Sovereign Risk Premia
- Supplementary Online Appendix -
NOT FOR PUBLICATION

This separate Appendix contains three sections, as in the main text and in the same order. Appendix A reports robustness checks on our portfolio building exercise. Appendix B describes our asset pricing methodology and reports additional asset pricing results. Appendix C focuses on the model: it details our computational algorithm and calibration and it reports additional simulation results.

Appendix A Portfolios of Sovereign Bonds

We report below additional statistics on portfolios of sovereign bonds, and then turn to individual bonds in order to estimate transaction costs.

I. A. Additional Portfolios Statistics

We report below additional descriptive statistics on our benchmark portfolios of EMBIs and then consider different sorts, different weights and different credit ratings.

In the main text, we use the US stock market excess returns in order to compute our bond betas. In this appendix, we use the US corporate bond market instead. We define the bond beta (β^i_{EMBI}) of each country i as the slope coefficient in a regression of EMBI bond excess returns on US BBB-rated corporate bond excess returns:

$$r^{e,i}_t = \alpha^i + \beta^i_{EMBI} r^{e,BBB}_t + \varepsilon_t,$$

where $r^{e,BBB}_t$ denotes the log total excess return on the Merrill Lynch US BBB corporate bond index.

- Table 5 reports additional statistics for our benchmark portfolios of countries sorted on credit ratings and market betas.
- Table 6 reports average excess returns obtained with different sorts (bond vs equity betas) and different weights (countries are given equal weights inside each portfolio or are value-weighted).

We complement the Standard and Poor's ratings with the "Outlook" opinion that Standard and Poor's offers for each country. We also convert this opinion into numbers and use them to sort countries more precisely. Specifically, we attribute the following record to each "Outlook": Negative = 0.5, Watch Negative = 0.25, Not Meaningful = 0, Satisfactory = 0, Stable = 0, Positive = -0.5, Strong = -0.5, Very Strong = -0.5. As a result, a country with a BBB rating and a Negative outlook would have a rating number of 9 - 0.5 = 8.5.

In the main text, we use credit ratings from Standard and Poor's as a proxy of a country probability of default. We check the robustness of our results to ratings from Moody's and Fitch. Table 7 reports average excess returns obtained with different sorts (bond vs equity betas) and different credit ratings. We use ratings on foreign currency denominated long term debt from Moody's and Fitch. Moody's and Fitch use letter grades to describe a country's credit worthiness. We index Moody's and Fitch letter grade classification with numbers going from 1 to 21 (Moody's) and 1 to 25 (Fitch). We get Moody's and Fitch ratings from Bloomberg. Note that we do not have any rating from Moody's for Belize, Cote d'Ivoire, Serbia and Ghana and from Fitch for Belize, Cote d'Ivoire, Iraq, Pakistan and Trinidad and Tobago. When we use Fitch's ratings, we start our sample on 1/1997, and not on 1/1995, because we do not have enough countries to build portfolios before this date.

I. B. Bid-Ask Spreads on Individual Bonds

EMBI series do not account nor report bid-ask spreads. In order to obtain an order of magnitude of the transaction costs, we build a database of individual sovereign bonds in emerging markets. We collect in Datastream all the ISIN codes corresponding to these bonds and retrieve their end-of day bid and ask prices from Bloomberg.[16] This data set is not as clean as the JP Morgan indices and this is a key reason why the JP Morgan indices are widely used as benchmarks. We obtain a very unbalanced panel: from 5 bonds at the start of the sample in 1995 to 350 bonds at the end in 2009. The number of bonds jumps three times during this period, reflecting the progressive availability of the data. Our dataset comprises many outliers, with bid-ask spreads that are either negative, zero, or extremely large.

We delete all observations that correspond to negative or zero bid-ask spreads. We also delete bid-ask spreads that are above 20% if the spread was below this cutoff the day before or the day after the spread is recorded. We keep, however, spreads above 20% if they do not appear as single observations. We then proceed in two steps. First, for each country, we compute the median bid-ask spreads at the end of each month (using the same dates as for our EMBI series). Second, we form 6 portfolios of those spreads using the same sorts as for our benchmark EMBI portfolios. In each portfolio, spreads are equally-weighted. Note that our data set does not correspond to the one used by JP Morgan in order to build EMBI indices. We do not have the list of bonds included in those indices or their weights. Table 8 shows that, in our sample, median bid-ask spreads vary between 41 basis points on the second portfolio to 65 basis point on the last portfolio.

Appendix B Asset Pricing Tests

We first briefly describe here the asset pricing tests used in the text. See Cochrane (2001) for a comprehensive presentation and discussion. We then report additional asset pricing results, first using portfolios of countries and then using individual countries. We finally pay a special attention to the dynamics of sovereign risk during the recent mortgage crisis.

[16] We thank James Hebden for his help in assembling this large database.

II. A. Asset Pricing Methodology

GMM The moment conditions are the sample analog of the populations pricing errors:

$$g_T(b) = E_T(m_t \widetilde{r_t^e}) = E_T(\widetilde{r_t^e}) - E_T(\widetilde{r_t^e} f_t')b,$$

where $\widetilde{r_t^e} = [\widetilde{r_t^{e,1}}, \widetilde{r_t^{e,2}}, ..., \widetilde{r_t^{e,N}}]'$ groups all the N EMBI portfolios. In the first stage of the GMM estimation, we use the identity matrix as the weighting matrix, while in the second stage we use the inverse of the spectral density S matrix of the pricing errors in the first stage: $S = \sum E[(m_t \widetilde{r_t^e})(m_{t-j} \widetilde{r_{t-j}^e})']$.[17] We use demeaned factors in both stages. Since we focus on linear factors models, the first stage is equivalent to an ordinary least square (OLS) cross-sectional regression of average returns on the second moment of returns and factors. The second stage is a generalized least square (GLS) cross-sectional regression of average excess returns on the second moment of returns and factors.

FMB In the first stage of the FMB procedure, for each portfolio j, we run a time-series regression of the EMBI excess returns $\widetilde{r_t^e}$ on a constant and the factors f_t, in order to estimate β^j. The only difference with the first stage of the GMM procedure stems from the presence of a constant in the regressions. In the second stage, we run a cross-sectional regression of the average excess returns $E_T(m_t \widetilde{r_t^e})$ on the betas that were estimated in the first stage, in order to estimate the factor prices λ. The first stage GMM estimates and the FMB point estimates are identical, because we do not include a constant in the second step of the FMB procedure. Finally, we back out the factor loadings b from the factor prices and covariance matrix of the factors.

II. B. Additional Asset Pricing Results on Portfolios

This subsection reports asset pricing results obtained using our EMBI portfolios and additional risk factors.

- Table 10 reports asset pricing results obtained with the equally-weighted portfolios built by sorting countries on credit ratings and bond (not stock) betas. The results are very similar those obtained on our benchmark portfolios.

- Table 11 reports asset pricing results obtained with US stock market return and either the log change in the VIX index or the TED spread as risk factors. Table 12 reports asset pricing results obtained with the return on a US BBB bond index and either the log change in the VIX index or the TED spread as risk factors. Both the log changes in the VIX index and the TED spreads are correlated with the US stock and bond market returns. The addition of these variables decreases the RMSE obtained with the bond return alone, but not the one obtained with the US stock market.

[17] We use a Newey and West (1987) approximation of the spectral density matrix The optimal number of lags is determined using Andrew's (1991) criterion with a maximum of 6 lags.

- Tables 13 and 14 report the results of our conditional asset pricing tests using VIX as the conditioning variable; we use either the US stock market return or the US BBB corporate bond return as risk factor. In both cases, market prices of risk increase significantly when the volatility of the US stock market is high.

- Table 15 reports asset pricing results from the perspective of world investors: we use either the MSCI world equity index or the Bank of America Merrill Lynch Global Broad Market Corporate BBB index. Results are very similar to those obtained with US indices.

II. C. Country-Level Asset Pricing Results

We have shown that our results are robust to the choice of past betas and to different portfolio weights. We now consider an additional robustness check: we run *country-level* Fama and MacBeth (1973) tests.

We first describe the procedure and then reports our results. The Fama and MacBeth (1973) procedure has two steps. In the first step, we run time series regressions of each country i's bond excess return on a constant and a risk factor (the US stock market return r^m or the US BBB bond return $r^{US_{BBB}}$):

$$r^{e,i}_{t+1} = c^i + \beta_i r^{US_{BBB}}_{t+1} (\text{or } r^m_{t+1}) + \epsilon_{i,t+1}, \text{for a given } i, \forall t.$$

In a second step, we run cross-sectional regressions of all bond excess returns on betas:

$$r^{e,i}_t = \lambda_t \beta_i + \xi_t, \text{for a given } t, \forall i.$$

We compute the market price of risk as the mean of all these slope coefficients: $\lambda = \frac{1}{T}\sum_{t=1}^{T} \lambda_t$.

This procedure is the original Fama and MacBeth (1973) experiment. Its first step is similar to the procedure described above and used on portfolios. Its second step differs: we run here T cross-sectional regressions (one for each date in the sample) instead of running one single cross-sectional regression on the average excess returns. We implement this modification because the number of countries varies along the sample period. Note that this procedure does not require forming portfolios. But it has one main drawback: it does not correspond to an implementable trading strategy since we use the whole sample to estimate the betas.

Table 16 and Table 17 report our results, using the US stock market returns and the US BBB bond returns as risk factors, respectively. The first panel of each table reports asset pricing results. In both cases, the market price of risk is positive and significant. The market price of US BBB risk is higher than but not statistically different from the mean of the risk factor's excess return. The market price of US equity risk is much higher than the mean equity excess return. These two results are similar to the ones we obtain with portfolios. In both cases, the square root of the mean squared errors and the mean absolute pricing error are larger than on portfolios, but we cannot reject the null hypothesis that all pricing errors are jointly zero.

A simple figure illustrates our results clearly. Figure 4 plots realized average excess returns on the vertical axis against predicted average excess returns on the horizontal axis. As described above, we regress each actual country-level excess return on a constant and US stock market return in order to obtain the slope coefficients β. Each predicted excess returns is then obtained using the OLS estimate of β times the market price of risk. All returns are annualized. As Figure 4 shows, a single risk factor explains a large share of the variation across countries and pricing errors are concentrated on a few countries like Trinidad and Tobago. High beta countries tend to offer high unconditional currency excess returns.

The second panel of Tables 16 and 17 check that EMBI country returns load significantly on the risk factors. We report six sets of panel regression results. We regress all the country-level excess returns on the risk factor, the country ratings, as well as the product of ratings and factor returns. The first three columns correspond to panels without fixed effects, while the last three columns include fixed effects. In the former case, standard errors are clustered by country and time. EMBI country returns load very significantly on the US corporate returns: the slope coefficient is 1.2 with a standard error of 0.2 for the US BBB bond return and 0.36 with a standard error of 0.1 for the US stock market return. The introduction of ratings and/or fixed effects does not alter this result. Adding the interaction of ratings and factor returns does affect the initial slope coefficient: the worse the ratings, the larger the loading of EMBI country returns on the US BBB or US stock market returns. The slope coefficient of this interaction is equal to 2.2 with a standard error of 0.7 for the US BBB bond return and 1.2 with a standard error of 0.3 for the US stock market return. This result is consistent with our portfolio experiement: when we sort countries on along the ratings and beta dimensions, we obtain a double cross-section of portfolio excess returns. The higher the betas, the higher the average excess returns, especially for countries with poor ratings.

II. D. Mortgage Crisis

We focus here on the recent mortgage crisis and provide a succinct account of this period from the perspective of our sovereign bond portfolios. Both the quantity and the market price of risk appear to have changed during this period. This is fully consistent with our asset pricing experiment: we rebalance our portfolios monthly in order to capture relative changes in the quantities of risk and we show that the market price of risk is higher in bad times, notably when the VIX index is high. It was clearly the case during the mortgage crisis. Our model, however, would impute most of the changes in bond prices to changes in the market price of risk. Four points are worth mentioning.

