which made Russia's financial sector highly vulnerable to sovereign default risk. Given this strong exposure, the sovereign default of Russia contributed to the effective collapse of the banking and financial sector. A similar episode occurred in Ecuador. These examples illustrate the fact that it is difficult for a defaulting government to discriminate against its creditors, as already discussed in chapter II.

4.2. Why do banks hold government debt?

It may be asked why banks keep holding domestic bonds. Gennaioli, Martin and Rossi (2010) mention that public debt holding constitutes a way to store liquidity for financing future investments. Bolton and Jeanne (2011) also address the issue by providing an analysis of sovereign debt crises through an integrated banking system. According to them, in advanced economies, banks hold government debt mostly for risk and liquidity-management purposes as government bonds may serve as collateral for interbank loans or repos[22]. Bolton and Jeanne also assume that banks hold government bonds for access to public liquidity purposes. Indeed, central banks generally agree to grant cheap loans to banks in exchange for collateral in the

[21] Das et al. (2012 b) summarize the detailed accounts by Sturzenegger and Zettelmeyer (2006) and Kharas et al. (2001).

[22] Interbank transactions guaranteed by the temporary sale of a financial asset that serves as collateral (Reding, 2014).

form of government and other highly rated securities. In order to reduce their exposure to sovereign default risk, banks should diversify their portfolios, in particular by holding varied sets of public debt issued by other countries. Diversification generates risk diversification benefits ex ante. However, as Bolton and Jeanne point out, it also engenders risks of contagion ex post, which would weaken the international financial system. The authors conclude that it is likely due to pressure from their neighbours that the integrated countries experience less episodes of default.

4.3.Focus on advanced economies

The economic literature typically agrees that the costs related to the banks and financial sector distress are greater in advanced economies. Such economies generally have more developed and therefore more efficient financial systems. Banks use higher leverage effects, which allows them to increase private credits and thus stimulate economic activity but which also made advanced economies more vulnerable to an adverse shock such as sovereign default. Gennaioli, Martin and Rossi (2010) find that the contraction in private credit that follows a sovereign default is positively correlated with the degree of development of the financial system of a country. However, given the better-developed deposit insurance mechanisms, bank panics can be more easily avoided in advanced economies. This tends to minimize the impact of a default on their financial system (Luck and Schempp, 2014).

5. Currency depreciation

According to Reinhart (2002 b), in advanced economies, there exists a strong link between currency crises and default[23]. Frankel and Rose (1996) study the impact of sovereign debt on the currency. They find that the odds of currency crises are positively correlated with the level of indebtedness of a country. Given these findings, it seems interesting to look at the relationship between exchange rates and sovereign debt.

Nowadays, there exist many theories of exchange rate determination. For the record, the exchange rate corresponds to the price of a nation's currency in terms of another currency. It influences the relative price of goods, services and domestic assets relative to foreign goods, services and assets. The following section focuses on the direct exchange rate, that is, the number of units of domestic currency needed to obtain a unit of foreign currency. In this

[23] About 85% of all the defaults in the Reinhart's (2002) are linked with currency crises. For the record, Reinhart relies on the definition of currency crisis proposed by Frankel and Rose (1996): "*a devaluation in a given month of 25% or greater, which is at least 10% greater than the devaluation in the preceding month*".

perspective, an increase (decrease) in the value of the exchange rate indicates a depreciation (appreciation) of the national currency in relation to the foreign currency (Bodart, 2016).

Generally, the level of the exchange rate of a currency is determined by the balance between its supply and demand of this currency. This balance depends on many factors, such as the monetary policy, the general price level, the interest rate, and the level of production (Bodart, 2016) or the solvency of the state (Calvo et al., 1993; Frankel and Rose, 1996).

According to the Balance Sheet Approach, the awareness of agents of the existence of significant weaknesses in the balance sheet of one or several sectors, i.e. public sector, private financial sector, and private non-financial sector, is the trigger of a balance of payments crisis (Bodart, 2016, IMF, 2005). Assuming that agents lose confidence in the state's financial health, i.e. they anticipate default, they will then make portfolio adjustments, including massive withdrawal of deposits from banks[24]. In order to protect their assets, agents may convert them into a foreign currency. Under a flexible exchange rate, such capital outflows will lead to a depreciation of its exchange rate. Under a fixed exchange rate, the country will lose foreign exchange reserves in order to defend its fixed exchange rate regime. If it cannot longer defend it, the country may be forced to switch to a floating exchange rate regime, and to let its currency depreciate. When the country is really short on its debt, the loss of confidence of the agents reaches a maximum level, which generally leads to a significant depreciation of the currency. As already introduced, Reinhart (2002 b) estimates the odds of a currency crisis, i.e. a major devaluation, during the two years following a default at 84 percent and at only 17 percent if the government services its debts.

5.1. Impact of a devaluation of the currency on the balance of payments: the Elasticity Approach

Bodart (2016) studies the effects of a devaluation of the currency based on the traditional "*Elasticity Approach*". The Elasticity Approach tries to predict the effects of an exchange rate depreciation on the balance of payments, focusing on the relative price effect, excluding any

[24] It refers to the concept of self-fulfilling anticipations introduced in the previous section. To illustrate the bank-government doom loop, that is, one supports the other but eventually both fail, the Greek case can be mentioned. Greece had a bank run in 2015 and banks were closed for two weeks. Withdrawals were then limited. In a currency union like the Euro area, the ECB was not willing anymore to lend money to Greek banks. In contrast, in a country with its own currency, printing money to make loans to banks which lend to governments (who rescue the banks) is always possible. However, printing new money generates inflation (see chapter II section 3) as well as currency depreciation and capital outflows (de Crombrugghe, 2016).

other effect. It is therefore a partial equilibrium approach. Under some assumptions[25], if a country decides, or is forced, to devaluate its currency, three effects are observed: two volume effects and a price effect. On the one hand, the volume effects consist of an increase in the demand for exportable goods and a decrease in the demand for the importable good. Indeed, the demand for the exportable (importable) good is a positive (negative) function of the exchange rate. The volume effects tend to improve the country's trade balance. On the other hand, the price effect corresponds to the increase in the price of the importable good in national currency, which tends to deteriorate the country's trade balance. The price and volume effects of a devaluation of the national currency thus have opposite effects on a country's balance of payments, the net effect depending on the relative weight of these effects.

If the trade balance is in equilibrium before the change in the exchange rate, following the devaluation, the trade balance improves if and only if the sum of the absolute values of the price elasticity of exports and imports is superior to the unity. This is the Marshall-Lerner condition. However, if the trade balance is in deficit before the change in the exchange rate, the Marshall-Lerner condition is no longer sufficient to ensure an improvement in the trade balance in the event of devaluation of the currency. The higher the initial deficit is, the higher (and greater than 1) the sum of the absolute values of the price elasticity of exports and imports must be[26].

It is interesting to distinguish short-term and medium-term effects of devaluation on the balance of payments. Indeed, the devaluation does not have an immediate effect on the quantities imported and exported (volume effects). The period during which prices are adjusted while quantities remain unchanged is called "pass-through period". During this short-term period, the devaluation of the currency deteriorates the balance of payments. Gradually, quantities will also adapt. The volume effects of depreciation are beginning to play. This succession of short- and medium-term effects of the devaluation of the currency on the balance of trade is called "J-curve effect".

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[25] Firstly, the price of the domestic exportable output is fixed, the supply being supposed infinitely elastic. Secondly, the country is price setter to export and price taker to import. The supply of the rest of the world is also infinitely elastic at the foreign price. Thirdly, domestic absorption is maintained constant. Fourthly, the demand for the exportable good is a negative function of the ratio between the price of the domestic output and the import price. While the demand for the importable good is a positive function of this same ratio. Finally, the link between the demand for the importable good and the domestic output and between the demand for the exportable good and the foreign output is neglected.

[26] The higher the initial value of imports relative to that of exports (and hence the higher the trade deficit), the more negative the effect of the change in the exchange rate on the value of import expenditures.

5.2.Potentially depressive effects of devaluation

As already mentioned, the Elasticity Approach is a partial equilibrium approach. It therefore omits a number of effects of the devaluation of the currency, some of which may be depressive (i.e. decreasing the level of economic growth). The following presentation is from Bodart (2016).

Firstly, in the case of a small open economy that is price taker in international markets, the depreciation increases in the price of goods traded, which implies an increase in domestic prices. Since nominal wages are generally rigid in the short term, the rise in prices leads to a reduction in real wages. For a given nominal level of wealth, devaluation of the currency implies a decline in the purchasing power of households' wealth. The decline in purchasing power, both in terms of wages and wealth, has the effect of reducing domestic absorption. In the longer term, workers observe the increase in the general level of prices and demand that their nominal wages be revised upwards in order to compensate for the loss of purchasing power. As a result of this increase in wage costs, firms may decide either to reduce their supply or raise their selling prices[27]. The potential rise in domestic prices mitigates the variation in the relative prices, which underlies the positive effects of depreciation on the trade balance.

Finally, devaluation implies an increase in local currency of foreign debt denominated in a country's foreign currency. The service of the debt in terms of local currency also increases, a larger part of domestic production will have to be devoted to servicing the debt. Consequently, for a given national production, national expenditure is reduced.

6. Military intervention

Tomz and Wright (2013) also mention military intervention as a cost of default. This cost is only very little addressed in the recent literature. Indeed, the use of weapons and the invasion of a country in order to obtain a reimbursement have not occurred since the beginning of the twentieth century. Nevertheless, this method was favoured earlier by creditors to punish defaulting countries, especially in Latin America (Finnemore, 1995). According to Mitchener and Weidenmier (2010), gunboat diplomacy was "*effective and commonly used*" to enforce debts before 1913. On the contrary, Tomz (2007) highlights historical patterns of sovereign debt repayment that contradict this gunboat hypothesis. He argues that investors generally did not resort to violence in order to be reimbursed. Moreover, he shows that creditors grant loans

[27] This effect was reinforced by the rise in local commodity prices following the devaluation.

to borrowers they had no chance of coercing and that borrowing countries repaid their debts to military strong lenders no more often than weak ones. Despite these historical disagreements, the majority of authors agree that, today, creditors do not use force in order to enforce debt contracts (Tomz and Wright, 2013).

7. Conclusion and broader considerations

If most of the costs studied, taken individually, do not answer the question "why does a government generally repay its debts?" it seems that the combination of these can do so. Furthermore, Bulow and Rogoff (2015) point out the importance of other factors that may influence the costs of sovereign debt defaults and restructurings. The Greek case clearly shows the broader costs of default a sovereign may have to deal with: the threat of expulsion from the EU may be considered as the greatest threat the country faces. Abundant literature informs that there are many different types of costs of sovereign debt defaults. It is imperative to understand these different costs and how they interact in order to estimate the total cost of an episode of sovereign debt default as accurately as possible.

IV. GAINS FROM SOVEREIGN DEBT RESTRUCTURING

As already discussed in chapter II, episodes of sovereign debt restructuring are far from trivial. What are the benefits for a debtor country to restructure its debt? First of all, it might be thought that the restructuring reduces the default costs presented in chapter III; that it implies a return to credit market access, a recovery in international trade and output growth, a restoration of the situation in the financial sector, etc. In addition, a restructuring can impact inefficiencies and generate value.

This fourth chapter focuses on the ways restructuring might generate value. The first section presents the debt overhang issue and how restructuring may reduce its effects. The second section deals with reallocation of resources. The last section introduces the multiple equilibria model developed by Calvo (1988), and discusses how debt restructuring can foster the 'good' equilibrium.

1. Reduction in debt overhang effects

The World Bank (1988) reports a severe decline in investment in the highly indebted countries (HICs)[28] as in the debt-distressed sub-Saharan African nations in the 1980s. The decline in investment was a leading factor in converting debt crisis intro growth crisis for the HICs. At first glance, a sort of vicious circle seems to be in operation in such countries at that time: very high debt levels tend to discourage a debtor country from investing, which reduces its ability to service its debt, which adds to the pressures of repayment (Deshpande, 1995).

