The Determinants of Sovereign Spreads in Emerging Markets

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September 2006

The Central Bank of the Republic of Turkey

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The determinants of sovereign spreads in emerging markets

Abstract

This study analyzes both short-run and long-run determinants of the sovereign spreads in a set of 21 emerging countries over the period 1998-2004 utilizing both daily and monthly data and estimate individual country and panel regressions. Our analysis shows that both domestic and international factors affect spreads, where the most important common determinant of the spreads is found to be the risk appetite of foreign investors. By using an event study methodology we find no evidence of impact of the FOMC announcements on spreads. Finally, we analyze whether news regarding domestic politics and announcements of international organizations play a role in the evolution of spreads. Using the post-crisis data of Turkey, we point out an important effect of such news releases.

1.   Introduction

This paper aims to identify the determinants of the emerging market bond index (EMBI)[1] spreads of a set of emerging countries. A standard measure of default risk of an emerging country is that country's component of the EMBI spread, which is the difference between the yield on emerging country sovereign bonds and the yield on bonds issued by a government of the industrialized world with identical currency denomination and maturity. Favero and Giavazzi (2004) showed that, in Brazil, important financial variables, like exchange rates and domestic interest rates, fluctuated parallel to the EMBI spread over the period 1999-2003. Özatay (2005) documented similar evidence for Turkey for the 2001 – 2004 post-crisis period. Blanchard (2004) estimated the probability of default of the Brazilian government by using EMBI spread data. He showed that the EMBI spread and the probability of default moved together over the 1995-2003 period.

These observations show that understanding the underlying factors determining EMBI spreads is not only important for international investors but also for economic policy-makers of emerging markets. If the main determinants of these spreads are macroeconomic fundamentals, then this will be good news for countries that have a bad track record but started to implement good policies. After all, as the implementation of sound policies continues, default risk will eventually diminish and converge to zero. However, the extent to which international risk factors such as changes in interest rates in the developed world have a great impact on spreads means that these countries can find themselves in serious trouble: they can be penalized when they are just doing the "right". A significant increase in

EMBI spreads (default risk) due to a tightening cycle in industrial countries, could lead to a rise in the debt-to-GDP ratio by depreciating the domestic currency and raising domestic interest rates, which has the potential to ignite a self-fulfilling prophecy as in the second generation crisis models. Moreover, based on positive correlations between domestic interest rates, exchange rates, and spreads, Favero and Giavazzi (2004) and Blanchard (2004) emphasized potential problems that inflation targeting countries could face in case of an upward trend in spreads followed by depreciation pressures on domestic currencies and deterioration in inflation expectations leading to a rise in inflationary pressures. If the debt to GDP ratio is an important determinant of spreads then a central bank that raises its policy rate to contain such inflationary pressures will find itself in deep trouble, simply because a rise in policy rates will undermine debt sustainability, especially when the average maturity of the debt is short.

What are the determinants of EMBI spreads? Earlier empirical literature has not been conclusive on the relative importance of macroeconomic fundamentals with respect to international risk factors on determining EMBI spreads. For instance, Cline and Barnes (1997) found the statistically insignificant effect of US interest rates on new-issue bond spreads (so-called launch spreads) of eleven emerging market countries for the period 1992-1996. Kamin and von Kleist (1999) reported that for almost 300 new-issue bond spreads over the 1991 – 1997 period, domestic macroeconomic fundamentals -as reflected by sovereign credit ratings- had played an important role in determining spreads. However, they could not identify any robust and statistically significant relationship between industrial

country interest rates and new-issue bond spreads. Eichengreen and Mody (1998) emphasized the fact that, for launch spreads, it is important to distinguish supply and demand effects of changes in international interest rates. They analyzed more than 1500 new-issue bond spreads between 1991 and 1996 and reported that, once controlled for negative impact of US interest rates on the decision of developing-country borrowers to issue debt, a rise in US rates had a negative effect on the demand by international investors for emerging market new issues, which put an upward pressure on spreads.

However, recent research on the determinants of secondary market spreads (rather than the launch spreads) has generally documented that both domestic and international factors played a role in the evolution of spreads. Arora and Cerisola (2001) analyzed the determinants of secondary market spreads for eleven emerging countries over the period 1994-1999. They found that both the country-specific fundamentals and US monetary policy had an impact on spreads. Kamin (2002) estimated an OLS error-correction equation for the EMBI spread and found statistically significant coefficients on the lagged level of the EMBI spread, lagged level of the US corporate spread and the contemporaneous change in US corporate spread (a measure of risk appetite of foreign investors) for the period 1992-2001. The significance of the lagged level of the EMBI spread points to a strong mean-reverting tendency of the EMBI. Using annual averages calculated from daily EMBI spreads for 28 countries over the 1994 – 2004 period, Hilscher and Nosbusch (2004) showed that debt to GDP ratios and risk appetite of foreign investors were important determinants of the spreads. Favero and Giavazzi (2004)

documented that Brazil's EMBI spread increased by an increase in the US corporate spread and Brazil's debt to GDP ratio, over the period 1999-2003. The findings of Blanchard (2004) are similar. Hence, the evidence documented in recent literature points to the risk appetite of foreign investors and debt to GDP ratios of emerging markets as the most important determinants of sovereign spreads.

These studies generally considered various fiscal policy and foreign debt-service indicators as macroeconomic fundamentals. However, while the debt to GDP ratio, for example, is an important indicator of the current stance of macroeconomic policy, it does not reveal much information regarding the future policies and intentions of policymakers. More important for investors is whether the current stance of fiscal policy is going to change and the direction of such a change. Political developments and announcements of international organizations can provide such information. Similarly, literature has generally considered current levels of US Treasury bond yields or Fed short-term interest rates as indicators of international risk factors. In a recent study, Gürkaynak *et al.* (2005) investigated the effects of US monetary policy on asset prices in the US. They showed that not only the policy actions of the Fed but also its statements had important but varying effects on asset prices, with statements having a much greater impact on longer-term Treasury yields.

This paper adds to existing literature in several dimensions. First, we use high frequency (daily) secondary market data. The results of both country-specific and panel regressions are provided. For comparison purposes we also show the

estimation results of the models with monthly frequency. Second, we analyze the impact of Fed announcements on the spreads along the lines of Gürkaynak *et al*. (2005). Third, by focusing on the Turkish data, we analyze the impact of political developments in addition to international factors and macroeconomic fundamentals on the EMBI spread, and thus bring a political economy perspective to the literature. Fourth, country-specific variables are not well captured in studies that use a cross section or pooled data. This study, in addition to political developments, as discussed below, takes the effects of the evolution of IMF relations and the European Union (EU) accession process into consideration. Hence, the data set we use provides the chance of testing whether macroeconomic fundamentals and international interest rates still have explanatory power for fluctuations in the EMBI spread once controlled for such specific factors.