First, note that our results are robust to a smaller sample that does not include the mortgage crisis. If we redo our asset pricing experiment in a sample that ends in May 2007 for example, we get quite similar results: again, we obtain a clear cross-section of average excess returns on our portfolios, and this cross-section corresponds to ex-post betas, such that the higher amounts of risk investors take, the larger the average excess returns. The betas are lower and the market price of risk higher than in a longer sample.

Second, the recent period reinforces the results. Adding data up to May 2009 or May 2011 leads to higher betas and lower market prices of risk than in the shorter sample above. It thus makes the market price of risk closer to the mean of the excess return on the risk factor (as implied by the no-arbitrage condition).

Third, consistent with the two results above, betas have increased overall during the crisis. To see this point, we look at the difference in time-varying ex-ante betas between the last and first portfolios. Those betas are the ones we use to sort countries into portfolios; they correspond to the average beta in each portfolio. The upper panel of Figure 5 reports these spreads in betas over the 7/2007–3/2011 period. They are positive but declining at first in 2008. They then shoot up and become very high at the end of 2008 and in 2009. They seem to be back in 2011 to their long term averages. Recall that the beta dated t corresponds to a slope coefficient obtained on the previous 200 days (i.e around one year).

Fourth, let's look now at the spread in returns between the corner portfolios. The lower panel of Figure 5 reports the spread in returns for the same period as the betas. Returns were down more than 25% in the last quarter of 2008 (not counting September returns, i.e after Lehman). Investors lost around 30% total in 2008. Returns later rebounded sharply in 2009. If one takes the NBER definition of the US recession, the overall return on this long-short strategy is close to 2% for the whole period, which is much lower than the average return in the whole sample (close to 10%).

Appendix C Model

In this section of the Appendix, we first describe the recursive equilibrium and then turn to the calibration parameters and a description of our simulation method. Finally, we report some additional simulation results.

III. A. Definition of the Recursive Equilibrium

In order to describe the economy at time t, we need to keep track of the borrower's endowment stream, his/her outstanding debt, and the lender's past surplus consumption ratios. Let y^i and s denote the history of events up to t: $y^i = (y^i_0, ..., y^i_t)$ and $s = (s_0, ..., s_t)$. We denote x a column vector that summarizes this information: $x = [y^i; s]$. Given that the two stochastic endowment processes are Markovian, we denote $f(x', x)$ the conditional density of x', i.e. the value of x at time $t+1$ given the initial value of x at time t. In what follows, the value of a variable in period $t+1$ is denoted with a *prime* superscript.

Given the initial state of the economy, the value of the default option is:

$$v^o(B, x) = max\{v^c(B, B', x), v^d(x)\},$$

where $v^c(B, B', x)$ denotes the contract continuation value, v^d the value of defaulting and v^o the value of being in good credit standing at the start of the period. The government acts so as to maximize the utility of the representative agent. The government can either repay the debt or default. If the government chooses to repay the debt coming to maturity, it can issue new debt. As a result, the value of staying in the contract is a function of the exogenous state vector x, the quantity of debt coming to maturity at time B and future debt B'. In case of default, all outstanding debt is erased, and the small economy is forced into autarky for a stochastic number of periods. Hence, the value v^d of defaulting depends only on the state vector x. We now define more precisely v^c and v^d.

The value of default depends on the probability of re-accessing financial markets in the future and on the current output loss:

$$v^d(x) = u(y^{def}) + \beta \int_{x'} [\pi v^o(0, x') + (1 - \pi) v^d(x')] f(x', x) dx',$$

where π is the exogenous probability of re-entering international capital markets after a default. Note, again, that here the letter β refers to the discount factor of the representative agent in the emerging market. As we have seen, when a borrower defaults, consumption is equal to the autarky value of output. In the following period, the borrower regains access to international capital markets with no outstanding debt with probability π, or remains in autarky with probability $1 - \pi$.

The value of staying in the contract and repaying debt coming to maturity is:

$$v^c(B, x) = Max_{B'} \{u(c) + \beta \int_{x'} v^o(B', x') f(x', x) dx'\},$$

subject to the budget constraint (1). The borrower chooses B' to maximize utility and anticipates that the equilibrium bond price depends on the exogenous states variable and on the new debt B'.

Let Υ denotes the set of possible values for the exogenous states x. For each value of B, the small open economy default policy is the set $D(B)$ of exogenous states such that the value of default is larger than the value of staying in the contract:

$$D(B) = \{x \in \Upsilon : v^d(x) > v^c(B, x)\}.$$

The default probability dp is endogenous and depends on the amount of outstanding debt and on the endowment realization. In particular, the default probability is related to the default set through:

$$dp(B', x) = \int_{D(B')} f(x', x) dx',$$

where $dp(B', x)$ denotes the expectation at time t of a default at time $t + 1$ for a given level B' of outstanding debt due at time $t + 1$.

III. B. Calibration

Parameters describing lenders' consumption growth and preferences are from Campbell and Cochrane (1999). They correspond to post-World War II US consumption, real risk-free rates and equity returns.[18] Parameters describing the borrowers' endowments and constraints are from Aguiar and Gopinath (2006, 2007), except for the direct output cost of default. We review these parameters here rapidly.

[18] The value of δ matches an average US real log risk-free rate of 1% per annum as in Aguiar and Gopinath (2006). The value of ϕ corresponds to the persistence of the price-dividend ratio in the data. The model implies an equity risk premium of 6.5%.

As already noted, the output cost of default is difficult to measure precisely because defaults are endogenous: in the data, expectations of bad economic conditions in the future might trigger current defaults. In the model, a large cost ensures that emerging countries do not default too often and thus can borrow at low interest rates. We pick a value that appears in lower range of the literature. We assume that the output cost of default θ is equal to 4% per period in the model. This value is higher than in Aguiar and Gopinath (2006) (2%) but lower than in Hatchondo and Martinez (2009) (10% minimum) and in line with the evidence of a significant output drop in the aftermath of a default (see, for example, Rose (2005)).

The probability π of re-entering capital markets after a default is equal to 10 percent per period, implying an average exclusion of 2.5 years, as in Aguiar and Gopinath (2006) and consistent with the evidence reported in Gelos, Sahay and Sandleris (2004). This value, again, appears conservative. Benjamin and Wright (2009), for example, report a longer average time of exclusion of 6 years.

The risk aversion parameter γ in the borrowers' (and lenders') utility functions is set equal to 2. Our model, as its predecessors, requires a low discount factor β in order to generate large debt to GDP ratios: it is equal to 0.80 as in Aguiar and Gopinath (2006).

We follow Aguiar and Gopinath (2007) for the description of the permanent and transitory components of the endowment process. We pick σ_g and σ_z equal to 2% and 1% respectively at quarterly frequency (4% and 2% at annual frequency). The persistence of the transitory component is 0.9 as in many business cycle models. The persistence of the permanent component is 0.2. These values imply that 45% of the total variance comes from the permanent component.

All small open economies share the same calibration parameters, except for the correlation of their endowment shocks to the US endowment shocks. This is the unique source of heterogeneity and we check that there is such heterogeneity in the data. We report in Table 18 reports the cross-country correlation coefficients between each EMBI country's real GDP and the US real GDP. We consider either annual or quarterly data. We extract their cyclical components using a HP filter (with the appropriate bandwidth parameter: 100 on annual and 1600 on quarterly data). At annual frequency, we use all available data and thus start at different dates for each country. At quarterly frequency, we consider one common sample (1994 - 2008) and ignore countries with incomplete series over that sample. We obtain correlation coefficients ranging from -0.3 to 0.6 on annual data and from -0.3 to 0.5 on quarterly data. These estimates are inherently imprecise: they rely on less than 60 observations. But they are in line with other estimates in the literature: Flood and Rose (2010) report in their figures 5 to 8 the GDP correlations of New Zealand, Sweden, Canada, and the U.K. with G3 aggregates. For these countries, long sample of GDP growth rates are available, allowing for the estimation of not only unconditional but also time-varying correlations. These correlations range from -0.5 to 0.9 approximately.

III. C. Computational Algorithm

To solve the model numerically we de-trend all the Bellman equations. To do so, we normalize all variables by $\mu_g \Gamma_{t-1}$.

Table 4: Parameters

Variable	Notation	Value
Lenders		
Risk-aversion	γ	2.00
Mean consumption growth (%)	g	1.89
Standard deviation of consumption growth (%)	σ	1.50
Persistence of the surplus consumption ratio	ϕ	0.87
Mean risk-free rate (%)	r^f	1.00
Borrowers		
Endowment		
Permanent: Persistence	α_g	0.20
Permanent: Standard deviation (%)	σ_g	4.00
Permanent: Mean (%)	μ_g	2.31
Temporary: Persistence	α_z	0.90
Temporary: Standard deviation (%)	σ_z	2.00
Temporary: Mean (%)	μ_z	$-Var(z)/2$
Preferences		
Risk-aversion	γ	2.00
Discount factor	β	0.80
Direct default cost (%)	θ	4.00
Probability of re-entry (%)	π	10.00

Notes: This table reports the parameters used in the simulation. The model is simulated at quarterly frequency. The values for the direct output cost and the probability of re-entering financial markets after a default are per quarter. In the table, the mean and standard deviations of endowments are annualized (e.g. they are reported as $4g$, 2σ, $2\sigma_g$, $2\sigma_z$), as well as the persistence of the surplus consumption ratio (ϕ^4) and the risk-free rate ($4r^f$). Values describing lenders' consumption growth and preferences are from Campbell and Cochrane (1999) and correspond to post-World War II US consumption data. These parameters imply a steady-state endowment ratio $\overline{S}$ equal to 5.9 percent and a maximum surplus endowment ratio S_{max} of 9.4 percent. Values describing the borrowers' endowments are from Aguiar and Gopinath (2006).

Hatchondo, Martinez, and Sapriza (2010) show that evenly spaced and coarse grids imply biases in the mean debt levels and volatility of spreads. To alleviate the biases, we discretize the borrower's endowment process using non evenly spaced grid points that span -5 to +5 standard deviations around the mean of each process. Most of the grid points are between one and three standard deviations around the means. We discretize the investors' surplus consumption ratio in 6 grid points equally spaced between .0072 and S_{max}. We build the transition matrix as described in Tauchen and Hussey (1991). The quantity of debt is discretized between 0 (no debt) and -0.95 and we check in our simulations that this constraint never binds. Most grid points are between -20% and +20% around the mean debt level. The exact definition of our grids and our programs are available on our websites.

We start with a guess for the bond price function $Q^0(B', x) = Q^{rf}$ for each B' and x, where Q^{rf} is the price of the risk free bond available to investors and is equal to $Q^{rf} = E[M']$ and $x = [y, s]$ is a vector containing the exogenous state variables. Given the bond price function, we use value function iteration to obtain the optimal consumption, asset holdings and default policy functions. Given the optimal default policy function found in the previous step, we update the bond price function $Q^1(B', x)$ according to equation 3. If a convergence criterion is satisfied, we stop. If not, we use the updated price function to compute new values for the optimal consumption, asset holdings and default policy functions and repeat this routine up to the point that $max\{Q^i(B', x) - Q^{i+1}(B'x)\} < 10^{-6}$.

We also compute the price of a claim on total consumption and its return. To obtain the equilibrium price-dividend ratio in the Campbell and Cochrane (2009) model, we follow Wachter (2005). In our simulation, the price-dividend ratio has a mean of 17.85 and a standard deviation of 13.13 (both annualized), and a quarterly autocorrelation of 0.97.

Due to the large number of state variables and the large number of countries, we run our code in parallel mode on 32 processors. We start with small grids and interpolate the obtained value functions to use them as initial guesses for larger grids. We have a total of 36 simulated countries, for 90,000 quarters; we use the second half of the sample for our analysis.