Krugman was one of the first authors of the economic literature to introduce and study the concept of 'debt overhang'. He defines a debt overhang as "*the presence of an existing 'inherited debt' sufficiently large that creditors do not expect with confidence to be fully repaid*" (Krugman, 1988). In other words, he states that "*a country has a debt overhang problem when the expected present value of potential future resource transfers is less than its debt*". In this case, creditors may be tempted to lend new money to the debtor country at an expected loss to protect their existing claims (Krugman, 1985a, 1985 b). Krugman suggests that the burden of debt may distort the incentives of a debtor country since the benefits of good performance essentially go to creditors rather than itself, and that such a distortion can be reduced if creditors

[28] HICs regroup heavily indebted countries associated with the 'Programme for Sustained Growth' introduced by the Governor for the US at the 1985 IMF/World Bank Annual Meeting in Seoul. The HICs group comprises 15 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ivory Coast, Ecuador, Mexico, Morocco, Nigeria, Peru, Philippines, Uruguay, Venezuela and Yugoslavia.

immediately forgive (part of) the debt rather than provide new money. Krugman also shows that conflicts between creditors' individual and collective interest may arise, and there may be free-rider problems that comprise the achievement of desirable new lending. According to the author, if a debtor country faces debt-servicing difficulties, its creditors have two choices, either they "*finance the country, lending at an expected loss in the hope that the country will eventually be able to repay its debt after all*", or they "*forgive, reducing the debt level to one the country can repay*". Krugman shows that this choice represents a trade-off. If creditors decide to finance the debtor country and it turns out to be able to repay, they will not have written drown their claims unnecessarily. In other words, financing gives the creditors an option value. However high debt levels distort the country's incentives to invest.

The first subsection presents the disincentive effects behind the debt overhang as identified by Deshpande (1995). The second subsection focuses on the different mechanisms by which a country can reduce its external debt.

1.1.The disincentive effects behind the debt overhang

Based on the work done by Krugman, Deshpande (1995) decides to examine the linkages between external debt and domestic investment of severely indebted countries (SICs)[29]. He suggests that debt overhang discourages investment in two basic ways: due to its pure disincentive effect on the one hand, due to the adjustment measures undertaken by the SICs on the other hand.

1.1.1. The pure disincentive effect

First of all, Deshpande argues that, since a country that has to service its debt shares only partially in any increase in output and exports, high burdens of debt are seen as a tax on investment, which reduces the incentives to invest. According to the author, the weakening of incentives to invest is more acute in a phase of involuntary lending. In that case, the actual debt repayment will depend on the negotiations between the borrowing country and its creditors. Therefore, increases in production and exports used for debt servicing may be known to the investors beforehand, which discourages them from investing.

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[29] Based on standard World Bank classification, Deshpande (1995) considers that severely indebted countries are "*those from whom three of the four key ratios are above the critical levels: debt to GNP (50%), debt to exports of goods and all services (275%), accrued debt service to exports (30%) and accrued interest to exports (20%)*". All the HICs are a subset of the larger set of SICs.

Deshpande also suggests that capital flight form SICs reflects this disincentive effect: "*due to the fear of appropriation of their funds for debt servicing, investors would rather send money out of the country*". Cuddington (1986) provides evidence of the contribution of the debt crisis of the 1980s to the increase in capital flight at that time.

To conclude about the pure disincentive effect, the author points out that, in a situation of debt overhang, a government would find it difficult to shift resources from consumption to investment. This difficulty is correlated to the divergence of interests between the ruling classes and the majority of the population.

1.1.2. Impact of adjustment measures

Debt overhang implies, by definition, debt-servicing difficulties. Therefore, according to Deshpande, a debtor sovereign with debt overhang would be undergoing an adjustment program. Since the IMF intervened in debt renegotiations between creditors and SICs, the author decides to investigate the adjustment package that the fund advocates. He focuses on two important components of this package: exchange rate devaluation and reduction in government deficits.

Exchange rate devaluation aims at improving the balance of payment position through increases in export revenues and import cuts, which negatively impact investments. The author highlights that the problem was acute for Latin America, which relies on imports for a large share of its capital goods.

In order to serve their debt, many SICs had to generate resources amounting to 5-6 percent of GDP (UNCTAD, 1988), generally coming from reductions in government deficits. Deshpande explains that the burden of fiscal adjustment has fallen on public sector investment and social spending. He argues that, due to their complementarity, a decline in public investments tends to 'crowd out' private investments.

1.2.Debt reduction schemes

It is interesting to look at the different mechanisms by which a country can reduce its external debt. The following presentation is from Bodart (2016), which relies on Shmitt-Grohé and Uribe's (2014) analysis.

1.2.1. Unilateral debt forgiveness

Consider a country whose external debt is $100. Assume that there is some uncertainty about the ability of this country to repay its debt in full, there are two possible situations: either the country is able to repay its debt in full (i.e. good state) or the government is able to partly repay its debt (i.e. bad state), see table 4.1. In the second situation, the country is only able to repay 25. Suppose also that the good state occurs with probability 1/3.

*Table **4.1**: Initial situation*

	Good state	**Bad state**
Probability	1/3	2/3
Face value D= 100		
Receipt of creditor	100	25
Expected repayment = 50		
Secondary market price = 0.5		

Given the two possible situations, the expected return to creditors is 50; (1/3)*100+(2/3)*25=50. The expected return to creditors is thus inferior to the face value of the debt (100). Therefore, the price of each unit of debt in the secondary market is inferior to 1, it is only 0.50; secondary market price = expected repayment/face value of the debt = 50/100=0.50.

Assume now that creditors agree to forgive 50 units of debt. The face value of the remaining debt outstanding is only 50 (D=50). Therefore, the expected return to creditors is not 50 anymore but is only (1/3)*50+(2/3)*25=33.3. The price of debt on the secondary market rises to 33.3/50=0.67.

*Table **4.2**: Unilateral debt forgiveness of 50*

	Good state	**Bad state**
Probability	1/3	2/3
Face value D= **50**		
Receipt of creditor	**50**	25
Expected repayment = **33.3**		
Secondary market price = **0.67**		

It is unlikely that creditors will accept such an arrangement since it implies a deterioration of their situation. The cost from debt forgiveness of 50 to creditors is calculated as the difference between the expected repayment without forgiveness and the expected repayment with forgiveness, that is, 50-33.3=16.67. The arrangement does not increase the ability of the

indebted country to repay its debt in the bad state. The debt forgiveness lightens the burden of the country's debt in the good state, that is, if the country is able to repay its debt in full.

1.2.2. Debt overhang

In reality, creditors sometimes do agree to forgive part of the sovereign debt. Why would it be beneficial to creditors to accept such an arrangement? To answer this question, it is important to focus on one unrealistic assumption of the previous example, that is, the ability of the debtor to repay its debt is independent of the size of its debt. Several economic reasons suggest that sovereign default risk increases with the size of the sovereign debt. The bigger the size of the debt, the greater the resources the government must devote to servicing its debt. Knowing that a significant part of the benefits of its efforts will go directly to creditors, the country will therefore have fewer incentives to take the necessary measures to redress its economic situation. The debt overhang argument reflects the idea that the probability of repayment is a negative function of the size of the debt.

If π, the probability that good state occurs, is a negative function of the size of the debt D,

$$\pi = \pi(D); \ \frac{d\pi(D)}{dD} < 0$$

Then, the expected return to creditors is given by: Expected repayment $= \pi(D) * D + \big(1 - \pi(D)\big) * 25$

In this configuration, it can be shown that there is a debt threshold at which expected return to creditors tends to decrease with the size of the debt. The relationship between the level of debt and the repayment is an"inverted-U" shape, this relationship is known as *"the debt Laffer curve"*. Let D* denote the level debt at which the expected return to creditors reaches its maximum. If D>D*, creditors can increase their expected receipts by forgiving debt in any amount less than D-D*. In particular, they maximize their expected return by forgiving D-D* units of debt.

Assume now creditors agree to forgive 20 units of outstanding debt. The new amount of debt is 80 (D=80). Consider also that, following this debt forgiveness, the probability that the good state occurs increases from 1/3 to 1/2. Therefore, the expected repayment is (80*1/2)+(25*1/2)=52.5. In this new configuration, the creditors increase their expected return by forgiving part of the debt.

In conclusion, under some specific conditions, to forgive part of the debt may be in the interest of the indebted country and its creditors. However, such an arrangement creates a free rider problem. As already mentioned in the previous section, each creditor has an interest in the forgiveness being carried out by other creditors. In this case, it benefits from the advantages (increase in the probability of good state and so increase in the expected return) without having to forgive part of the debt. Aware of this problem, a creditor will therefore agree to forgive some part of the debt only if all other creditors also agree to do so. Because of this free rider problem, debt forgiveness programs generally involve all the creditors of an indebted country.

1.2.3. Third-party debt buy-backs

This debt-reduction scheme consists of a repurchase of part of the debt of a country on the secondary market by a third party, usually a generous country or funds which agree on a loss, in order to reduce the debt burden of that country.

Consider the initial example (see table 4.1). Assume now that the World Bank announces it will repurchase 75 units of the outstanding debt in the secondary market. After such a buy-back, the remaining debt outstanding is 25 (D=25). In this case, the country is able to repay its debt in full, whatever (good or bad) the state. Therefore, the expected return to creditors corresponds to the face value of the remaining debt and the price of debt on the secondary market rises from 0.50 to 1 as soon as the World Bank makes an announcement, before the buy-back actually occurs.

On the one hand, creditors benefit from the buy-back transaction as they receive 75 from the World Bank and 25 from the debtor country. They are thus repaid in full and they receive more than they would have obtained without the buy-back. The gain of creditors is 50. On the other hand, the government takes advantage of this transaction as the amount it must repay to its creditors decreases from 50 to 25. The gain of the debtor country is 25. In conclusion, a third-party buy-back benefits both parties, but the gain in relative value (percentage) for creditors is greater.

1.2.4. Debt swaps

A debt swap consists in issuing new debt with seniority over the old debt, i.e. the holders of the new debt being preferred creditors. This implies that holders of the new debt will be repaid before those of the old one. In such a debt-reduction scheme, the new debt issued is used to repay the outstanding debt.

Consider again the initial example (see table 4.1). Suppose now that the borrowing country issues 25 units of new debt. The holders of this new debt being privileged compared to the former creditors, the default risk that they face is zero. Indeed, in the bad state, the country has 25, which is enough to repay the new creditors. As a result, the new debt can be issued at par, i.e. the price of new debt is unity. However, in the bad state, all the resources being devoted to repay the new debt, the debtor defaults on the totality of the old debt.

What is the amount of the old debt that can be bought back through the new issue (25)? To calculate this amount, it is necessary to determine the price of the outstanding debt in the secondary market. Let D^0 be the outstanding stock of old debt after the swap. Old creditors receive D^0 in the good state, 0 otherwise. After the swap operation the expected repayment on the outstanding old debt is: $1/3*D^0+2/3*0=1/3*D^0$. The secondary market price of this old debt corresponds to the ratio of the expected repayment to the face value, that is, $(1/3*D^0)/ D^0=1/3$. As a result of the swap, this price falls from 0.5 to 0.33. At this price, the government can use the 25 units of new debt to swap 75 units of old debt; 25/0.33=75. After the swap, the outstanding amount of old debt decreases from 100 to 25, thus $D^0 = 25$.

Contrary to third-party debt buy-backs, debt swaps only benefit the debtor. Before the swap operations, the government has to repay 50, $D^{New} = 50$. As a result of the debt swap, it has to repay 1/3*25+2/3*0=8.33 to old creditors and 25 to the new ones. The indebted country must therefore repay a total of 33.33. The gain of the debtor equal 50-33.33=16.67.

As a result of the debt swap, the expected repayment of the creditors of the old debt falls from 50 to 33.33, of which 25 comes directly from the swap and 8.33 is the expected repayment on the remaining amount of the old debt. In other words, the new issue is a swap of 75 old for 25 new. The new issue has further depreciated the old debt.

2. Reallocation of resources

A debt restructuring alleviates the debt burden that a country is facing and allows the government to release resources that can be used for more productive purposes. To be convinced of this, it is useful to rewrite the budget constraint of the government. As already introduced in the chapter II, Champ, Freeman and Haslag (2016) define the government's inter-temporal budget constraint measured in domestic currency at t, in nominal terms, as follow:

$$p_t g_t + r_{t-1} D_{t-1} = p_t \tau_t + [M_t - M_{t-1}] + (D_t - D_{t-1}) \qquad \textbf{(4.1)}$$

The left-hand side of equation 4.1 represents the government's expenditures in period t. The right-hand side reflects its income in period t, where $(D_t - D_{t-1})$ is the change from period *t-1* to t in the debt level.

A reduction in the debt burden results in a decrease in the term $r_{t-1}D_{t-1}$, freeing resources. With these additional resources, the government can increase public goods expenditures and/or reduce the tax burden, which increases the well-being of citizens and boosts the country's economic growth.

