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Risk Aversion, Sovereign Bonds and Risk Premium

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Abstract

This paper analyzes the risk premium associated with sovereign bonds. We use the Generalized Method of Moments to estimate the level of risk aversion that is implied by the demand for such bonds. We show that although sovereign bonds offer comparable returns to those of US Equities they command higher risk premiums. Second, we observe that in contrast to what is suggested by theory, risk aversion parameters differ for each country. We name this observation "The Sovereign Bond Premium Puzzle." Moreover, we present that, as oppose to ones intiution, country fundamentals and default probability are not answers for this variation.

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1 Introduction

Since the development of consumption based asset pricing model in the 1980's numerous studies attempted to test the empirical performance of the model. The main feature of the model is its simplicity in explaining dynamic intertemporal asset pricing models. The model's intuition is based on the fundamental pricing equation. This equation relates the opportunity cost of postponing current consumption which is reflected in the loss of marginal utility to expected gains in marginal utility in the future, and therefore the assets are priced such that the losses incurred today should match the gains received later. Assets that payoff high in good times are less valuable than the ones that pay the same amount in bad times. In pricing assets insurance against higher volatility in consumption is the key to understand the model's predictions.

The predictions of this simple model are strong, however it performs empirically poor. Hansen and Singleton (1982) reject the model on pricing of US equities and conclude that the model is not capturing the time variation and cross sectional returns of equities and bonds simultaneously. Moreover, the model performs worse than The Capital Asset Pricing Model (CAPM) which is a special case of the consumption model itself. There are a significant number of portfolio based models which perform better than the consumption based models, yet most of them are the derivations of the consumption based model.

There are significant number of attempts to generalize the key features of the model to reconcile data with model predictions. Some address the issue of changing preferences to include habit formation which was initially proposed by Constantinides (1990) and later modified by Campbell and Cochrane (1999) to include recessions. These models are able to capture time variation in asset returns. The utility depends on current and past levels of consumption. Therefore, bad shocks drive the consumption level to the habit level, increase the risk aversion and increase expected returns. One important implication is that even in the case of lower risk aversion parameters, small changes in consumption leads to significant volatility in marginal utilities. Therefore, risk aversion moves counter cyclically with the business cycle. However, this modification only allows for low risk free rate but does not explain a high premium on risky assets since both of these returns move with the business cycle.

As indicated above, the consumption based asset pricing model derives a relationship between risk aversion and the risk premium. The model suggests that increasing risk aversion increases risk premium. This is very intuitive, when consumers are more averse to negative movements in their consumption then the opportunity cost of postponing their current consumption rises. Therefore, they will require higher premium on their savings with increasing opportunity costs. The wealth of empirical evidence suggest that coefficient of risk aversion is a small number: less than 10 (Mehra 2003). However, the consumption based model does not generate the risk premium that is implied by the risk aversion coefficient. Larger risk premium requires a large risk aversion. This is the celebrated "Equity Premium Puzzle" which was initially addressed by Mehra and Prescott (1985).[2] Note that this puzzle is a quantitative rather than a qualitative puzzle. The model does generate a premium, yet it is still far from what is observed empirically. Attempts for refinement of the model still fail to resolve the puzzle.

In this study we present two puzzles that are inherent in the sovereign bond returns. One similar to the Equity Premium Puzzle and the other that implies different risk aversion parameters. Sovereign bonds are bond issues of emerging economies mostly in US dollar terms. Since the enactment of the Brady Plan[3] in the 1980's the market for sovereign bonds has grown significantly. Moreover, the instruments used in foreign issues also brought variety to the

[2] Although, Mehra and Prescott (1985) used the short term Treasury Bill's as a riskless instrument alternative to the stocks, I display longer term US Treasury Bonds. This is due to our motivation for explaining the premium associated with sovereign bonds which have longer term maturities so good benchmark for comparison would be a long term US Treasury Bond than a short term US Treasury Bill.

[3] Brady plan is an agreement towards rescheduling of emerging market debt. During the process some part of the debt is collateralized.

international bond markets. For developed countries, bond financing is a cheap and important source of financing. The same is not true for emerging economies. The cost of financing for these economies is significantly higher than for developed economies. One explanation for high costs is simply the risks associated with these bonds. It is not uncommon that return on these bonds can be negative and in cases of default, investors can loose all their investments in these assets.

Our analysis includes sovereign bond issues that are partly collateralized. This limits the degree of risk that these bonds can admit. Moreover, our dataset only includes bond issues in US dollar terms, therefore exchange risk is also not present in the premium. Although, on average sovereign bonds are less risky than US stocks, they admit comparable returns. Ceteris paribus, US equities are more risky therefore the risk premium over riskless assets should be higher on equities. Given that sovereign bonds a difference in riskiness of these two sets of investment instruments why do we observe higher risk premiums associated with sovereign borrowing? Table 1 provides some evidence on the spreads on sovereign bonds for some of emerging economies. We display the results for the "Emerging Markets Bond Index Plus" (EMBI+). EMBI+ tracks total returns[4] for external-currency-denominated debt instruments of the emerging markets: Brady bonds, loans, and Eurobonds, thus it reflects a reasonable representation of sovereign bond portfolio[5]. For the 1995 – 2003 period, average real annual return for EMBI+ is 12.3 percent where as a 10 year constant maturity US Treasury Bonds on average generated 2.1 percent of real return (Table 2). During the same period, US equities generated an average return of 7.8 percent.

One explanation for higher premium on sovereign bonds is the possibility of the default. Sovereigns can repudiate their debt anytime and this possibility is expected to be priced. Russia

[4] For any bond, total return is calculated by the total payments (sum of the market price of the bonds, dividends and amortization associated with the bond)
[5] US dollar denominated foreign debt of emerging countries.

and Argentina are recent examples of countries that repudiated their foreign debt. The two issues that are addressed in the literature with respect to sovereign bonds issues are the ability and the willingness to pay.[6] In some cases willingness to pay does not imply the ability to pay and vice versa. Our dataset does include both Argentinean and Russian crises, therefore sovereign bond return includes the default probability. These are reflected as large negative returns. We should expect that with higher volatility in returns investors should expect higher returns. The Argentinean and Russia bond returns have volatilities 1.5 and 4 times higher than the Standard and Poor's Index.