We reproduce on simulated data the same experiment that we run on actual data. Table 20 reports asset pricing results on portfolios of simulated data. We use the US stock market return as our risk factor. We obtain a positive and significant market price of risk that is in line with the mean of the risk factor. This unique risk factor explains 95% of the cross-section of average sovereign bond excess returns. The alphas are overall small and not statistically significant at the 1% level. For the high beta portfolios, however, the alphas are individually significant. This result is in line with the model: the investors' preferences imply that the market price of risk is time-varying and cannot be perfectly summarized by a unique risk factor. We also obtain a clear cross-section of betas. High beta countries offer high sovereign risk premia. This is in line with the data: high (pre-formation) beta portfolios exhibit high (post-formation) stock market betas, as in the data. Note that the time-series R^2 are small because of missing risk factors (higher order terms in the log linearization of the stochastic discount factor), idiosyncratic variations and our assumption of zero recovery rates in case of defaults.

III. D. Simulation Results

We solve our model for a set of 36 countries. Again, these countries differ only along one dimension: the correlation between investors' consumption growth and borrowers' endowments. These correlation coefficients are uniformly spaced between $-.5$ and $.5$. Each ρ^i corresponds to a different sovereign borrower. All borrowing countries face the same investors' consumption growth, and thus the same time-varying risk-aversion. The values for all the other parameters are those in Table 4. Table 19 reports simulation results at the country level, for three different values of the cross-country correlation: $\rho =$ -0.5, 0, and 0.5. We compare simulation results to averages obtained over the same set of countries as in the sample of Section II.. Emerging market moments are computed by combining JP Morgan EMBI and Standard and Poor's data with the IMF-IFS (National Accounts) macroeconomic time series for the countries in our sample. As a result, macro moments are based on a sample of 26 emerging market economies (we drop Iraq, Philippines, Serbia, Uruguay and Ukraine for lack of data). Debt to income ratios come from the World Bank Global Development Finance database.

Panel A focuses on real business cycle moments. We consider HP-filtered variables and first log differences. We report the annualized volatility of HP-filtered output, output growth, consumption, and trade balance as a fraction of GDP, along with their first-order quarterly autocorrelation coefficients. The model broadly matches these moments. The volatility of GDP is 6.6% in the model and 5.4% on average in the data, while the first-order autocorrelation is 0.8 in both. The volatility of output growth and the trade balance are a bit too high in the model (4.6% vs 3.6% for output growth; 7.6% vs 5.0% for the trade balance). The autocorrelation of output growth is too low (0.15 vs 0.45). The model implies that consumption is more volatile than output, as is the case in emerging countries. The ratio of these two volatilities is on average 1.6 in the model and 1.3 in the data. But the model misses three macroeconomic moments. First, it underestimates the counter-cyclicality of the trade balance as a fraction of GDP (the correlation of the trade balance with GDP is -0.13 in the model versus -0.3 in the data). Second, it underestimates debt levels as a fraction of GDP. The average debt level is equal to 49% on average in the data, but only around 29% on average in the model. Note, however, that the model produces large maximum debt levels, with values up to 60%. Third, the model overestimates default probabilities. They are around 2% in the data. For countries whose business cycles are positively correlated to the US ($\rho = 0.5$), default probabilities are 3%, thus reasonably close. But they jump to 6% for countries whose business cycle are negatively correlated to the US ($\rho = -0.5$): in the model, defaults are not too costly for those countries; they do not have to pay high interest rates and thus optimally choose to default often.

Panel B focuses on asset pricing moments. We describe these moments in the main text.

Simulated Time Series In order to check the mechanism of the model, we report in Figures 6 and 7 the average consumption growth of lenders and borrowers before and after defaults. When the correlation between their endowment shocks is positive, borrowers tend to default when lenders' consumption growth is low.

The model implies time-variation in the market price of risk. In order to obtain an order of magnitude of this time-variation, we feed the model with actual real US consumption growth per capita and compute the realized surplus-consumption ratio. Figure 8 reports the time-series of the Sharpe ratio in the model, using actual consumption growth shocks in the US over the sample period.

CDS Curves Our model focuses on one-period bonds. The excess returns we obtain should thus be much smaller than the ones on long-term contracts. We obtain an order of magnitude of the increase in sovereign risk premia with the maturity of the contracts by looking at the term structure of sovereign CDS. As already mentioned, CDS contracts are available for less countries and shorter time windows. We thus only use them to provide a simple order of magnitude of the term structure.

Table 21 reports the mean senior CDS rates at different horizons for countries in our sample. Our dataset comprises series for 1, 2, .. 10-year horizons. We obtain the fitted CDS curves by spline interpolation of the rates from existing CDS contracts. We impose the boundary condition that the CDS rates tend to 0 when the horizon tends to 0. We compute fitted values only when at least the 1-year, 5-year and 10-year CDS rates are available. We do not have data for Belize, Bulgaria, Cote d'Ivoire, Dominican Republic, Gabon, Ghana, Sri Lanka, Trinidad and Tobago and Uruguay. The sample period is 1/2003–5/2011, but most series start later than January 2003. In our sample, ten-year CDS rates are on average five times higher than 3-month CDS rates.

Symmetric Default Cost and Bailouts In the benchmark model described in section IV., we assume an asymmetric direct output cost of default. This assumption implies that defaults are more costly in good times. In the section, we test the robustness of our results to a different specification of the direct default cost. We follow closely Aguiar and Gopinath (2006) and assume that the direct output cost of default is a constant fraction θ of current output: $Y_t^{i,default} = (1-\theta)Y^i$. In addition, creditors receive a transfer in the event of a default from a third agent that we do not model directly, for example the IMF. The transfer is a constant fraction B^* of the debt to GDP ratio of the country in default. Funds lent up to B^* are risk-free from the perspective of creditors. As a result, the risky bond price is equal to:

$$Q(B',x) = E[M']E[1_{1-dp(B',x)} + 1_{dp(B',x)}B^*] + cov[M', 1_{1-dp(B',x)} + 1_{dp(B',x)}B^*].$$

Aguiar and Gopinath (2006) show that, with risk neutral investors, a model with symmetric direct output cost, bailouts and shocks to trend is able to reproduce levels of debt of about 18% of GDP and a mean annual default probability of about 3.6%. However, their model generates yield spreads that are only a fraction of what is observed in the data. We introduce risk averse investors with habit preferences and simulate the model for three countries with different correlations of the endowment shocks with respect to the lenders (negative, zero and positive). We calibrate the model so that the maximum bailout is equal to 21% of the detrended GDP, and we increase the time preference of the borrower to 0.9 and reduce θ to 2%. Table 22 reports country level simulation results. The implications for real business cycle variables are roughly similar to those of the model with asymmetric direct default cost (Table 19). The model reproduces excess returns that increase with the correlation with the business cycle. However, excess returns are significantly lower than in the data and less volatile. In particular, the difference in excess returns across the polar cases is only 0.51%, while it is equal to 3.4% in the benchmark model.

Table 5: Additional Statistics on Benchmark EMBI Portfolios

Portfolios	1	2	3	4	5	6
β^j_{EMBI}		Low			High	
S&P	*Low*	*Medium*	*High*	*Low*	*Medium*	*High*
			Market Capitalization			
Mean	5.19	7.71	9.68	5.84	7.32	5.90
Std	2.62	6.86	6.87	4.58	5.77	4.82
			Higher Moments of Returns			
Skewness	−0.84	−3.06	−2.83	−1.44	−1.36	−2.92
	[1.30]	[1.19]	[1.59]	[1.02]	[0.75]	[1.23]
Kurtosis	16.60	23.62	26.44	14.24	11.54	23.03
	[2.96]	[7.53]	[10.32]	[3.35]	[2.34]	[6.84]
			Spread Duration			
Mean	5.22	5.24	4.89	6.79	6.64	6.41
Std	0.68	1.15	0.83	0.94	0.68	1.43
			Effective Interest Rate Duration			
Mean	5.37	4.95	4.85	6.93	6.74	6.70
Std	0.70	1.54	1.00	0.94	0.78	1.32
			Life			
Mean	7.87	7.94	9.15	11.13	12.84	13.77
Std	2.64	3.03	3.30	3.19	3.27	2.60
			External Debt to GNP			
Mean	0.36	0.44	0.51	0.38	0.44	0.52
Std	0.14	0.12	0.11	0.11	0.11	0.13

Notes: This table reports, for each portfolio j, the market capitalization (in billions of US dollars), higher moments of returns (skewness and kurtosis), spread duration, effective interest rate duration, life of EMBI indices and external debt to GNP ratios.For the higher moments of returns, we report standard errors between brackets. They are obtained by bootstrapping, assuming that returns are $i.i.d$. The average life L of a bond index at time t is calculated by: $L_t = \frac{\sum L_{i,t} * N_{i,t}}{\sum N_{i,t}}$, where the summations are over the bonds currently in the index, L is the life to assumed maturity, and N is the nominal value of amount outstanding. The portfolios are constructed by sorting EMBI countries on two dimensions: every month countries are sorted on their probability of default, measured by the S&P credit rating, and on β_{EMBI}. Note that Standard and Poor's uses letter grades to describe a country's credit worthiness. We index Standard and Poor's letter grade classification with numbers going from 1 to 23. Data are monthly, from JP Morgan and Standard and Poor's (Datastream) with the exception of external debt data that is from the World Bank Global Development Finance annual dataset (we linearly interpolate annual series to obtain series at monthly frequency). The sample period is 1/1995–5/2011. Duration measures are available starting in 2/2004. External debt to GNP data are available up to 12/2009.

Table 6: EMBI Portfolios: Different Sorts and Different Weights

Portfolios	1	2	3	4	5	6
β^j_{EMBI}		Low			High	
S&P	*Low*	*Medium*	*High*	*Low*	*Medium*	*High*
	Panel A: Bond Betas, Equal Weights					
Mean	2.50	4.72	7.53	7.28	10.96	14.46
s.e	[2.24]	[2.63]	[3.83]	[2.25]	[2.70]	[4.92]
Std	9.27	10.57	15.82	9.18	11.45	19.04
SR	0.27	0.45	0.48	0.79	0.96	0.76
	Panel B: Bond Betas, Value-Weighted					
Mean	5.51	3.16	9.43	6.94	10.20	13.59
s.e	[3.40]	[2.68]	[4.43]	[3.06]	[3.54]	[5.87]
Std	12.64	9.95	16.65	11.36	12.84	22.24
SR	0.44	0.32	0.57	0.61	0.79	0.61
	Panel C: Market Betas, Value-Weighted					
Mean	2.28	6.29	5.88	8.74	8.18	14.86
s.e	[2.33]	[2.89]	[3.12]	[3.83]	[3.37]	[6.91]
Std	8.69	10.87	11.91	14.01	12.64	25.39
SR	0.26	0.58	0.49	0.62	0.65	0.59
	Panel D: Market Betas, Equal Weights, Outlook					
Mean	3.68	4.38	6.75	8.34	10.66	12.59
s.e	1.78	2.15	2.91	2.94	3.55	5.37
Std	7.34	8.96	11.60	11.82	14.52	20.67
SR	0.50	0.49	0.58	0.71	0.73	0.61

Notes: This table reports, for each portfolio j, the average EMBI log total excess return $r^{e,j}$, the standard error on the average, as well as the standard deviation and Sharpe ratio. Excess returns are annualized and reported in percentage points. Sharpe ratios correspond to the ratios of annualized means to annualized standard deviations. Standard errors are obtained by bootstrapping, assuming that returns are $i.i.d$. The portfolios are constructed by sorting EMBI countries on two dimensions: every month countries are sorted on their probability of default, measured by the S&P credit rating, and on β_{EMBI}. Note that Standard and Poor's uses letter grades to describe a country's credit worthiness. We index Standard and Poor's letter grade classification with numbers going from 1 to 23. The different panels use different measures of β_{EMBI} and different weights for each country (equally-weighted or value-weighted). "Bond" betas are obtained by regressing EMBI bond excess returns on the US-BBB corporate bond excess returns. "Market" betas are obtained by regressing EMBI bond excess returns on the US stock market excess returns. The last panel uses the "Outlook" published by S&P to augment the information in the S&P rating. Data are monthly, from JP Morgan, MSCI and Standard and Poor's (Datastream). The sample period is 1/1995–5/2011.