The outline of the paper is as follows. The following section gives detailed information regarding our methodology and the data set. The third section provides the estimation results for a group of 21 emerging economies. It is shown that both international and domestic factors play a role in the evolution of spreads. The appetite for risk of foreign investors is the most important common determinant of spreads. Fed announcements do not have an impact on spreads. The impact of political news and announcements of international institutions are analyzed for the Turkish component of the EMBI spread in the fourth section. It is shown that news releases of this kind do have a significant impact on spreads. The last section concludes.

2.   Methodology and data

The most general model employed in literature on the empirical determinants of sovereign spreads is a relationship of the form

$$s_t = c + \alpha_1 r_{us,t} + \alpha_2 \theta_t + \sum_{i=1}^{n} \beta_i x_{i,t} + u_t ,$$ (1)

where s is the log of EMBI spreads, c is a constant term, r_{us} is the yield on US treasury bonds or Fed funds rate, θ is a proxy for the risk appetite of foreign investors (generally the spread between the yield on US corporate bonds rated BBB+ with a maturity of 10 years and a 10-year US treasury bond), x_i is the ith domestic macroeconomic variable, and u is the error term. Since the sovereign spread of a country is a measure of its default risk, domestic macroeconomic variables included in the models are indicators of the default risk of that country. Debt, net foreign assets, the fiscal balance, gross reserves all as ratios to the GDP of the country, debt service ratios, credit ratings, changes in terms of trade are among the most commonly employed domestic default indicators.

Summary results of estimation models for the determinants of emerging economies secondary market sovereign spreads in recent literature are provided in Table 1. With the exception of Hilscher and Nosbusch (2004), all of the studies reported in the table used monthly data. The striking fact is that the coefficients of alternative measures for the US treasury yield were not significant in Kamin and Kleist (1999) and Kamin (2002), whereas the coefficient of this variable is negative in Hilscher and Nosbusch (2004). The only significant and positive coefficient was reported by Arora and Cerisola (2001) and this is for the Fed funds rate. However, when the risk appetite of foreign investors as measured by the US corporate default spread is included its coefficient appears to be positive and significant (Kamin

(2002), Blanchard (2004) –not reported in the table, Favero and Giavazzi (2004), and Hilscher and Nosbusch (2004)). Arora and Cerisola (2001) also included the volatility of spread between the US 3-month treasury yield and Fed target rate and reported a positive and significant coefficient. Regarding domestic macroeconomic fundamentals, the coefficients of debt to GDP ratios are significant and correctly signed in all of the models. Arora and Cerisola (2001) employed various other domestic macroeconomic variables and found correctly signed and significant coefficients for some of them. Hilscher and Nosbusch (2004) included terms of trade as an additional variable and reported significant and correctly signed coefficients.

Kamin and Kleist (1999) emphasized that when they used the level of the spread as the dependent variable the equation was subject to extreme autocorrelation. Based on augmented Dickey-Fuller tests they found that the variables used in the regressions were not stationary in level terms. Hence, they reported results for the first difference of the spread as well. Note that Kamin (2002) estimated an error-correction model for the spreads due to the same reason. Similarly, Arora and Cerisola (2001) provided results of the Philips-Perron test for co-integration and showed that in eight out of 11 cases sovereign spreads were co-integrated with the various explanatory variables shown in Table 1. While diagnostic test results for autocorrelation were not reported in Favero and Giavazzi (2004), they plausibly included the first lag of the dependent variable as an additional explanatory variable in their models in order to control the autocorrelation.

Table 1
Summary results of estimation models for the determinants of emerging economies secondary market sovereign spreads in the recent literature[a]

	Kamin and Kleist (1999) 10 countries, P, M				Arora and Cerisola (2001) 11 countries, TS, M	Kamin (2002) Index, EC, M	Favero and Giavazzi (2004) Brazil, NL, M	Hilscher and Nosbuch (2004) 28 countries, P, A
Time period	1991.1 - 1997.6				1994.4 - 1999.12	1992.3 - 2001.11	1991.2 - 2003.6	1994 - 2004
Dependent variable	log (spread)		Dlog (spread)		log (spread)	Dlog (spread)	log (spread)	spread
International risk factors	Full	Sub[b]	Full	Sub				
US 3-month treasury yield	+	ns	+	ns		ns[e]		
US 10-year treasury yield						ns		-
US 30-year treasury yield	Al[c].:ns	ns	Al.:ns	ns				
FED funds rate					+ (11/11)[d]			
Volatility of spread between US 3-month treasury yield and FED target rate					+ (8/11)			
US corporate default spread						+	+[f]	Al.:+
Domestic risk factors								
Ratings						ns		
Debt / GDP					+ (6/6)		+	+
Volatility of terms of trade								+
Change in terms of trade								-
Net foreign assets / GDP					- (7/7)			
Fiscal balance / GDP					- (3/3)			
Reserves / GDP					- (3/10)			
Debt service ratio					+ (2/3)			
Indicator for default history								-

[a] P: Panel, M: Monthly, TS: Time series, EC: Error-correction, NL: non-linear least squares, A: Annual. A '+' sign indicates that the coefficient of the explanatory variable is positive and significant at least at 10 percent level. Similarly, a '-' sign indicates that the relevant coefficient is negative and significant, whereas 'ns' shows that the relevant coefficient is not significant.

[b] Sub sample is 1995.1 - 1997.6.

[c] 'Al.' stands for an alternative estimation. In Kamin and Kleist (1999) and Kamin (2002) US 30-year treasury yield is used as an alternative to US 3-month treasury yield. In Hilscher and Nosbuch (2004) US corporate default spread is used as an alternative to US 10-year treasury yield.

[d] '(x/y)' indicates that the relevant explanatory variable is included in the regressions for 'y' countries and out of 'y' coefficients 'x' of them are significant.

[e] In Kamin's error-correction model both the lagged levels and the contemporaneous first differences of the explanatory variables are included. In this case 'ns' ('+') denotes insignificance (significance) for the coefficients of both the levels and first differences of the relevant variable.

