Duration of Capital Market Exclusion: An Empirical Investigation*

Christine Richmond† Daniel A. Dias‡

First Draft: June 2007
This Draft: July 2009

Abstract

We document the time countries are excluded from international capital markets after resolving a default and examine why some countries are able to regain access to international capital markets immediately after resolving a default, whereas other countries are punished for longer periods. We develop a methodology to determine when market access occurs after default settlement, distinguishing between partial and full access. Our main findings from examining the duration of exclusion from international capital markets between 1980-2005 by sovereign defaulters are: i) countries regain partial market access after 5.7 years on average (median of 3.0 years) while it takes 8.4 years on average (median of 7.0 years) to regain full market access; ii) partial market access depends mostly on external financial markets conditions; iii) full market access depends primarily on long term market expectations and the size of the losses inflicted to creditors; iv) the occurrence of a natural disaster reduces the period of exclusion for both partial and full access; and v) there are regional differences, with African and Middle Eastern defaulters taking substantially longer to regain market access than other regions.

JEL Classification: F21, F34, G15, H63

Keywords: sovereign default, market access, international capital markets, duration

*We have benefitted from discussions with Stijn Claessens, Sebastian Edwards, Edward Leamer, Mike Tomz, Aaron Tornell, Christoph Trebesch, Romain Wacziarg, Mark Wright, and Jeromin Zettlemeyer. We are grateful for additional comments from Jonathan Eaton and Guido Sandleris. We thank seminar participants at the 3rd Portuguese Economic Journal meeting, 5th Latin Finance Network meeting, 2008 Royal Economic Society Annual Conference, 2007 LACEA-LAMES Meetings, Central Bank of Portugal, and UCLA International Economics Proseminar for their comments and suggestions. We gratefully acknowledge partial financial support from CIBER - UCLA. All remaining errors are our own.

†Corresponding author. Anderson Graduate School of Management, UCLA. 110 Westwood Plaza, Entrepreneurs Hall, Suite C525, Los Angeles, CA 90095-1481, United States. Tel.: +1 310.825.8207, Fax: +1 310.825.4011; E-mail: christine.richmond.2010@anderson.ucla.edu.

‡Anderson Graduate School of Management, UCLA and CEMAPRE. 110 Westwood Plaza, Entrepreneurs Hall, Suite C525, Los Angeles, CA 90095-1481, United States. E-mail: daniel.dias.2010@anderson.ucla.edu.

1 Introduction

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? Looking at two countries in Latin America, we can contrast their market experiences, although both are recent defaulters. Argentina has defaulted four times on foreign currency bond debt and twice on foreign currency bank debt during the last 183 years (Beers and Chambers, 2006). The most recent default, in December 2001 on USD79.7bn in foreign debt, excluding past due interest, took until May 2005 to be resolved when the majority of bondholders finally accepted the government's terms (Dhillon et al., 2006). Despite being in default for 3.5 years and forcing investors to realize large haircuts on their positions, once the restructured bonds began trading in the grey market Argentina appeared to have immediately regained access to international capital markets. Ecuador, however, has faced a very different experience with international capital markets and has largely been cut off from markets since its default in 1999 on USD6.5bn in foreign debt (which was settled in 2000). More recently, the Global Financial Crisis has brought the issue of international capital market access to the attention of developed countries. The failure of UK and Eastern European debt auctions, potential of a new wave of sovereign defaults in Eastern Europe, and resurgence of IMF lending illustrate the need to understand what policies can help countries regain market access.

While some recent research has begun to examine the question of when a country will have market access (IMF, 2001, 2003, and 2005), the question of how long a country will be excluded from international capital markets once a period of default is settled has yet to be examined. This line of research is different from earlier work as we look explicitly at periods of sovereign default during the modern financial period (1980-2005) in an effort to determine the duration of market exclusion, rather than solely identifying characteristics of market access.

The question of access to capital markets is important from three points of view. First, from the country point of view capital market access plays an important role for developing countries economies, particularly for trade and investment activities. Domestic investment projects for both infrastructure and capacity-building purposes can boost a country's productivity and growth over the long run as well as improve international competitiveness. However, since most countries do not have the domestic resources available to finance such large-scale projects, the main vehicles for funding are overseas aid, borrowing from international capital markets, or assistance from development banks (Eichengreen, 1994). Rose (2005) presents support for the hypothesis that the downside of a non-repayment strategy comes through the trade channel and finds that debt renegotiation is associated with a decline in bilateral trade of approximately eight percent a year that persists for around fifteen years. Kohlscheen and O'Connell (2007) show that trade credit lines, the vehicle used to finance international trade, can disappear during periods of default and debt renegotiation. In analyzing sovereign defaults between 1992 and 2001 the authors find that the volume of trade credit provided by banks typically falls considerably following a default, with the median reduction in trade credit, relative to the year

of default, amounting to 35% after two years and 51% after four years. Thus, knowledge of the period of exclusion and the costs associated with it can influence a country's decision whether or not to default. If the punishment of exclusion is short and economic impact is small, it could lead to more frequent defaults. The study of this issue may also allow borrowers to learn what actions they can undertake, if any, in order to minimize the period of exclusion from markets. Secondly, from the lender's point of view, potential lenders can understand the behavior of countries during default periods and assist in the evaluation of whether or not to extend new funds post default. Finally from the institutional point of view, study of this issue can assist in the design of country policies to allow for more continued market access or help countries graduate to market-based borrowing.

The remainder of the paper proceeds as follows. In section 2 we present a review of relevant literature. In section 3 we define the empirical strategy of the paper, presenting our stylized facts as well as the macroeconomic variables that we believe could drive the outcomes, and present the results, while section 4 concludes.

2 Related Literature

Much of the literature on sovereign debt focuses on why governments wish to repay their obligations and has largely ignored the issue of how long countries have been excluded from international capital markets after resolving a default. This has been the case starting with Eaton and Gersovitz's (1981) seminal work where sovereigns repay debt because future lending depends on reputation and there is a threat of a permanent embargo on future loans by private sector lenders if a default should occur. However, real-world observations show that countries do default and are able to borrow again at some point in the future. Recent quantitative research by Arellano (2008) and Yue (2006) extend the approach developed by Eaton and Gersovitz (1981) and model country exclusion from borrowing as part of a stochastic general equilibrium model with endogenous default risk. Arellano (2008) models exclusion from international financial markets after defaulting as a stochastic number of periods, with reaccess occurring with an exogenous probability, or independent of both global financial conditions and country-specific conditions. Yue (2006) considers the reaccessing of financial markets dependent on the country's bargaining power, with greater bargaining power resulting in shorter periods of exclusion, averaging around 1 year.

Preliminary work has begun to endogenize the period of exclusion from capital markets. Pitchford and Wright (2007) model the sovereign debt renegotiation process, during which time it is assumed that there is no market access, using an incomplete markets model with an explicit model of the sovereign debt renegotiation process, with delays arising due to creditor holdout for better terms and freeriding by negotiators, while Benjamin and Wright (2008) study delays in the debt renegotiation process, where outcomes are driven by fluctuations in domestic economic conditions as well as changes in creditor and debtor bargaining power. Bi (2008) argues that delays in a debt renegotiation process may be mutually beneficial so as to

increase the size of the "cake" and finds that given the defaulted debt level, the expected delay length is determined by the output process.