Table 7: EMBI Portfolios: Different Ratings

Portfolios	1	2	3	4	5	6
β^j_{EMBI}		Low			High	
Rating	*Low*	*Medium*	*High*	*Low*	*Medium*	*High*
			Panel A: Bond Betas, Moody's ratings			
Mean	3.03	5.15	6.77	8.08	12.69	16.48
s.e	[2.29]	[3.27]	[3.93]	[2.24]	[3.00]	[4.94]
Std	9.00	12.86	15.87	9.12	12.52	19.75
SR	0.34	0.40	0.43	0.89	1.01	0.83
			Panel B: Bond Betas, Fitch's ratings			
Mean	1.66	2.83	8.03	7.87	8.50	13.16
s.e	[2.49]	[3.86]	[3.71]	[2.24]	[3.34]	[5.02]
Std	9.73	14.90	14.55	8.69	12.67	19.77
SR	0.17	0.19	0.55	0.91	0.67	0.67
			Panel C: Market Betas, Moody's ratings			
Mean	4.29	3.50	7.21	10.72	9.10	15.79
s.e	[1.81]	[2.13]	[3.03]	[2.87]	[3.68]	[5.34]
Std	7.42	8.74	12.25	11.82	14.80	22.40
SR	0.58	0.40	0.59	0.91	0.62	0.71
			Panel D: Market Betas, Fitch's ratings			
Mean	3.18	2.79	4.96	7.83	10.55	14.03
s.e	[2.08]	[2.33]	[3.02]	[3.20]	[4.11]	[5.71]
Std	7.86	9.10	11.57	12.29	15.78	22.21
SR	0.40	0.31	0.43	0.64	0.67	0.63

Notes: This table reports, for each portfolio j, the average EMBI log total excess return $r^{e,j}$, the standard error on the average, as well as the standard deviation and Sharpe ratio. Excess returns are annualized and reported in percentage points. Sharpe ratios correspond to the ratios of annualized means to annualized standard deviations. Standard errors are obtained by bootstrapping, assuming that returns are $i.i.d$. The portfolios are constructed by sorting EMBI countries on two dimensions: every month countries are sorted on their probability of default, measured by credit ratings, and on β_{EMBI}. Credit ratings are from Moody's and Fitch. Note that Moody's and Fitch use letter grades to describe a country's credit worthiness. We index Moody's letter grade classification with numbers going from 1 to 21 and Fitch's with numbers from 1 to 25. The different panels use different measures of β_{EMBI} and credit ratings from the two different rating agencies. "Bond" betas are obtained by regressing EMBI bond excess returns on the US-BBB corporate bond excess returns. "Market" betas are obtained by regressing EMBI bond excess returns on the US stock market excess returns. Data are monthly, from JP Morgan, MSCI (Datastream) and Moody's and Fitch (Bloomberg). The sample period is 1/1995–5/2011 for panels A and C and 1/1997–5/2011 for panels B and D.

Table 8: Bid-Ask Spreads on Individual Bonds

Portfolio	1	2	3	4	5	6
Median	60.43	39.69	51.62	49.97	53.94	63.57
Mean	88.50	39.65	54.97	51.69	60.37	73.13
Max	906.63	182.29	201.43	203.67	217.87	306.87
Min	14.89	8.91	21.32	15.99	11.70	36.71
Std	123.66	26.89	21.75	23.72	30.17	36.64

Notes: The table presents summary statistics on individual bonds' bid-ask spreads for each portfolio. Our data set corresponds to all available bonds in Bloomberg with ISIN numbers that match those of sovereign bonds in Datastream (for the emerging countries in our sample). We delete all observations that correspond to negative or zero bid-ask spreads. We also delete bid-ask spreads that are above 20% if the spread was below this cutoff the day before or the day after the spread is recorded. We then obtain our portfolio series in two steps. First, for each country, we compute the median bid-ask spreads at the end of each month. Second, we form 6 portfolios of those spreads using the same sorts as for our benchmark EMBI portfolios. In each portfolio, spreads are equally-weighted. All spreads are in basis points. We report the median, mean, max, min, and standard deviation of those spreads. Data are monthly. The sample is 01/1995–05/2011.

Table 9: US Holdings of Foreign Long Term Government Debt

Countries	1997	2001	2003	2004	2005	2006	2007	2008	2008 (USD)
Argentina	14112	1339	1341	1923	4058	7281	6079	2579	1794
Belize	0	0	32	14	9	25	27	49	49
Brazil	8189	8768	15234	16611	17822	14820	12580	15671	7476
Bulgaria	1041	1663	1437	1167	350	184	169	86	83
Chile	202	248	1891	1821	1501	1103	827	576	576
China	1534	171	579	481	406	464	332	363	361
Colombia	1337	2071	2903	3338	3464	4724	5059	4585	2340
Cote D'Ivoire	26	43	38	83	75	92	153	60	30
Dominican Republic	25	113	496	428	622	513	562	303	303
Ecuador	1366	672	853	1023	900	506	663	343	343
Egypt	0	248	48	46	981	1134	1632	1461	1258
El Salvador	1	15	506	626	791	897	788	474	474
Hungary	1152	267	564	575	491	422	1370	1009	87
Indonesia	259	61	362	594	1440	2107	2876	3725	2083
Iraq	−−	−−	−−	−−	−−	−−	−−	−−	−−
Kazakhstan	63	110	5	11	9	11	0	0	0
Lebanon	438	31	97	155	285	265	272	179	179
Malaysia	161	557	1185	1394	1618	1650	2981	2604	390
Mexico	10916	11355	17947	18791	16751	12465	11949	10294	6946
Morocco	163	177	80	136	114	28	46	21	16
Pakistan	219	78	48	20	15	187	313	20	176
Panama	1848	1723	2808	2839	2898	2348	2211	1626	1626
Peru	673	1071	2878	3196	3688	2695	2926	270	1607
Philippines	1217	1646	2452	2638	3180	3541	3404	2166	2100
Poland	2448	1725	1536	2466	2750	4377	4737	2827	460
Russia	1843	5025	7466	9739	9215	7360	5729	4124	4124
Serbia	1	1	0	0	101	93	59	96	96
South Africa	1982	797	2451	2759	2260	2691	2998	1899	917
Thailand	801	212	341	503	644	757	65	397	0
Trinidad and Tobago	143	254	569	437	462	329	405	297	297
Tunisia	27	155	405	245	384	340	265	389	244
Turkey	640	1003	1813	2269	2898	3934	5107	3961	2216
Ukraine	2	189	585	1413	1079	1130	1337	748	559
Uruguay	301	512	520	717	925	1659	1711	1202	898
Venezuela	3758	2325	4101	5084	4556	4421	3946	2868	2693
Vietnam	24	20	81	113	306	231	233	192	192
All	56912	44645	73652	83655	87048	84784	83180	69118	42993

Notes: The table presents the market value of US holdings of long term foreign government debt. Data are available in different pdf documents at *http://www.treas.gov/tic/fpis.shtml#usclaims*. We collected it manually. The information comes from the surveys of Foreign Portfolio Holdings of US Securities. We report here all the available years. For 2008, the table also reports the market value US holdings of long term foreign government debt *issued in US dollars* (in the last column). Amounts in millions of US dollars.

Table 10: Asset Pricing: Portfolios of Countries Sorted on Credit Ratings and Bond Market Betas

	Risk Factor: US Stock Market					Risk Factor: US Bond Market				
	Panel I: Factor Prices and Loadings									
	λ_{US-Mkt}	b_{US-Mkt}	R^2	$RMSE$	$p-value$	λ_{US-BBB}	b_{US-BBB}	R^2	$RMSE$	$p-value$
GMM_1	21.55	0.69	67.85	2.22		7.47	1.70	81.50	1.69	
	[12.82]	[0.41]			11.88	[4.55]	[1.04]			10.95
GMM_2	32.76	1.06	−60.73	4.97		8.59	1.96	70.51	2.13	
	[10.55]	[0.34]			17.76	[2.91]	[0.66]			11.55
FMB	21.55	0.69	59.85	2.22		7.47	1.70	77.73	1.69	
	[7.11]	[0.23]			7.61	[2.41]	[0.55]			18.11
	(7.47)	(0.24)			12.26	(2.50)	(0.57)			24.19
$Mean$	5.29					4.43				
	[4.26]					[1.84]				
	Panel II: Factor Betas									
Portfolio	$\alpha_0^j(\%)$	β^j_{US-Mkt}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$	$\alpha_0^j(\%)$	β^j_{US-BBB}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	0.05	0.22	14.70			−0.29	0.79	26.66		
	[0.21]	[0.08]				[0.18]	[0.12]			
2	0.20	0.27	16.78			−0.09	0.76	18.77		
	[0.24]	[0.09]				[0.21]	[0.11]			
3	0.30	0.46	21.85			−0.06	1.08	17.15		
	[0.39]	[0.15]				[0.40]	[0.23]			
4	0.45	0.22	15.14			0.01	0.94	38.71		
	[0.20]	[0.08]				[0.17]	[0.11]			
5	0.67	0.35	24.37			0.14	1.21	41.11		
	[0.24]	[0.09]				[0.21]	[0.16]			
6	0.74	0.66	31.49			0.04	1.83	33.91		
	[0.37]	[0.16]				[0.42]	[0.34]			
All				12.16	5.85				7.95	24.16

Notes: This table reports asset pricing results obtained using either the US stock market return (left-hand side) or the US-BBB corporate bond return (right-hand side) as risk factors. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. All excess EMBI returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. We also report the mean of the excess return on the US-BBB risk factor and the corresponding standard error obtained by bootstrapping. Panel II reports OLS regression results. We regress each portfolio return on a constant (α) and the risk factor (the corresponding slope coefficient is denoted β_{US-Mkt} or β_{US-BBB}). R^2s are reported in percentage points. The alphas are annualized and in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1}\alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix V_α (with one lag) for the system of equations (see Cochrane (2001), page 234). Data are monthly, from JP Morgan in Datastream. The sample period is 1/1995–5/2011.