3. Good equilibrium in multiple equilibria

In multiple equilibria models, the role of expectations are crucial in determining the equilibrium that prevails. Calvo (1988) develops such a model in which, if an equilibrium with a positive public debt exists, there are in general two possible equilibria: a 'good' Pareto-efficient equilibrium, that is, the government fully services its debts, and a 'bad' Pareto-inefficient equilibrium, that is, the government partially repudiates its debts (Calvo, 1988). What is the impact of a debt restructuring in a multiple equilibria model? Does it impact expectations?

The first subsection presents the assumptions and the results of Calvo's analysis, while the second subsection focuses on the impact of a restructuring of the determination of the equilibrium.

3.1.Multiple equilibria: the role of expectations

Calvo (1988) presents a two-period model, where debt is issued in the first period and serviced in the second. To conduct his analysis, he considers distorting taxes. Hence, the government has an incentive to renege on the debt. He assumes that debt repudiation is costly and that this cost is proportional to the amount being repudiated, in order to get an equilibrium with positive public debt. Moreover, he supposes that individuals know the relevant model they are playing in. This 'rational expectations' assumption leads to the equality between the equilibrium net rate of interest on public bonds (adjusted for debt repudiation) and the rate of return on capital.

The Calvo model is presented below in a simple way, according to the structure proposed by Angeletos (2013). Calvo constructs a Barro-Gordon like model, with the option to default on domestic debt. In period 0, the government borrows $b = \bar{b}$ (exogenous) at rate R_b (to be determined in equilibrium). In period 1, the government decides the fraction ϕ of $R_b b$ to be repudiated. The ex post budget constraint of the government can be written as follows:

$$T = g + (1 - \phi(1 - \theta))R_b b \quad \textbf{(4.2)}$$

Where T represents distortionary taxes (endogenous), g corresponds to government spending (exogenous) and θ is the cost of repudiation per unit of debt repudiated (exogenous).

The welfare of the representative agent is given by his consumption,

$$c = y - \Lambda(T) + Rk + (1 - \phi)R_b b - T \quad \textbf{(4.3)}$$

Let $\Lambda(T)$ denote the cost of distortionary taxes and R the exogenous rate of return on capital k (outside opportunity, pins down risk-free rate).

Equilibrium. In period 1, the benevolent government chooses $\phi \epsilon [0,1]$ so as to maximize c, with R_b given from period 0. Since debt is domestic, repudiation of debt is a transfer within the economy. However, debt repudiation can be desirable from the perspective of a benevolent government as it allows the government to lower distortionary taxation (see chapter II section 3).

For $\theta \epsilon [0,1]$, there is a range $[\underline{R_b} < \overline{R_b}]$ such that:

- whenever $R_b < \underline{R_b}$, optimal to set $\phi = 0$;
- whenever $R_b \epsilon (\underline{R_b} < \overline{R_b})$, optimal $\phi \epsilon (0,1)$ and increasing in R_b;
- whenever $R_b > \overline{R_b}$, optimal to set $\phi = 1$.

That is, the incentive to repudiate, and hence the optimal ϕ, increases with R_b.

Since agents are indifferent between holding capital k and bonds b, equilibrium R_b must satisfy

$$(1 - \phi)R_b = R \quad \textbf{(4.4)}$$

It follows that R_b increases with (expected) ϕ, in other words, the optimal repudiation share in period is an increasing function of the interest rate contracted in period 0.

There exist multiple equilibria in this model, for intermediate values of θ. In the 'good equilibrium' $R_b = R$, agents expect no repudiation ($\phi = 0$). The government fully repays its debt in period 1, expectations are thus fulfilled. In the 'bad equilibrium', repudiation is partial

and thus $R_b > R$, $\phi > 0$. At this equilibrium, R_b and ϕ are sensitive to changes in b. The 'good' equilibrium is associated with low repudiation, low interest rate while the 'bad' one is associated with high repudiation, high interest rate.

In the model presented above, repudiation was explicit. However, it works similarly if it is implicit in the form of deflating nominal debt. Indeed, Calvo conducts a similar analysis for a monetary economy with non-indexed bonds. As already mentioned in chapter II section 3, in this context, inflation is equivalent to repudiation. Calvo shows that the nominal interest rate does not simply passively reflect people's inflationary expectations. Indeed, the nominal interest rate is actually one of the main determinants of inflation. This analysis gives results similar to the ones in the non-monetary economy. Finally, Calvo extends the analysis to an open economy where foreign creditors hold a positive share of total public debt. He finds that multiple equilibria can still occur in this context. The author also suggests that the effect on the bond interest rate of increasing foreigners' participation in the market depends on which equilibrium the economy settles down to (Calvo, 1988).

3.2.Restructuring: impact on equilibrium determination

What is the impact of a debt restructuring in a multiple equilibria model? Calvo highlights that the higher the burden of debt, the higher would be the temptation to repudiate it. Considering that debt restructuring helps alleviate the debt burden faced by a government, it is likely that restructuring would decrease the optimal repudiation share ϕ. Since R_b increases with (expected) ϕ, debt restructuring would result in lower interest rate contracted in period 0. In conclusion, under the model developed by Calvo, restructuring should enable the 'good equilibrium', characterized by low repudiation and low interest rate.

4. Conclusion

Chapter IV provides an understanding of the benefits of restructuring for a debtor country. If a restructuring, which can be considered as a partial default (see chapter II), reduces the costs associated with the default, it also generates value for the debtor. It therefore appears that the restructuring improves the debtor's situation. Since the repayment of creditors is strongly related to the debtor's situation, the combination of chapter III and IV also allows the question "why does a creditor enter into a restructuring?" An additional question deserves to be raised, "what is the impact of the restructuring on losses incurred by the creditor?" The empirical analysis presented in chapter V addresses this issue by focusing on the impact of the timing of a restructuring on losses incurred by the creditor. To conclude, it is important to bear in mind that

restructuring entails significant negotiation costs for both the debtor and the creditor. Indeed, the expenses for financial and legal advisors and for negotiating and communicating with bondholders can be considerable (Das et al., 2012 b). During the eighties, such negotiation costs and fees is estimated to have amounted to 2 percent of restructured volume.

V. EMPIRICAL STUDY

The empirical part focuses on the determinants of losses incurred by creditors as a result of sovereign debt restructuring, as recently discussed by Edwards (2015). Section 1 presents the research question and defines the hypothesis to test. Section 2 gives an overview of the dataset and describes the variables of the analysis. Section 3 provides the results of the empirical study, while section 4 discusses endogeneity and robustness. Finally, section 5 concludes the analysis by establishing its limitations.

1. Research question

The following analysis aims at measuring the impact of a particular variable on the size of losses incurred by creditors as a result of a sovereign debt restructuring. This variable identifies the timing of the sovereign debt restructuring. According to Asonuma and Trebesch (2016), restructurings can be implemented in two main ways: pre-emptively or post-default. In post-default cases, "*the government defaults first and then starts to renegotiate its debt later on*", while in pre-emptive cases, "*restructurings are implemented prior to a unilateral payment default*".

The IMF (2013 a) highlights that the timing of sovereign debt restructurings plays a key role in the policy debate on sovereign debt and defaults. According to the IMF, most of the recent debt restructurings have been conducted pre-emptively (all recent cases except Argentina, Ecuador, and Seychelles). Such restructurings have achieved high creditor participation (above 90 percent for Belize, Grenada, Jamaica and St. Kitts and Nevis). In the post-default case of Argentina, the proportion of hold-out was higher (24 percent) and the NPV haircut was larger. Finally, the IMF recommends that the member avoids defaulting on its debt to the extent possible. In other words, a member should seek to engage in pre-emptive debt restructuring and remain to service its debt obligations during the restructuring process. Avoiding a sovereign default is primordial because it may exacerbate the current economic and financial dislocation on the one hand, but also because it may undermine the member's ability to regain access to international capital markets in the medium term on the other hand (IMF, 2013 a).

The hypothesis that will be tested in this chapter is the following: "**a pre-emptive sovereign debt restructuring results in lower losses incurred by creditors than a post-default restructuring**".

2. Dataset: data source, sample selection and variables

The initial database comes from Cruces and Trebesch (2013)[30]. The data covers 180 sovereign debt restructurings with foreign commercial creditors, i.e. bank and bondholders, between 1978 and 2010. Cruces and Trebesch updated their dataset in 2014. The new dataset includes 187 restructurings[31] between 1970 and 2013. The empirical analysis is based on this updated dataset.

Cruces and Trebesch rely on five key criteria to identify and select debt restructurings. Firstly, the authors define sovereign debt restructurings as "*restructurings of public or publicly guaranteed debt*". Secondly, they restrict their sample to debt restructurings with foreign private creditors[32]. As already introduced in chapter II, these defaults are the most interesting to study because they seem most difficult to resolve in practice (Wright, 2010). Thirdly, they regard distressed debt exchange, which they define as "*restructuring of bonds (bank loans) at less favourable terms than the original bond (loan)*". They focus on the definition proposed by Standard and Poor's (2006), "*restructurings that are part of routine sovereign liability management such as debt swaps and buy backs in normal time are disregarded*". Fourthly, the authors include medium and long-term debt restructurings only. They ignore short-term agreements and agreements with maturity extension of less than a year. However, they include restructurings in which "*short-term debt is exchanged into debt with a maturity of more than one year*". Finally, they focus on debt restructurings that are actually implemented. The authors disregard cases in which "*negotiations where never concluded or in which an agreement in principle or an exchange offer were never finalized*". Based on those criteria, they identify 187 bank loans and bond restructurings since 1970, including sovereign from all parts of the world.

2.1. Dependent variable

As already discussed in the second chapter, sovereign debt restructuring usually consists in exchanging old outstanding debt in default for a new debt contract. The dependent variable of the empirical analysis, defined as losses incurred by creditors in the event of sovereign debt restructuring, will be measured by haircuts (see chapter II section 3 subsection 3.2). For several reasons put forward by Cruces and Trebesch, this analysis favours the approach proposed by

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[30] Cruces and Trebesch (2013), "Data from "Sovereign Defaults: The Price of Haircuts", URL: https://sites.google.com/site/christophtrebesch/data, accessed on April 4th 2017.

[31] Newly added restructurings: Belize 2013, Cote d'Ivoire 2012, Greece 2012, St.Kitts and Nevis 2012, Liberia 2009, Mozambique 2007, Nicaragua 2007, Congo 1988 and Peru 1978. Deleted restructurings: Cameroon 2002 and Mozambique 1987.

[32] Cruces and Trebesch follow the categorization into domestic and external debt of Sturzenegger and Zetterlmeyer (2006, p. 263).

Strurzenegger and Zettelmeyer to compute haircuts. However, the market approach will also be tested (see section 4).

2.1.1. Discounting payment streams

Firstly, Cruces and Trebesch (2013) compute the contractual cash flows (in US dollars) of the old and the new debt instruments, for each year from restructuring to maturity, using data on debt characteristics that might influence an instrument's value (such as debt amounts, maturity, repayment schedule, contractual interest rate, etc)[33].

Secondly, the authors discount the cash flow streams to assess their present values. In their analysis of major restructuring episodes from 1998 until 2005, Strurzenegger and Zettelmeyer use "*the secondary market yield implicit in the price of the new debt instruments on the first trading day after the debt exchange*" as a discount rate for each restructuring (Cruces and Trebesch, 2013). However, Cruces and Trebesch point out that yields are only available for a small subsample of recent cases. While other authors use a constant rate across restructuring (although sovereigns restructured their debts in very different conditions), they develop a procedure to impute voluntary market rates specific to each restructuring of their sample[34]. These imputed discount rates rely on two main factors that determine the cost of capital facing debt issuers at the exit from default: the specific country situation and the level of the credit risk premium at that time.

2.1.2. Negative haircuts

Cruces and Trebesch estimate negative haircuts for a limited number cases, most of which happened in the first half of the 1980s. The authors highlight that negative haircuts are associated with restructurings in which interest rates on the new debt exceed the estimated discount rates prevailing at that time. Negative haircuts imply that any lengthening of maturities will increase the present value of the restructured debt. At first sight, such restructurings may look like bad deals for the debtor countries. However, Cruces and Trebesch suggest that a

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[33] In computing cash flows, the authors take advantage of the most disaggregated information available, see Cruces and Trebesch (2013) for additional information.