Empirical work on this area is also limited. Lensink and Van Bergeijk (1991) present one of the first papers tackling the determinants of a country's ability to access international capital markets during the 1985-1987 period. The authors use the observation of whether a country has access to international capital markets or not as the dependent variable, which is based on undertaking actual borrowing. However, by utilizing this definition the data sample is contaminated because it groups countries that do not need to borrow with those that do not have access to markets, thereby inflating the number of countries observed to have no market access. Gelos et al. (2004) measure the frequency of borrowing by developing countries during the 1980-2000 period to determine access to international capital markets and find that vulnerability to shocks, perceived quality of policies, and institutions are important determinants of access. Fostel and Kaminsky (2007) examine the question of whether volatile international capital markets are the main reason for the boom-bust pattern of Latin America capital market participation. The authors find that during the 1990s, domestic factors (macroeconomic policies, economic activity, political risk, real exchange rate volatility, and openness) were important for international capital market access by Argentina, Brazil, and Chile, whereas external factors (global liquidity, world economic activity, and terms of trade) were important for Colombia, Mexico, and Venezuela. However, during the period of 2002-2005, external factors were most important for market access by all of the countries analyzed. Lastly, Trebesch (2008) studies delays in the sovereign debt renegotiation process and finds that the average duration from the start of debt distress until the final debt renegotiation deal is about 2.5 years, which is largely driven by political instability and government actions rather than creditor holdout.

Our paper adds to the literature by empirically analyzing the duration of the exclusion from international capital markets in the aftermath of defaults. We first show some basic facts regarding the periods of market exclusion and then identify macroeconomic characteristics of defaulters that explain the differences in the length of market exclusion.

3 Empirical Strategy

3.1 Definitions

As a starting point for our analysis, we define two terms: default and market access. We use Standard & Poor's standard definition of default: "...the failure to meet a principal or interest payment on the due date (or within the specified grace period) contained in the original terms of a debt issue ... or tenders an exchange offer of new debt with less-favorable terms than the original issue" (Beers and Cavanaugh, 2006). Further, Standard & Poor's considers a country to have emerged from default when the agency has concluded that "...no further near-term resolution of creditors' claims is likely" (Beers and Cavanaugh, 2006).

Using S&P's definition of default, during the period 1980-2005, we have identified 128 episodes of sovereign default on foreign currency bank debt and foreign currency bonds (Beers and Chambers, 2006), with an average default of 7.3 years.[1] We next consider defaults in four separate regions: Emerging Europe, Latin America and Caribbean, Asia-Pacific, and the Middle East and Africa and summarize the default results in Table 1. It is worth stressing that while a country is not classified by S&P as entering into default until the expiration of the grace period, a country may in fact be in default. Thus the reported durations of default should be recognized as having a downward bias, which could be up to one year.

insert Table 1 around here

We define market access to be the first of either of the following events occurring post 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. By looking at these measures we can say whether or not a country has access to international capital markets even if they do not borrow because we may assume that for a private firm to borrow from abroad, the country must be in good financial standing.[2] We choose to restrict our attention to net transfers, new borrowing less debt service, to represent the net flow of real resources from bank and bond creditors to the debtor and distinguish between a country merely rolling over its debt and contracting new debt (Eaton, 1992). This limits the problem faced during the 1980s when commercial banks rolled over loans to developing countries rather than writing them down and prevents us from considering these funds as a country having market access.

We consider bond and bank debt instruments to be close substitutes as sources of external financing. Bonded debt is a contract with covenants and loan-granting decisions dependent on only public information, while a bank loan uses the public information as well as additional information gathered via costly monitoring of the borrower's actions. A key implication of this result is that once a country establishes a positive reputation, the need for close monitoring is reduced.[3]

We also consider a country as being able to gain market access even if there is outstanding litigation with holdout creditors. While in earlier times it may have been more difficult to access markets if a country was facing legal challenges and the possibility of assets being attached, today the global bond market has developed sufficiently so that debt can be issued in

[1] We exclude default events in Cuba, North Korea, and the Former Yugoslavia.

[2] Typically the ratings of private firms are constrained by the country rating. This is especially evident in the case of developing countries. As of June 2008 Standard & Poor's rated only 82 corporate, counterparty, and municipal ratings above the rating of the sovereign in the country of domicile. On a foreign currency basis, moreover, only 31 of these entities were based in developed countries. See Cavanaugh et al. (2008).

For a discussion on emerging markets' private sector access to international debt markets during sovereign debt crises, see Arteta and Hale (2007, 2008).

[3] See, for example, Diamond (1991).

different legal jurisdictions, i.e., the Eurobond market, which allows US-based firms to purchase government securities from countries with outstanding litigation. Further, the advent of special purpose vehicles (SPVs) has created loopholes in existing legislation, which makes it easier for countries to issue debt and avoid the attachment of assets.[4]

We next distinguish between partial and full market reaccess. We consider partial reaccess as the first year in which there are positive net bond and bank transfers to the public or private sector, whereas full market reaccess is defined as the first year of positive net bond and bank transfers to the private or public sector greater than 1.0% of GDP. This threshold is chosen as it is, on average, less than one-half of the annual central government borrowing requirement over the entire sample.[5] If a country exits default and regains market access in the same year, we consider the duration of market exclusion to be one year. The rationale for this is that we know the duration of the event is greater than zero, but by using discrete data our first observation of the change is in the following period.[6]

3.2 Preliminary Data Analysis

We begin by presenting some results regarding the duration of exclusion. In particular we show the average periods of both partial and full market exclusion. We also show the distribution of periods of exclusion for the sample of countries we are studying.

The first finding we obtain is that countries are excluded from capital markets for a long period of time. Table 2 shows the average and the median period of exclusion for both partial and full market access and what we see is that the average length of time it takes for a country to be able to regain partial market access is 5.7 years, while regaining full market access takes 8.4 years on average. Regarding the median period of exclusion, we see that 50% of the countries regain partial market access within 3 years, while it takes 7 years for 50% of the countries to regain full market access. Regaining partial access occurs much faster than full access; in one year 46% of countries regain partial market access, whereas only 29% of countries regain full market access over the same time period. These results are significantly longer than those previously implied by Gelos et al. (2004) and those being modeled theoretically. The long duration of exclusionary periods lends support to the premise that countries are punished by markets for defaulting.

insert Table 2 around here

[4] One can consider the case of EM Ltd. v. Russia, which was unsuccessful in its many attempts to attach assets. In the past, government and central bank assets have been placed in the Bank of International Settlements (BIS) in Switzerland to utilize the legal protection afforded to the BIS against the attachment of assets. See, for example, Sturzeneger and Zettelmeyer (2006b).

[5] The idea of setting a threshold is not uncommon in the international finance literature, particularly for financial crises and currency crises. For a summary of the different currency crisis definitions used by researchers see, for example, Esquivel and Larraín (1998).

[6] See Appendix 1 for performance of our measure against default periods.