Table 2 also indicates that sovereign bonds offer significantly higher returns than the Treasury Bonds. During 1994 – 2003 period monthly return for sovereign bonds was one percent higher than the US Bonds. Furthermore, standard deviation for monthly return on sovereign bonds and US Treasury bonds are 5.1 and 0.3, respectively. However, to compare we normalize the standard deviation with average return, sovereign bonds on average turn out to be 3.4 times riskier than US Treasury Bonds.

Using similar methodology as Mehra and Prescott (1985) it should not be hard to document a similar "Puzzle" in sovereign bond premium. In addition, we address another puzzle inherent in these bonds. The theory suggests that investors have a common coefficient of risk aversion. The pricing equations when estimated separately for each country reveals differing risk aversion estimates, and these estimates turn out to be significantly different from the joint estimation of the pricing equations. This we call "The Sovereign Bond Premium Puzzle." Our calculations indicate a risk aversion parameter in the -0.7 – 5.6 range. On average when we use consumption in non – durables and services we calculate a coefficient of risk aversion which is equal to 3.8 and use of non – durable consumption indicates a coefficient of 2.2. These results are

[6] A marvelous survey of these issues can be found at Eaton and Fernandez (1995).

inline with Hansen and Singleton (1982). The reason for the difference is the consumption variability. The growth rate of non – durable consumption has greater variability than the non – durables and services in total. As will be clear in the methodology section, risk premium is inversely related to consumption variability. With increases in variability of consumption, the necessary coefficient of risk aversion is lower to justify the excess return of sovereign bonds over US bonds.

The remainder of the paper is organized as follows. In the next section we outline the theoretical model that sets the foundations for our estimation strategy which is described in Section 3. Section 4 provides details of the data which is followed by results in Section 5. Section 6 concludes. The three appendices present derivations for equations in section 2.

2 The Model

Consider an endowment economy populated by a large number of identical households, each with a preference of the following form:

$$E_t \sum_{t=0}^{\infty} \beta^t U(c_t) \tag{2.1}$$

where c_t is the consumption of the single perishable good of the economy. *U(.)* is the single period utility function, strictly concave, increasing and continuously differentiable, β is the representative individual's discount factor and lies in the interval *(0,1)*. E_t is the mathematical expectation conditional on information available in period *t*. We restrict preferences to admit Constant Relative Risk Aversion (CRRA) with the following representation:

$$U_t = c_t^{1-\gamma} / (1-\gamma) \tag{2.2}$$

here $\gamma > 0$ implies risk aversion. An advantage of CRRA is that equilibrium processes are stationary although consumption grows over time.

In each period $t \geq 0$, households are endowed with a perishable good y_t and consume c_t. Representative individual allocates her total savings (endowment and assets that are brought from previous period less consumption) between one-period of nominal domestic risk free bond B_t with gross return $R_{t,US}$, and one-period emerging economies US dollar bonds $B^*_{t,j}$ with gross return $R_{t+1,j} = (p_{t+1} + d_{t+1})/p_t$.[7] Here, $j=1,...,J$, is an index for the emerging economy. p_t is the price of the bond and d_t is the coupons paid, both denominated in consumption units. We constrain individuals to hold positive amounts of domestic bonds.

Agents maximize (2.2) constrained by their budget, we also assume that agents die with zero level of debt.

$$c_t + B_t + B^*_{t,j} \leq B_{t-1}R_{t,US} + B^*_{t-1,j}R_{t,j} + y_t \tag{2.3}$$

The representative household chooses $\{c_t, B_t, B^*_{t,j}\}^{\infty}_{t=0}$ so as to maximize (2.2) subject to (2.3). Denote λ_t as the marginal utility of wealth. The first order conditions of the optimization problem are as follows:

$$c_t^{-\gamma} - \lambda_t = 0 \tag{2.4}$$

$$-\lambda_t + \beta E_t \lambda_{t+1} R_{t+1,US} = 0 \tag{2.5}$$

$$-\lambda_t + \beta E_t \lambda_{t+1} R_{t+1,J} = 0 \tag{2.6}$$

for $j=1,...,J$, and (2.2) and (2.3) holds with equality. (2.4) to (2.6) provides us with fundamental pricing equations. With the help of (2.4) we can represent (2.5) and (2.6) as

$$\beta R_{t+1,US}\left(\frac{c_{t+1}}{c_t}\right)^{-\gamma} - 1 = 0 \tag{2.7}$$

$$\beta R_{t+1,J}\left(\frac{c_{t+1}}{c_t}\right)^{-\gamma} - 1 = 0 \tag{2.8}$$

[7] There is no exchange rate risk in this model since both assets are denominated in the same currency.

for $j = 1, \ldots, J$. These are the consumption euler equations. Since we observe positive consumption growth, the stochastic discount factor will allow the economy one price and free of arbitrage. If we expand (2.7) and substituting (2.8) in (2.7) we obtain the following:

$$E_t R_{t+1,j} = R_{t+1,j} - \mathrm{cov}_t(c_{t+1}^{-\gamma}, R_{t+1,j}) / E_t c_{t+1}^{-\gamma} \tag{2.9}$$

Equation (2.9) indicates the two components that affect the premium in sovereign bonds. The first is the covariance between real consumption and real gross return from investing in sovereign bonds. The second component is the preference parameter γ. These two components are negatively related, when consumption variability increases risk aversion will decrease. Notice that risk aversion also captures the variation that cannot be explained by consumption variability. Furthermore, we observe a positive relationship between consumption variability to risk premium. Positive covariation between returns and consumption will lower risk premium. When returns follow business cycle, they do not provide insurance against recessions and therefore admit lower premium. In states where consumption is high, marginal utility of consumption will be low; therefore premium on these bonds must be lower.

Equation (2.9) cannot be computed directly since we do not know the parameter γ. Following Mehra (2003) we can make the following assumptions for simplification. Growth rate of consumption and dividends are distributed independently and identically and jointly lognormal. These assumptions, together with (2.7) and (2.9) in equilibrium will generate the following equations.[8] Details of the calculations can be found at Appendices A1 – A.3 .

$$\ln E_t R_{t+1,j} = \ln R_{t+1,US} + \gamma var(c_{t+1}/c_t) \tag{2.10}$$

$$\ln R_{t+1,US} = -\ln\beta + \gamma E_t(c_{t+1}/c_t) - (1/2)\gamma^2\,\mathrm{var}(c_{t+1}/c_t) \tag{2.11}$$

[8] In Equilibrium the bond return and growth rate of consumption will be equal to each other. The details of the derivation are provided in the appendix.