[34] The procedure designed by Cruces and Trebesch (2013) can be summarized as follows: "*We start from secondary market yields on low-grade US corporate bonds which we group by credit rating category. We then convert these corporate yields into discount rates on sovereign debt by first linking corporate and sovereign secondary market yields and then imputing yield levels for each sovereign based on its credit rating at the time of restructuring. In the spirit of SZ, we then use these imputed discount rates at the exit from default to discount the cash flows of the old and new debt*". See Cruces and Trebesch (2013) for a detailed methodological description.

successful agreement, even at unfavourable terms, can buy time and avoid a disorderly default. They conclude that, in severe distress, a government can benefit from accepting such a deal.

2.2.Independent variables

2.2.1. Pre-emptive or post default restructuring

The goal of the empirical analysis is to measure the impact of the timing of the sovereign debt restructuring on the losses incurred by creditors. The variable that accounts for the timing of the restructuring is called "Timing". It is a dummy variable that classifies sovereign debt restructurings between 'pre-emptive restructuring' and 'post-default restructuring'. The classification adopted corresponds to the one provided by Asonuma and Trebesch (2016).

Asonuma and Trebesch (2016) define a pre-emptive debt restructuring as "*a restructuring in which a debtor exchanges outstanding debt without missing any contractual payment towards the creditors involved*". In order to account for borderline cases, in which restructurings involve minor arrears, the authors distinguish between strictly and weakly pre-emptive cases. Restructurings are classified as 'strictly pre-emptive' if they are implement with no missed payments, i.e. no legal default. If some payments are missed temporarily and after the start of negotiations with creditor representative, restructurings are 'weakly pre-emptive', i.e. no unilateral default. In all other cases, restructurings are identified as 'post-default', i.e. unilateral default prior to negotiations. In practice, Asonuma and Trebesch considered strictly and weakly cases as 'pre-emptive restructurings'.

Asonuma and Trebesch (2016) focus only on sovereign debt restructurings identified by Cruces and Trebesch in the first version of their dataset. Nine cases of restructurings were added in the updated database in 2014. The IMF[35] provides information about the timing of three of these restructurings (Belize 2013, Greece 2012 and St. Kitts and Nevis 2012) and Asonuma and Trebesch (2016) includes the added case of Congo in 1988. It was decided to remove the five other cases from the sample, as no relevant information was found.

Based on those definitions, 71 pre-emptive and 111 post-default sovereign debt restructurings were identified in the sample. In other words, in the sample, there is no unilateral default in 38 percent of cases.

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[35] IMF (2016), "Sovereign Debt Restructurings-Recent Developments and Implications for the Fund's Legal Policy Framework", URL: https://www.imf.org/external/np/pp/eng/2013/042613.pdf, accessed on April 4th 2017.

2.2.2. Number of years between beginning of debt crisis and restructuring

The timing of the sovereign debt restructurings can be captured either by a dummy variable, see point 2.2.1, or by a continuous variable. A second independent continuous variable that captures the timing of the sovereign debt restructuring was constructed as the difference between the year of the restructuring and the year of the beginning of the debt crisis. The data about years of restructurings comes directly from Cruces and Trebesch dataset, while data about years of debt crises comes from that of Reinhart and Rogoff[36]. Reinhart and Rogoff focus on external debt crises. They define a sovereign default as "*the failure to meet a principal or interest payment on the due date (or within the specified grace period)*. They also specify that "*the episodes also include instances where rescheduled debt is ultimately extinguished in terms of less favourable than the original obligation*". Data about debt crises are available for 87 out of the 187 episodes of restructurings identified by Cruces and Trebesch.

2.3.Control variables

In order not to distort the estimate of the impact of the timing of the restructuring on the extent of losses suffered by creditors, other variables that influence the size of haircuts must also be included in the model. It is necessary to add a maximum of relevant independent variables, e.g. control variables, to obtain the most accurate estimate possible, or in other words, the least biased. Selected control variables were strongly inspired by those included in the Edwards model (2015). However, the way of constructing these variables may differ.

2.3.1. Individual country's economic situation and circumstances

The first category of control variables captures each country's economic situation and circumstances at the time of the negotiations.

Indebtedness: according to Yue (2012), the country's economic condition impacts the debt renegotiation result and there exists a positive correlation between the haircut and the debt-to-GDP ratio. Debt-to-GDP ratio is also included in Edwards' analysis (2015). A large majority of the data comes from the IMF[37]. This database, however, contains missing data, particularly

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[36] Reinhart, "Dates for Banking Crises, Currency Crashes, Sovereign Domestic of External Default (or Restructuring), Inflation Crises, and Stock Market Crashes (Varieties)", URL: http://www.carmenreinhart.com/data/browse-by-topic/topics/7/, accessed on April 4th 2017.

[37] IMF, "IMF Data: Historical Public Debt Database (HPDD)", URL: http://data.imf.org/?sk=806ED027-520D-497F-9052-63EC199F5E63&sId=1390030341854, accessed on April 4th 2017.

for the poorest countries (e.g. Guinea, Macedonia, Sudan, Tanzania, etc). Some of this data could be recovered in Das, Papaioannou and Trebesch's work[38].

Economic growth: in order to capture the economic situation of a country, the model includes economic growth. The data is provided by the World Bank[39]. Considering Yue's work (2012), a negative correlation between haircuts and GDP growth is expected. It is likely that a country with low economic growth will default on a larger scale than a country in a good economic situation. However, Tomz and Wright (2007) find that the relationship between growth and the decision to default is weak.

Poverty: Edwards (2015) investigates the impact of poverty on the size of haircuts and expects a positive relationship between those two variables. In fact, it is likely that creditors will accept greater losses if the country in trouble is poor because the default of a poor country will be less quickly perceived as opportunistic. Furthermore, according to Wright (2010) haircuts tend to decline as the income level of a country increases. The classification between poor and rich countries corresponds to that proposed by the World Bank[40]. This classification relies on estimates of gross national income (GNI) per capita, calculated with the so-called "Atlas" method[41]. The World Bank identifies four classes of countries: Low income, Lower middle income, Upper income and High income. It was decided to consider low income and lower middle income as poor countries. The thresholds that determine those classes evolve from year to year (see appendix 1). As the first data were published in 1987, the countries for which restructurings occurred between 1978 and 1987 were classified with their 1987 status. The countries for which restructurings occurred in 1987 and after were classified with their status of the year before the restructuring took place.

Region: variables identifying the region in which the default occurred may be added to the model. According to Wright (2010), besides the income of the country, it is relevant to disaggregate data by region. The continent of reference (in the constant) is Europe.

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[38] Das, U, Papaioannou, M., Trebesch, C. (2012 b), "Sovereign Debt Restructurings 1950-2010: Literature Survey, Data, and Stylized Facts", IMF Working Paper No. WP 12/203, International Monetary Fund.

[39] The World Bank, "Data Bank: World Development Indicators (GDP growth)", URL: http://databank.worldbank.org/data/reports.aspx?source=2&series=NY.GDP.MKTP.KD.ZG&country=#, accessed on April 4th 2017.

[40] The World Bank, "Country Classification: World Bank Country and Lending groups", URL: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519, accessed on April 4th 2017.

[41] For more information about the Atlas method, see "The World Bank Atlas method – detailed methodology", URL: https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-the-world-bank-atlas-method, accessed on April 4th 2017

Armed conflicts: as Edwards (2015) points out, it is likely that a sovereign involved in an armed conflict will find it more difficult to service its debt. Armed conflicts data comes from the combined "Uppsala Conflict Data Program (UCDP)" and "Peace Research Institute Oslo (PRIO)" dataset[42]. The database classifies conflicts according to several characteristics. It was chosen to retain armed conflicts, equated with war, resulting in the death of more than 1,000 people in the same year.

2.3.2. State of the global economy

The second category of variables tends to capture the state of the global economy at the time of each restructuring.

Global interest rates: as suggested by Edwards (2015), a variable reflecting global refinancing conditions is added in the model. Those conditions are represented by the 10-year interest rate on US bonds. The data came from the Federal Reserve Bank of St. Louis data bank[43]. The changes in the yield reflect the monetary policy implemented by the Federal Reserve: a monetary contraction (expansion) involves an increase (decrease) in the 10-Year Treasury Yield. Edwards expects a negative relationship between the size of haircuts and 10-Year Treasury Yield because creditors should be less generous in the event of a monetary contraction. However, this relationship may also be positive. Indeed, borrowers in trouble will find it harder to refinance themselves if interest rates are high. Therefore, larger haircuts may be expected.

Global recession: as highlighted by Edwards (2015), the extent of the losses incurred by creditors can be impacted by global recessions. As the author suggests, the global economic situation can be approached by that of the US economy. A positive relationship between the size of haircuts and global recession is expected. Indeed, a larger default on sovereign debt seems more legitimate when the global economy is not doing well (Tomz and Wright, 2007). The data about US recession is provided by the National Bureau of Economic Research[44]. For the record, the NBER defines a recession as a "*significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales*". Considering this definition, the

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[42] UCDP/PRIO, "UCDP/PRIO Armed Conflict Dataset", URL: http://ucdp.uu.se/downloads/, accessed on April 4th 2017.

[43] Federal Reserve Bank of St. Louis, "10-Year Treasury Constant Maturity Rate (GS10)", URL: https://fred.stlouisfed.org/series/GS10, accessed on April 4th 2017.

[44] National Bureau of Economic Research, "US Business Cycle Expansions and Contractions", URL: http://www.nber.org/cycles.html, accessed on April 4th 2017.

NBER identifies five periods of recession in the US economy between 1978 and 2013. Over this period, a recession period lasts 11.2 months on average.

Decade: variables that identify the decade in which the events of restructuring happen may also be included in the model. One can assume that the improvement of the crisis resolution mechanisms through the year tend to reduce losses incurred by the creditors in case of sovereign debt restructurings. One other view proposed by Reinhart and Rogoff (2008) is that restructurings supervision by institutions such as the IMF pushes creditors to be more lenient towards defaulting borrowers. The decade of reference (in the constant) is the 2000s.

2.3.3. Aspects of the sovereign debt restructurings

The last category of variables summarizes some specific aspects of the restructurings.

Brady deal: "*The Brady Plan was introduced in early 1989 and offers a comprehensive debt restructuring package for commercial bank debt. Under the plan commercial lenders/creditors can chose from a menu of instruments including buybacks, discount exchanges for debt stock reduction, and par exchanges at reduced interest rates for debt service reduction*", (OECD, 2013). As Edwards (2015) mentions, a dummy variable referring to the Brady agreements can be included in the model. The data come from the Cruces and Trebesch updated database presented in the beginning of section 2. Edwards expects a positive relationship between the participation in the Brady deal and the size of haircuts. Indeed, Brady agreements constrain creditors to make concessions to resolve the serious debt problem that poor countries had to deal with (OECD, 2013).

Support from international organizations: according to Edwards (2015), some defaults may be partly financed by the international donor community, e.g. IMF, World Bank, regional developments banks and/or bilateral aid agencies, that provides funds in order to facilitate the exchange. The data about financial support comes from Cruces and Trebesch's initial database. This kind of financial assistance is granted on strict conditions to defaulting countries which face significant difficulties. Such defaults will be less quickly considered opportunistic by creditors. One can therefore expect a positive relationship between haircuts and support from the international community, creditors should be more willing to accept larger losses (Edwards, 2015).

*Table **5.1**: Summary – variables and descriptions*

Name	Date	Frequency	Unit
Dependent variable			
Haircut_SZ	*t*	Monthly/yearly	Percentage
Haircut_Market	*t*	Monthly/yearly	Percentage
Independent variables			
Timing	*t*	-	=1 in case of pre-emptive restructuring, 0 otherwise
Timing_yrs	*t*	Yearly	Number of years
Control variables			
Individual country's economic situation and circumstances			
Debt_GDP	*t-1*	Yearly	Percentage
GDP_growth	*t-1*	Yearly	Percentage
Poor	*t-1*	Yearly	=1 if the debtor country is classified as poor, 0 otherwise
Africa	*t*	-	=1 if the debtor country is located in "Africa", 0 otherwise
America	*t*	-	=1 if the debtor country is located in "America", 0 otherwise
Asia	*t*	-	=1 if the debtor country is located in "Asia", 0 otherwise
Conflict	*t*	Yearly	=1 if the debtor country is involved in an armed conflict, 0 otherwise
State of the global economy			
Int_rate_US	*t*	Monthly/yearly	Percentage
Recession_US	*t*	Yearly	=1 if the US economy is in recession, 0 otherwise
Seventies	*t*	-	=1 if the restructuring episode occurs during the 1970s, 0 otherwise
Eighties	*t*	-	=1 if the restructuring episode occurs during the 1980s, 0 otherwise
Nineties	*t*	-	=1 if the restructuring episode occurs during the 1990s, 0 otherwise
Aspects of sovereign debt restructurings			
Brady	-	-	=1 if the restructuring was part of the Brady deal from the early 1990s, 0 otherwise
Fin_support	-	-	=1 if the international donor community participated in the restructuring, 0 otherwise

2.4.Descriptive statistics

As already mentioned in the previous subsection, some data is not available for all restructurings listed by Cruces and Trebesch. This mainly concerns the following variables: Debt_GDP (164 instead of 187) and Timing (182 instead of 187). Complete data was only obtained for 164 restructurings out of 187. An exhaustive list of sovereign debt restructuring episodes selected in the complete sample is available in appendix 2. The two following tables present descriptive statistics of quantitative and qualitative variables of this complete sample.