Another result from our preliminary analysis is that there are regional differences to the length of market exclusion. Defaulters from Middle Eastern & African countries are excluded from capital markets for substantially longer periods than defaulters from other regions, in terms of both partial and full market access. Latin America & Caribbean country defaulters regain partial market access the fastest, with an average exclusion of 3.1 years, while Emerging European countries regain full market access the fastest, with an average exclusion of 4.7 years.

insert Table 3 around here

A final result worth noting is that there is some time variation of the length of market exclusion. Looking at the decade in which the default episode begins, we find that defaulters in the 1980s are excluded from capital markets for longer periods of time that defaulters from more recent decades. This finding is in line with Trebesch (2008) who finds that debt renegotiations before 1999 took substantially more time to be completed.

insert Table 4 around here

3.3 Determining Factors of Market Access

In this section we consider the important macroeconomic variables that may influence the duration of capital market exclusion by distinguishing between the forces of (i) short term domestic behavior, (ii) long term market expectations, (iii) external financial markets conditions, and (iv) specific default conditions.

Short term domestic behavior may be captured by a number of macroeconomic variables including inflation, imports coverage and the value of the export sector as a share of GDP. All these variables relate to the capacity of the country to service its foreign debt. Inflation measures the stability of the currency, and therefore it is an indicator for investors if the country is going to be able to repay its debt. Imports coverage are a measure of the availability of foreign currency reserves, which is also a measure of the ability of the country to honor its debt obligations. The third one, export share of GDP, is a direct measure of the capacity that the country has to obtain foreign currency. We expect that the lower the inflation rate, the higher the imports coverage and the higher the share of exports on GDP the faster a country would regain market access. We do not consider variables such as GDP growth, fiscal deficit, or levels of debt stocks because these variables may be endogenous to our dependent variable, net borrowing.

Long term market expectations can be captured by credit ratings, which aim to measure the forward-looking estimate of default probability of a national government on its obligations (Beers and Cavanaugh, 2006). The economic rationale for credit ratings are twofold. First, they provide information economies of scale - it is efficient for creditors and investors in initiating and monitoring transactions because of the economies of scale achieved in gathering and

analyzing information.[7] Secondly, ratings help formulate a simple and verifiable rule with low transaction costs so as to be able to monitor and constrain the actions of agents (Gonzalez et al., 2004). Further, ratings can contribute towards determining the financial cost of issuing debt and the quality of the investor base. Specifically the Institutional Investor country credit rating surveys senior economists and sovereign risk analysts at global banks, money management, and securities firms, rating countries in terms of likelihood of default. Thus we would expect that countries with higher credit ratings to regain market access faster.[8]

To measure external financial market conditions and investor demand for sovereign debt we focus our attention on the interest rate spread between risk free assets (US Treasury yields) and riskier assets such as developing country sovereign debt (proxied by non-investment grade corporate yields). We believe that this can capture global credit concerns given that international investors are largely US-based, or at least use US assets as benchmarks in pricing risks and returns in international financial markets (Hartelius et al., 2008). Following the findings of Hartelius et al. (2008) that US interest rates have an effect on emerging market debt spreads, implying that the US can reduce the risk of disruption to emerging debt markets, we anticipate that tighter spreads indicate greater investor demand and overall market liquidity would lead to shorter periods of market exclusion. We also look at the level of US interest rates, which sets an implicit floor on the interest rate that defaulters face when accessing markets. We anticipate that higher US interest rates, either short-term or long-term rates, will lead to longer exclusion periods.

A third set of variables pertains to characteristics that are specific to the default event. Here we control for the existence of any natural disaster in the year of or year before the default. The rationale for this variable is the idea that certain defaults may be excusable as they were caused by factors that were completely out of the control of the country's authorities. We also control for the cost that the default imposed on creditors. For this we use Benjamin and Wright's (2008) estimates of haircuts. Our expectation is that the smaller the haircut the shorter the period of exclusion as creditors do not need to impose a larger penalty due to only incurring small losses. Finally, we consider the existence of an IMF program. Our expectation is that the presence of the IMF should prepare the country better for the aftermath of the default period, which in the case of this premise being true, default events where the IMF was present should generate shorter periods of market exclusion.

Lastly, we consider the size of the country, in terms of nominal GDP.[9] We would predict that large countries regain market access more quickly than small countries due to their relative importance in providing significant investment opportunities for investors. Large countries

[7] One can think of this as helping creditors or investors to minimize the "lemon problem". See Akerlof (1970) for a discuss of this problem. For a good discussion of the determinants and impact of country credit ratings, see Cantor and Packer, 1996.

[8] We use the Institutional Investor country credit rating due to data limitations imposed by S&P and Moody's country coverage. Prior to the mid-1990s both rating agencies did not provide ratings to countries that were below investment grade.

[9] We define the largest 10% of countries, in terms of USD nominal GDP, as "big".

tend to have larger nominal debt stocks, which allows for more liquid debt instruments and typically leads to higher weightings in asset class indices.

3.4 Measuring the Duration of Market Exclusion

In this section we start by looking at the unconditional survival and hazard functions for the duration of market exclusion and then proceed with our analysis by estimating a discrete time duration model with time varying regressors in order to analyze the impact of some of the variables previously identified in section 3.3. Our analysis going forward is based on 106 default episodes (out of 128 events originally) due to data limitations.

3.4.1 Preliminary Analysis

As a preliminary analysis of the data on market exclusion we start by presenting the empirical survival and hazard functions for the duration of market exclusion.[10] In order to estimate the survival functions we use a non-parametric estimator that is very popular in the duration literature, the Kaplan-Meier estimator. This estimator is defined as follows:

$$\widehat{S}_{KM}(t) = \prod_{j=1}^{t} \left(1 - \frac{d_j}{n_j}\right), \tag{1}$$

where d_j denotes the number of exits in the j-th period and n_j denotes the total number of possible exits in the j-th period. The estimator for the hazard function follows immediately from the survival function estimator and it simply uses a fundamental relationship between the hazard and the survival functions

$$\widehat{\lambda}_{KM}(t) = \frac{\widehat{S}_{KM}(t-1) - \widehat{S}_{KM}(t)}{\widehat{S}_{KM}(t-1)} = \frac{d_t}{n_t}, \tag{2}$$

where d_t and n_t have the same interpretations as before. The results for the survival function can be seen in Figure 1.

Figure 1 around here

Figure 2 around here

From the initial analysis of the empirical survival functions, we see that 50% of defaulters regain partial market access within 3 years, while it takes 7 years for 50% of defaulters to

[10] The survival function is defined as $S(t) = 1 - F(t)$, where $F(t)$ is the cumulative distribution function. This function tells us what percentage of the population is still in the state after t periods, in our case, it tells us the percentage of countries that have not regained market access after t periods. The hazard function is defined as $\lambda(t) = \frac{f(t)}{S(t)}$, where $f(t)$ is the density function. This function tells us the instantaneous probability of exiting a state at time t conditional on not having exited after t periods. In this case it states that the probability of a country regaining market access after t years conditional on not having got access until then.

regain full market access. Regaining partial access occurs relatively quickly compared to full market access; in less than 7 years 75% of defaulters were able to borrow from abroad again. In order for 75% of defaulters to regain full market access it takes 11 years, which suggests that creditors remember defaults and make obtaining large quantities of external funds quite difficult. The question that this raises, but we are not able to answer with the data that we are analyzing, is to know whether the fact of a country not being able to borrow large amounts of money from abroad for fairly long periods of time is a sufficient punishment for default or whether the country does not feel the cost of being financially constrained.