For risk averse individuals, (2.10) implies a risk premium that is positive. Since our investors are homogenous these equations also suggest a cross section invariant risk premium, and therefore a constant risk aversion.

Our monthly data on consumption has variance of 0.7 percent of the average growth rate. Our sovereign bond return data indicates a monthly bond premium of 1.2 percent. Our choice of β is 0.99 and γ is 5, which are inline with the majority of literature. The implied variability is 0.1 percent, which is far less than what data implies.

3 Estimation

We will closely follow Hansen and Singleton (1982) in our estimation strategy. Their proposed Generalized Methods of Moments (GMM) is easily calculated and does not require distributional assumptions for the error terms.

At optimum, both (2.7) and (2.8) should be satisfied. We have data for sovereign bond returns and consumption. The two equations are non – linear in risk aversion (γ) and linear in consumer patience (β). Our estimation involves two steps: initially we estimate parameter of risk aversion using GMM by pairing (2.7) and (2.8) for each country. We will have J risk aversion estimates. These regressions are followed by testing whether J parameters are equal to each other. The theory that we outline in section 2 addresses a single risk aversion parameter.

Let's begin with rewriting and stacking (2.7) and (2.8) into the following

$$E_t h(x_{t+1},\theta) = E_t \begin{bmatrix} \beta R_{t+1,US}\left(\frac{c_{t+1}}{c_t}\right)^{-\gamma} - 1 \\ \beta R_{t+1,J}\left(\frac{c_{t+1}}{c_t}\right)^{-\gamma} - 1 \end{bmatrix} \tag{2.12}$$

where $x_{t+1} = [c_{t+1} / c_t, R_{t+1,j}, R_{t+1,US}]$ is the vector of variables and parameter vector $\theta = \{\beta, \gamma\}$. By definition $E_t h(x_{t+1},\theta) = 0$. Now assume that second moments of ε_{t+1} exists.

$$h(x_{t+1},\theta) = \varepsilon_{t+1} \tag{2.13}$$

By construction we know that ε_{t+1} will be orthogonal to any information that is known to the econometrician at time t. Therefore, any time t or earlier variable will serve as an instrument. Natural instruments would be the lag values of x_{t+1}. Let's denote the instrument matrix as $x_{t+1}=[1,(c_{t-s}/c_{t-s-1}),R_{t-s,j},R_{t-s,US},z_{t-s}]$ for $s=0,\ \ldots,\ S$. Here z_t is a matrix of instrumental variables that are observable by the econometrician but not included in (2.12). If the number of instruments is greater than the number of parameters, we can check for the validity of instruments by testing overidentifying restrictions. This test is simply the product of the number of observations and the minimized criterion function (Q) which is provided in (2.14). This product is distributed as χ^2 with $(J\text{-}p)$ degrees of freedom, where p is the number of overidentifying restrictions.

We initially conduct our regressions excluding z_t's. Then to test for the robustness of our results we include z_t's. We need the value of the minimized criterion Q both with and without the restriction. The test is the product of the number of observations and the difference between restricted and unrestricted Q that is distributed χ^2 with 1 degree of freedom.

We can express our orthogonality conditions as $E_t(\varepsilon_{t+1},x_t) = 0$ and formulate our minimization function as:

$$Q(\theta) = \left[1/T\sum_{t=1}^{T} h(x_{t+1},\theta)\otimes x_t\right]' \hat{S}_T^{-1}\left[1/T\sum_{t=1}^{T} h(x_{t+1},\theta)\otimes x_t\right]' \tag{2.14}$$

In the first stage GMM we use identity matrix as the weighting matrix, $W= I$, while in the second stage we use $W = S^{-1}$ where S is the optimal weighting matrix which is the estimate of the asymptotic variance of the sample mean of evaluated at the true value of parameters $h(x_{t+1},\theta_0)$ in the first stage. Notice that (2.14) may not be zero since the number of instruments may exceed the number of orthogonality conditions. Therefore, we will be searching for values that minimize this quadratic form.

The second component of the first step estimation is to test whether the risk aversion parameters that we estimated in the first step are equal to each other. The null and alternative is represented as follows

$$\begin{aligned} H_o &: \gamma_1 = \gamma_2 = \ldots = \gamma_J = \gamma_{\text{joint}} \\ H_a &: \text{at least one is not equal} \end{aligned} \tag{2.15}$$

here γ_{joint} is estimated by stacking (2.8) for $j=1,\ldots,J$ as in (2.12) along with (2.7) and estimating a single coefficient of risk aversion. We calculate the sum of the minimized Q's in the first stage, then we calculate a minimized Q in the joint estimation. The test is the product of the number of observations and the difference between these two quantities. The test statistics is distributed as χ^2 with *(p)* degrees of freedom where p is the number of restrictions.[9]

4 Data

The strength of our paper is the dataset that we use for sovereign bond rates. We obtained our end of the month unbalanced panel data from JP Morgan for the period December 31st, 1993 – April 30th, 2003. We compute a return measure that includes all coupon payments associated with each bond. Therefore, it represents the total return that one can obtain by holding onto the bond for a given amount of time. This data controls for maturity since it is based on a daily index. Furthermore, since data includes all price movements, it also represents the default in the sample. After a default, the value of the portfolio will go to zero where returns go to negative infinity. However, since our data set only includes those bonds for which the principal are collateralized, we are able to observe partial default on coupon payments and some part of the losses rising from the costs involved in repatriation of assets. Therefore, data indicates large negative returns but not negative infinite.

[9] The sum of χ^2 distributions is also distributed as χ^2.

The sovereign bond return is calculated from the index named "Emerging Markets Bond Index Plus" (EMBI+) that tracks total returns for external-currency-denominated debt instruments of the emerging markets: Brady bonds, loans, and Eurobonds. The EMBI+ offers coverage of 21 emerging market countries.[10]

The index is composite for its four markets: Brady bonds, Euro bonds, US dollar local markets, and loans. There are four steps involved in the calculation of the bond rates. First, daily total return for each bond within each market is computed, second weighted average of the daily total return is computed. Market capitalization is used to weight each bond. In the third step, market capitalization weighted average of the 4 markets is computed. This measure of sovereign bond rates control for all information with respect to the volume and type of issues in differing maturities. In the earlier literature, maturity structure and type of issue[11] were the variables that were used as control variables on the right hand side of regressions (Edwards, 1986). This still contains a measurement error since this approach proxies for maturity structure of bonds by averaging over bonds. This problem is not present in our dataset. The EMBI+ tracks prices of portfolios on a daily basis and our return measure simply calculates the return of holding for that portfolio for a specific time period.