Table 11: Asset Pricing: Benchmark Portfolios, CAPM, Ted Spread and ΔVIX

	Risk Factor: US Stock Market and ΔVIX							Risk Factor: US Stock Market and Ted Spread						
	Panel I: Factor Prices and Loadings													
	λ_{US-Mkt}	$\lambda_{\Delta VIX}$	b_{US-Mkt}	$b_{\Delta VIX}$	R^2	$RMSE$	$p-value$	λ_{US-Mkt}	λ_{TED}	b_{US-Mkt}	b_{TED}	R^2	$RMSE$	$p-value$
GMM_1	19.29	−55.29	0.53	−0.04	90.57	0.99		19.46	−1.26	0.58	−1.32	91.00	0.97	
	[19.92]	[58.06]	[1.46]	[0.37]			53.46	[10.66]	[3.39]	[0.36]	[7.13]			53.02
GMM_2	11.59	−69.09	−0.03	−0.17	65.86	1.89		17.79	0.20	0.63	1.73	61.58	2.01	
	[16.05]	[53.54]	[1.24]	[0.33]			57.29	[10.05]	[3.09]	[0.34]	[6.50]			56.71
FMB	19.29	−55.29	0.52	−0.04	87.91	0.99		19.46	−1.26	0.58	−1.31	88.81	0.97	
	[11.88]	[62.17]	[1.13]	[0.34]			66.61	[7.84]	[2.17]	[0.36]	[4.93]			65.03
	(12.51)	(65.68)	(1.19)	(0.36)			71.38	(8.21)	(2.30)	(0.38)	(5.23)			70.17
$Mean$	5.29	−2.24						5.29	3.48					
	[4.26]	[12.50]						[4.26]	[1.73]					
	Panel II: Factor Betas													
Portfolio	$\alpha_0^j(\%)$	β^j_{US-Mkt}	$\beta^j_{\Delta VIX}$	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$		$\alpha_0^j(\%)$	β^j_{US-Mkt}	β^j_{TED}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$	
1	0.26	0.08	−0.02	7.57				0.35	0.11	−0.21	6.80			
	[0.17]	[0.06]	[0.01]					[0.25]	[0.05]	[0.42]				
2	0.24	0.15	−0.03	16.16				0.50	0.20	−0.53	15.81			
	[0.21]	[0.07]	[0.02]					[0.32]	[0.09]	[0.37]				
3	0.45	0.19	−0.05	22.59				0.57	0.29	−0.36	19.00			
	[0.23]	[0.09]	[0.02]					[0.37]	[0.10]	[0.42]				
4	0.54	0.24	−0.06	29.63				0.56	0.36	−0.20	25.26			
	[0.22]	[0.08]	[0.02]					[0.38]	[0.09]	[0.69]				
5	0.49	0.34	−0.07	33.10				0.55	0.50	−0.30	29.03			
	[0.26]	[0.10]	[0.02]					[0.46]	[0.10]	[0.69]				
6	0.84	0.54	−0.07	32.04				1.76	0.64	−1.79	32.65			
	[0.42]	[0.16]	[0.03]					[0.59]	[0.16]	[0.84]				
All					7.37	28.83						12.86	4.53	

Notes: This table reports asset pricing results obtained using either the US stock market return and ΔVIX (left-hand side) or the US stock market return and the TED spread (right-hand side) as risk factors. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. All excess EMBI returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. We also report the mean of the excess return on the risk facto and the corresponding standard errors. Panel II reports OLS regression results. We regress each portfolio return on a constant (α) and the risk factor (the corresponding slope coefficient is denoted β_{US-Mkt}, for example). R^2s are reported in percentage points. The alphas are annualized and in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix V_α (with one lag) for the system of equations (see Cochrane (2001), page 234). Data are monthly, from JP Morgan in Datastream. The sample period is 1/1995–5/2011.

Table 12: Asset Pricing: Benchmark Portfolios, Bond Return, Ted Spread and ΔVIX

	Risk Factor: US Bond Market and ΔVIX							Risk Factor: US Bond Market and Ted Spread						
	Panel I: Factor Prices and Loadings													
	λ_{US-BBB}	$\lambda_{\Delta VIX}$	b_{US-BBB}	$b_{\Delta VIX}$	R^2	$RMSE$	$p-value$	λ_{US-BBB}	λ_{TED}	b_{US-BBB}	b_{TED}	R^2	$RMSE$	$p-value$
GMM_1	4.06	−58.05	0.63	−0.12	92.34	0.90		6.51	−2.21	1.15	−3.48	89.31	1.06	
	[4.49]	[46.30]	[1.17]	[0.13]			68.41	[4.59]	[3.45]	[0.76]	[6.92]			59.07
GMM_2	3.99	−45.17	0.69	−0.09	81.16	1.40		5.23	−1.44	0.99	−2.07	55.70	2.15	
	[2.96]	[38.37]	[0.79]	[0.10]			70.59	[4.29]	[3.38]	[0.66]	[6.77]			60.64
FMB	4.06	−58.05	0.63	−0.12	89.90	0.90		6.51	−2.21	1.14	−3.46	85.80	1.06	
	[2.73]	[35.33]	[0.77]	[0.10]			74.64	[2.42]	[1.80]	[0.70]	[3.97]			48.97
	(2.82)	(36.72)	(0.80)	(0.10)			77.78	(2.54)	(1.92)	(0.74)	(4.24)			56.21
$Mean$	4.43	−2.24						4.43	3.48					
	[1.84]	[12.50]						[1.84]	[1.73]					

Panel II: Factor Betas												
Portfolio	$\alpha_0^j(\%)$	β^j_{US-BBB}	$\beta^j_{\Delta VIX}$	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$	$\alpha_0^j(\%)$	β^j_{US-BBB}	β^j_{TED}	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	−0.15	0.73	−0.01	39.84			−0.31	0.78	0.23	39.32		
	[0.11]	[0.08]	[0.01]				[0.19]	[0.11]	[0.25]			
2	−0.14	0.77	−0.03	36.69			−0.05	0.83	−0.23	32.39		
	[0.17]	[0.11]	[0.02]				[0.19]	[0.11]	[0.17]			
3	0.13	0.71	−0.07	32.10			0.18	0.85	−0.25	21.49		
	[0.18]	[0.10]	[0.02]				[0.27]	[0.13]	[0.20]			
4	0.15	0.88	−0.08	42.71			0.06	1.05	−0.05	29.45		
	[0.20]	[0.13]	[0.02]				[0.28]	[0.16]	[0.38]			
5	0.06	1.06	−0.10	42.18			0.05	1.29	−0.24	27.16		
	[0.24]	[0.15]	[0.02]				[0.42]	[0.20]	[0.40]			
6	0.25	1.54	−0.13	40.93			1.10	1.67	−1.69	31.46		
	[0.39]	[0.29]	[0.04]				[0.47]	[0.29]	[0.59]			
All					7.31	29.33					9.81	13.28

Notes: This table reports asset pricing results obtained using either the US-BBB corporate bond return and ΔVIX (left-hand side) or the US-BBB corporate bond return and the TED spread (right-hand side) as risk factors. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. All excess EMBI returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. We also report the mean of the excess return on the US-BBB risk factor and the corresponding standard errors. Panel II reports OLS regression results. We regress each portfolio return on a constant (α) and the risk factor (the corresponding slope coefficient is denoted β_{US-BBB}, for example). R^2s are reported in percentage points. The alphas are annualized and in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix V_α (with one lag) for the system of equations (see Cochrane (2001), page 234). Data are monthly, from JP Morgan in Datastream. The sample period is 1/1995–5/2011.

Table 13: Conditional Asset Pricing: Benchmark Portfolios, US_{Mkt} and $US_{Mkt} * VIX$ as Risk Factors

Panel I: Factor Prices and Loadings							
	$\lambda_{US_{Mkt}}$	$\lambda_{US_{Mkt}*VIX}$	$b_{US_{Mkt}}$	$b_{US_{Mkt}*VIX}$	R^2	$RMSE$	χ^2
GMM_1	20.14	64.08	0.92	−0.08	91.84	3.30	
	[17.52]	[42.91]	[2.09]	[0.47]			33.14
GMM_2	23.95	85.82	0.36	0.12	43.42	8.68	
	[7.26]	[23.05]	[0.68]	[0.17]			54.11
FMB	20.14	64.08	0.92	−0.08	91.54	3.30	
	[9.10]	[24.73]	[1.18]	[0.29]			22.20
	(9.58)	(25.81)	(1.24)	(0.31)			31.98
$Mean$	5.29	16.72					
	[4.26]	[16.06]					

Panel II: Factor Betas									
$\alpha_0^j(\%)$	β^j_{US-Mkt}	$\beta^j_{US-Mkt*VIX}$	$R^2(\%)$	$\alpha_0^j(\%)$	β^j_{US-Mkt}	$\beta^j_{US-Mkt*VIX}$	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
	Portfolios 1 to 6				Portfolios 7 to 12				
0.24	0.08	0.01	6.55	0.70	0.22	0.05	5.63		
[0.16]	[0.15]	[0.05]		[0.52]	[0.84]	[0.28]			
0.22	0.11	0.03	14.95	0.72	−0.30	0.31	18.35		
[0.22]	[0.16]	[0.04]		[0.71]	[0.56]	[0.19]			
0.38	0.23	0.02	18.74	1.43	−0.12	0.35	24.23		
[0.25]	[0.19]	[0.05]		[0.77]	[0.65]	[0.21]			
0.51	0.03	0.10	27.74	2.25	−0.85	0.65	29.58		
[0.23]	[0.20]	[0.06]		[0.89]	[0.99]	[0.35]			
0.44	0.20	0.09	30.18	2.01	−0.86	0.79	35.01		
[0.28]	[0.21]	[0.06]		[1.00]	[0.89]	[0.31]			
0.81	0.31	0.12	30.93	2.39	−0.88	1.01	34.36		
[0.44]	[0.37]	[0.12]		[1.46]	[1.52]	[0.56]			
								16.54	16.77

Notes: Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. All excess EMBI returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. In the top panel, the risk factors are the US stock market return, and the same multiplied by the lagged value of the VIX index scaled by its standard deviation. $b_{US_{Mkt}}$ and $b_{US_{Mkt}*VIX}$ denote the vector of factor loadings. We use 12 test assets: the original 6 EMBI portfolio excess returns and 6 additional portfolios obtained by multiplying the original set by the conditioning variable VIX (see Cochrane (2001)). Data are monthly, from JP Morgan in Datastream. The sample period is 1/1995–5/2011. We do not include a constant in the second step of the FMB procedure.

Table 14: Conditional Asset Pricing: Benchmark Portfolios, US_{BBB} and $US_{BBB} * VIX$ as Risk Factors

Panel I: Factor Prices and Loadings

	$\lambda_{US_{BBB}}$	$\lambda_{US_{BBB}*VIX}$	$b_{US_{BBB}}$	$b_{US_{BBB}*VIX}$	R^2	$RMSE$	χ^2
GMM_1	5.00	20.68	−0.20	0.39	91.36	3.39	
	[6.37]	[18.18]	[3.36]	[0.64]			9.20
GMM_2	8.73	33.02	0.79	0.35	−4.93	11.82	
	[2.50]	[8.13]	[0.88]	[0.14]			17.47
FMB	5.00	20.68	−0.20	0.39	90.48	3.39	
	[3.47]	[8.62]	[2.98]	[0.69]			2.52
	(3.57)	(8.79)	(3.08)	(0.72)			3.90
$Mean$	4.43	18.87					
	[1.84]	[6.26]					

Panel II: Factor Betas

$\alpha_0^j(\%)$	β^j_{US-BBB}	$\beta^j_{US-BBB*VIX}$	$R^2(\%)$	$\alpha_0^j(\%)$	β^j_{US-BBB}	$\beta^j_{US-BBB*VIX}$	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
	Portfolios 1 to 6				Portfolios 7 to 12				
−0.16	0.68	0.02	38.99	−0.35	−1.13	1.10	46.27		
[0.12]	[0.27]	[0.09]		[0.43]	[1.33]	[0.47]			
−0.18	0.69	0.05	32.35	−0.50	−0.85	1.13	42.12		
[0.18]	[0.23]	[0.08]		[0.59]	[0.76]	[0.31]			
0.07	0.43	0.13	22.28	0.34	−1.38	1.34	38.17		
[0.22]	[0.37]	[0.09]		[0.61]	[0.78]	[0.24]			
0.11	0.21	0.25	32.83	0.93	−3.53	2.20	45.36		
[0.23]	[0.27]	[0.07]		[0.80]	[0.84]	[0.28]			
−0.01	0.39	0.27	29.46	0.41	−3.34	2.41	43.36		
[0.29]	[0.32]	[0.08]		[0.93]	[0.95]	[0.31]			
0.13	1.03	0.24	29.92	−0.16	−0.64	2.17	35.41		
[0.49]	[0.69]	[0.21]		[1.75]	[3.94]	[1.44]			
								14.70	25.84

Notes: Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. All excess EMBI returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. In the top panel, the risk factors are the high yield US market return, and the same multiplied by the lagged value of the VIX index scaled by its standard deviation. $b_{US_{BBB}}$ and $b_{US_{BBB}*VIX}$ denote the vector of factor loadings. We use 12 test assets: the original 6 EMBI portfolio excess returns and 6 additional portfolios obtained by multiplying the original set by the conditioning variable VIX (see Cochrane (2001)). Data are monthly, from JP Morgan in Datastream. The sample period is 1/1995–5/2011. We do not include a constant in the second step of the FMB procedure.