In Figure 2 we present the empirical hazard functions. What we learn from this graph is that the speed at which countries that have not yet regained market access is non-decreasing over time.[11] This means that, over time for those countries that have not regained market access, the probability of being able to access the market again does not decrease (in some cases it actually increases) from period to period. In the case of partial market access, in each of the first 8 years, close to 20% of the countries that are excluded from the market are able to access it again. In the case of full market access, we see a similar pattern, with the speed of access fairly constant during the initial 8 years, around 10% per year, and then it increases somewhat.

From the analysis of the hazard functions, the result that should be seen as the most concerning from an incentives point of view is the fact that a country can simply wait and the odds of being able to regain market access are in its favor. That is, as time passes, it becomes more likely that a country will be able to again have access to international capital markets.

3.4.2 Econometric Analysis

We proceed with our analysis by specifying and estimating a discrete time duration model with time varying covariates, for both partial and full market access, in order to understand the quantitative impact of different factors affecting the duration of market exclusion. The benefits to this approach are the fact that it allows us to incorporate episodes in which market access has not yet occurred (censored observations) and for the interaction between the duration of exclusion and the evolution of the variables previously identified that can potentially impact the length of market exclusion.[12] The parametric specification we consider here is a proportional hazard model with time varying covariates. This means that, in our model, the hazard function is the product of two elements: the baseline hazard function, $\lambda_0(t)$, and some factor

[11] Besides the economic interpretation inherent to this feature, there is also an important statistical interpretation that this result signals, which is the fact that there are no signals of major sources of unobserved heterogeneity which is something we use in the next subsection of our econometric approach. For a detailed discussion of this topic see Lancaster (1990).

[12] Note that the approach that we are following here is, to some extent, similar to the one adopted in Gelos et al. (2004). These authors use a probit model to analyze the same phenomena, but they do not give it an hazard interpretation nor use direct measures for the length of market exclusion.

of proportionality that varies with the covariates, $g(x_{it}, \beta)$.[13] We start by assuming that $\lambda_0(t)$ is piece-wise constant, which leads to the model proposed by Prentice and Gloeckler (1978) for grouped data.[14] After testing for the possibility that the baseline hazard is constant for all duration times and not being able to reject this hypothesis, we end up using an exponential duration model.[15]

insert Table 5 around here

insert Table 6 around here

Based on the results presented in Tables 5 and 6 several conclusions can be drawn: i) the factors that explain partial market access are not the same that explain full market access. In the case of partial market access, external financial conditions matter the most, captured by the spread between US Treasuries and high yield assets as well as the level of short-term US interest rates. For full market access, the most important factors are long term market expectations and the size of creditor losses. Aside from the regional dummies, the only variable that is significant in both cases is the existence of a natural disaster prior to default. In both cases, the existence of a natural disaster before the default reduces the time of exclusion and this suggests that creditors see some defaults as excusable and therefore they are penalized less; ii) short term domestic conditions do not have an impact on the duration of exclusion for both partial and full access. In the case of partial market access, investors are already taking into account those factors in the price (and therefore both spread and US interest rates are important). In the case of full market access investors care less about the short term since their investment horizon is longer (assuming that larger quantities of borrowing are usually associated with longer maturities) and what is important is the longer term expectations about the economy (measured by the Institutional Investors credit rating); iii) size and the presence of the IMF do not seem to matter for regaining market access. To some extent it was surprising for us to find out that the presence of the IMF does not help reduce the duration of exclusion, but this is something we do not want to emphasize as it could be the case that the presence of the IMF is not random. In particular, it could be the case that the IMF chose to be present in the most difficult cases and therefore what we see is that the presence of the IMF helps countries achieve similar conditions to those of non-IMF supported countries - this is consistent with the fact that the variable measuring the presence of the IMF is not significant

[13] Notice that in the specification of this model, t denotes elapsed time and not historical time, that is, it represents the amount of time during which a country did not have market access after settling its default and not the chronological time of market exclusion.

[14] See Appendix 4 for a derivation of the likelihood function.

[15] We also considered the possibility of unobserved heterogeneity and for that we estimated this same model assuming an unobserved error with distribution Gamma. In all estimations we had problems with estimating the variance of the unobserved error as it was always trying to converge to 0. These results are available from the authors upon request.

at the usual levels; and iv) there is a regional ordering in terms of the speed at which countries regain market access. The Africa and Middle Eastern region takes significantly longer to regain market access than other regions, second comes Asia and Latin America, and Eastern European countries are the fastest in terms of regaining access. This holds for both partial and full market access and highlights the fact that there are regional differences between borrowers.

4 Concluding Remarks

This paper documents the time it takes for a country to be able to borrow from international capital markets after resolving a default episode and examine why some countries are able to regain access to international capital markets immediately after resolving a default, whereas other countries appear to be punished for long periods Our main findings from examining the duration of exclusion from international capital markets between 1980-2005 by sovereign defaulters are: i) countries regain partial market access after 5.7 years on average (median of 3.0 years) while it takes 8.4 years on average (median of 7.0 years) to regain full market access; ii) partial market access depends mostly on external financial markets conditions; iii) full market access depends primarily on long term market expectations and on the size of the creditor losses; iv) the occurrence of natural disasters prior to a default episode reduce substantially the period of exclusion; and v) there are regional differences, with African and Middle Eastern defaulters taking substantially more time to regain market access than other regions.

Our results complement earlier findings by Gelos et al. (2004) in that we find that the quality of policies perceived by the market matter, however, we find significantly longer periods of capital market exclusion. Our findings also support the recent work of Fostel and Kaminsky (2007) in that global liquidity is an important drivers of market access.

Our work also has several important policy implications: i) to understand if the regional rankings that we documented are caused by some omitted economic variable or if the rankings reflect some sort of prejudice, especially, against African and Middle Eastern countries. If it is the latter, then proper policies should be implemented to help those countries regain access to international financial markets; ii) since partial access is driven by factors not under countries control, it is advisable that countries focus their efforts on improving the view that investors have about their long term development. With these efforts, the country will be able to borrow again and in larger quantities; and iii) if the country wishes to be able to borrow from abroad more quickly, it should weigh the gains from reducing its outstanding debt (increasing the size of the creditor losses) versus the losses it will face from being excluded from the international financial markets for a longer period.

There are many interesting extensions of this work that can be undertaken. First, we would like to utilize our resulting stylized facts to establish a theoretical model of market access. Second, we would extend our analysis of post default market reaccess to consider periods of market exclusion resulting from financial crises and financial contagion. By understanding

the loss of market access under various circumstances we would like to be able to formulate specific policies to assist countries in the market reaccess process. Third, we believe that our findings can be incorporated into recent work on sovereign debt, which is beginning to endogenize the international capital market reaccess process. The addition of this friction may lead to different results, particularly with regards to the emerging market business cycles literature and explanations of interest rate spreads. Finally, it may be useful to study the composition of debt flows during a default cycle to see how a country is able to get around the closure of capital markets, which may explain the low associated costs of capital market exclusion.