[f] For the debt to GDP ratio above 54 percent, the response of spread to US corporate default spread increases non-linearly

Based on these results two observations follow: first, models that use levels of sovereign spreads as the dependent variable should be interpreted as exploring long-term relationships (more on this issue below). Second, international investors' appetite for risk, debt to GDP ratio, and various volatility measures are important determinants of emerging market spreads. Hence, both international risk factors and domestic macroeconomic fundamentals derive long-term movements of secondary market sovereign spreads. Note that this contrasts the findings of Calvo, who argued that once one accounts for the investors' appetite for risk, domestic factors in emerging markets do not play any significant role in explaining emerging market spreads.[2]

2.1.   *Methodology and data for 21 emerging countries*

In the third section we report the estimation results of Eq. (1) for 21 emerging countries: Argentina, Brazil, Bulgaria, Colombia, Ecuador, Egypt, Mexico, Malaysia, Morocco, Nigeria, Panama, Peru, Philippines, Poland, Qatar, Russia, South Africa, South Korea, Turkey, Ukraine and Venezuela. In contrast to studies reported in Table 1 that used either monthly or annual data, we used daily data for the December 31, 1997 – December 31, 2004 period. For some countries the sample size is shorter. Hence, the maximum number of observations is 1750, whereas the shortest sample size is for South Africa and the number of observations is 742 (April 30, 1998 – July 30, 2002). Our dependent variable is the EMBI spread of each country. For alternative potential international deriving forces of spreads we considered the US federal funds target rate, yield on 2-year US treasury bonds, yield on 10-year US treasury bonds, and a proxy for

international investors' appetite for risk. As in, for example, Blanchard (2004), Favero and Giavazzi (2004), Hilscher and Nosbusch (2004), international investors' appetite for risk was defined as the spread of US corporate bonds with a Moody's rating of Baa and a maturity of 10 years over 10-year US treasuries. In addition to these variables, following Arora and Cerisola (2001), we included the fitted values for the conditional standard error from a GARCH (1,1) model for the spread between the three-month yield on the US treasury bill and the federal funds target rate as a proxy for international market volatility as another explanatory variable.

Making use of high frequency data puts a constraint on the usage of potential domestic factors as explanatory variables. As emphasized in the preceding paragraphs, various indicators of fiscal policy, terms of trade, and indicators for the debt servicing capability of a country are among such potential factors. However, Cantor and Packer (1996, pp.49) showed that "sovereign ratings effectively summarize and supplement the information contained in macroeconomic indicators and therefore strongly correlated with market-determined credit spreads." For a cross-section of thirty-five countries, they found that once the rating variable is included as an explanatory variable along with domestic macroeconomic variables, domestic factors become collectively and individually insignificant. Based on this observation, Kamin and Kleist (1999) used ratings by Moody's and Standard and Poor's, instead of various country performance variables. Similarly, Eichengreen and Mody (1998) included a measure of country credit-worthiness derived from data provided by Institutional

Investor. In what follows, for high-frequency regressions, we included sovereign ratings by Standard and Poor's and alternative credit-worthiness data provided by Institutional Investor, as a proxy for domestic factors. The assignment of numerical values to credit ratings is as in Kamin and Kleist (1999), with 1 being the worst credit risk and 22 the best, whereas the credit-worthiness data of the Institutional Investor is on a scale of zero to 100, with 100 representing the least chance of default. To check robustness of our results, we estimated Eq. (1) using monthly data and various domestic macroeconomic variables, as well. These variables are fiscal balance, public debt, net foreign assets, exports (all as shares in GDP) and credit ratings. For the long-run determinants of EMBI spreads related to 21 countries, final results are derived from a panel estimation using both daily and monthly data.[3]

What are the short-run determinants of EMBI spreads? Augmented Dickey-Fuller tests show that the variables used in the regressions are not stationary in level terms. Hence, documented evidence for level data can at best be suggestive for long-term relations between the variables. To capture short-run dynamics while preserving the long-run information, we estimated error-correction models for the countries in our sample. The most general form of the estimated models is of the following type:

$$\Delta s_t = c + \alpha_1 s_{t-1} + \alpha_2 \Delta r_{us,t} + \alpha_3 r_{us,t-1} + \alpha_4 \Delta \theta_t + \alpha_5 \theta_{t-1}$$
$$+ \sum_{i=1}^{n} \beta_i \Delta x_{i,t} + \sum_{j=1}^{n} \delta_j x_{j,t-1} + \varepsilon_t \quad , \quad (2)$$

where Δ is the first difference operator. As noted by Blinder and Deaton (1985), this is a flexible distributed lag model and nests many of the specifications that have been discussed in the literature –including the error-correction model. For example, Giavazzi and Pagano (1996) and Kamin (2002), among others, used this specification.

In a recent study Gürkaynak *et al.* (2005) investigated the effects of US monetary policy on asset prices in the US. They showed that not only the policy actions of the Fed but also its statements had important but differing effects on asset prices, with statements having a much greater impact on longer-term Treasury yields. In the final part of the third section, we turn to the effects of Fed announcements on emerging spreads, which has not yet been tackled in literature. Basically, we used event study methodology. Events are the Federal Open Market Committee's (FOMC) announcements in the January 1998 –December 2004 period. Gürkaynak *et al.* (2005, pp.57) used "the term 'announcement' to refer to any means by which a policy decision was communicated to financial markets, including operations as well as explicit press releases". First, we took a symmetric window of two, five and ten-day lengths around each FOMC statement and checked whether there is a change in the mean and variance of the sovereign spread of each country in our sample. The maximum number of total events is 60, while for Qatar the number of total events drops to 11. Second, using the two-factor approach of Gürkaynak *et al.* (2005), we estimated the following event-regression:

$$\Delta s_t = \alpha_o + \alpha_1 Z_{1,t} + \alpha_2 Z_{2,t} + \varepsilon_t, \tag{3}$$

where Δs is the change in the spread between the pre-event and post-event, with changes calculated for different lengths of windows –minimum one-day and maximum 5-days. Z_1 and Z_2 are respectively the "target factor" and "path factor" defined in Gürkaynak *et al*. (2005). They argued that the effects of Fed monetary policy announcements on asset prices were not adequately characterized by a single factor but by the surprise component of the change in the current federal funds rate target. Instead, they found that two factors were required. They gave a structural interpretation to these factors: "current federal funds rate target" factor (Z_1) and "future path of policy" factor (Z_2).

2.2.   Methodology and data for the impact of political news on Turkish spreads

As noted in the introduction, while various domestic factors used by the literature to explain sovereign spreads are among the important indicators of the current stance of macroeconomic policy, they do not reveal much information for the future policies and intentions of policymakers. Political news and the announcements of international organizations can provide extra information regarding whether the current stance of fiscal policy is going to change and the direction of such a change. In order to analyze the impact of political developments in addition to international factors and macroeconomic fundamentals on the EMBI spread, and thus bring a political economy perspective to the literature, in the fourth section we focus on developments in the post-crisis period in Turkey.