Table 15: Asset Pricing: Benchmark Portfolios, World Investors

	Risk Factor: World Equity Market					Risk Factor: World Bond Market				
	Panel I: Factor Prices and Loadings									
	$\lambda_{World-Mkt}$	$b_{World-Mkt}$	R^2	$RMSE$	p-value	$\lambda_{World-BBB}$	$b_{World-BBB}$	R^2	$RMSE$	p-value
GMM_1	19.01	0.62	92.14	1.01		7.12	1.31	81.67	1.67	
	[11.41]	[0.37]			63.01	[5.26]	[0.97]			12.38
GMM_2	16.34	0.53	81.22	1.57		4.47	0.82	28.53	3.30	
	[8.60]	[0.28]			64.48	[3.75]	[0.69]			14.80
FMB	19.01	0.62	90.83	1.01		7.12	1.30	78.36	1.67	
	[6.54]	[0.21]			76.66	[2.98]	[0.55]			6.43
	(6.78)	(0.22)			80.70	(3.07)	(0.56)			8.97
$Mean$	3.70					4.16				
	[4.51]					[2.24]				
	Panel II: Factor Betas									
Portfolio	$\alpha_0^j(\%)$	$\beta^j_{World-Mkt}$	$R^2(\%)$	$\chi^2(\alpha)$	p-value	$\alpha_0^j(\%)$	$\beta^j_{World-BBB}$	$R^2(\%)$	$\chi^2(\alpha)$	p-value
1	0.24	0.12	7.20			−0.16	0.63	39.22		
	[0.16]	[0.06]				[0.13]	[0.08]			
2	0.21	0.24	17.78			−0.24	0.76	31.40		
	[0.22]	[0.09]				[0.19]	[0.11]			
3	0.40	0.31	18.29			−0.01	0.74	22.08		
	[0.24]	[0.10]				[0.21]	[0.11]			
4	0.47	0.40	29.15			0.14	1.02	33.53		
	[0.23]	[0.08]				[0.23]	[0.13]			
5	0.42	0.54	31.62			−0.02	1.16	26.49		
	[0.28]	[0.10]				[0.30]	[0.19]			
6	0.78	0.77	35.29			0.11	1.73	29.42		
	[0.42]	[0.18]				[0.49]	[0.35]			
All				5.95	42.93				9.75	13.56

Notes: This table reports asset pricing results obtained using either the world stock market return (left-hand side) or the world BBB corporate bond return (right-hand side) as risk factors. Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. All excess EMBI returns are multiplied by 12 (annualized). The standard errors in brackets are Newey and West (1987) standard errors with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. We also report the mean of the excess return on the risk factors and the corresponding standard error obtained by bootstrapping. Panel II reports OLS regression results. We regress each portfolio return on a constant (α) and the risk factor (the corresponding slope coefficient is denoted $\beta_{World-Mkt}$ or $\beta_{World-BBB}$). R^2s are reported in percentage points. The alphas are annualized and in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix V_α (with one lag) for the system of equations (see Cochrane (2001), page 234). For world equity returns, we use the MSCI World index. For world bond returns, we use the Bank of America Merrill Lynch Global Broad Market Corporate BBB index. Data are monthly, from JP Morgan, MSCI, and Bank of America Merrill Lynch, available in Datastream. The sample period is 1/1995–5/2011 for the equity risk factor and 1/1997–5/2011 for the bond risk factor.

Table 16: Country-Level Asset Pricing: US Stock Market as Risk Factor

Panel I: FMB Asset Pricing						
	λ_{US-Mkt}	b_{US-Mkt}	R^2	$RMSE$	$MAPE$	χ^2
FMB	22.28	8.58	66.45	3.28	2.55	
	[7.45]	[2.87]				25.05
	(7.86)	(3.03)				49.99
$Mean$	5.29					
	[4.26]					

Panel II: Panel Regressions						
	(1)	(2)	(3)	(4)	(5)	(6)
US_{Mkt}	0.36	0.36	-0.23	0.36	0.36	-0.23
	[0.10]	[0.10]	[0.08]	[0.10]	[0.10]	[0.08]
$Ratings$		0.02	0.02		0.04	0.03
		[0.01]	[0.01]		[0.02]	[0.02]
$US_{Mkt} * Ratings$			1.17			1.17
			[0.27]			[0.27]
R^2	12.57	13.07	15.72	13.04	13.47	16.11
N	5019	5019	5019	5019	5019	5019
$F.E$	No	No	No	Yes	Yes	Yes

Notes: The first panel of this table reports results from the Fama-McBeth asset pricing procedure on country-level data. The market price of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$, the mean absolute pricing error $MAPE$, and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the factor loading. The first panel also reports the mean excess return of the risk factor and its standard error. All excess returns are multiplied by 12 (annualized). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). The second panel of this table reports six sets of panel regression results. We regress all the country-level excess returns on the US stock market returns, the country ratings, as well as the product of ratings and market returns. The first three columns correspond to panels without fixed effects, while the last three columns include fixed effects. In the former case, standard errors are clustered by country and time. In the latter case, they are clustered by time. The panel reports the slope coefficients and their standard errors, the R^2 in percentages, the number of observations N, as well the presence of absence of fixed effects ($F.E$). Data are monthly. The sample period is 1/1995–5/2011.

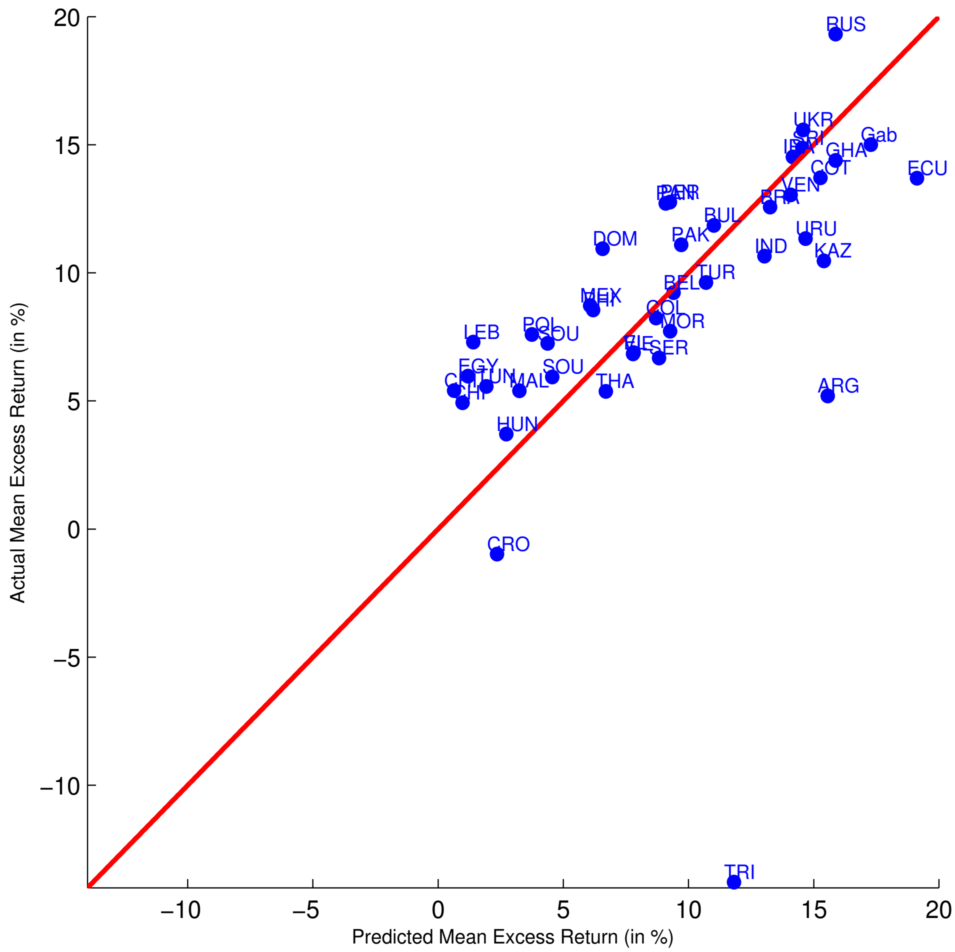

Figure 4: Predicted Against Unconditional Actual Country-Level Excess Returns.

This figure plots realized average excess returns on the vertical axis against predicted average excess returns on the horizontal axis. We regress each actual country-level excess return on a constant and the return on the US stock market index in order to obtain the slope coefficients β^j. Each predicted excess returns is obtained using the OLS estimates of β^j times the market price of risk. All returns are annualized. The data are monthly. The sample is 1/1995–5/2011.

Table 17: Country-Level Asset Pricing: US BBB as Risk Factor

Panel I: FMB Asset Pricing						
	λ_{US-BBB}	b_{US-BBB}	R^2	$RMSE$	$MAPE$	χ^2
FMB	7.46	20.31	51.63	3.75	2.58	
	[2.58]	[7.03]				40.37
	(2.69)	(7.32)				61.15
$Mean$	4.43					
	[1.87]					

Panel II: Panel Regressions						
	(1)	(2)	(3)	(4)	(5)	(6)
US_{BBB}	1.18	1.18	-0.01	1.18	1.18	-0.01
	[0.18]	[0.17]	[0.25]	[0.16]	[0.16]	[0.25]
$Ratings$		0.02	0.01		0.04	0.03
		[0.01]	[0.01]		[0.02]	[0.02]
$US_{BBB} * Ratings$			2.36			2.36
			[0.72]			[0.75]
R^2	20.24	20.68	22.39	20.63	21.03	22.74
N	5019	5019	5019	5019	5019	5019
$F.E$	No	No	No	Yes	Yes	Yes

Notes: The first panel of this table reports results from the Fama-McBeth asset pricing procedure on country-level data. The market price of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$, the mean absolute pricing error $MAPE$, and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the factor loading. The first panel also reports the mean excess return of the risk factor and its standard error. All excess returns are multiplied by 12 (annualized). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. The standard errors in brackets are Newey and West (1987) standard errors computed with the optimal number of lags according to Andrews (1991). The second panel of this table reports six sets of panel regression results. We regress all the country-level excess returns on the US BBB corporate returns, the country ratings, as well as the product of ratings and BBB returns. The first three columns correspond to panels without fixed effects, while the last three columns include fixed effects. In the former case, standard errors are clustered by country and time. In the latter case, they are clustered by time. The panel reports the slope coefficients and their standard errors, the R^2 in percentages, the number of observations N, as well the presence of absence of fixed effects ($F.E$). Data are monthly. The sample period is 1/1995–5/2011.

Table 18: Cross-Country Correlations

Notes: This table reports the correlation coefficients between GDP in the US and in emerging countries. The left panel focuses on annual series. The right panel uses quarterly series. In the left panel, we modify the sample window for each country in order to use all available (annual) data. In the right panel, we impose a common sample (1994:IV - 2008:III) and ignore countries which do not have complete (quarterly) series over the sample. Real GDP series are HP-filtered using a smoothing parameter of 100 on annual and 1600 on quarterly data. Data are from Global Financial Data.