5 References

1. Akerlof, G. 1970. The market for "lemons": quality uncertainty and the market mechanism. Quarterly Journal of Economics 84(3): 488-500.

2. Arellano, C. 2008. Default risk and income fluctuations in emerging economics. American Economic Review, 98(3): 690–712.

3. Arteta, C. and G. Hale. 2008. Sovereign debt crises and credit to the private sector. Journal of International Economics 74:53-69.

4. Arteta, C. and G. Hale. 2007. Currency crises and foreign credit in emerging markets: credit crunch of demand effect? Federal Reserve Bank of San Francisco Working Paper 2007-02.

5. Beers, D., Cavanaugh, M., 2006. Sovereign Credit Ratings: A Primer. Standard & Poor's RatingsDirect, October 19.

6. Beers, D., Chambers, J., 2006. Default Study: Sovereign Defaults At 26-Year Low, To Show Little Change In 2007. Standard & Poor's CreditWeek, September 18.

7. Benjamin, D. and Wright, M. L. J. 2008. Recovery before redemption? A theory of delays in sovereign debt renegotiations. University of California, Los Angeles, mimeo.

8. Bi, Ran. 2008. "Beneficial" delays in debt restructuring negotiations. International Monetary Fund Working Paper No. 38.

9. Cantor, R., Packer, F., 1996. Determinants and Impact of Sovereign Credit Ratings. Federal Reserve Board of New York Policy Review, October 1996.

10. Cavanaugh, M., S. Bugie, and E. Dubois-Pelerin. 2008. Corporate and counterparty credit ratings that exceed the sovereign's rating. Standard & Poor's RatingsDirect, June 5.

11. Chuhan, P., Sturzenegger, F., 2004. Default Episodes in the 1980s and 1990s: What have we Learned? in: World Bank (Ed.), Managing Volatility and Crisis: A Practitioners Guide. Mimeo.

12. Dhillon, A., García-Fronti, J., Ghosal, S., Miller, M., 2006. Debt Restructuring and Economic Recovery: Analyzing the Argentine Swap. World Economy 29(4): 377-398.

13. Diamond, D. W., 1991. Monitoring and Reputation: The Choice Between Bank Loans and Directly Placed Debt. Journal of Political Economy 99(4): 689-721.

14. Eaton, J. 1992. Sovereign debt: a primer. World Bank Policy Research Working Paper No. 855.

15. Eaton, J., Fernandez, R., 1995. Sovereign Debt in: Grossman, G. M., Rogoff, K. (Eds.) Handbook of International Economics (3). Amsterdam: North-Holland.

16. Eaton, J., Gersovitz, M., 1981. Debt with Potential Repudiation: Theoretical and Empirical Analysis. Review of Economic Studies 48(2): 289-309.

17. Eichengreen, B. 1994. Financing infrastructure in developing countries: lessons from the railway age. University of California, Berkeley Economics Department Working Paper No. 230.

18. Esquivel, G. and F. Larraín. 1998. Explaining currency crises. John F. Kennedy School of Government Faculty Research Working Paper No. R98-07.

19. Feinland Katz, L. 2005. Ratings above the sovereign: foreign currency rating criteria update. Standard & Poor's RatingsDirect, November 3.

20. Fostel, A., Kaminsky, G., 2007. Latin America: Access to International Capital Markets. Good Behavior or Global Liquidity? NBER Working Paper 13194.

21. Gelos, R. G., Sahay, R., Sandleris, G., 2004. Sovereign Borrowing by Developing Countries: What Determines Market Access? IMF Working Paper 04/221.

22. Goldstein, M. 2003. Debt sustainability, Brazil, and the IMF. Institute for International Economics Working Paper No. 03-1.

23. Gonzalez, F., F. Haas, R. Johannes, M. Persson, L. Toldeo, R. Violi, M Wieland, and C. Zins. 2004. Market dynamics associated with credit ratings, a literature review. European Central Bank Occasional Paper Series No. 16.

24. Hartelius, K., K. Kashiwase, and L. E. Kodres. 2008. Emerging market spread compression: is it real or is it liquidity? IMF Working Paper 08-10.

25. International Monetary Fund, 2005. Assessing the Determinants and Prospects for the Pace of Market Access by Countries Emerging from Crises: Further Considerations. Prepared by the International Capital Markets Department.

26. International Monetary Fund, 2003. Access to International Capital Markets for First-Time Sovereign Issuers. Prepared by the International Capital Markets Department.

27. International Monetary Fund, 2001. Assessing the Determinants and Prospects for the Pace of Market Access by Countries Emerging from Crises. Prepared by the Policy Development and Review Department.

28. International Monetary Fund and World Bank. 2006. Applying the debt sustainability framework for low-income countries post debt relief.

29. Jenkins, S. P. 1995. Easy estimation methods for discrete-time duration models. Oxford Bulletin of Economics and Statistics 57(1): 129-138.

30. Kohlscheen, E. and S. A. O'Connell. 2007. Trade credit, international reserves and sovereign debt. The Warwick Economics Research Paper Series (TWERPS) 833, University of Warwick, Department of Economics.

31. Lancaster, T, 1990. The Econometric Analysis of Transition Data. Econometric Society Monographs 17, London: Cambridge University Press.

32. Lensink, R., Van Bergeijk, P., 1991. The Determinants of Developing Countries' Access to the International Capital Market. Journal of Development Studies 28(1): 86-103.

33. Levy-Yeyati, E. and U. Panizza. 2006. The elusive costs of sovereign defaults. Inter-American Development Bank Working Paper 581.

34. Lindert, P. H., Morton, P. J., 1998. How Sovereign Debt Has Worked in: Sachs, J. (Ed.) Developing Country Debt and Economic Performance (1). Chicago: University of Chicago Press.

35. Mumssen, C. 2008. IMF conditionality: theory and practice. International Monetary Fund, African Department.

36. Pitchford, R. and Wright, M. L. J. 2007. Restructuring the sovereign debt restructuring mechanism. University of California, Los Angeles, mimeo.

37. Prentice, R. L., Gloeckler, L. A., 1978. Regression Analysis of Grouped Survival Data with Application to Breast Cancer Data. Biometrics, 34, 57-68.

38. Reinhart, C. M., Rogoff, K. S., Savastano, M. A., 2003. Debt Intolerance. NBER Working Paper No. 9908.

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

40. Rose, A. 2005. One reason countries pay their debts: renegotiation and international trade. Journal of Development Economics 77(1): 189-206.

41. Sturzenegger, F., Zettelmeyer, J., 2007. Haircuts: Estimating Investor Losses in Sovereign Debt Restructurings, 1998-2005. Forthcoming in Journal of International Money and Finance.

42. Sturzenegger, F., Zettelmeyer, J., 2006a. Creditor Losses versus Debt Relief: Results from a Decade of Sovereign Debt Crises. IMF preliminary draft.