*Table **5.2**: Descriptive statistics of quantitative variables of the complete sample*

Variable	Observations	Mean	Standard dev.	Min	Max
Haircut_SZ	164	36.686 %	27.118 %	-9.8 %	97 %
Haircut_Market	164	39.809%	26.991%	-9.8%	97%
Debt_GDP	164	89.561 %	79.370 %	18.51 %	784.35 %
GDP_growth	164	2.052 %	5.549 %	-26.479 %	23.598 %
Int_rate_US	164	8.042 %	2.713 %	1.97 %	14.94 %
Timing_yrs	87	4.943	4.463	0	20

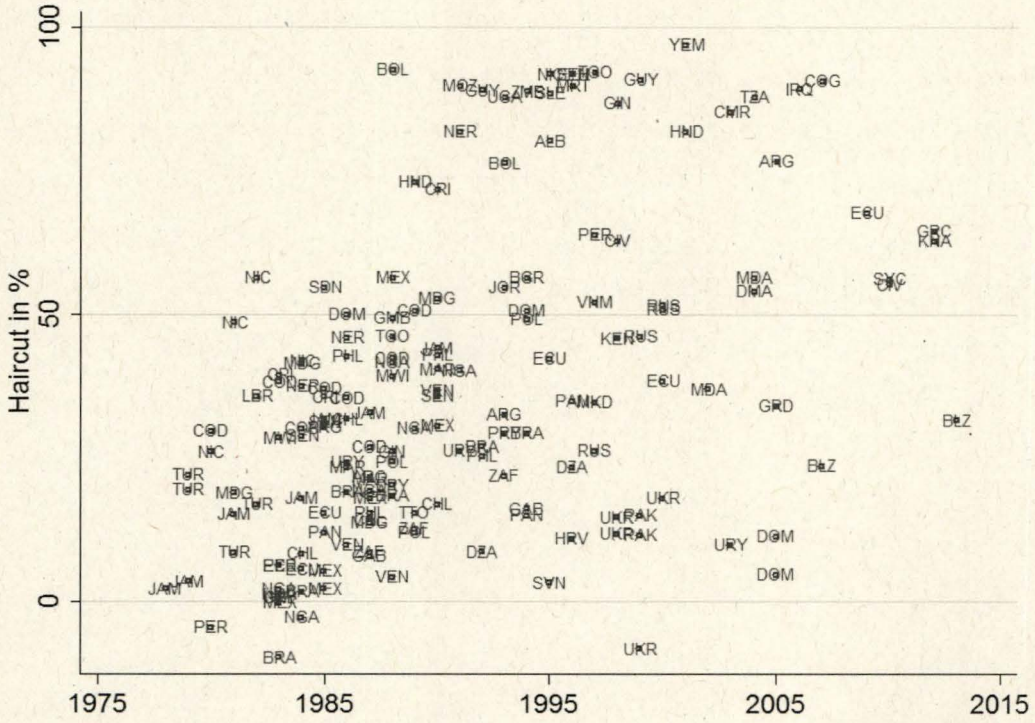
*Table **5.3**: Descriptive statistics of qualitative variables of the complete sample*

		Freq.	Percent	Cum.
Timing	Pre-emptive	65	39.63	39.63
	Post default	99	60.37	100
Poor	Poor debtor	131	79.88	79.88
	Rich debtor	33	20.12	100
Region	Africa	58	35.37	35.37
	America	73	44.51	79.88
	Asia	10	6.10	85.98
	Europa	23	14.02	100
Conflict	Conflict	14	8.54	8.54
	No conflict	150	91.46	100
Recession	Global recession	16	9.76	9.76
	No global recession	148	90.24	100
Decade	Seventies	4	2.44	2.44
	Eighties	79	48.17	50.61
	Nineties	56	34.15	84.76
	2000	25	15.24	100
Brady deal	Brady	17	10.37	10.37
	No Brady	147	89.63	100
Financial support	Fin support	21	12.80	12.80
	No fin support	143	87.20	100

In the complete sample of 164 episodes of restructuring, the average haircut computed by Sturzenegger and Zettelmeyer's approach, between 1978 and 2013, is 37 percent, while the average market haircut over the same period is 40 percent. As expected (see chapter II section 3), the market haircuts tend to be larger than the Sturzenegger and Zettelmeyer haircuts. On average, creditors could preserve almost two-thirds of their assets value in restructurings of the past decades. Cruces and Trebesch (2013) suggest that the size of losses incurred by investors is surprisingly low when compared to corporate debt exchanges. According to Moody's (2008) the average haircut of US corporate bond and loan restructurings, between 1982 and 2005, was 64 percent, that is, almost twice as high as for sovereign debt. It is surprising as US corporate debt can be enforced in courts, in contrast to sovereign debt, and as any corporate debt restructuring is subject to a bankruptcy regime (Cruces and Trebesch, 2013).

Figure 5.1 below plots the estimates of Haircut_SZ expressed in percentage points across countries and time At first glance, large variability in haircut size across space and time can be observed. Furthermore, the dispersion in haircuts seems to have increased over time. Finally, this graph illustrates that large variations in haircuts have been observed in recent years, as already discussed in chapter II.

*Figure **5.1**: Estimates of Haircut_SZ expressed in percentage points across countries and time*



Looking at the descriptive table 5.3 below, the average haircut is higher in case of 'post-default restructurings' than in case of 'pre-emptive restructurings'. It seems consistent with the recent sovereign debt literature (Chuhan and Sturzenegger, 2005; Benjamin and Wright, 2009; IMF 2013 a).

*Table **5.3**: Descriptive statistics "Haircut_SZ", sorted by "Timing"*

	Observations	Mean	Std dev.	Min	Max
Post-default restructuring					
Haircut_SZ (in %)	99	47.255	27.310	-2.8	97
Pre-emptive restructuring					
Haircut_SZ (in %)	65	20.589	17.175	-9.8	64.6

3. Empirical results

Table 5.5: Haircut equations (OLS regression)[45]

	(1) Haircut_SZ	(2) Haircut_SZ	(3) Haircut_SZ	(4) Haircut_SZ	(5) Haircut_SZ	(6) Haircut_Market
Timing	-12.52***	-	-16.40***	-	-12.57***	-12.87***
	(-4.44)		(-3.97)		(-4.71)	(-4.65)
Timing_yrs	-	-	-	1.755**	-	-
				(2.43)		
Debt_GDP	0.0713***	0.0763***	0.135***	0.131***	0.0723***	0.0724***
	(4.28)	(4.33)	(3.75)	(3.37)	(4.44)	(4.30)
GDP_growth	0.411*	0.434*	0.414	-0.0385	0.420*	0.483**
	(1.84)	(1.83)	(1.31)	(-0.11)	(1.90)	(2.10)
Poor	6.889**	9.202***	6.103	6.851	6.536*	6.413*
	(2.02)	(2.64)	(1.31)	(1.36)	(2.01)	(1.90)
Africa	4.943	6.375	-3.141	-1.475	-	-
	(1.120)	(1.47)	(-0.43)	(-0.18)		
America	4.209	1.692	6.484	4.080	-	-
	(1.05)	(0.40)	(0.93)	(0.55)		
Asia	3.830	0.808	10.21	-2.176	-	-
	(0.63)	(0.13)	(0.93)	(-0.20)		
Conflict	6.772	7.581	3.955	4.437	6.980	6.218
	(1.49)	(1.57)	(0.54)	(0.57)	(1.62)	(1.39)
Int_rate_US	-1.932**	-1.976**	-2.675***	-2.491*	-2.737***	-2.698***
	(-2.29)	(-2.21)	(-2.11)	(-1.82)	(-5.35)	(-5.07)
Recession_US	7.410*	5.452	13.32**	13.65*	9.340**	10.29**
	(1.67)	(1.16)	(2.17)	(2.06)	(2.25)	(2.38)
Seventies	-15.57*	-19.76**	6.852	5.754	-10.38	-12.97
	(-1.70)	(-1.91)	(0.46)	(0.36)	(-1.34)	(-1.61)
Eighties	-8.636	-9.718	0.165	-3.890	-	-
	(-1.42)	(-1.50)	(0.02)	(-0.40)		
Nineties	-13.05***	-13.55***	-2.509	-7.868	-9.341***	-9.466***
	(-2.92)	(-2.86)	(-0.34)	(-0.99)	(-2.92)	(-2.85)
Brady	11.48**	15.92***	9.610	7.876	12.58***	17.49***
	(2.36)	(3.15)	(1.46)	(1.05)	(2.71)	(3.62)
Fin_support	38.77***	42.00***	18.06*	9.501	40.56***	37.13***
	(8.41)	(8.69)	(1.89)	(0.84)	(9.17)	(8.08)
Constant	42.14***	35.84***	35.97***	25.52**	46.56***	49.43***
	(7.28)	(6.02)	(3.52)	(2.17)	(9.24)	(9.44)
Observations	164	164	**87**	**87**	164	164
R2	0.7220	0.6849	0.6141	0.5648	0.7164	0.6910
Adjusted R2	0.6939	0.6553	0.5325	0.4729	0.6958	0.6686
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AIC	1368.918	1387.467	743.0509	753.5007	1364.227	1376.734
BIC	1418.516	1433.965	782.5054	792.9552	1401.425	1413.933

[45] *t statistics in parentheses, * p<0.1, ** p<0.05, *** p<0.01*

OLS (ordinary least squares) regression analysis was applied in order to determine the factors that impact the size of haircuts and test the following hypothesis: a pre-emptive sovereign debt restructuring results in lower creditors' losses than a post-default restructuring.

3.1.Control variables

In the first specification (equation (1) in table 5.5, stata output available in appendix 3), 72.20 percent of variations in the dependent variable is explained by the explanatory variables included in the model. The adjusted R-squared, which adjusts the statistic based on the number of independent variables included in the model, is 69.39 percent. The Fisher test allows to reject the null hypothesis that all coefficients are equal to zero (Verardi, 2015).

As regards the control variables, the results tend to confirm the intuitions formulated in section 2. The coefficients of three of these variables are significantly different from 0 at a level of 1 percent, that is, "Debt_GDP", "Fin_support" and "Nineties"[46]. The first two variables are positively correlated with the size of the haircut, while the latter is negatively correlated with the dependent variable. The positive correlation between the extent of haircuts, the ratio Debt to GDP (measured one year before the restructuring) on the one hand and the financial support on the other hand, were expected. The coefficients of three other control variables are significantly different from 0 at a level of 5 percent, "Poor", "Brady" and "Int_rate_US"[47]. Again, the first two variables are positively correlated with the size of the haircut, while the latter is negatively correlated with the dependent variable. These results are in line with the expectations discussed in the previous section. Finally, three control variables are significantly different from 0 at a level of 10 percent, "GDP_growth", "Recession_US" and "Seventies"[48].

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[46] Firstly, ceteris paribus, a one percentage point increase in the ratio Debt to GDP, measured one year before restructuring, increases the haircut size by 0.0713 percentage points. Secondly, ceteris paribus, receiving financial support from a third party at the time of the restructuring increases, on average, the haircut size by 38.77 percentage points. Finally, ceteris paribus, a restructuring that takes place during the 1990s results, on average, in a haircut 13.05 percentage points lower than a restructuring that occurs in the 2000s.

[47] Firstly, ceteris paribus, a restructuring that involves a poor debtor country results, on average, in a haircut 6.889 percentage points higher than a restructuring that involves a rich debtor sovereign. Secondly, ceteris paribus, a restructuring that is part of Brady's plan results, on average, in a haircut 11.48 percentage points higher that a restructuring that is not part of it. Finally, an increase in 10-year Treasury Yield in the United States by one percentage point, reduces, on average, the haircut size by 1.932 percentage points.