	Annual		Quarterly	
Argentina	(1945/2007)	0.15	(1994:IV/2008:III)	0.51
Brazil	(1991/2007)	−0.01	(1994:IV/2008:III)	0.11
Bulgaria	(1994/2007)	−0.40	(1994:IV/2008:III)	−0.15
Chile	(1945/2007)	0.05		
Colombia	(1945/2007)	0.03	(1994:IV/2008:III)	−0.20
Hungary	(1947/2008)	0.41		
Indonesia	(1958/2008)	−0.35		
Malaysia	(1955/2008)	−0.20	(1994:IV/2008:III)	−0.09
Mexico	(1945/2008)	0.20	(1994:IV/2008:III)	0.52
Peru	(1945/2007)	0.19	(1994:IV/2008:III)	−0.21
Philippines	(1946/2008)	−0.23	(1994:IV/2008:III)	−0.12
Poland	(1980/2008)	0.65		
Russia	(1995/2004)	−0.65		
South Africa	(1945/2007)	0.10	(1994:IV/2008:III)	0.02
Thailand	(1948/2008)	−0.34	(1994:IV/2008:III)	−0.29
Turkey	(1950/2007)	0.50		

Table 19: Country-Level Simulation Results

Macro Moments				
	Model			Data
Cross-country correlation:	Low	Zero/Risk Neutral	High	
$\sigma(Y)$	6.61	6.61	6.61	5.39
$\sigma(\Delta Y/Y)$	4.60	4.60	4.60	3.60
$\rho(Y)$	0.78	0.78	0.78	0.81
$\rho(\Delta Y/Y)$	0.15	0.15	0.15	0.45
$\sigma(C)/\sigma(Y)$	1.66	1.61	1.56	1.30
$\sigma(TB/Y)$	8.12	7.59	7.03	5.00
$\rho(TB/Y, Y)$	−0.11	−0.13	−0.15	−0.33
$\rho(C, Y)$	0.69	0.71	0.74	0.59
E(Default)	6.67	4.97	3.27	1.91
E(Debt/Y)	−30.30	−28.96	−27.50	−33.00
Asset Pricing Moments				
	Model			Data
Cross-country correlation:	Low	Zero/Risk Neutral	High	
$E(R^e)$	−2.20	−−	1.15	7.00
$\sigma(R^e)$	26.21	−−	18.36	18.07
$\rho(Y, R^e)$	−0.07	−−	−0.06	−0.19
$\rho(TB/Y, R^e)$	−0.02	−−	−0.01	0.14
$E(spread)$	4.69	4.92	4.50	5.44
$\sigma(spread)$	1.15	1.22	1.07	3.77

Notes: This table reports macro (first panel) and asset pricing (second panel) moments from simulated and actual data. The first three columns present moments from simulated data for three countries with different cross-country correlations in endowment growth shocks ρ: low (−.5), zero (0) and high (.5). The zero-correlation case is equivalent to risk-neutral investors. The last column report their empirical counterparts. Macroeconomic variables in levels are HP-filtered. Before filtering the series, we remove the seasonal components with the X-12-ARIMA algorithm from the US Census Bureau. The first panel reports the volatility and autocorrelation of output and output growth; the volatility of consumption and the volatility of the ratio of net exports to GDP; the correlation of consumption and net exports with output; the mean default rate and the average debt as a percentage of output. The second panel reports the mean and volatility of EMBI bonds' yield spreads and excess returns, along with the correlation of bond excess returns with income and net exports (as a fraction of GDP). Yield spreads correspond to the difference between yields on foreign bonds and yields on US bonds of similar maturities. Yields are obtained as the inverse of bond prices. Note that the debt levels and correlation measures pertaining to excess returns correspond to samples without defaults. Emerging market moments are computed by combining JP Morgan EMBI and Standard and Poor's data with IMF-IFS (National Accounts) macroeconomic time series for the countries in our sample. As a result, macro moments are based on a sample of 26 emerging market economies (we drop Iraq, Philippines, Serbia, Uruguay and Ukraine for lack of data). External public debt to income ratios come from the World Bank Global Development Finance database. The mean probability of default is the mean frequency, in the sample, of episodes defined as "selective default" by Standard and Poor's. The sample period is 1/1995 - 5/2009 (for some countries the sample is shorter, depending on data availability). All moments are at quarterly frequency. Averages and standard deviations are annualized and in percentages.

Table 20: Asset Pricing: Simulated Portfolios Sorted on Stock Market Betas

Panel I: Factor Prices and Loadings					
	λ_{Mkt}	b_{Mkt}	R^2	$RMSE$	$p-value$
GMM_1	8.72	1.59	85.52	0.26	
	[1.23]	[0.22]			18.45
GMM_2	10.14	1.85	83.22	0.28	
	[0.89]	[0.16]			41.84
FMB	8.72	1.59	95.10	0.26	
	[1.40]	[0.25]			36.38
	(1.49)	(0.27)			44.28
$Mean$	6.48				
	[0.06]				

Panel II: Factor Betas					
Portfolio	$\alpha_0^j(\%)$	β_{Mkt}^j	$R^2(\%)$	$\chi^2(\alpha)$	$p-value$
1	-0.04	-0.14	0.62		
	[0.04]	[0.01]			
2	-0.01	-0.08	0.25		
	[0.04]	[0.01]			
3	0.05	-0.05	0.09		
	[0.04]	[0.01]			
4	0.08	-0.00	0.00		
	[0.04]	[0.01]			
5	0.09	0.02	0.02		
	[0.04]	[0.01]			
6	0.09	0.04	0.08		
	[0.04]	[0.01]			
All				14.01	2.95

Notes: Panel I reports results from GMM and Fama-McBeth asset pricing procedures. Market prices of risk λ, the adjusted R^2, the square-root of mean-squared errors $RMSE$ and the p-values of χ^2 tests on pricing errors are reported in percentage points. b denotes the vector of factor loadings. All simulated excess returns are multiplied by 4 (annualized). The standard errors in brackets are Newey and West (1987) standard errors with the optimal number of lags according to Andrews (1991). Shanken (1992)-corrected standard errors are reported in parentheses. We do not include a constant in the second step of the FMB procedure. Panel II reports OLS estimates of the factor betas. R^2s and p-values are reported in percentage points. The χ^2 test statistic $\alpha' V_\alpha^{-1} \alpha$ tests the null that all intercepts are jointly zero. This statistic is constructed from the Newey-West variance-covariance matrix (1 lag) for the system of equations (see Cochrane (2001), page 234). Data are quarterly. Details on the simulation are in section V. of the paper. The alphas are annualized and in percentage points.

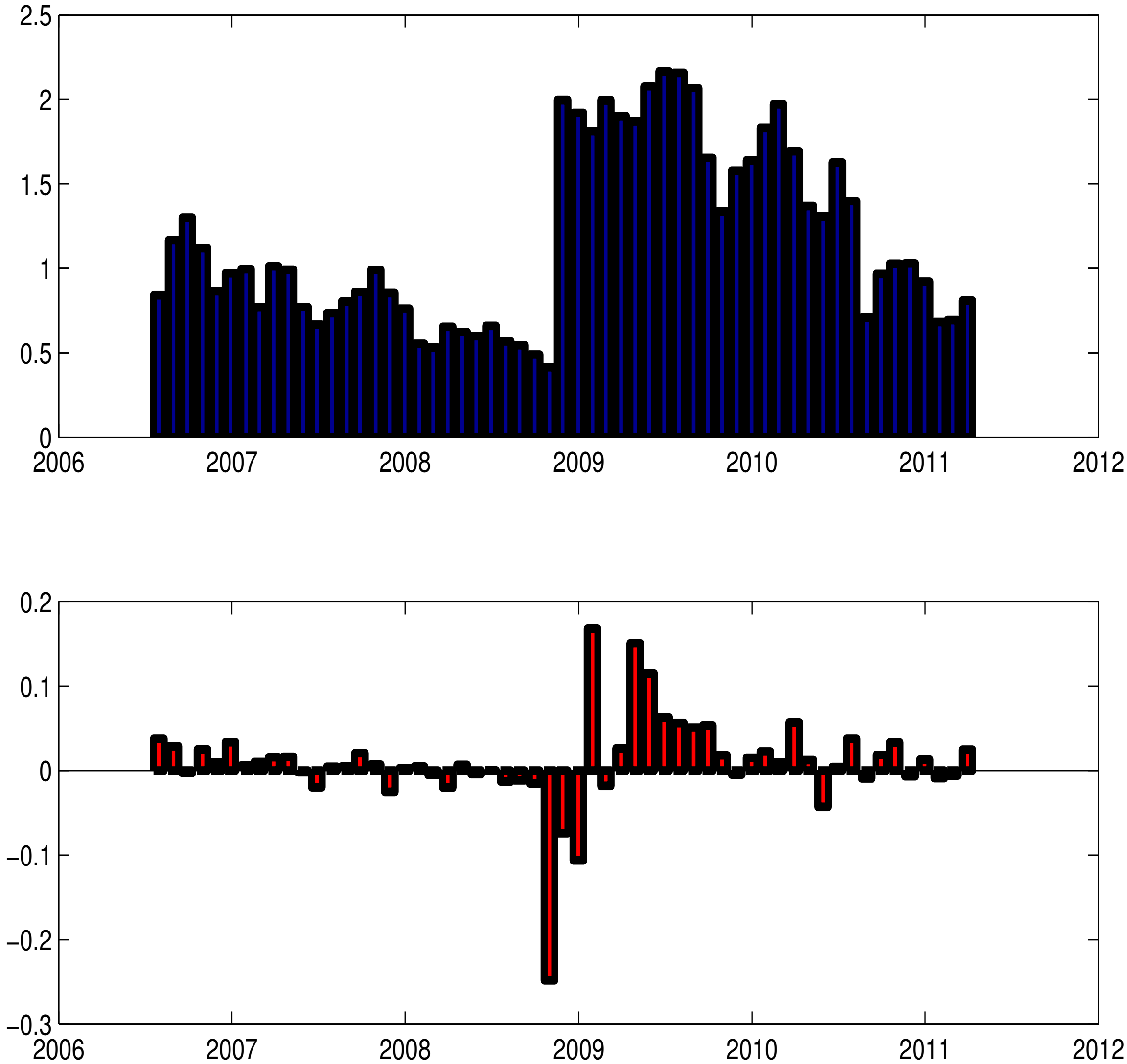

Figure 5: EMBI Betas and Excess Returns During the Mortgage Crisis

The upper panel of this figure reports the difference in betas between the first and last portfolios. The lower panel of this figure reports the difference in excess returns between the first and last portfolios. Countries are sorted on their bond betas and credit ratings. Data are monthly, from Datastream. The period is 7/2007–3/2011.

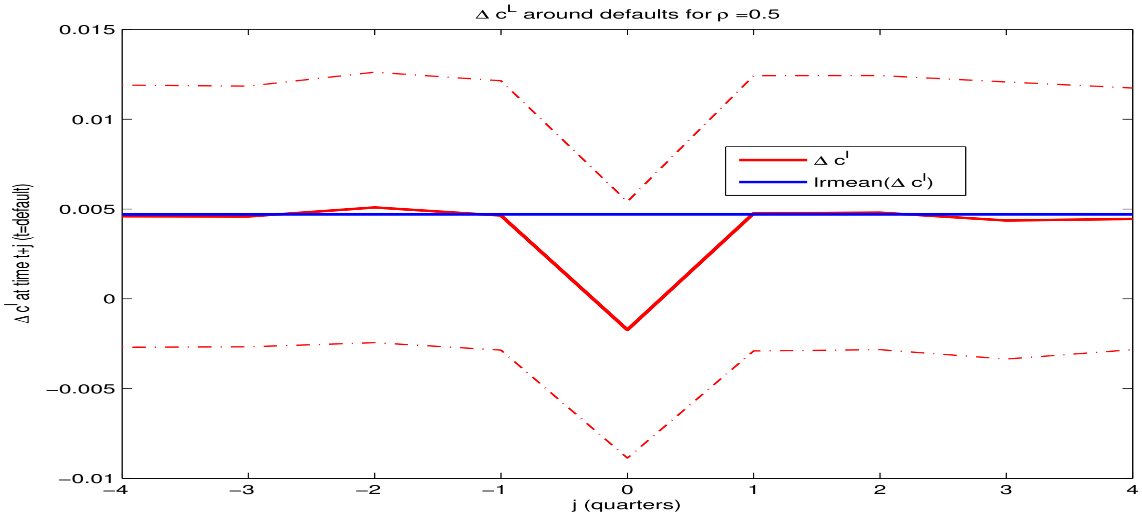

Figure 6: Lenders' Consumption Growth Around Defaults in the Model

This figure plots the average consumption growth of lenders around defaults. The dotted lines represent one standard deviation bands. The correlation between lenders' and borrowers' endowment shocks is 0.5.