We used daily data for the May 16, 2001 – December 31, 2004 period. The beginning date of the period marks the starting date of the IMF backed program. We

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estimated Eq. (2) with additional explanatory variables to capture the effects of various news releases on spreads. For news events, our main information source is Reuters. In addition, we checked that the analysis in Reuters is consistent with that of the Anatolian News Agency, local and foreign financial papers. We classified news into three categories: (1) political news; (2) announcements made by the IMF; (3) structural reform process towards the EU accession. We then classified each item of news in these categories as either "good" or "bad". Note that our news releases selection, classification, and transformation to dummy variables methodology is in line with the literature. For example, Ganapolsky and Schmukler (1998), Kaminsky and Schmukler (1998), and Baig and Goldfajn (1999) estimated the impact of various news events on movements in financial markets. They map daily news of a country into a set of dummy variables (like good and bad news for each category of news) to quantify the impact of such news releases on financial markets. Kim and Mei (2001), Fornari *et al*. (2002), and Blasco *et al.* (2002) followed almost an identical procedure. The first of these studies explicitly classifies political news as good and bad news and forms dummy variables accordingly. The second study maps various kinds of news releases into aggregated good and bad dummy variables, but mainly with a political focus. It is interesting to note that Blasco *et al.* (2002) concentrated on news such as joining the EU.

In the period analyzed, there are hundreds of such news events and most of them are irrelevant from the perspective of this paper given that they are either mainly in the form of trivial talk or in some other cases original news is followed by similar news after very short intervals. Hence, the first issue is to reduce the number

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of news events to a manageable level. In order to decrease the risk of subjectivity and bias, the following procedure was adopted:

First, only political news that falls in one of the following categories was considered: (i) good news: (1) resolution of conflicts within the government regarding taking the necessary steps on the structural reform agenda of the IMF supported program; (2) signals of financial support from the US; (3) formation of a strong government after the elections; (ii) bad news: (1) disagreement within the coalition government; (2) chaos in parliament and election risk; (3) the hospitalization of Prime Minister Ecevit and early election talks; (3) news related September 11, Iraqi war and blasts hit in Istanbul.

Second, regarding IMF news, a postponement of a scheduled board meeting was classified as bad news, whereas an agreement with the IMF and approval of credit were taken as good news. Third, EU related news was classified as good news whenever the Turkish parliament passed a reform towards EU accession or EU member countries signaled backing Turkey's membership. Conversely, opposition of EU countries for Turkey's membership as well as the negative developments at the end of 2002 about giving a "date" for Turkey starting negotiations were classified as bad news.

3.   The determinants of spreads

Below we report both the long-run and short-run estimation results for the determinants of spreads of 21 emerging countries. The results provided are for daily and monthly data for individual countries as well as a panel of 21 countries.

3.1.   *Long-run determinants of spreads of 21 emerging countries*

Table 2 presents the OLS estimation results of Eq. (1) for the 21 emerging countries stated in the preceding section. The frequency of the data is daily. For more than half of the countries (13 out of 21 countries), the coefficients of the Fed target rate are negative in contrast to expected sign. In most cases the coefficients of the US corporate bond spread and Institutional Investor rating are as expected. Exceptions are the US corporate bond spread for Russia and Korea, Institutional Investor rating for Colombia, Ecuador, Egypt, Philippines and Turkey. When the sovereign ratings of Standard and Poor's were used, the coefficient of the corporate bond spread for South Korea and Institutional Investor rating for Ecuador, Philippines and Turkey are correctly signed. All of the coefficients with the exception of Colombia's and Egypt's rating and Fed target rate in Philippines using Standard and Poor's rating are significant at the one percent level. As in the studies cited in the preceding section the Durbin Watson test statistics are very low. Note that this is a long-run estimation. For eight countries, the variables included in the regressions are co-integrated. Using US Treasury 2-year or 10-year bond rates instead of the Fed target rate makes difference in a few cases slightly but does not affect the overall results. Hence, we do not report those results.

Table 2
Long-run determinants of EMBI spreads for 21 emerging countries
(Daily frequency, December 31, 1997 - December 31, 2004)[a]

Countries	Number of observations	Coefficients[b]			Adjusted R^2; DW	Co-integration test t-values[d]
		FED target rate	US Corporate bond spread[c]	Institutional Investor rating		
Argentina	1750	-1.240	0.792	-0.472	0.94; 0.03	-3.0
Brazil	1750	-0.104	0.935	-1.794	0.34; 0.02	-2.5
Bulgaria	1750	0.138	1.166	-2.073	0.91; 0.04	-3.1 (1)
Colombia[e]	1398	-0.057	0.871	0.047	0.56; 0.03	-3.6
Ecuador	1750	0.225	1.206	0.688	0.43; 0.01	-2.2
(With S&P rating)	1104	-0.228	1.201	-0.432	0.72; 0.09	-3.7 (3)
Egypt	648	-0.269	2.677	0.747	0.80; 0.12	-3.7 (1)
Mexico	1750	-0.052	0.812	-3.651	0.78; 0.04	-3.9*
Malaysia[e]	730	-0.162	0.994	-2.946	0.85; 0.08	-3.5 (1)
Morocco	1750	0.109	0.895	-5.294	0.76; 0.05	-4.0 (1)*
Nigeria	1750	-0.121	1.46	-1.893	0.77; 0.06	-4.5 (1)**
Panama	1750	-0.039	0.538	-0.777	0.49; 0.04	-4.4**
Peru	1750	0.071	0.714	-1.29	0.59; 0.03	-3.3
Philippines[e]	1586	-0.031	0.400	0.376	0.28; 0.02	-1.6
(With S&P rating)	1586	0.003	0.457	-0.871	0.29; 0.02	-1.75
Poland	1750	0.128	1.450	-6.224	0.81; 0.09	-4.0 (3)*
Qatar[e]	310	0.105	1.195	-1.19	0.92; 0.31	-5.0**
Russia	1750	0.577	-0.197	-1.428	0.67; 0.01	-1.8
S. Africa[e]	670	-0.212	1.154	-2.036	0.83; 0.18	-4.3 (1)**
S. Korea[e]	1062	0.681	-0.787	-0.633	0.54; 0.02	-2.3
(With S&P rating)	1062	0.108	0.445	-6.835	0.88; 0.08	-4.4**
Turkey[e]	1355	-0.422	1.738	0.357	0.55; 0.03	-3.5
(With S&P rating)	1355	-0.14	0.948	-1.739	0.75; 0.04	-3.0 (1)
Ukraine[e]	845	0.373	1.216	-0.658	0.86; 0.08	-3.7 (1)
Venezuela	1750	0.019	0.731	-0.679	0.29; 0.02	-2.2

[a] All of the explanatory variables, except market volatility, are in logarithms.
[b] The insignificant coefficients are the Colombia's and Egypt's rating and Fed target rate for Philippines when estimated with Standard and Poor's rating. All other coefficients are significant at the 1 percent level.
[c] The spread of US corporate bonds with a BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields.
[d] Engle-Granger two-step test results. * and ** respectively denote significance at the 10 and 5 percent levels.
[e] Samples for these countries: Colombia: 28.05. 1999- 31.12.2004; Egypt: 31.05.2002-31.12.2004; Malaysia: 31.01.2002-30.12.2004; Qatar: 29.12.2000-29.08.2002; S. Africa: 30.04.2002-2004.12; Korea: 30.04.1998-30.07.2002; Turkey: 30.07.1999-31.02.2004; Ukraine: 10.08.2001-31.12.2004. For Philippines, the values between 1998.11-1999.04, for Qatar, the values between 2001.07-2001.12 are missing in data.