These bonds are mostly long term[12], therefore to be consistent we use the 10 year constant maturity US Treasury Bonds as our risk free benchmark (Cruces, Buscaglia, Alonso, 2002). We calculate the price of a riskless bond (q_{t+1}) as the inverse of the gross yield ($R_{t+1,US}$): $q_{t+1} = 1/\ R_{t+1,US}$. All returns are converted to the real terms by using seasonally adjusted consumer price inflation data that we obtained from the Federal Reserve Bank of St. Louis. Consumer

[10] Argentina, Brazil, Bulgaria, Colombia, Ecuador, Egypt, South Korea, Malaysia, Mexico, Morocco, Nigeria, Panama, Peru, Philippines, Poland, Qatar, Russia, South Africa, Turkey, Ukraine, Venezuela.
[11] The instrument used in the issue
[12] Only emerging bond issues with $500 million and at least 2.5 years to maturity are included in the dataset.

Expenditure[13] and Disposable Income are also obtained from the same source and defined as in the US National Income and Products Accounts. In order to calculate the per-capita figures for consumption and disposable income we make use of population counts from the Census Bureau.

Our consumption measures are the consumption in non – durables and consumption in non – durables and services. As argued by Hall (1978), "… theoretical foundations of the aggregate consumption function apply to individual categories of consumption … ." Moreover, we are able to compare our results with the ones in Hansen and Singleton (1982), since they also used these measures. We do not include consumption in durables since we have to be careful to differentiate between consumption and investment motives of the consumers. Decision of the consumers to spend on durables is an investment for future consumption which is exactly what we are trying to identify with assets. For illustrative purposes we also display results with total consumption expenditures.

Figure 1 displays the real annual percentage change in the EMBI+, Mexican peso crisis in 1994, the Russian financial crisis in late 1998 and the crisis in Argentina and Turkey in mid 2001 are apparent in the graph. Although, we see a significant volatility in returns, on average investors made 12.3 percent on average in real dollar terms during 1995 – 2003 period. The figure also indicates that negative returns do not approach to negative infinity. Some part of the bond issue is collateralized; therefore with default, investors can retrieve a portion of their investments. Furthermore, they can also have expectations that liabilities that are inherent in these bonds will be fulfilled in the future, which in turn motivates the investors to hold on to their defaulted bonds.

[13] We will make use of three different consumer expenditure data; consumer expenditure on non – durables, non – durables and services total consumer expenditures. All in per – capita terms.

5 Results

Table 3(a) gives the first set of results when we use the per – capita total consumption expenditures. The identifying instruments are lag of 10 year US Treasury Bond return, lag of consumption measure in interest and lag of return on sovereign bonds. The first column of the table is the estimates of the coefficient of risk aversion. The striking result of the Table is the variation in coefficient of risk aversion across countries. The highest risk aversion is observed in Argentina with 4.2, followed by Philippines and Brazil. Note that these countries observed significant financial turmoil in the past 10 years, therefore it is natural to see that investors are more risk averse towards investing in these countries. For each of this regressions we have two additional instruments to identify our only parameter γ. Fifth column of the table presents the results for test of overidentifying restrictions. In finite samples this test is upward bias towards rejection of the null hypothesis. Keeping that in mind, our results indicate that the restrictions are valid.

The next step is to introduce another restriction to the model with a variable that is not in the model but observed by the econometrician. We know that any $t+1$ variable will be orthogonal to the information at time t. In this step we introduce the growth rate of real disposable income to test the sensitivity of our results. Results are displayed on Table 3(b). The last column presents the difference in the γ estimates with and without the use of this new instrument. We observe that for most of the countries the difference is different from zero. To test whether this difference is significant we calculate the value of the criterion function Q with and without the restriction. The test statistics is presented on the seventh column of the table. The restriction is not rejected for the validity of the additional instrument. With additional restriction we reorder the countries from highest to lowest risk aversion. The ordering is slightly changed, however the highest three are still to be Argentina, Philippines and Brazil. Furthermore, the precision of our estimate is slightly improved. In Argentina and in Ukraine we have lower standard errors.

In the previous section we indicated the need to distinguish between the consumption and investment motives in identifying the coefficient of risk aversion. Per – capital total consumption expenditures includes consumption in durables. This component is the most volatile component of the total consumption expenditures. Therefore, our model predicts that estimates of γ must be higher if we use less volatile measure of consumption. The next step is to identify γ with individual components of the consumption. Consumption in non – durables and consumption in services are less volatile than durable goods consumption.

Table 4(a) displays the results for real per – capita consumption expenditures in durables. Argentinean bonds are still the ones that investors are most risk averse with 3.7 and Qatar has the lowest. Again, test of overidentifying restrictions are not rejected. Sensitivity results are addressed on Table 4(b) with the inclusion of disposable income in the instruments list. In most cables validity of this instrument is not rejected. On Tables 5(a) and 5(b) we display the results with the sum of per – capita consumption expenditures in non – durables and services. These two components accounts for 83% percent of total consumption expenditures, and this total is less volatile as compared to non durables consumption. As expected we estimate higher risk aversion parameters. The countries that observed financial turmoil are the ones that the investors are most averse in investing at. On average with non – durables and services as the consumption measure we obtain a γ of 3.8.

The use of individual components still addresses the variability of our gamma estimates across countries, however we need a more formal test to justify this argument. Initially we need to estimate the $J+1$ optimality conditions with the same set of instruments. The results of the system estimation are presented on Table (6), our risk aversion parameters are presented on the first column of the table. The first three rows make use of the lag of US Treasury bond return, Lag of consumption measure and the return on sovereign bonds. The next three displays the results for inclusion of disposable income into the instrument set. Similar to the previous case, additional restriction turns out be valid. Table (7) compares the difference between the sum of the *Q* statistics obtained in the first stage and the *Q* statistics that is obtained in the system estimation. The calculated test statistics is presented on the second column of the table and significantly greater than the $\chi^2(21)$ table value which is 38.6 at one percent significance level. This is a strong indication of the rejection of null hypothesis that is addressing parameter equality.