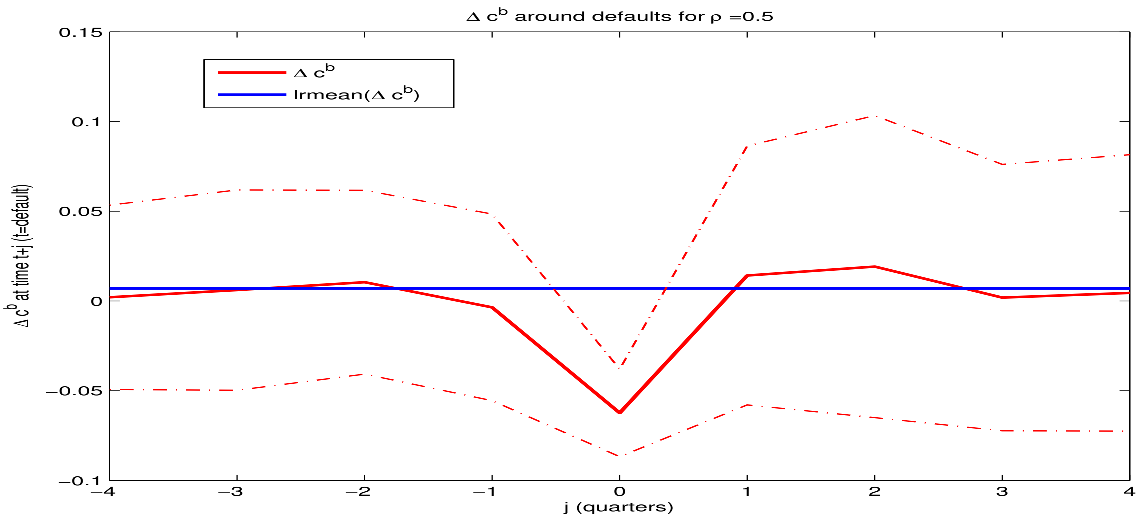

Figure 7: Borrowers' Consumption Growth Around Defaults in the Model

This figure plots the average consumption growth of borrowers around defaults. The dotted lines represent one standard deviation bands. The correlation between lenders' and borrowers' endowment shocks is 0.5.

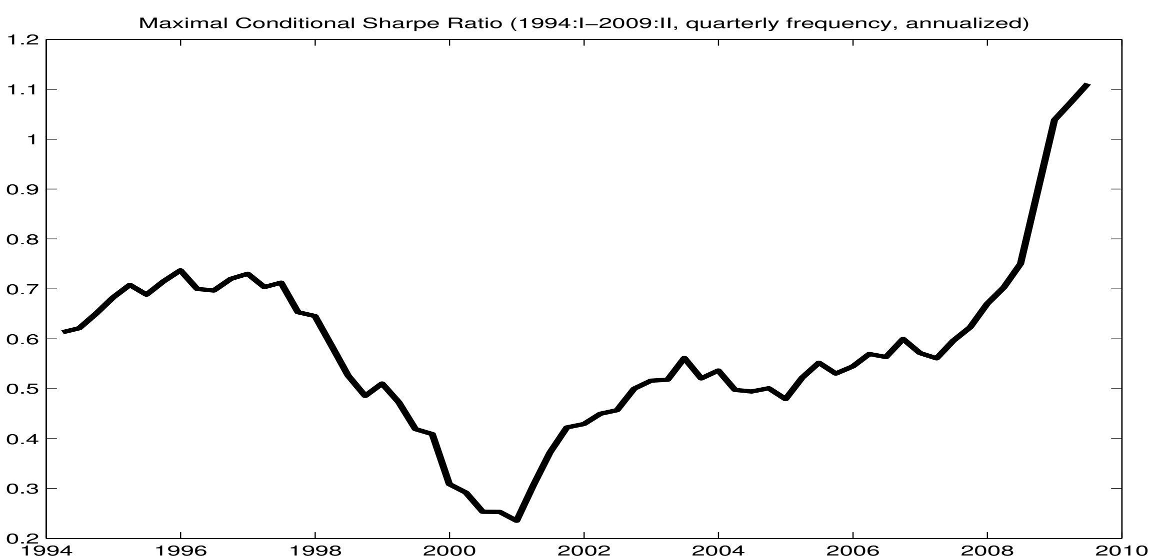

Figure 8: Lenders' Maximal Sharpe Ratio in the Model

This figure plots the maximal conditional Sharpe ratio in the model. We use actual real US consumption growth per capita to compute the dynamics of the surplus consumption ratio and the maximal conditional Sharpe ratio. Data are quarterly and start in 1952:I. The graph corresponds to our sample period, 1994:I–2009:II.

Table 21: CDS Curves for EMBI Global countries

The table presents mean senior CDS rates (in basis points) for the sample of J.P. Morgan EMBI Global countries at different horizons. The last column reports the ratio of the 10-year (observed) to the 3-month (fitted) CDS rates. Our dataset comprises series for 1, 2, .. 10-year horizons. We obtain the fitted CDS curves by spline interpolation of the rates from existing CDS contracts. We impose the boundary condition that the CDS rates tend to 0 when the horizon tends to 0. We compute fitted values only when at least the 1-year, 5-year and 10-year CDS rates are available. We do not have data for Belize, Bulgaria, Cote d'Ivoire, Dominican Republic, Gabon, Ghana, Sri Lanka, Trinidad and Tobago and Uruguay. The sample period is 1/2003–5/2011, but most series start later than January 2003.

	3-month	1-year	5-year	10-year	Slope 10-yr / 3-month
Argentina	363.12	891.74	952.97	970.15	2.67
Belize	–	–	–	–	–
Brazil	24.58	78.49	215.47	261.90	10.65
Bulgaria	–	–	–	–	–
Chile	11.06	30.44	58.71	75.29	6.81
China	10.64	28.34	53.32	64.76	6.09
Colombia	26.93	79.84	208.16	258.39	9.60
Cote d'Ivoire	–	–	–	–	–
Croatia	–	–	–	–	–
Dominican Republic	–	–	–	–	–
Ecuador	382.23	945.81	1033.78	1032.09	2.70
Egypt	64.07	163.91	238.83	261.55	4.08
El Salvador	58.23	150.51	216.43	239.59	4.11
Gabon	–	–	–	–	–
Ghana	–	–	–	–	–
Hungary	36.33	92.84	124.96	134.36	3.70
Indonesia	48.85	129.59	240.30	290.19	5.94
Iraq	57.81	195.44	647.67	1121.04	19.39
Kazakhstan	72.62	190.19	247.35	251.54	3.46
Lebanon	92.88	271.27	415.15	483.59	5.21
Malaysia	14.81	39.06	70.66	82.48	5.57
Mexico	22.41	61.08	118.66	149.58	6.67
Morocco	30.01	84.24	146.45	174.40	5.81
Pakistan	324.70	771.39	742.39	746.06	2.30
Panama	24.60	71.87	177.47	226.40	9.20
Peru	26.82	75.95	186.05	233.07	8.69
Philippine	47.64	130.98	270.75	328.25	6.89
Poland	15.01	40.33	67.09	77.23	5.15
Russia	52.04	133.18	171.94	191.94	3.69
Serbia	28.39	78.86	179.09	296.99	10.46
South Africa	24.74	66.91	124.06	149.91	6.06
South Korea	23.94	60.61	84.16	60.61	2.53
Sri Lanka	–	–	–	–	–
Thailand	17.57	45.79	80.66	95.47	5.43
Trinidad and Tobago	–	–	–	–	–
Tunisia	21.82	58.98	98.79	117.07	5.37
Turkey	38.56	109.49	232.99	282.92	7.34
Ukraine	284.26	683.90	682.56	680.96	2.40
Uruguay	–	–	–	–	–
Venezuela	226.04	573.27	707.30	720.16	3.19
Vietnam	56.90	146.54	220.80	247.44	4.35

Table 22: Country-Level Simulation Results: Symmetric Default Cost and Bailouts

Macro Moments				
		Model		Data
Cross-country correlation:	Low	Zero/Risk Neutral	High	
$\sigma(Y)$	6.06	6.05	6.06	5.39
$\sigma(\Delta Y/Y)$	4.10	4.10	4.10	3.60
$\rho(Y)$	0.80	0.80	0.80	0.81
$\rho(\Delta Y/Y)$	0.20	0.20	0.20	0.45
$\sigma(C)/\sigma(Y)$	1.20	1.17	1.10	1.30
$\sigma(TB/Y)$	4.07	3.61	2.45	5.00
$\rho(TB/Y, Y)$	-0.01	-0.03	-0.08	-0.33
$\rho(C, Y)$	0.84	0.87	0.94	0.59
E(Default)	6.47	4.77	1.84	1.91
E(Debt/Y)	-22.92	-23.05	-23.14	-33.00
Asset Pricing Moments				
		Model		Data
Cross-country correlation:	Low	Zero/Risk Neutral	High	
$E(R^e)$	-0.33	$--$	0.18	7.00
$\sigma(R^e)$	2.83	$--$	1.35	18.07
$\rho(Y, R^e)$	-0.12	$--$	-0.07	-0.19
$\rho(TB/Y, R^e)$	-0.04	$--$	-0.02	0.14
$E(spread)$	0.40	0.52	0.37	5.44
$\sigma(spread)$	0.11	0.14	0.07	3.77

Notes: This table reports macro (first panel) and asset pricing (second panel) moments from simulated and actual data. Simulated data are from a model with symmetric default cost and bailouts. The first three columns present moments from simulated data for three countries with different cross-country correlations in endowment growth shocks ρ: low ($-.5$), zero (0) and high (.5). The zero-correlation case is equivalent to risk-neutral investors. The last column report their empirical counterparts. Macroeconomic variables in levels are HP-filtered. Before filtering the series, we remove the seasonal components with the X-12-ARIMA algorithm from the US Census Bureau. The first panel reports the volatility and autocorrelation of output and output growth; the volatility of consumption and the volatility of the ratio of net exports to GDP; the correlation of consumption and net exports with output; the mean default rate and the average debt as a percentage of output. The second panel reports the mean and volatility of EMBI bonds' yield spreads and excess returns, along with the correlation of bond excess returns with income and net exports (as a fraction of GDP). Yield spreads correspond to the difference between yields on foreign bonds and yields on US bonds of similar maturities. Yields are obtained as the inverse of bond prices. Note that the debt levels and correlation measures pertaining to excess returns correspond to samples without defaults. Emerging market moments are computed by combining JP Morgan EMBI and Standard and Poor's data with IMF-IFS (National Accounts) macroeconomic time series for the countries in our sample. As a result, macro moments are based on a sample of 26 emerging market economies (we drop Iraq, Philippines, Serbia, Uruguay and Ukraine for lack of data). External public debt to income ratios come from the World Bank Global Development Finance database. The mean probability of default is the mean frequency, in the sample, of episodes defined as "selective default" by Standard and Poor's. The sample period is 1/1995 - 5/2009 (for some countries the sample is shorter, depending on data availability). All moments are at quarterly frequency. Averages and standard deviations are annualized and in percentages.