43. Sturzenegger, F., Zettelmeyer, J. 2006b. Has the Legal Threat to Sovereign Debt Restructuring Become Real? Universidad Torcuato Di Tella, Centro de Investigación de Finanzas. Mimeo.

44. Tomz, M., Wright, M. L. J., 2007. Do Countries Default in "Bad Times"? Journal of the European Economic Association 5(2-3): 352-360.

45. Trebesch, C. 2008. Delays in debt restructurings. Should we really blame the creditors? Free University of Berlin, mimeo.

46. Uribe, M. 2006. A fiscal theory of sovereign risk. Journal of Monetary Economics 53: 1857-1875.

47. Yue, V. Z. 2006. Sovereign default and debt renegotiation. New York University, mimeo.

Tables

in years	Average	Median	N
Emerging Europe	4.9	5.0	16
Latin America & Caribbean	6.9	5.0	42
Middle East & Africa	8.5	5.5	60
Asia-Pacific	5.3	2.0	10
Full Sample	7.3	5.0	128

Table 1 - Summary default statistics

in years	Partial	Full
Average	5.7	8.4
Median	3.0	7.0
N	128	128

Table 2 - International capital market exclusion periods

	Emerging Europe		Latin America & Caribbean		Middle East & Africa		Asia-Pacific	
in years	Partial	Full	Partial	Full	Partial	Full	Partial	Full
Average	3.4	4.7	3.1	6.0	8.2	11.8	4.1	5.4
Median	2.0	3.0	2.0	5.0	5.0	9.0	4.0	8.0[16]
N	17	17	41	41	61	61	9	9

Table 3 - International capital market exclusion periods, by region

	1980s		1990s		2000s	
in years	Partial	Full	Partial	Full	Partial	Full
Average	5.5	8.2	4.1	5.8	2.5	3.7
Median	4.0	8.0	2.0	6.0	3.0	3.0
N	79	79	32	32	17	17

Table 4 - International capital market exclusion periods, by decade of default

[16] This result is driven by one censored event which takes at least 8 years to regain full market access. However, after 2 years 60% of countries have regained full market access.

	Partial Market Access
Constant	2.6536
	(0.92)
Imports coverage	0.0237
	(0.53)
Inflation	−0.0001
	(−0.24)
Exports % GDP	0.0056
	(0.93)
log(Institutional Investor rating)	0.0002
	(0.00)
Spread	−0.8273**
	(−2.20)
1yr UST	−0.2787*
	(−1.82)
Natural disaster prior to default	0.6141**
	(2.45)
Size of creditor haircut	−0.0117
	(−1.46)
Big, Dummy	0.6163
	(1.39)
IMF program, dummy	0.1127
	(0.36)
Africa, Dummy	−1.6053***
	(−3.24)
Latin America, Dummy	−0.8006*
	(−1.90)
Asia, Dummy	−0.9250
	(−1.49)
Log Likelihood	−111.136
# Observations	256

1) T-statistics in parenthesis;

2) *, **, *** denote significance at 10%, 5%, and 1% respectively.

3) Robust standard errors

Table 5 - Partial market access regression results

	Full Market Access
Constant	−1.0455
	(−0.30)
Imports coverage	0.0072
	(0.15)
Inflation	−0.0047
	(−0.98)
Exports % GDP	0.0051
	(0.78)
log(Institutional Investor rating)	1.1327*
	(1.88)
Spread	−0.2507
	(−0.70)
10yr UST	−0.4334
	(1.48)
Natural disaster prior to default	0.9277***
	(2.70)
Size of creditor haircut	−0.0126*
	(−1.68)
Big, Dummy	−0.2334
	(−0.42)
IMF program, dummy	−0.1297
	(−0.42)
Africa, Dummy	−1.7586***
	(−2.92)
Latin America, Dummy	−0.9245**
	(−2.07)
Asia, Dummy	−1.5788*
	(−1.83)
Log Likelihood	−126.905
# Observations	419

1) T-statistics in parenthesis;

2) *, **, *** denote significance at 10%, 5%, and 1% respectively.