Table 3 reports the estimation results of Eq. (1) for an unbalanced panel of 21 countries. Again the frequency of the data is daily. All of the coefficients are significant and the signs are as expected. The only exception is the coefficient of the market volatility in the regression VI, which is not significant although it has the expected sign.

Table 3
Long-run determinants of EMBI spreads for a panel of 21 emerging countries
(Daily frequency, December 31, 1997 - December 31, 2004)[a]

	Coefficients[b]					
	I	II	III	IV	V	VI
Constant	13.405	13.407	13.442	13.473	7.792	7.795
FED target rate	0.096	0.096			0.179	0.176
US Treasury 2-year bond yield			0.085			
US Treasury 10-year bond yield				0.062		
US corporate bond spread[c]	0.680	0.677	0.730	0.764	0.477	0.47
Market volatility[d]		0.212				0.81
Institutional Investor rating	-2.049	-2.049	-2.066	-2.076		
S&P rating					-0.863	-0.863
Number of countries	21	21	21	21	20	20
Number of observations	29604	29591	29604	29604	27080	27070
Adjusted R^2	0.84	0.84	0.84	0.84	0.84	0.84

[a] All of the explanatory variables, except market volatility, are in logarithms. Unbalanced panel.
[b] All of the coefficients are significant at the 1 percent level, except market volatility in column VI.
[c] The spread of US corporate bonds with BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields.
[d] Obtained from a GARCH(1,1) model for the spread of 3-month US Treasury bill rate over FED target rate.

The studies cited in the preceding section used either monthly or annual data. To compare our results with the results of these studies and check the robustness of our results, we estimated Eq. (1) using monthly data. Using a lower data frequency allowed us to make use of various macroeconomic indicators in addition to the rating variables. The results are reported in Table 4. The estimated coefficients of the Fed target rate are generally in line with the estimations results using daily data. The signs of the coefficients of the US corporate bond spread are robust to the change in the frequency of the data excluding Malaysian and Russian cases. With the exception of Panama and Turkey, they are all significant. The evidence is mixed for the signs and significance levels of the domestic macroeconomic variables.

Table 5 presents the estimation results of Eq. (1) for an unbalanced panel of 21 countries. The frequency of the data is monthly. All of the coefficients are significant at a level of one percent with the exception of the coefficient of fiscal balance in column IV and the Fed target rate in column VIII. The Fed target rate in column III, IV, VIII, and US Treasury bond yield in column V and VI have wrong signs. The signs of the remaining coefficients are as expected. One further point that deserves emphasis is that, in contrast to the findings of Cantor and Packer (1996, pp.49), once the rating variable is included as an explanatory variable along with domestic macroeconomic variables, domestic factors do not become insignificant.

Table 4

Long-run determinants of EMBI spreads for 21 emerging countries (Monthly frequency, January 1998 - December 2004)[a]

Countries	No. of obs.	FED target rate	US Corporate bond spread[c]	Ins. Inv. Rating[d]	Debt / GDP	NFA/GDP	Exports / GDP	Adjusted R^2; DW
Argentina	84	-1.131***	0.938***	0.881**	-0.795*	-0.035**	1.767***	0.95 ; 0.50
Brazil	84	-0.105	0.549**	1.334*	-0.859**	-0.263***	-0.247	0.61 ; 0.30
Bulgaria	84	0.085*	0.528***	0.343	2.341***	-0.063***	-0.388**	0.96 ; 0.53
Colombia[e]	68	0.133	0.635***	0.228	-1.256***	0.114***	-0.716***	0.73 ; 0.53
Ecuador	84	-0.590**	1.089***	2.237***	3.051*	-0.007	-0.325	0.80 ; 0.54
Egypt[e]	32	0.401	0.764*	-1.399	0.553	0.032	-2.143	0.96 ; 1.48
Mexico	84	-0.156*	1.037***	1.264*	2.381***	-0.061	-3.503***	0.89 ; 0.53
Malaysia[e]	24	-0.032	-0.313	3.949**	13.354***	-0.014	18.142**	0.92 ; 1.45
Morocco	84	-0.253***	1.002***	-0.408	2.527***	0.002	-3.357***	0.88 ; 0.51
Nigeria	84	-0.046	1.052***	-1.359***	1.261***	-0.004	-0.905***	0.81 ; 0.54
Panama	84	0.002**	0.657	-1.056***	0.466***	0.008	-0.399	0.50 ; 0.49
Peru	84	0.096	0.797***	-1.057**	-1.495**	0.024	-0.069	0.60 ; 0.40
Philippines[e]	77	-0.208***	0.577***	0.669	-0.074	-0.031**	0.566*	0.38 ; 0.36
Poland	84	0.103	0.656***	-3.035***	-0.640**	0.084**	-1.829***	0.87 ; 0.51
Qatar[e]	16	0.117*	1.183***	-0.389		0.004		0.96 ; 1.98
Russia	84	-0.700***	1.818***	0.011	-2.203***	-0.272***	4.405***	0.94 ; 0.34
S. Africa[e]	33	-0.658***	1.129***	0.089	-2.051	-0.084	4.885	0.89 ; 1.00
S. Korea[e]	52	0.075	1.015***	2.954***		-0.094***	3.353***	0.89 ; 0.77
Turkey[e]	66	0.122	0.229	0.916**	1.561***	-0.058***	-0.266*	0.77 ; 0.42
Ukraine[e]	41	-0.202	1.908***	0.403	-3.739	-0.277*	6.672***	0.90 ; 0.82
Venezuela	84	-0.526***	1.158***	0.671	2.796***	-0.061***	-0.307	0.76 ; 0.74

[a] All of the variables, except net foreign assets (NFA), are in logarithms.

[b] *, **, *** respectively denote significance at the 10, 5, and 1 percent levels.

[c] The spread of US corporate bonds with a BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields.

[d] Institutional Investor rating

[e] Samples for these countries: Colombia: 1999.05-2004-12; Egypt: 2002.05-2004.12; Malaysia: 2002.01-2003.12; Qatar: 2000.12-2002.08; S. Africa: 2002.04-2004.12; Korea: 1998.04-2002.07; Turkey: 1999.07-20004.12; Ukraine: 2001.08-2004.12. For Philippines, the values between 1998.11-1999.04, for Qatar, the values between 2001.07-2001.12 are missing in data.