The parameters that we estimated are in line with a majority of the literature, Campbell and Cochrane (1999 and 2000), Mehra (2003). Moreover, on average risk aversion estimates with non – durables and services are higher than the non –durables alone. This finding is also parallel to the results indicated by Hansen and Singleton (1982). We still have a puzzle in our hands and in the next stage we are presenting evidence that this puzzle is not due to the misspecification of the model. One can claim that the estimate of coefficient of risk aversion is capturing something that is inherent in the cross country variability of the risk premium. Note that risk premium incorporates information with respect to macroeconomic fundamentals and the link between fundamentals and the default probability is also addressed in the literature (Eaton, Gersovitz and Stiglitz (1986), (Eichengreen and Mody, 1998) (Cohen and Sachs, 1986), (Edwards, 1986) and (Grandes, 2003). Worsening fundamentals imply greater probability of default, therefore higher risk premium.

Therefore, if risk aversion is capturing an information that is inherent in the risk premium than our estimates of the coefficient must be correlated with the determinants of the risk premium. To do this we look at the simple correlation coefficient between the risk aversion estimate and some macroeconomic variables.

For the period of 1995 – 2003 we obtain the cross country data on the ratio of present value of the debt stock (PVDEBT), external debt stock (EXT), domestic debt stock (DOM), and current account deficit (CA) to Gross Domestic Product (GDP), and the growth rate of per – capita GDP (GROWTH) from the World Development Indicators. Political risks (polrisk) and corruption (corrupt) data from PRS group and finally the country ratings (RATINGS) data from Standard and Poor's, Moody's and Fitch. (Eichengreen, Hausman and Panizza, 2002).

Most theoretical and empirical models point out the importance of the debt to GDP ratio (Sachs, 1984), Eaton and Gersovitz (1981) and Edwards (1986). We expect to find a positive correlation coefficient between PBDEBT and EXT, and a negative for DOM and risk aversion. There are two effects of the domestic financing which works in opposite direction. As domestic financing increases there will be less foreign borrowing indicating lower premium and therefore lower risk aversion. However, increasing domestic borrowing increases the total debt stock which should generate higher risks for default therefore, risk aversion should increase. GROWTH is expected to have a negative coefficient, since positive growth increase credit worthiness therefore the ability to repay the debt. Increasing CA implies increasing need for financing, therefore we should expect a positive correlation. We believe that increasing political risks and corruption should make investors more risk averse, and finally Ratings should be positively correlated since poor credit ratings implies higher premium for financing.

We calculated the average of these variables over time in the sample period and measure the degree of correlation with our cross country findings of coefficients of risk aversion. Table 8 displays the results. All of the variables except the ratings and the political risk have the right signs and indicate an explanation of the variation in risk aversion. However, these correlation coefficients are small (the highest coefficient is 34 percent) and they are statistically insignificant. Determinants of risk premium are not explanatory for risk aversion.

6 Conclusion

Consumption based asset pricing models gained significant attention since its development in late 1970's. They are able to explain complex asset pricing mechanism with simple pricing equations. Its qualitative predictions are significant however fail to fit data quantitatively. Numerous attempts to test the model with real data have been made. Most of these studies study the premium inherent in US securities. But there is significantly less attention given to the pricing of emerging bonds which has been a growing substantially since the enactment of Brady Plan.

In this study we provided evidence with respect to the presence of a premium puzzle with sovereign bonds identical to the one with Equity premium puzzle. Moreover, we provide evidence on contrary to the model predictions of a single risk aversion parameter. Individual country estimates of the fundamental pricing equations of the consumption based asset pricing model generate different risk aversion coefficients. This is the second puzzle that we address.

Our cross country estimates of coefficient of risk aversion are not significantly correlated with the determinants of risk premium. Therefore, concluding that model's predictive power on single risk aversion fails on data, moreover the answer is not incorporated in the risk premium.

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Appendix A.1 – Equalities and Properties of Joint Normal Distribution

(A.1) $$E(xy) = E(x)E(y) + \mathrm{cov}(x, y)$$

For log normal distributions with mean μ and variance σ;

(A.2) $$E(d^{a}) = E(\exp(a \ln d)) = \exp(a\mu_{d} + 1/2\, a^{2}\sigma_{d}^{2})$$

(A.3) $$E(d^{a}c^{b}) = \exp(a\mu_{d} + a\mu_{c} + 1/2(a^{2}\sigma_{d}^{2} + b^{2}\sigma_{d}^{2})$$

Appendix A.2 – Derivation of Equation (9)

We will make use of equations (7) and (8) to derive (9). With the help of A.1 in *Appendix A.1* we can expand Equation (8) as follows

$$\beta E_t \left(\frac{c_{t+1}}{c_t}\right)^{-\gamma} E_t R_{t+1,j} + \beta \operatorname{cov}_t \frac{\left(c_{t+1}^{-\gamma}, R_{t+1,j}\right)}{c_t} = 1 \tag{A.4}$$

substituting for right-hand-side with equation (7) we obtain equation (9).

Appendix A.3 – Derivation of Equation (10) and (11)

We know that p_t is homogeneous of degree 1 in d_t. This implies that $p_t = \phi d_t$. Initially we can derive an expression for $R_{t+1,j}$ using this condition. Note that $R_{t+1,j} = (p_{t+1} + d_{t+1}) / p_t$, substituting for p_t we find the following relation between gross rate of return and growth rate of dividends.

(A.5)
$$R_{t+1,j} = \frac{\varphi + 1}{\varphi} \hat{d}_{t+1}$$

where $\hat{d}_{t+1}$ is the growth rate of dividends from period *(t)* to *(t+1)*. If we substitute for p_t in Equation (8) and denote $\hat{c}_{t+1}$ as the growth rate of consumption from period *(t)* to *(t+1)*.

(A.6)
$$\beta E_t\left(\frac{\varphi + 1}{\varphi} \hat{d}_{t+1}\right)\hat{c}_{t+1}^{-\gamma} = 1$$

Take expectations of both sides of (A.2.5) and substitute for $R_{t+1,j}$ it in (A.2.5) we obtain the following equality.