[48] Firstly, ceteris paribus, a one percentage point increase in the GDP growth, measured one year before restructuring, increases the default size by 0.411 percentage points. Finally, ceteris paribus, a restructuring that takes place during a global recession results, on average, in a haircut 7.410 percentage points higher than a restructuring that does not occur during a global recession. Finally, ceteris paribus, a restructuring that takes place during the 1970s results, on average, in a haircut 15.57 percentage points lower than a restructuring that occurs in the 2000s.

"Seventies" is negatively correlated with the dependent variable. The correlations between the two other variables and the size of the haircut are positive. The positive correlation between GDP growth and the haircut size seems contrary to the intuitions developed in the previous section. For the record, Tomz and Wright (2007) point out that a larger default on sovereign debt seems more legitimate when domestic economic conditions were unfavourable. Nevertheless, the authors conclude that the negative relationship between default and economic performance is unexpectedly weak. If debtor countries generally have defaulted during bad times, some have suspended payments when the domestic economy is doing well while some others maintain debt service when they face adverse shocks.

Other control variables do not appear to be significant. On the one hand, "Conflict" and variables identifying the region of the country are positively correlated to the size of the haircut. Variables identifying the region indicate lower haircuts in European countries compared to those in other continents. These relations seem consistent with the intuitions developed in the previous section. On the other hand, "Eighties" is negatively correlated to the size of the haircut. It would appear that haircuts are higher in the 21st century than in the eighties.

3.2. Test of the hypothesis – a pre-emptive sovereign debt restructuring results in lower losses incurred by creditors than a post-default restructuring

The independent variable on which the empirical analysis focuses, i.e. "Timing", is significantly different from 0 at a level of 1 percent. This variable is negatively correlated to the size of the haircut. Ceteris paribus, a pre-emptive restructuring results, on average, in a haircut 12.52 percentage points lower than a post-default restructuring. In the sample selected, the timing of the restructuring thus seems to significantly explain the variations in the size of the haircuts and the hypothesis is confirmed.

3.2.1. Complete sample – without "Timing"

In order to confirm the validation of the hypothesis, a second equation without the variable "Timing" has been estimated (see equation (2) in table 5.5, stata output available in appendix 4). In this specification, the variable "Recession_US" becomes non-significantly different from 0. No big changes are observed in the coefficients of significant variables. The Akaike information criterion (AIC) and Bayesian information criterion (BIC) [49] are higher in equation

[49] The Akaike information criterion (AIC) and the Bayesian information criterion (BIC) discriminate between several models. These two criteria consider the trade-off between the overall performance of the models and the number of variables included in the specification (BIC penalizes larger models than AIC). One will prefer the model with the more negative AIC and/or BIC (De Walque, 2016).

(2) than in equation (1). It tends to confirm the explicative power of the variable "Timing" in the size of haircuts.

3.2.2. Subsample – with "Timing_yrs"

Finally, to confirm the hypothesis, the independent binary "Timing" variable was replaced by another continuous variable, that is, "Timing_yrs". For the record, this new independent variable measures the number of years between the beginning of the debt crisis, as identified by Reinhart and Rogoff, and the year of the restructuring, as identified by Cruces and Trebesch. Given the availability of Reinhart and Rogoff data, this new regression is performed on a sub-sample that contains 87 restructuring episodes out of the 164 restructuring episodes included in the complete sample. Description of this subsample is available in appendix 5. Compared to the complete one, the average haircut is lower in the subsample. Moreover, it contains a larger share of pre-emptive restructurings. The distribution of restructurings by region is also affected: the share of restructurings in Africa decreases significantly, while the share of restructurings in Asia has increased. Finally, the sub-sample includes a greater share of restructurings associated with the Brady plan and a drastically smaller share of restructuring episodes accompanied by financial support.

In order to determine the impact of replacement of the independent variable "Timing" by "Timing_yrs", equation (1) was re-estimated using the subsample (equation (3) in table 5.5, stata output available in appendix 6). "GDP_growth", "Poor", "Seventies", "Nineties" and "Brady" variables are no longer significant. In absolute value, the coefficients of variables that remain significant tend to be larger, except for variable "Fin_support". Moreover, the signs of these coefficients do not change.

Equation (4) (see equation (4) in table 5.5, stata output available in appendix 7) replaces independent variable "Timing" by "Timing_yrs" in equation (3). The coefficient of "Timing_yrs" is significantly different from 0 at a level of 5 percent. Ceteris paribus, an increase of one unit in the number of years between the beginning of the debt crisis and the restructuring, results in an increase of the haircut of 1.755 percentage points, on average. The positive correlation between "Timing_yrs" and the dependent variable tends to confirm the hypothesis: a pre-emptive sovereign debt restructuring results in lower losses incurred by creditors than a post-default restructuring. It seems logical that the situation of the debtor degrades over time and that it can pay less than it had to repay its creditors, ceteris paribus. This is also consistent with the results of equation (1), which indicate that pre-emptive restructuring results in lower

haircuts, ceteris paribus. Furthermore, there is no significant change from equation (3) in the coefficients of significant control variables. Since this new regression brings together observations from different authors, this one is less precise and less efficient than the first. However, this new regression does not contradict the message of the first, on the contrary it confirms it.

4. Robustness tests, endogeneity and alternative measures of investors' losses

4.1. Tests for multicollinearity

In the presence of multicollinearity, the estimates from the empirical analysis could be inaccurate. Multicollinearity increases the variance of the regression coefficients and makes them unstable and difficult to interpret (Verardi, 2015). The correlation matrix of independent variables is available in appendix 8. Significant pairwise correlations above 0.5 at the 5 percent level are observed three times: between "America" and "Africa", between "Int_rate_US" and "Eighties" and between "Eighties" and "Nineties". To deal with residual concerns about multicollinearity, the variance-inflation factors (VIF) for the first model were computed (see appendix 9) (Verardi, 2015). Results are in line with those of the correlation matrix. The mean VIF of both models concludes that predictors are moderately correlated.

The first model was re-estimated without "Eighties" and region variables (see equation (5) in table 5.5., stata output available in appendix 10) which seem to be interrelated to other independent variables and which seem to have explaining power in the size of haircuts.

There is no significant change in the coefficients (equation (5) is compared to equation (1) in table 5.5), except for the coefficient of "Conflict" variable that becomes significantly different from 0 at the 10 percent level in equation (5). "Conflict" is positively correlated to the size of haircuts. This result is conform to the intuition developed in section 2. The conclusions presented in the previous section still hold. Especially, the negative relationship between the "Timing" variable and the size of haircuts is still significant at the level of 1 percent. The VIF was computed for models (5), see appendix 11. These factors tend to decrease with the suppression of region and "Eighties" variables. The mean VIF concludes that there is no evidence of high inter-correlation in those models. Finally, the Akaike and Bayesian information criteria of equations (5) are lower than those of equations (1). It confirms that the new model is preferred to the old one. If this 'parcimonious' model is preferred, it may also be run with the "Timing_yrs" variable.

4.2.Endogeneity

From a methodological point of view, an essential question is whether the estimates may be subject to some endogeneity problems. Analysis of the equations tends to indicate that almost every regressor is either an exogenous variable or, given the lags structure, a predetermined variable (Edwards, 2015). However, the timing of debt restructurings may be endogenous. In this case, a reverse causality problem could emerge and coefficients estimates could be biased. To address this issue of potential endogeneity, the instrumental variable (IV) approach could be used[50] (Verardi, 2015). In order to test for endogeneity, the correlation between the independent variable "Timing" and the residuals of equation (5) was computed. This correlation is zero, which does not seem to indicate the presence of an endogeneity problem. Moreover, in order to reduce the risk of such an issue, an alternative independent variable, "Timing_yrs" was included in the model (see section 3 point 3.2.2).

4.3.Alternative measures of investors' losses

As introduced in section 2, an alternative measure of haircuts compares the face value of the old debt to the market value of the new debt, that is, market haircut. For the complete sample, the difference between both measures is -3.123 percentage points (see appendix 13) and the correlation between both measures of haircuts is 0.9796. Strurzenegger and Zettelmeyer's approach leads to lower haircut estimates than the market approach. The difference between these measures comes from the comparison between the face value and the present value of the old debt (Cruces and Trebesch, 2013)[51]. When the haircut regression (5) is re-estimated with the market haircut as the dependent variable, results are quite similar and conclusions still hold (see equation (6) in table 5.5, stata output available in appendix 14). Especially, the negative relationship between "Timing" variable and the size of haircuts is still significant at the level of 1 percent.

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[50] Forni et al. (2016) use the probability that a restructuring occurs in any given year post default as an instrument for the timing dummy. They proxy this probability by using the distribution over time of restructurings after default. For further information, see Forni et al. (2016).

[51] Cruces and Trebesch (2013) argue that, when r_t^i is larger than the interest rate on the old debt, the present value of the old debt is smaller than par and then $H_M > H_{SZ}$ (see definitions of H_M and H_{SZ} and interpretations in chapter II section 3).

5. Limitations of the empirical study

In order to conclude this analysis, it is important to consider its potential limitations. First of all, the variable that measures the indebtedness of the debtor country (i.e. "Debt_GDP" measured one year before the restructuring) is relatively imprecise. The debt-to-GDP ratio varies according to the sources used. Three different sources were considered: IMF, World Bank and Reinhart database[52]. It was decided to work with data from the IMF, as this source provides the most complete dataset. However, as already mentioned in section 2, the indebtedness variable restricts the complete sample from 187 to 164 episodes of restructuring, which reduces the quality of the estimate. Since the excluded restructurings mainly concerned the countries of Eastern Europe in the 1980s, the sample could be biased. Moreover, some other variables could be defined more precisely. For instance, the "Poor" variable, that identifies debtor countries considered poor one year before the restructuring, does not distinguish low income from lower middle income sovereigns. Furthermore, some variables that control the individual country's economic situation and circumstances could be constructed in a different way. For instance, indebtedness or economic growth, which are measured one year before the restructuring episode, could be measured two or three years before. The equations reported above could be re-estimated using larger windows for defining some variables, such as "Conflict", as tested by Edwards (2015).

[52] http://www.carmenreinhart.com/data/browse-by-topic/topics/9/

VI. CONCLUSION

It is rather difficult to accurately assess the consequences a debtor country would face if it decided to default or restructure its debt, with each episode having its own specificities. Throughout this thesis, it was attempted to establish by which channels the sovereign defaults affect an economy and its creditors, while trying to understand why the consequences were not identical between the different episodes.

The academic literature admits that sovereign debt default is costly for the debtor, even if all economists do not agree on the actual nature and extent of these costs. Chapter III provides an overview of the most cited and empirically studied costs of default: exclusion of international capital market, decline in output and drop in trade, reputational spillovers, dislocation of the financial sector, currency depreciation, and military intervention. Given that no supranational authority has the power to force a country to serve its debts, the costs of default play a key role in understanding why a government generally services its debts. If most of the costs studied, taken individually, do not answer the question "why does a government generally repay its debts?" it seems that the combination of these can do so. Therefore, it is imperative for any debtor country to understand these different costs and how they interact in order to estimate the total cost of an episode of sovereign debt default as accurately as possible. Chapter III also highlights that the extent and importance of these costs varies across defaults episodes.

Chapter IV focuses on the gains for a debtor country to restructure its debt. If a restructuring, which can be considered as a partial default (see chapter II), reduces the costs associated with the default, it also generates value for the debtor. Essentially, a restructuring reduces the debt overhang effects, allows to reallocate resources, and can foster to 'good equilibrium' in the context of a multiple equilibria model, as that developed by Calvo (1988). It therefore appears that the restructuring improves the debtor's situation. Since the repayment of creditors is strongly related to the debtor's situation, the combination of chapter III and IV also contributes to our understanding of the question "why does a creditor enter into a restructuring?" Indeed, an improvement of the economic conditions of the debtor can increase its solvency and hence reduce the restructuring losses incurred by the creditors.