3) Robust standard errors

Table 6 - Full market access regression results

Figures

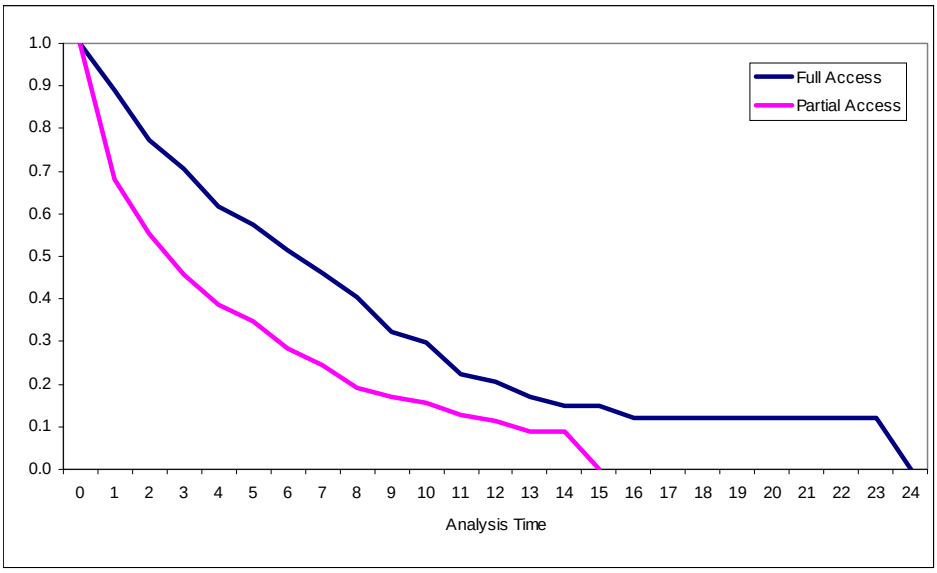

Figure 1 - Empirical survival function estimates

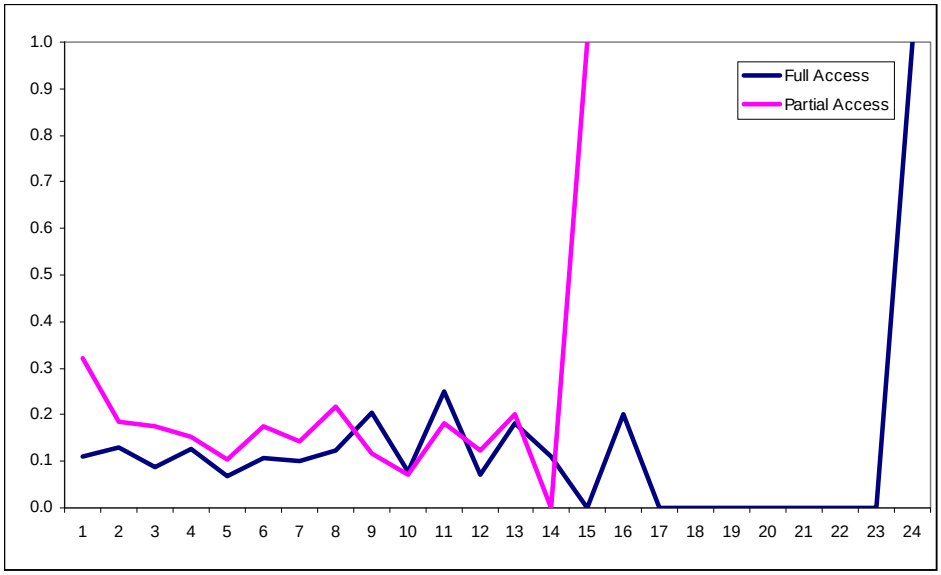

Figure 2 - Empirical hazard function estimates

Appendix 1 - Discussion of Market Access Measure

We believe that using net bank and bond debt transfers to public and private creditors is a good way to measure access to international capital markets. To test this, we check whether during years of a sovereign default, net transfers are negative, which implies no market access. We exclude the starting year of default because due to annual data we cannot tell whether the transfers occurred before the default episode began. We also exclude the year of reaccess if it is in the same year of exiting default, because, again, the transfers could occur after the default episode ended.

We find that approximately 10% of the sample shows positive net transfers during bank default episodes, and substantially less for bond default episodes. These measures are not weighted by the number of events, but are weighted by the length of the event because potentially a country experiencing a longer period of default can have more years of positive net transfers than those countries experiencing short periods of default.

	# Observations	Percentage
Default&public borrowing>0% of GDP	87	9.9
Default&private borrowing>0% of GDP	58	6.6
Default&sum of borrowing>0% of GDP	89	10.1
Default	878	

Table A.2 - Positive net transfers during default years

We also include some figures for a graphical representation of our measures ability to match default years.

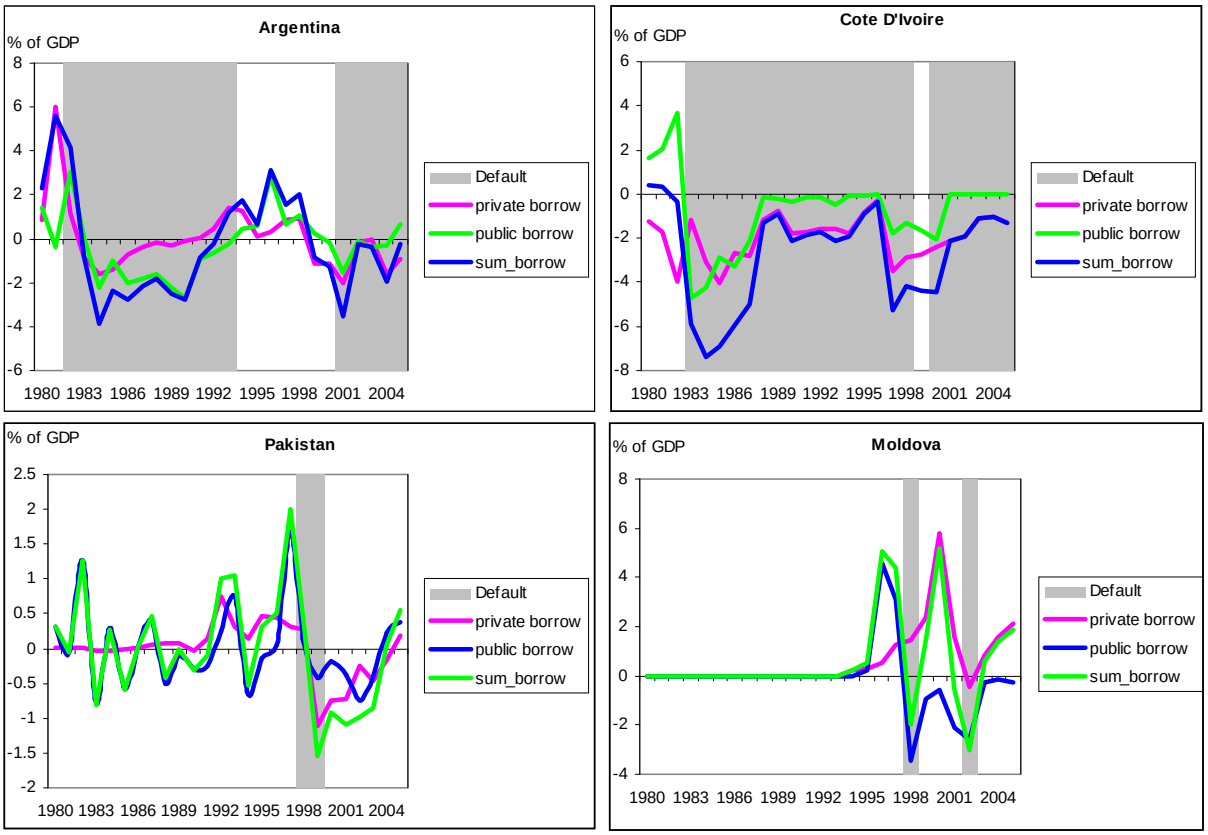

Figure A.2 - Net public and private transfers by private creditors

Appendix 2 - Derivation of the Likelihood Function

The econometric model that we use in the paper is the piece-wise constant proportional hazard model. This model is defined as follows: let $\lambda(t|X,\beta) = \lambda(t)\exp(X'\beta)$ be the conditional hazard function, where $\lambda(t)$ is the baseline hazard and $\exp(X'\beta)$ is proportional factor that control the effect of the regressors X on the hazard. The main characteristic of the piece-wise constant hazard model is that its baseline hazard is defined by pieces, that is, the hazard varies with time but it is constant within certain ranges:

$$\lambda(t) = \begin{cases} \lambda_1 \quad if \quad 0 < t \leq 1 \\ \lambda_2 \quad if \quad 1 < t \leq 2 \\ \qquad (...) \\ \lambda_J \quad if \quad t > J \end{cases}$$

Using the definition of the baseline hazard we can write the conditional survival function:

$$\begin{aligned} S(t|X,\beta) &= \exp\left(-\int_0^t \lambda(u)\,du \exp\left(X'\beta\right)\right) \\ with \quad \int_0^t \lambda(u)\,du &= \begin{cases} \sum_{j=1}^{t} \lambda_j \quad if \quad t \leq J \\ \sum_{j=1}^{J} \lambda_j + (t-J)\lambda_J \quad if \quad t > J \end{cases} \end{aligned}$$