(A.7)
$$E_t R_{t+i,j} = \frac{E_t \hat{d}_{t+1}}{\beta E_t(\hat{d}_{t+1} \hat{c}_{t+1}^{\gamma})}$$

for the US Treasury return we have the following form

(A.8)
$$R_{t+1,US} = \frac{1}{\beta E_t(\hat{c}_{t+1}^{-\gamma})}$$

using log normal distributions' properties as outlined in Appendix 1, we can rewrite (A.7) and (A.8) as follows

(A.9)
$$E_t R_{t+i,j} = \frac{\exp\left(\hat{\mu}_d + \frac{1}{2}\sigma_d^2\right)}{\beta \exp\left(\hat{\mu}_d - \gamma\hat{\mu}_c + \frac{1}{2}\left(\sigma_d^2 + \gamma^2\sigma_c^2 - 2\gamma\sigma_{d,c}\right)\right)}$$

similarly for the gross return on US Bonds

(A.10) $$R_{t+1,US} = \frac{1}{\beta \exp\left(-\gamma\hat{\mu}_c + \frac{1}{2}\gamma^2\sigma_c^2\right)}$$

if we take logs of both sides in both equations

(A.11) $$\ln E_t R_{t+i,j} = -\ln\beta - \gamma\hat{\mu}_c - \frac{1}{2}\gamma^2\sigma_c^2 + \gamma\sigma_{d,c}$$

(A.12) $$\ln R_{t+1,US} = -\ln\beta + \gamma\hat{\mu}_c - \frac{1}{2}\gamma^2\sigma_c^2$$

we can substitute for (A.11) with (A.12) and impose the equilibrium condition $\hat{c} = \hat{d}$ obtain the following

(A.13) $$\ln E_t R_{t+i,j} = \ln R_{t+1,US} + \gamma\sigma_c^2$$

Table 1
Emerging Economies Sovereign Bond Returns
(1995 - 2003, %)

	EMBI+	*Africa*	*Asia*	*Europe*	*Latin*	*Non Latin*
Full Sample	*12.3	12.0	10.4	25.2	10.0	20.2
	***17.3*	*11.9*	*9.3*	*36.2*	*17.8*	*26.6*
Excluding Crisis	20.4	15.7	10.3	38.0	18.2	29.5
	12.8	*9.6*	*8.5*	*23.0*	*14.9*	*15.8*
Crisis* **	-9.8	-0.4	8.5	-15.0	-11.1	-9.7
	10.4	*11.4*	*11.7*	*40.4*	*8.1*	*31.4*

Source: JP Morgan
* Average
** Standard errors
*** Crisis: June 1998 – July 1999, September 2001 – September 2002.

Table 2
Equity and Sovereign Bond Premium
(1994 - 2003, monthly, %)

	TB10	*S&P*	*EMBI+*
Full Sample	-0.2	0.7	0.8
	0.3	4.7	5.1
Excluding Crisis	-0.2	1.0	1.2
	0.3	4.1	4.2
Crisis* **	-0.1	-0.5	-0.4
	0.3	6.0	7.2

* Average
** Standard errors
*** Crisis: June 1998 – July 1999, September 2001 – September 2002.

TABLE 3(a)
Total Per-Capita Consumption Expenditures
[Instruments: $us10_{t-1}$, $cons_{t-1}$, R_{t-1}]

	γ	σ_γ	*Q*	*N*	*T*Q*	*Prob*
Argentina	4.2	0.6	0.051	119	6.0	0.05
Brazil	3.7	0.3	0.145	119	17.3	0.00
Bulgaria	3.4	0.3	0.193	119	22.9	0.00
Colombia	2.3	0.4	0.450	54	24.3	0.00
Ecuador	3.2	0.3	0.261	119	31.0	0.00
Egypt	0.9	0.5	0.705	18	12.7	0.00
Korea	2.6	0.4	0.305	51	15.6	0.00
Malaysia	1.6	0.3	0.627	22	13.8	0.00
Mexico	3.3	0.4	0.229	119	27.3	0.00
Morocco	3.4	0.4	0.183	109	20.0	0.00
Nigeria	3.1	0.3	0.232	109	25.3	0.00
Panama	3.2	0.3	0.209	119	24.8	0.00
Peru	3.3	0.3	0.209	119	24.9	0.00
Philippines	3.8	0.4	0.119	112	13.3	0.00
Poland	3.3	0.3	0.227	119	27.0	0.00
Qatar	-0.2	0.2	0.917	21	19.3	0.00
Russia	3.4	0.3	0.252	119	29.9	0.00
South Africa	3.1	0.4	0.308	45	13.9	0.00
Turkey	2.5	0.4	0.353	52	18.4	0.00
Ukraine	1.3	0.3	0.650	28	18.2	0.00
Venezuela	3.5	0.3	0.220	119	26.2	0.00

White covariance, Iterate coefficients after one-step weighting matrix
us10 = 10 Year Constant maturity US Treasury return
cons = real total per –capita consumption growth
R = One month return on sovereign bond

TABLE 3(b)
Total Per-Capita Consumption Expenditures
[Instruments: $us10_{t-1}$, $cons_{t-1}$, R_{t-1}, di_{t-1}]

	γ	σ_γ	*Q*	*N*	*T*Q*	*Prob*	*T*(Qr-Qu)*	*Prob*	$\gamma_2 - \gamma_1$
Argentina	4.5	0.5	0.073	119	8.6	0.03	2.6	0.10	0.37
Brazil	3.7	0.3	0.156	119	18.6	0.00	1.3	0.25	0.01
Bulgaria	3.4	0.3	0.221	119	26.3	0.00	3.4	0.07	-0.04
Colombia	2.2	0.4	0.460	54	24.8	0.00	0.5	0.46	-0.05
Ecuador	3.2	0.3	0.273	119	32.5	0.00	1.4	0.23	-0.03
Egypt	1.0	0.5	0.716	18	12.9	0.00	0.2	0.66	0.09
Korea	2.6	0.4	0.344	51	17.6	0.00	2.0	0.16	-0.04
Malaysia	1.7	0.3	0.686	22	15.1	0.00	1.3	0.25	0.11
Mexico	3.3	0.4	0.261	119	31.1	0.00	3.8	0.05	0.00
Morocco	3.4	0.4	0.191	109	20.9	0.00	0.9	0.35	0.01
Nigeria	3.1	0.3	0.246	109	26.9	0.00	1.5	0.21	-0.04
Panama	3.2	0.3	0.215	119	25.6	0.00	0.7	0.39	-0.01
Peru	3.3	0.3	0.228	119	27.1	0.00	2.2	0.14	-0.05
Philippines	3.8	0.4	0.147	112	16.5	0.00	3.1	0.08	0.00
Poland	3.2	0.3	0.256	119	30.5	0.00	3.5	0.06	-0.03
Qatar	-0.4	0.2	0.933	21	19.6	0.00	0.3	0.56	-0.18
Russia	3.3	0.3	0.271	119	32.3	0.00	2.4	0.12	-0.07
South Africa	3.0	0.3	0.354	45	15.9	0.00	2.1	0.15	-0.09
Turkey	2.5	0.4	0.359	52	18.7	0.00	0.3	0.58	-0.02
Ukraine	0.8	0.2	0.742	28	20.8	0.00	2.6	0.11	-0.49
Venezuela	3.5	0.3	0.226	119	26.9	0.00	0.7	0.40	0.01