Table 5

Long-run determinants of EMBI spreads for a panel of 21 emerging countries (Monthly frequency, January 1998 – December 2004)[a]

	Coefficients[b]							
	I	II	III	IV	V	VI	VII	VIII
Constant	13.377	9.463	7.857	7.878	7.873	8.373	7.803	6.129
FED target rate	0.101	0.089	-0.047	-0.035			0.186	-0.018
US Treasury 2-year bond yield					-0.088			
US Treasury 10-year bond yield						-0.419		
US corporate bond spread[c]	0.676	0.633	0.679	0.643	0.676	0.688	0.467	0.549
Fiscal balance / GDP				-0.007				
Total public debt / GDP		0.593	1.109	1.076	1.129	1.178		1.032
Net foreign assets / GDP			-0.028	-0.027	-0.028	-0.028		-0.029
Exports / GDP			-0.560	-0.499	-0.581	-0.627		-0.684
Institutional Investor rating	-2.041	-1.514	-0.938	-0.966	-0.926	-0.919	-0.869	
S&P rating								-0.471
Number of countries	21	19	19	18	19	19	20	18
Number of observations	1429	1361	1349	1305	1349	1349	1311	1231
Adjusted R^2	0.84	0.86	0.89	0.89	0.89	0.89	0.84	0.89

[a] All of the explanatory variables, except fiscal balance and net foreign asset, are in logarithms. Unbalanced panel.
[b] All of the coefficients are significant at the 1 percent level, except the coefficients of fiscal balance in Equation IV and Fed target rate in Equation VIII, which are insignificant.
[c] The spread of US corporate bonds with a BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields.

What do these results tell us? Both international and domestic factors play an important role in the long-run evolution of emerging market spreads. Individual country and panel estimates using daily data and panel estimates using monthly data show that risk appetite of international investors and sovereign ratings are important determinants of long-run movements of spreads. Monthly panel estimates also indicate that fiscal balance, public debt, net foreign assets and exports as ratios to GDP are among the important determinants of the monthly evolution of spreads.

3.2.   Short-run determinants of spreads of 21 emerging countries

The estimation results of Eq. (2) for 21 emerging countries are presented in Table 6. The frequency of the data is daily. The lagged level of the EMBI spread is correctly signed and significant in most of the cases which points to a mean- reverting tendency of the EMBI. The rating variable is both correctly signed and significant for 10 countries either in lagged-level or contemporaneous change form. Only for Egypt and Russia, it is both significant and incorrectly signed. The lagged level of the Fed target rate is correctly signed in more than half of the cases and significant in ten cases. Its first difference is only significant for two countries one of which has wrong sign. The results of the panel estimates, presented in Table 7, are in line with those of individual country estimates for the mean-reverting tendency of the EMBI. The lagged levels of the Fed target rate and rating variable are correctly signed and significant, while in the first difference form, rating in all cases and Fed target rate in the column IV are correctly signed but insignificant. The first difference of the US corporate spread is correctly signed in three out of the four cases while significant in all cases.

However, the estimated coefficients of its lagged level have significantly incorrect sign in all of the estimates.

In monthly regressions, presented in Table 8 and 9, findings for the lagged level of the EMBI spread and the US corporate bond spread are in line with daily estimates. The results of the individual country estimates do not give a clear cut idea of the effects of the variables that proxy the domestic macroeconomic variables. However, panel estimates show that total public debt, exports and net foreign assets to GDP ratios are important determinants of the short run fluctuations of the EMBI spread. The rating variable is another significant determinant.

Our results show that the contemporaneous change in the US corporate bond spread has a considerable effect on the short run fluctuations of the EMBI spread. This is valid regardless of the frequency of the data and both for individual and country and panel estimates. Domestic macroeconomic variables have also important impact on the short-run behavior of spreads. The Fed target rate does not play an important role. Hence, these results are in line with the findings for the long run evolution of the spreads.

Table 6

Short-run determinants of EMBI spreads for 21 emerging countries (Daily frequency, December 31, 1997 - December 31, 2004)[a]

	Coefficients [b]							
	Lagged level of	FED target rate		US corporate bond spread[c]		Institutional Investor rating		Adjusted
Countries	EMBI spread	Lagged level	First difference	Lagged level	First difference	Lagged level	First difference	R^2
Argentina	-0.008**	-0.016***	0.027	0.009**	0.020	0.007	0.041	0.003
Brazil	-0.002	0.002	-0.046	-0.003	0.005	0.015	-0.046	-0.00002
Bulgaria	-0.004	0.002	-0.080**	0.001	-0.018	-0.012	-0.278***	0.01
Colombia	-0.010***	-0.001	-0.013	0.011*	0.018	0.001	-0.10	0.001
Ecuador	-0.003	0.003*	-0.004	-0.002	-0.014	0.005	-0.041	0.0002
(With S&P rating)	-0.020***	-0.007***	-0.008	0.030***	0.009	-0.004	0.003	0.01
Egypt	-0.013*	0.003	0.157*	0.043	0.090	-0.065	0.879*	0.01
Mexico	-0.023***	0.009**	0.119	-0.010	0.156*	-0.093	-1.292***	0.03
Malaysia	-0.019**	-0.004	-0.013	0.017	0.059	-0.068*	0.324	0.003
Morocco	-0.016***	0.004*	0.049	0.011*	-0.030	-0.086**	-0.106	0.01
Nigeria	-0.016***	0.0003	-0.031	0.017**	0.146***	-0.033*	-0.058	0.01
Panama	-0.015***	-0.0002	0.029	0.007	0.033	-0.017	-0.270**	0.01
Peru	-0.007*	0.002*	-0.013	0.002	-0.034	-0.012	0.010	0.001
Philippines	-0.003	0.002**	0.011	-0.003	0.032	0.005	0.062	0.001
Poland	-0.031***	0.007**	-0.030	0.037***	0.227***	-0.171***	-0.708	0.02
Qatar	-0.090***	0.010*	0.078	0.090**	0.274***	-0.154	0.808	0.04
Russia	-0.0001	0.007***	0.013	-0.007**	0.015	0.012**	-0.014	0.01
S. Africa	-0.054***	-0.004	-0.029	0.043*	0.090	-0.175***	0.045	0.02
S. Korea	-0.012***	0.012***	0.125	-0.020***	0.165*	0.048**	0.380*	0.02
(With S&P rating)	-0.023***	0.009**	0.119	-0.010	0.156*	-0.093	-1.292***	0.03
Turkey	-0.006**	-0.003	-0.014	0.014**	0.034	0.011	0.148*	0.01
(With S&P rating)	-0.007*	-0.001	-0.013	0.014**	0.035	-0.003	-0.201**	0.004
Ukraine	-0.025***	0.012	-0.069	0.016	0.078	-0.020	-0.051	0.006
Venezuela	-0.003	0.0003	0.002	-0.004	0.001	0.018	0.060	0.001

[a] The dependent variable is the log first difference of EMBI spread. All of the explanatory variables are in logarithms. For each country, number of observations is one less than that given in Table 2.
[b] *, **, *** respectively denote significance at the 10, 5, and 1 percent levels.
[c] The spread of US corporate bonds with a BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields.