Based on a sample of 164 restructuring episodes between 1978 and 2013, the empirical analysis presented in chapter V addresses this issue of the repayment potential by focusing on the impact of the timing of a restructuring on losses incurred by the creditor. On the one hand, a broader restructuring facilitates the return to a balanced budget. On the other hand, such a restructuring

increases the likelihood that the default will be considered to be strategic by the creditors, which negatively affects the reputation of the debtor country. Empirical results of the analysis confirm the hypothesis, "a pre-emptive sovereign debt restructuring results in lower losses incurred by creditors than a post-default restructuring". Based on Cruces and Trebesch (2013) as well as Edwards (2015), the investors' losses is measured by haircuts. The authors present two approaches to compute haircuts: Sturzenegger and Zettelmeyer haircut and market haircut. This empirical analysis focuses on the first approach, but the second was also tested and the results don't change significantly. The timing of a restructuring can be captured either by a dummy variable, which distinguish pre-emptive from post default restructuring, or by a continuous variable, which counts the number of years between the beginning of the debt crisis and the restructuring settlement. In both cases, a negative correlation between the timing variable and the haircut variable was found. Other parameters also appear to have a significant impact on the scale of the restructuring. Examples include, but are not limited to: the conditions of global refinancing, the level of indebtedness of the debtor country or the cyclical position of the world economy.

Finally, it is important to remember that this analysis tends only to show that a pre-emptive sovereign debt restructuring significantly results in lower losses incurred by creditors than a post-default restructuring, nothing was concluded about their influence on the occurrence of a future default. It might be interesting to carry out an empirical study on this subject in the future.

VII. BIBLIOGRAPHY

ALESSI, C., McBRIDE, J. (2015), "The Eurozone in Crisis", CFR (Feb 11 2015), URL: http://www.cfr.org/eu/eurozone-crisis/p22055, accessed on November 11th 2016.

AGRONOVSKY, A., TREBESCH, C. (2009), "Trade credit during financial crises: Do negotiated agreements work?", In *Credit, Currency, or Derivatives: Instruments of Global Financial Stability Or Crisis?*, ed. JJ Choi, MG Papaioannou. London: Emerald Publishing Group.

AGUIAR, M., GOPINATH, G. (2006), "Sovereign Debt", in Gopinath G., Helpman E. and Rogoff K., *The Handbook of International Economics*, Volume 4.

AMADOR, M. (2009), "Sovereign Debt and the Tragedy of the Commons.", Unpublished Paper, Stanford University.

ANGELETOS, G.M. (2013), "Crises and Multiple Equilibria", Lecture Notes, MIT.

ARELLANO, C. (200), "Default Risk and Income Fluctuations in Emerging Economies.", *American Economic Review 98(3),* pp. 690-712.

ARTETA, C., HALE, G. (2006), "Sovereign Debt Crises and Credit to the Private Sector", International Finance Discussion Papers No. 878, Board of Governors of the Federal Reserve System, Federal Reserve Bank of San Francisco.

ASONUMA, T., TREBESCH, C. (2016), "Sovereign Debt Restructurings: Preemptive or Post-Default", *Journal of the European Economic Association*, Vol. 14 (1), pp. 175-214.

BEERS, DT., CHAMBERS, J. (2006), "Default Study: Sovereign Defaults At 26-Year Low, To Show Little Change In 2007", *Standard & Poor's RatingsDirect.*

BENJAMIN, D., WRIGHT, M J.L. (2009), "Recovery Before Redemption: A Theory of Delays in Sovereign Debt Renegotiations", URL: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1392539, accessed on March 17th 2017.

BODART, V. (2016), "Relation Monétaires Internationales", Lecture notes, Université Catholique de Louvain.

BOGAERT, H. (2015), "Politique économiques et finances publiques - Chapitre 5: Politique budgétaire dans la zone euro: un difficile parcours du combatant", Lecture notes, Université de Namur.

BOLTON, P., JEANNE, O. (2011), "Sovereign Default Risk and Bank Fragility in Financially Integrated Economies", NBER Working Paper No. 16899, National Bureau of Economic Research.

BORDO, M., EICHENGREEN, B., KLINGEBIEL, D., SOLEDAD MARTINEZ-PERIA, M. (2001), "Is the Crisis Problem Growing More Severe?", *Economic Policy* 16, April 2001, 51-82.

BORENSZTEIN, E., PANIZZA, U. (2009), "The Costs of Sovereign Default", *IMF Staff Papers (56)*, pp. 683-741.

BORENSZTEIN, E., PANIZZA, U. (2010), "Do Sovereign Defaults Hurt Exporters?", *Open Economies Review 21*, pp. 393-412.

BRONER, F., MARTIN, A., VENTURA, J. (2006), "Sovereign Risk and Secondary Markets", NBER Working Paper No. 12783, National Bureau of Economic Research.

BRONER, F., VENTURA, J. (2006), "Globalization and Risk Sharing", NBER Working Paper No. W12482, National Bureau of Economic Research.

BUITER, W., SIBERT, A. (2006), "How the Eurosystem's Treatment of Collateral in its Open Market Operations Weakens Fiscal Discipline in the Eurozone (and What to Do about It)", *Fiscal Policy and the Road to the Euro,* National Bank of Poland, pp. 29-60.

BULOW, J., ROGOFF, K. (1988), "Multilateral Negotiations for Rescheduling Developing Country Debt: A Bargaining-Theoretic Framework", *IMF Staff Papers (35),* pp. 644-657.

BULOW, J., ROGOFF, K. (1989 c), "A Constant Recontracting Model of Sovereign Debt", *The Journal of Political Economy 97*, pp. 155-178.

BULOW, J., ROGOFF, K. (1989 a), "Sovereign Debt: Is to Forgive to Forget?", *The American Economic Review*, Vol. 79, No.1, (Mar., 1989), pp. 43-50.

BULOW, J., ROGOFF, K. (1989 b), "Sovereign Debt Repurchases: No Cure for Overhang", NBER Working Paper No. 2850, National Bureau of Economic Research.

BULOW, J., ROGOFF, K. (2015), "Why sovereigns repay debts to external creditors and why it matters", *Vox CEPR's Policy Portal (10 June 2015)*, URL: http://voxeu.org/article/why-sovereigns-repay-debts-external-creditors-and-why-it-matters, accessed on April 10th 2017.

CALVO, G. (1988), "Servicing the Public Debt: The Role of Expectations", *The American Economic Review*, Vol. 78, No. 4 (Sep., 1988), pp. 647-661.

CALVO, G., LEIDERMAN, L., REINHART, C. (1993), "Capital Inflows and Real Exchange Rate Appreciation in Latin America", *IMF Staff Papers* Vol. 40 No.1, International Monetary Fund.

CANTOR, R., PACKER, F. (1996), "Determinants and Impact of Sovereign Credit Ratings", *Policy Review*, Vol. 2 (October), Federal Reserve Bank of New York, pp. 37-53.

CATAO, L.A.V., FOSTEL, A., KAPUR, S. (2009), "Persistent Gaps and Default Traps", *Journal of Development Economics*, Vol. 89 (2), pp. 271-284.

CHAMP, B., FREEMAN, S., HASLAG, J. (2016), "Modelling Monetary Economies", pp. 299-376.

CHUHAN, P., STURZENEGGER, F. (2005), "Default episodes in the 1900's: what have we learned? Managing Economic Volatility and Crises: A Practitioner's Guide", Cambridge University Press.

COHEN, D., SACHS, J. (1986), "Growth and External Debt under Risk of Debt Repudiation", *European Economic Review 30*, pp. 529-60.

COLE, H.L, KEHOE, P.J. (1988), "Models of Sovereign Debt: Partial Versus General Reputations", *International Economic Review* 39, pp. 55-70.

CRUCES, J.J., TREBESCH, C. (2013), "Sovereign Defaults: The Price of Haircuts", *American Economic Journal: Macroeconomics*, 5(3), pp. 85-117.

DANIELS, K., RAMIREZ, G. (2007), "Debt restructurings, holdouts, and exit consents", URL: http://www.sciencedirect.com/science/article/pii/S1572308907000162, accessed on February 13th 2017.

DAS, U., PAPAIOANNOU, M.G, TREBESCH, C. (2010), "Sovereign default risk and private sector access to capital in emerging markets", IMF Working Paper No. WP 10/10, International Monetary Fund.

DAS, U., PAPAIOANNOU, M.G, TREBESCH, C. (2012 a), "Restructuring Sovereign Debt: Lessons from Recent History", International Monetary Fund.

DAS, U, PAPAIOANNOU, M.G, TREBESCH, C. (2012 b), "Sovereign Debt Restructurings 1950-2010: Literature Survey, Data, and Stylized Facts", IMF Working Paper No. WP 12/203, International Monetary Fund.

DE CROMBRUGGHE, A. (2016), "Corporate Finance and Financial Intermediation", Lecture notes, Université de Namur.

DE PAOLI, B., HOGGARTH, G. SPORTA, V. (2009), "Output costs of sovereign crises: some empirical estimates", Bank of England Working Paper No. 362.

DESHPANDE, A. (1995), "The debt overhang and the disincentive to invest", *Journal of Development Economics*, Vol. 52 (1997), pp. 169-187.

DE WALQUE, G. (2016), "Macroeconomics and Business Cycles: Univariate Time Series Analysis in Theory", Lecture notes, Université Catholique de Louvain.

DIAS, D.A., RICHMOND, C. (2009), "Duration of Capital Market Exclusion: An Empirical Investigation", UIUC Working Paper.

EATON, J., GERSOVITZ, M. (1981), "Debt with Potential Repudiation: Theoretical and Empirical Analysis", *The Review of Economic Studies*, Vol. 48, No. 2 (Apr., 1981), pp. 289-309.

EDWARDS, S. (2015), "Sovereign Default, Debt Restructuring, and Recovery Rates: Was the Argentinean "Haircut" Excessive?", *Open Economies Review*, *26*(5), 839-867, NBER Working Paper No. 20964, National Bureau of Economic Research.

EICHENGREEN, B., HAUSMANN, R. (1999), "Exchange Rates and Financial Fragility", *New Challenges for Monetary Policy*, pp.329-68, Federal Reserve Bank of Kansas City.

EICHENGREEN, B., HAUSMANN, R., PANIZZA, U. (2005), "The Mystery of Original Sin", *Other People's Money*, pp. 233-65, Chicago: University of Chicago Press.

ENGLISH, W. (1996), "Understanding the Cost of Sovereign Default: American State Debts in the 1840's", *American Economic Review 86*, pp. 259-275.

EUROPEAN CENTRAL BANK, "Annual Report 2015", URL: https://www.ecb.europa.eu/pub/pdf/annrep/ar2015fr.pdf?33442d868260d516a9b38063a4ce961c, accessed on November 11th 2016.

FEDERAL RESERVE BANK OF ST. LOUIS, "10-Year Treasury Constant Maturity Rate (GS10) ", URL: https://fred.stlouisfed.org/series/GS10, accessed on April 4th 2017.

FINNEMORE, M. (1995), "Sovereign Default and Military Intervention", In *91st Annual Meeting of the American Political Science Association, San Francisco.*

FORNI, L., PALOMBA, G., PEREIRA, J., RICHMOND, C. (2016), "Sovereign Debt Restructuring and Growth", IMF Working Paper No. WP 16/147, International Monetary Fund.

FRANKEL, J, ROSE, A. (1996), "Currency Crashes in Emerging Markets: An Empirical Treatment", *Journal of International Economics 41(3-4),* pp. 651-366.

FUENTES, M., SARAVIA, D. (2010), "Sovereign defaulters: Do international capital markets punish them?", *Journal of Development Economics*, *91*(2), 336-347.

GIANVITI, F., KRUEGER, A O., PISANI-FERRY, J., SAPIR, A., von HAGEN, J. (2010), "A European Mechanism for Sovereign Debt Crisis Resolution: A Proposal", URL: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.670.8852&rep=rep1&type=pdf, accessed on February 14th 2017.

GENNAIOLI, N., MARTIN, A., ROSSI, S. (2010), "Sovereign Default, Domestic Banks and Financial Institutions", *The Journal of Finance* 69(2) (April 2014), pp. 819-866.

GROSSMAN, H., HAN, T. (1997), "Sovereign debt and consumption smoothing", NBER Working Paper No. 5997, National Bureau of Economic Research.

GROSSMAN, H., VAN HUYCK, J. (1989), "Sovereign Debt as a Contingent Claim: Excusable Default, Repudiation, and Reputation", *American Economic Review*, Vol 78, No. 5, pp.1088-197.

HANKE, S. H., KRUS, N. (2012), "World Hyperinflations", Cato Working Paper No. 8, Cato Institute.

HILSCHER, J., NOSBUCH, Y. (2008), "Determinants of Sovereign Risk: Macroeconomic Fundamentals and the Pricing of Sovereign Debt", URL: https://pdfs.semanticscholar.org/eb77/5964676dfc27dc6b603ebb36d40fe644a9c7.pdf, accessed on March 21st 2017.