White covariance, Iterate coefficients after one-step weighting matrix
us10 = 10 Year Constant maturity US Treasury return
cons = real total per –capita consumption growth
R = One month return on sovereign bond
di = real disposable income growth

TABLE 4(a)
Per-Capita Consumption Expenditures in Non – Durables
[Instruments: $us10_{t-1}$, cd_{t-1}, R_{t-1}]

	γ	σ_γ	*Q*	*N*	*T*Q*	*Prob*
Argentina	3.7	0.6	0.070	119	8.4	0.02
Brazil	2.8	0.3	0.246	119	29.3	0.00
Bulgaria	2.9	0.3	0.261	119	31.1	0.00
Colombia	2.1	0.4	0.466	54	25.2	0.00
Ecuador	2.3	0.5	0.369	119	43.9	0.00
Egypt	0.0	0.3	0.761	18	13.7	0.00
Korea	2.4	0.4	0.308	51	15.7	0.00
Malaysia	1.2	0.3	0.594	22	13.1	0.00
Mexico	2.9	0.3	0.264	119	31.4	0.00
Morocco	2.9	0.4	0.168	109	18.3	0.00
Nigeria	2.8	0.3	0.353	109	38.4	0.00
Panama	2.6	0.3	0.352	119	41.9	0.00
Peru	2.6	0.3	0.414	119	49.2	0.00
Philippines	3.0	0.4	0.180	112	20.1	0.00
Poland	2.9	0.3	0.332	119	39.6	0.00
Qatar	-0.5	0.3	0.884	21	18.6	0.00
Russia	2.5	0.4	0.415	119	49.4	0.00
South Africa	2.0	0.4	0.426	45	19.2	0.00
Turkey	2.5	0.4	0.248	52	12.9	0.00
Ukraine	1.2	0.3	0.643	28	18.0	0.00
Venezuela	3.1	0.3	0.206	119	24.6	0.00

White covariance, Iterate coefficients after one-step weighting matrix
us10 = 10 Year Constant maturity US Treasury return
R = One month return on sovereign bond
cnd = real consumption growth (non durables)

TABLE 4(b)
Per-Capita Consumption Expenditures in Non – Durables
[Instruments: $us10_{t-1}$, cnd_{t-1}, R_{t-1}, di_{t-1}]

	γ	σ_γ	*Q*	*N*	*T*Q*	*Prob*	*T*(Qr-Qu)*	*Prob*	$\gamma_2 - \gamma_1$
Argentina	3.8	0.7	0.09	119	10.2	0.02	1.8	0.18	0.07
Brazil	2.7	0.3	0.27	119	31.9	0.00	2.7	0.10	-0.09
Bulgaria	2.8	0.3	0.27	119	32.3	0.00	1.2	0.28	-0.04
Colombia	2.1	0.4	0.48	54	25.8	0.00	0.6	0.43	-0.03
Ecuador	2.3	0.5	0.36	119	43.4	0.00	0.6	0.44	0.00
Egypt	-0.0	0.3	0.78	18	14.1	0.00	0.4	0.51	-0.01
Korea	2.4	0.4	0.30	51	15.5	0.00	0.2	0.67	0.00
Malaysia	1.3	0.3	0.61	22	13.5	0.00	0.4	0.51	0.05
Mexico	2.9	0.3	0.27	119	32.5	0.00	1.0	0.32	0.04
Morocco	3.0	0.4	0.17	109	18.7	0.00	0.4	0.52	0.04
Nigeria	2.8	0.3	0.34	109	37.1	0.00	1.4	0.24	0.00
Panama	2.6	0.3	0.38	119	45.1	0.00	3.2	0.07	-0.09
Peru	2.6	0.3	0.42	119	50.5	0.00	1.3	0.25	-0.07
Philippines	3.0	0.4	0.18	112	20.7	0.00	0.5	0.46	-0.03
Poland	2.9	0.3	0.32	119	38.0	0.00	1.5	0.22	0.00
Qatar	-0.7	0.2	0.90	21	18.8	0.00	0.2	0.63	-0.17
Russia	2.4	0.4	0.46	119	54.7	0.00	5.2	0.02	-0.11
South Africa	1.9	0.4	0.44	45	20.0	0.00	0.8	0.37	-0.02
Turkey	2.4	0.4	0.28	52	14.6	0.00	1.7	0.19	-0.10
Ukraine	0.7	0.3	0.74	28	20.8	0.00	2.8	0.10	-0.53
Venezuela	3.1	0.3	0.20	119	24.0	0.00	0.5	0.46	-0.02

White covariance, Iterate coefficients after one-step weighting matrix
us10 = 10 Year Constant maturity US Treasury return
R = One month return on sovereign bond
cnd = real consumption growth (non durables)
di = real disposable income growth

TABLE 5(a)
Per-Capita Consumption Expenditures in Non – Durables & Services
[Instruments: $us10_{t-1}$, $cnds_{t-1}$, R_{t-1}]

	γ	σ_γ	δ	σ_δ	*Q*	*N*	*T*Q*	*Prob*
Argentina	5.3	0.7	7.089	0.000	0.033	119	4.0	0.14
Brazil	4.8	0.4	11.667	0.000	0.124	119	14.8	0.00
Bulgaria	4.9	0.4	11.316	0.000	0.144	119	17.1	0.00
Colombia	3.5	0.5	6.754	0.000	0.315	54	17.0	0.00
Ecuador	4.8	0.5	9.574	0.000	0.168	119	20.0	0.00
Egypt	0.3	0.5	0.638	0.528	0.764	18	13.8	0.00
Korea	3.7	0.5	6.987	0.000	0.280	51	14.3	0.00
Malaysia	2.2	0.5	4.581	0.000	0.643	22	14.1	0.00
Mexico	4.5	0.4	10.590	0.000	0.191	119	22.8	0.00
Morocco	4.7	0.4	10.436	0.000	0.117	109	12.8	0.00
Nigeria	4.6	0.4	11.821	0.000	0.165	109	18.0	0.00
Panama	4.5	0.4	11.617	0.000	0.174	119	20.7	0.00
Peru	4.6	0.4	11.255	0.000	0.172	119	20.5	0.00
Philippines	4.8	0.5	9.292	0.000	0.112	112	12.6	0.00
Poland	4.6	0.4	11.683	0.000	0.173	119	20.6	0.00
Qatar	-0.4	0.4	-1.203	0.236	0.901	21	18.9	0.00
Russia	4.9	0.6	8.373	0.000	0.147	119	17.5	0.00
South Africa	4.2	0.6	6.570	0.000	0.365	45	16.4	0.00
Turkey	3.7	0.5	7.070	0.000	0.278	52	14.5	0.00
Ukraine	1.8	0.5	3.323	0.002	0.645	28	18.1	0.00
Venezuela	4.8	0.4	11.657	0.000	0.134	119	16.0	0.00