Table 7

Short-run determinants of EMBI spreads for a panel of 21 emerging countries (Daily frequency, December 31, 1997 - December 31, 2004)[a]

	Coefficients[b]			
	I	II	III	IV
Constant	0.034***	0.031***	0.016*	0.0252***
First lag of EMBI spread	-0.003***	-0.003***	-0.003***	-0.004***
FED target rate				
First lag	0.002***			0.002***
First difference	-0.0001			0.006
US Treasury 2-year bond yield				
First lag		0.003***		
First difference		-0.350***		
US Treasury 10-year bond yield				
First lag			0.008***	
First difference			-0.726***	
US corporate bond spread[c]				
First lag	-0.002**	-0.003***	-0.002**	-0.002**
First difference	0.034***	0.018*	0.006	0.030***
Institutional Investor rating				
First lag	-0.005**	-0.004**	-0.004**	
First difference	-0.007	-0.016	-0.013	
S&P rating				
First lag				-0.003***
First difference				-0.006
Number of countries	21	21	21	20
Number of observations	29581	29581	29581	27058
Adjusted R^2	0.002	0.07	0.08	0.002

[a] The dependent variable is the log first difference of EMBI spread. All of the explanatory variables are in logarithms. Unbalanced panel.
[b] *, **, *** respectively denote significance at the 10, 5, and 1 percent levels.
[c] The spread of US corporate bonds with a BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields.

Table 8
Short-run determinants of EMBI spreads for 21 emerging countries (Monthly frequency, January 1998 - December 2004)[a]

							Coefficients[b]							
	Lagged	FED target rate		Corp. bond spread[c]		Ins. Inv. Rating[d]		Total debt / GDP		NFA / GDP		Exports / GDP		Adjusted
Countries	spread	First lag	First diff.	First lag	First diff.	First lag	First diff.	First lag	First diff.	First lag	First diff.	First lag	First diff.	R²
Argentina	-0.370***	-0.467***	-0.165**	0.259*	0.612**	-0.102	-0.052	-0.149**	0.133	0.012	-0.205**	0.454	0.108	0.24
Brazil	-0.289***	-0.044	-0.199	0.088	0.695***	0.116	0.201	0.175	2.187*	-0.014	-0.237***	-0.131	0.798***	0.50
Bulgaria	-0.264***	0.015	-0.303	0.075	0.640***	0.166	0.168	0.676*	3.630	-0.029**	-0.057**	0.115	-0.388	0.28
Colombia	-0.310***	-0.012	0.225	0.185	0.759***	0.123	0.167	0.260	2.080	0.012	0.327***	-0.168	-0.325	0.42
Ecuador	-0.256**	0.069	0.098	0.254	0.777**	0.901	0.778	2.910	-10.790	0.180	-0.844	-3.032	8.430	0.16
Egypt	-1.195***	1.173***	0.797**	1.36**	0.413	-3.100*	-0.790	21.921*	-24.131	1.561	-19.510**	-15.397	209.874**	0.55
Mexico	-0.272***	0.011	0.044	0.135	0.760***	0.678	-0.036	0.808	21.024	0.083	2.494	1.524	33.824	0.26
Malaysia	-1.199**	0.003	0.483	-0.628	-1.247**	-2.070	-0.679	38.529*	535.594	-0.091	-0.175*	145.221*	1600.117*	0.57
Morocco	-0.285***	0.011	-0.376	0.198	0.861***	-0.435	-0.387	0.381	-9.686	-0.004	0.022	-0.553	4.269	0.19
Nigeria	-0.292***	0.111	0.205	-0.037	0.800***	0.072	0.228	0.719	2.855	0.009	-0.097	-0.528	-1.748	0.32
Panama	-0.401***	0.009	-0.008	0.13	0.625***	0.343	0.015	-0.823	-0.995	0.002	-0.003	0.099	-3.889	0.18
Peru	-0.290***	-0.063	-0.563**	0.186**	0.943***	1.205***	0.513	-0.011	9.326**	-0.016	0.038	-0.523***	0.487	0.34
Philippines	-0.040	0.047	-0.008	-0.050	0.558***	-0.735	-0.531	0.168	1.776	0.008	-0.017	0.537**	0.339	0.25
Poland	-0.291***	0.102	0.359	0.132	0.680**	-0.585	-0.698	-0.492*	1.568	0.013	0.110*	-0.518	-3.074	0.20
Qatar	-0.841	0.340	0.424	0.517	0.826	2.965	1.252			-0.017	0.423			0.23
Russia	-0.306***	-0.007	0.02	0.339*	1.129***	1.008***	0.502**	0.405	10.446**	-0.044*	0.362	0.666	-11.083**	0.47
S. Africa	-0.849***	-0.202	-0.001	1.449**	0.824**	-3.193**	-1.779	3.154	-30.534	0.329**	8.721**	-7.792	81.834	0.42
S. Korea	-0.457***	-0.189	-0.396	0.203	1.035***	1.609**	0.330			-0.025	0.508	1.028*	2.202	0.54
Turkey	-0.217**	0.190*	-0.091	-0.09	0.476*	0.382	0.697*	0.321	-1.901	-0.034**	-0.06	-0.078	-0.165	0.28
Ukraine	-1.078***	-0.739***	-0.553**	0.905**	0.356	-0.652*	-0.599**	24.319**	110.872	0.242	-8.173	17.891**	29.267	0.68
Venezuela	-0.305**	-0.465**	-0.11	-0.011	0.826***	0.232	0.04	2.787**	-13.131*	-0.129**	0.105	0.753*	-0.357	0.26

[a] The dependent variable is the log first difference of EMBI spread. All of the variables, except net foreign assets (NFA), are in logarithms. For each country, number of observations is one less than that given in Table 4.
[b] *, **, *** respectively denote significance at the 10, 5, and 1 percent levels.
[c] The spread of US corporate bonds with BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields
[d] Institutional Investor rating

Table 9

Short-run determinants of EMBI spreads for a panel of 21 emerging countries (Monthly frequency, January 1998 - December 2004)[a]