The model described above assumes constant covariates, and therefore, in order to allow for time-varying covariates it is necessary to describe the method by which we are able to use time varying covariates. The way we incorporate time varying covariates in our model is through "event split". The idea of event split was proposed by Jenkins (1995) and the best way to describe is through an example. Let's suppose that we are interested in analyzing the time between first employment and a house purchase. Let's assume further that one of the explanatory variables is a dummy variable indicating whether the individual is married or not. As it is obvious, this variable can change over time. The way to incorporate a change in the marital status (from singe to married) is by considering 2 events instead of only one. The first event is the time between first job and marriage and the second is the time between marriage and purchase of house conditional on not having purchased the house until that moment. The first event, when the individual is still single, is going to be considered a censored event, as we do not observe the purchase of a house while single. The second event is also a censored event, but in this case a left censor event for which we know the time the event started. If we assumed that it took t_1 periods until the purchase of the house but at $t_0 < t_1$ the individual got married, we can write the individual contribution to the likelihood as follows:

$$f(t|marital\ status) = S(t_0|single)\,\frac{f(t|married)}{S(t_0|married)}.$$

In our particular case the variables we use are not always discrete variables, but for those that are continuous, we assume that the value of the variable did not change during the year. Using the previous information, we can write the individual contribution to the likelihood as follows:

$$L_i\left(\beta\left|X\left(t\right),t\right.\right)=\begin{cases}\left[\prod_{j=1}^{t-1}\frac{S(j|X(j),\beta)}{S(j-1|X(j),\beta)}\right]\left[\frac{f(t|X(t),\beta)}{S(t-1|X(t),\beta)}\right] & if\ non-censored\\ \prod_{j=1}^{t}\frac{S(j|X(j),\beta)}{S(j-1|X(j),\beta)} & if\ censored\end{cases}$$

This expression can be simplified further:

$$\begin{aligned}\frac{S\left(j\left|X\left(j\right),\beta\right.\right)}{S\left(j-1\left|X\left(j\right),\beta\right.\right)} &= \frac{\exp\left(-\int_0^j\lambda\left(u\right)du\exp\left(X\left(j\right)'\beta\right)\right)}{\exp\left(-\int_0^{j-1}\lambda\left(u\right)du\exp\left(X\left(j\right)'\beta\right)\right)}\\ &= \exp\left(-\int_{j-1}^{j}\lambda\left(u\right)du\exp\left(X\left(j\right)'\beta\right)\right)\\ &= \exp\left(-\lambda_j\exp\left(X\left(j\right)'\beta\right)\right)\\ &= 1-h\left(j\left|X\left(j\right),\beta\right.\right)\end{aligned}$$

Also, since we are working with yearly data, we can assume that the data is discrete, and therefore, $f\left(t\left|X\left(t\right),\beta\right.\right)=S\left(t-1\left|X\left(t\right),\beta\right.\right)-S\left(t\left|X\left(t\right),\beta\right.\right)$. This implies:

$$\begin{aligned}\frac{f\left(t\left|X\left(t\right),\beta\right.\right)}{S\left(t-1\left|X\left(t\right),\beta\right.\right)} &= \frac{S\left(t-1\left|X\left(t\right),\beta\right.\right)-S\left(t\left|X\left(t\right),\beta\right.\right)}{S\left(t-1\left|X\left(t\right),\beta\right.\right)}\\ &= 1-\frac{S\left(t\left|X\left(t\right),\beta\right.\right)}{S\left(t-1\left|X\left(t\right),\beta\right.\right)}\\ &= 1-\exp\left(-\lambda_t\exp\left(X\left(t\right)'\beta\right)\right)\\ &= h\left(t\left|X\left(t\right),\beta\right.\right)\end{aligned}$$

Now, if we define $d=1$ if the event is right censored, that is, the end is not observed, we can re-write the individual contribution to the likelihood as follows:

$$L_i\left(\beta\left|X\left(t\right),t\right.\right)=\left\{\prod_{j=1}^{t-1}\left[1-h\left(j\left|X\left(j\right),\beta\right.\right)\right]\right\}\left[1-h\left(j\left|X\left(j\right),\beta\right.\right)\right]^d\left[h\left(j\left|X\left(j\right),\beta\right.\right)\right]^{1-d}$$

And the individual contribution to the log-likelihood function is:

$$\begin{aligned}l_i\left(\beta\left|X\left(t\right),t\right.\right) &= \sum_{j=1}^{t_i-1}\left(\ln\left[1-h\left(j\left|X\left(j\right),\beta\right.\right)\right]\right)+\\ &\quad d_i\ln\left(\left[1-h\left(j\left|X\left(j\right),\beta\right.\right)\right]\right)+\\ &\quad \left(1-d_i\right)\ln h\left(j\left|X\left(j\right),\beta\right.\right).\end{aligned}$$

Appendix 3 - Data Description - MUST NEED TO BE UPDATED, NO?

Default events. Standard and Poor's definition of start and end date.

Institutional Investor Country Credit Rating. Based on information provide by senior economists and sovereign risk analysts at global banks, money management, and securities firms. Each country is rated on a scale of 0 to 100, with 100 representing those countries that have the least chance of default.

IMF program. Taken from the IMF webpage for History of Lending Arrangements. A country must have a program for at least 5 months out of 12 to be considered as having a program in a given year. We consider just the existence of a Stand-By Agreement as well as any type of program, including SBA, EFF, Structural Adjustment Facility, and PRGF.

Macroeconomic variables. Taken from GDF and IFS. Missing data is filled in as much as possible using Inter American Development Bank, African Development Bank, Asian Development Bank, and European Bank for Reconstruction and Development resources.

Partial market access. The first year of net positive bank or bond transfers from private creditors to either the public and publicly guaranteed sector or the private sector. This definition excludes arrears from being considered as a positive transfer to the debtor. Data is available from GDF using the following series: DT.NTR.PNGB.CD; DT.NTR.PNGC.CD; DT.NTR.PBND.CD; DT.NTR.PCBK.CD.

Full market access. The first year of 1% of GNP net positive bank or bond transfers from private creditors to either the public and publicly guaranteed sector or the private sector. This definition excludes arrears from being considered as a positive transfer to the debtor. Data is available from GDF using the following series: DT.NTR.PNGB.CD; DT.NTR.PNGC.CD; DT.NTR.PBND.CD; DT.NTR.PCBK.CD.

Haircut. We use Benjamin and Wright's (2008) database of private creditor haircuts on 90 defaults and renegotiations.

Region. Determined by the CIA World Factbook. https://www.cia.gov/library/publications/the-world-factbook/

Country size. We use nominal US$ GNP from the GDF, series: NY.GNP.MKTP.CD.

Population. United Nations Population Division, World Population Prospects: 2006 Revision. Data is available in 5-year increments and we use linear interpolation to fill in the missing years.

US Treasury rates. Global Financial Data - CBOE 30-year US Government Bond Yield Index.

High Yield rates. Global Financial Data - Barron's Intermediate-Grade Bond Yield, an index of 10 medium-grade corporate bonds.

Spread. Difference between high yield and US Treasury rates. Used to measure liquidity and investor risk appetite. A smaller spread indicates higher liquidity and demand for riskier assets.

Natural disaster costs. EM_DAT Emergency Events Database by the Centre for Research on the Epidemiology of Disasters (CRED) at Université Catholique de Louvain. For a disaster to be included in the database it must meet at least one of the following criteria: 10 or more people reported killed; 100 or more people affected; declaration of a state of emergency; or call for international assistance. Our focus is on natural and complex disasters, measured by estimated damages in USD. We require an event to occur the year before or during the initial year of a sovereign default. In our empirical model we used the difference to the average loss in order to take into account that certain countries may be more prone to having natural disasters and therefore this fact should already be incorporated in the pricing of the debt. This the same as assuming that what matters are the unexpected losses. http://emdat.be