White covariance, Iterate coefficients after one-step weighting matrix
us10 = 10 Year Constant maturity US Treasury return
R = One month return on sovereign bond
cnds = real consumption growth (non durables and services)

TABLE 5(b)
Per-Capita Consumption Expenditures in Non – Durables & Services
[Instruments: $us10_{t-1}$, $cnds_{t-1}$, R_{t-1}, di_{t-1}]

	γ	σ_γ	*J*	*N*	*T*Q*	*Prob*	*T*(Qr-Qu)*	*Prob*	$\gamma_2 - \gamma_1$
Argentina	5.6	0.7	0.053	119	6.3	0.10	2.4	0.12	0.26
Brazil	4.8	0.4	0.126	119	14.9	0.00	0.2	0.66	-0.01
Bulgaria	4.9	0.4	0.151	119	18.0	0.00	0.9	0.35	-0.01
Colombia	3.5	0.5	0.319	54	17.3	0.00	0.2	0.64	-0.01
Ecuador	4.8	0.5	0.168	119	20.0	0.00	0.0	0.90	0.00
Egypt	0.1	0.6	0.809	18	14.6	0.00	0.8	0.37	-0.21
Korea	3.7	0.5	0.290	51	14.8	0.00	0.5	0.49	0.00
Malaysia	2.2	0.4	0.645	22	14.2	0.00	0.1	0.80	0.03
Mexico	4.6	0.4	0.215	119	25.5	0.00	2.8	0.10	0.07
Morocco	4.8	0.4	0.124	109	13.5	0.00	0.8	0.38	0.07
Nigeria	4.6	0.4	0.176	109	19.2	0.00	1.2	0.28	-0.03
Panama	4.5	0.4	0.175	119	20.8	0.00	0.1	0.79	0.00
Peru	4.5	0.4	0.184	119	21.9	0.00	1.4	0.23	-0.05
Philippines	4.9	0.5	0.130	112	14.5	0.00	1.9	0.16	0.06
Poland	4.6	0.4	0.203	119	24.2	0.00	3.6	0.06	-0.05
Qatar	-0.7	0.3	0.909	21	19.1	0.00	0.2	0.68	-0.30
Russia	4.8	0.6	0.153	119	18.2	0.00	0.8	0.38	-0.05
South Africa	4.0	0.6	0.396	45	17.8	0.00	1.4	0.23	-0.19
Turkey	3.6	0.5	0.290	52	15.1	0.00	0.6	0.44	-0.06
Ukraine	1.2	0.5	0.712	28	19.9	0.00	1.9	0.17	-0.64
Venezuela	4.8	0.4	0.138	119	16.5	0.00	0.5	0.49	0.00

White covariance, Iterate coefficients after one-step weighting matrix
us10 = 10 Year Constant maturity US Treasury return
R = One month return on sovereign bond
cnds = real consumption growth (non durables and services)
di = real disposable income growth

Table 6
System Estimation
[Instruments: $us10_{t-1}$, c_{t-1}, R_{t-1}; di_{t-1}]

	γ	σ_γ	*t-stat*	*prob*	*Q*	*N*
syscnd	1.60	0.31	5.22	0.00	0.70	1946
syscnds	3.11	0.43	7.16	0.00	0.50	1946
syscons	2.03	0.31	6.49	0.00	0.58	1946
syscnddi	1.56	0.30	5.14	0.00	0.71	1946
syscndsdi	3.08	0.43	7.12	0.00	0.51	1946
sysconsdi	2.00	0.31	6.44	0.00	0.63	1946

White covariance, Iterate coefficients after one-step weighting matrix
c = real consumption growth (durables, non durables, non durables and services, total consumption)
di = real disposable income growth
us10 = 10 Year Constant maturity US Treasury return
R = One month return on sovereign bond

Table 7
Test of Equality of Risk Aversion Parameters

	Sum Q	*T*(Qr-Qu)*	*α=0.01*
syscnd	7.96	14122	38.9
syscnds	6.05	10788	38.9
syscons	6.84	12196	38.9
syscnddi	8.29	14738	38.9
syscndsdi	6.37	11399	38.9
sysconsdi	7.36	13101	38.9

Qr : Q-statistics under restriction (Equation 2.15, null hypothesis)
Qu: Q-statistics unrestricted
($\alpha = 0.01$) : critical value at 1% level

Table 8
Correlation between Risk Aversion and Macroeconomic Variables

	growth	*pvdebt*	*corrupt*	*dom*	*ext*	*ratings*	*ca*	*polrisk*
γ_{cons}	-0.05	0.28	0.22	-0.09	0.28	-0.25	0.17	-0.40
	(-0.20)	*(1.25)*	*(0.97)*	*(-0.41)*	*(1.29)*	*(-1.15)*	*(0.74)*	*(-1.90)*
γ_{nds}	-0.09	0.35	0.20	-0.03	0.34	-0.27	0.16	-0.48
	(-0.39)	*(1.61)*	*(0.91)*	*(-0.12)*	*(1.58)*	*(-1.22)*	*(0.71)*	*(-2.37)*
γ_{nd}	-0.05	0.30	0.21	0.00	0.27	-0.21	0.18	-0.44
	(-0.21)	*(1.38)*	*(0.93)*	*(0.01)*	*(1.23)*	*(-0.92)*	*(0.80)*	*(-2.14)*

Figures in parenthesis are standard errors
cons : real per – capita total consumption expenditures
nd : real per – capita consumption expenditures on non durables
nds : real per – capita consumption expenditures on non durables and services

Figure 1
Emerging Markets Bond Index Plus (EMBI+)
(Real, annual percentage change)