HOLMSTRÖM, B. (1979), "Moral Hazard and Observability", *The Bell Journal of Economics*, Vol. 10, No. 1 (Spring, 1979), pp.74-91.

INTERNATIONAL MONETARY FUND, "IMF Data: Historical Public Debt Database (HPDD)", URL: http://data.imf.org/?sk=806ED027-520D-497F-9052-63EC199F5E63&sId=1390030341854, accessed on April 4th 2017, International Monetary Fund.

INTERNATIONAL MONETARY FUND (2002 c), "Assessing Sustainability", URL: http://www.imf.org/external/np/pdr/sus/2002/eng/052802.pdf, accessed on April 19th, 2017.

INTERNATIONAL MONETARY FUND (2002 a), "Moral Hazard: Does IMF Financing Encourage Imprudence by Borrowers and Lenders?", *Economic Issues No. 28*, International Monetary Fund.

INTERNATIONAL MONETARY FUND (2002 b), "Sovereign Debt Restructurings and the Domestic Economy Experience in Four recent Cases", *The Policy Development and Review Department*, International Monetary Fund.

INTERNATIONAL MONETARY FUND (2003), "External Debt Statistics: Guide for Compilers and Users – Appendix III, Glossary", URL: http://www.imf.org/external/pubs/ft/eds/Eng/Guide/index.htm, accessed on October 15th 2016, International Monetary Fund.

INTERNATIONAL MONETARY FUND (2013 b), "Staff Guidance Note for Public Debt Sustainability Analysis in Market-Access Countries", URL: http://www.imf.org/external/np/pp/eng/2013/050913.pdf, accessed on April 19th, 2017.

INTERNATIONAL MONETARY FUND (2013 a), "Sovereign Debt Restructuring – Recent Developments and Implications for the Fund's Legal and Policy Framework ", *IMF Staff Paper*, International Monetary Fund.

INTERNATIONAL MONETARY FUND (2016), "Sovereign Debt Restructurings-Recent Developments and Implications for the Fund's Legal Policy Framework", URL: https://www.imf.org/external/np/pp/eng/2013/042613.pdf, accessed on April 4th 2017, International Monetary Fund.

KHARAS, H., PINTO, B., ULATOV, S. (2001), "An Analysis of Russia's 1998 Meltdown: Fundamentals and Market Signals", Brookings Papers on Economic Activity 37(1), pp. 1-68.

KLETZER, K., WRIGHT, B. (1998), "Sovereign Debt as Intertemporal Barter", URL: https://core.ac.uk/download/pdf/9311515.pdf, accessed on February 27th 2017.

KOHLSCHEEN, E., O'CONNELL, SA. (2007), "A Sovereign Debt Model with Trade Credit and Reserves", URL: https://www.researchgate.net/publication/23724861_A_Sovereign_Debt_Model_with_Trade_Credit_and_Reserves, accessed on April 10th, 2017.

KRUGMAN, P. (1985 a), "International debt strategies in an uncertain world" in Cuddington, J. and Smith, G., eds., International debt and the developing countries, World Bank.

KRUGMAN, P. (1985 b), "Prospects for international debt reform", in UNCTAD, International Monetary and financial issues for the developing countries.

KRUGMAN, P. (1988), "Financing VS. Forgiving a Debt Overhang", NBER Working Paper No. 2486, National Bureau of Economic Research.

LAEVEN, L., VALENCIA, F. (2013), "Systemic Banking Crises Database", *IMF Economic Review* 61(2), pp. 225-270.

LANE, P. (2012), "The European Sovereign Debt Crisis", *Journal of Economic Perspectives*, Vol 26, No. 3 (Summer 2012), pp.49-68.

LEPINE, X. (2011), "La restructuration des dettes souveraines Européennes: un plan Brady à l'européenne", *Revue d'économie financière*, 3/2011, N°103, p. 297-306.

LEVY-YEYATI E., PANIZZA, U. (2011), "The Elusive Costs of Sovereign Defaults", *Journal of Development Economics* 94, pp. 95-105.

LINDERT, P., MORTON, P. (1989), "How Sovereign Debt Has Worked", *Developing Country Debt and Economic Performance, Volume 1: The International Financial System*, pp. 39-106.

LUCK, S., SCHEMPP, P. (2014), "Sovereign Defaults, Bank Runs and Contagion", Preprints of the Max Planck Institute for Research on Collective Goods Bonn 2014/15.

MANASSE, P., ROUBINI, N., SCHIMMELPFENNIG A. (2003), "Predicting Sovereign Debt Crises", IMF Working Paper No. WP/03/221, International Monetary Fund.

MARTINEZ, J.V., SANDLERIS, G. (2011), "Is it punishment? Sovereign defaults and the decline in trade", *Journal of International Money and Finance 30*, pp. 909-30.

MENDOZA, E.G., YUE, V.Z. (2008), "A Solution to the Default Risk-Business Cycle Disconnect", NBER Working Paper No. 13861, National Bureau of Economic Research.

MITCHENER, K.J., WEIDENMIER, M.D. (2010), "Supersanctions and sovereign debt repayment", *Journal of International Money and Finance* 29, pp. 19-36.

MOODY'S (2008), "Corporate Default and Recovery Rates, 1920-2007", URL: http://www.moodys.com/sites/products/DefaultResearch/2007000000474979.pdf, accessed on May 4th 2017.

MORAIS, B., WRIGHT, M J.L. (2008), "International Financial Crisis Facts", Working Paper, Department of Economics, University of California at Los Angeles.

NATIONAL BUREAU OF ECONOMIC RESEARCH, "US Business Cycle Expansions and Contractions", URL: http://www.nber.org/cycles.html, accessed on April 4th 2017.

NIEMINEN, R. (2017), "Sovereign debt restructuring: Main drivers and mechanism", European Parliamentary Research Service, Briefing-February 2017.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, "Glossary of Statistical Terms: Brady Plan", URL: https://stats.oecd.org/glossary/detail.asp?ID=2981, accessed on April 4th 2017.

PANIZZA, U. (2008), "Domestic and external public debt in developing countries", United Nations Conference on Trade and Development discussion paper No. 188.

PITCHFORD, R., WRIGHT M J.L. (2010), "Holdout in Sovereign Debt Restructuring: A Theory of Negotiation in a Weak Contractual Environment", NBER Working Paper No. 16632, National Bureau of Economic Research.

REDING, P. (2014), "Monnaie et Finance", Lecture notes, Université de Namur.

REINHART, C. (2002 b), "Default, Currency Crises, and Sovereign Credit Ratings", NBER Working Paper No. 8738, National Bureau of Economic Research.

REINHART, C. (2002 a), "Sovereign credit ratings before and after financial crises", In R. Levich, G. Majnoni, and C. Reinhart, (eds.) Ratings, Rating Agencies and the Global Financial System. New York: Kluwer Academic Press, pp. 251-268.

REINHART, C. (2010), "Dates for Banking Crises, Currency Crashes, Sovereign Domestic of External Default (or Restructuring), Inflation Crises, and Stock Market Crashes (Varieties)", URL: http://www.carmenreinhart.com/data/browse-by-topic/topics/7/, accessed on April 4th 2017.

REINHART, C., ROGOFF, K., SAVASTANO, M.A. (2003), "Debt intolerance", NBER Working Paper No. 9908, National Bureau of Economic Research.

REINHART, C., ROGOFF, K. (2004), "Serial Default and the "Paradox" of Rich to Poor Capital Flows", NBER Working Paper No. 10296, National Bureau of Economic Research.

REINHART, C., ROGOFF, K. (2008), "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises", NBER Working Paper No. 13882, National Bureau of Economic Research.

REINHART, C., ROGOFF, K. (2009), "This Time is Different: Eight Centuries of Financial Folly", Princeton University Press.

ROSE, A. (2002), "One Reason Countries Pay Their Debts: Renegotiation and International Trade", NBER Working Paper No. 8853, National Bureau of Economic Research.

ROSE, A. (2005), "One reason countries pay their debts: renegotiation and international trade", *Journal of Development Economics* 77, pp. 189-206.

SCHMITT-GROHE, S., URIBE, M. (2014), "International Macroeconomics", chapter 11: The Macroeconomics of External Debt, Columbia University, pp.313-337.

SCHUMACHER, J., TREBESCH, C., ENDERLEIN, H. (2014), "Sovereign Defaults in Court", URL: http://ssrn.com/abstract=2189997, accessed on April 4th 2017.

SCHWARCZ, S. (1999), "Sovereign debt restructuring a bankruptcy reorganization approach", *Duke Law School Public Law and Legal Theory Working Paper Series Working Paper No. 1,* URL: https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=176848, accessed on February 24th 2017.

SINGH, M. (2003), "Recovery Rates from Distressed Debt: Empirical Evidence from Chapter 11 Filings, International Litigation, and Recent Sovereign Debt Restructurings", IMF Working Paper No. W03/161, International Monetary Fund.

STANDARD AND POOR's (2006), "Default Study: Sovereign Defaults At 26-Year Low, To Show Little Change in 2007", Standard and Poor's Credit Week, September 18th 2006.

STURZENEGGER, F. (2004), "Tools for the Analysis of Debt Problems", *Journal of Restructuring Finance*, Vol. 1, pp. 201-223.

STURZENEGGER, F., ZETTELMEYER, J. (2006), "Debt Defaults and Lessons from a Decade of Crises", Cambridge, MA: MIT Press.

THE ECONOMIST (2005), "Oil producers' surpluses: Recycling the petrodollars", The Economist (Nov 5th 2005), URL: http://www.economist.com/node/5136281, accessed on November 11th 2016.

THE ECONOMIST (2010), "Europe's sovereign-debt crisis: Acropolis now", The Economist, (Apr 29th 2010), URL: http://www.economist.com/node/16009099, accessed on November 11th 2016.

THE WALL STREET JOURNAL (2017), "The 'Trilemma' According to China's Central Bank", The Wall Street Journal (Apr 14th 2017), URL: https://blogs.wsj.com/chinarealtime/2017/04/14/the-trilemma-according-to-chinas-central-bank/, accessed on April 25th 2017.

TOMZ, M., WRIGHT, M J.L. (2007), "Do Countries Default in 'Bad Times'?", *Journal of the European Economic Associtation,* 5(2-3), pp. 352-360.

TOMZ, M., WRIGHT, M J.L. (2013), "Empirical research on sovereign debt and default", *Annual Review of Economics*, 5 (1), pp. 247–272.

UCDP/PRIO, "UCDP/PRIO Armed Conflict Dataset", URL: http://ucdp.uu.se/downloads/, accessed on April 4th 2017.

UCDP/PRIO, "UCDP/PRIO Armed Conflict Dataset Codebook", URL: http://ucdp.uu.se/downloads/ucdpprio/ucdp-prio-acd-4-2016.pdf, accessed on March 31st 2017.

UNCTAD (1988), "Trade and development report", United Nations Conference on Trade and Development.

VERARDI, V. (2015), "Econométrie et Analyse Mutlivariée", Lecture notes, Univrsité de Namur.

WORLD BANK (1988), "World development report", Washington, DC, World Bank.

WOLRD BANK, "Country Classification: World Bank Country and Lending groups", URL: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519, accessed on April 4th 2017.

WOLRD BANK, "Data Bank: World Development Indicators: GDP growth", URL: http://databank.worldbank.org/data/reports.aspx?source=2&series=NY.GDP.MKTP.KD.ZG&country=#, accessed on April 4th 2017.

WORLD BANK (2016), "Nouvelle classification des pays en function de leur revenu: actualisation 2016", URL: http://blogs.worldbank.org/opendata/fr/nouvelle-classification-des-pays-en-fonction-de-leur-revenu-actualisation-2016, accessed on April 4th 2017.

WORLD BANK, "The World Bank Atlas method – detailed methodology", URL: https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-the-world-bank-atlas-method, accessed on April 4th 2017.

WRIGHT, M J.L. (2010), "Restructuring Sovereign Debts with Private Sector Creditors: Theory and Practice", URL: https://www.researchgate.net/publication/228433622_Restructuring_Sovereign_Debts_with_Private_Sector_Creditors_Theory_and_Practice, accessed on March 20th 2017.

YUE, VZ. (2010), "Sovereign Default and Debt Renegotiation", *Journal of International Economics*, pp. 176-187.

ZYMEK, R. (2012), "Sovereign Default, International Lending, and Trade", *IMF Economic Review 60*, pp. 265-394.