	Coefficients[b]							
	I	II	III	IV	V	VI	VII	VIII
Constant	0.198	0.253	0.323*	0.344**	0.325*	0.314*	0.297***	0.454***
EMBI spread: First lag	-0.029***	-0.053***	-0.074***	-0.075***	-0.074***	-0.073***	-0.043***	-0.082***
FED target rate: First lag	0.016***	0.013**	-0.001	0.000			0.016***	0.001
First difference	-0.067	-0.075*	-0.054	-0.064			-0.093**	-0.082*
US Treasury 2-year bond yield: First lag					0.003			
First difference					-0.084**			
US Treasury 10-year bond yield: First lag						0.011		
First difference						-0.183**		
US corporate bond spread[c]: First lag	-0.020	-0.004	0.020	0.017	0.014	0.017	-0.009	0.026
First difference	0.687***	0.692***	0.690***	0.697***	0.641***	0.620***	0.689***	0.684***
Fiscal balance / GDP: First lag				-0.003				
First difference				0.011				
Total public debt / GDP: First lag		0.041**	0.112***	0.109***	0.111***	0.112***		0.097***
First difference		0.777***	0.634***	0.613**	0.647***	0.666***		0.634**
Net foreign assets / GDP: First lag			-0.003***	-0.003**	-0.003**	-0.003**		-0.003**
First difference			-0.027***	-0.026***	-0.026***	-0.026***		-0.021**
Exports / GDP: First lag			-0.065***	-0.061**	-0.064***	-0.066***		-0.066**
First difference			-0.056	-0.047	-0.065	-0.074		0.047
Institutional Investor rating: First lag	-0.009	-0.022	-0.003	-0.008	-0.005	-0.006		
First difference	-0.102	-0.063	-0.046	-0.050	-0.056	-0.069		
S&P rating: First lag							-0.026**	-0.022
First difference							-0.298***	-0.261***
Number of countries	21	19	19	18	19	19	20	18
Number of observations	1406	1341	1329	1286	1329	1329	1289	1212
Adjusted R^2	0.15	0.16	0.17	0.18	0.18	0.18	0.19	0.20

[a] The dependent variable is the log first difference of EMBI spread. All of the explanatory variables, except net foreign asset, are in logarithms. Unbalanced panel.
[b] *, **, *** respectively denote significance at the 10, 5, and 1 percent levels.
[c] The spread of US corporate bonds with a BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields.

3.3. *Impact of the Fed announcements on spreads*

We now turn to the effects of the announcements of the Fed in the January 1998 – December 2004 period. Table 10 documents whether there is a change in the mean and variance of the spread of each country around each FOMC statement. Our null hypothesis is that pre- and post-event means (or variances) are equal. The window lengths are two, five and ten days. For the most narrow window length, the rejection rates of the null hypothesis are very low. This value increases once wider windows are used. However, using wider windows has the risk of masking the effects of the announcements due to the possible impact of other determinants of spreads. Nevertheless, for a five-day window, the rejection rates are less than 50 percent in almost half of the countries. For variances, these values are much lower. The estimation results of Eq. (3), which are presented in Table 11, show that the "target factor" and "path factor" defined in Gürkaynak *et al*. (2005) do not have a significant impact on the EMBI spreads.

Based on these results we can conclude that the FOMC announcements did not have an immediate and remarkable effect on spreads in the period analyzed. Note that this result is in contradiction with the findings of Gürkaynak *et al*. (2005) for the US.

Table 10
Results of event study (Events are the FOMC's announcements between January 1998 and December 2004)[a]

	2-day window				5-day window				10-day window			
	No. of events	Mean test Rej. rate (%)[b]	No. of events	Variance test Rej. rate (%)[c]	No. of events	Mean test Rej. rate (%)	No. of events	Variance test Rej. rate (%)	No. of events	Mean test Rej. rate (%)	No. of events	Variance test Rej. rate (%)
Countries												
Argentina	60	23.3	57	1.8	60	60.0	60	25.0	56	67.9	56	44.6
Brazil	60	11.7	58	1.7	60	60.0	60	8.3	56	67.9	56	30.4
Bulgaria	60	15.0	55	0	60	50.0	60	21.7	56	67.9	56	37.5
Colombia	48	10.4	45	4.4	48	54.2	48	16.7	44	70.5	44	31.8
Ecuador	60	16.7	60	3.3	60	68.3	60	16.7	56	75.0	56	32.1
Egypt	21	33.3	19	0	21	38.1	21	4.8	21	61.9	21	23.8
Mexico	60	20.0	56	3.6	60	53.3	60	13.3	56	73.2	56	28.6
Malaysia	21	19.0	12	0	23	43.5	21	38.1	23	65.2	23	47.8
Morocco	59	18.6	45	0	60	61.7	60	28.3	56	71.4	56	37.5
Nigeria	60	20.0	60	6.7	60	43.3	60	13.3	56	51.8	56	35.7
Panama	60	11.7	57	1.8	60	50.0	60	16.7	56	60.7	56	23.2
Peru	60	23.3	58	0	60	68.3	60	13.3	56	69.6	56	21.4
Philippines	53	24.5	47	0	53	47.2	53	18.9	49	63.3	49	28.6
Poland	60	13.3	57	0	60	40.0	60	13.3	56	73.2	56	21.4
Qatar	11	18.2	10	0	10	40.0	10	20.0	10	50.0	10	40.0
Russia	60	18.3	58	0	60	50.0	60	11.7	56	67.9	56	37.5
S. Africa	21	9.5	18	0	22	27.3	22	9.1	21	66.7	21	28.6
S. Korea	38	2.6	35	2.9	38	52.6	38	13.2	34	73.5	34	38.2
Turkey	47	14.9	44	0	47	48.9	47	21.3	43	72.1	43	34.9
Ukraine	29	20.7	27	7.4	29	55.2	29	17.2	26	57.7	26	34.6
Venezuela	60	10.0	58	1.7	60	48.3	60	11.7	56	76.8	56	35.7

[a] FOMC denotes the Federal Open Market Committee. Events are taken from Gurkaynak, Sack and Swanson (2005).
[b] H0: Pre- and post-event means are equal.
[c] H0: Pre- and post-event variances are equal.

Table 11

Impact of the FOMC's actions and announcements on the change in EMBI spreads (January 1998 and December 2004)[a]

Countries	No. of events[b]	1-day window			5-day window		
		Target factor[c]	Path factor[d]	Adjusted R^2	Target factor	Path factor	Adjusted R^2
Argentina	59	-0.177	-0.225	0.00	-3.50**	1.665	0.05
Brazil	59	-0.131	0.070	0.00	-0.261	2.181**	0.10
Bulgaria	59	0.222**	0.002	0.02	0.439	0.435	0.01
Colombia	47	-0.234	-0.328**	0.19	-0.247	0.609**	0.08
Ecuador	59	-0.263	-0.422	0.01	0.110	1.866	0.03
Egypt	21	-0.848	-0.454***	0.38	-1.302**	-0.143	0.10
Mexico	59	-0.097	-0.052	0.02	0.466	0.580	0.03
Malaysia	23	0.046	-0.049	0.10	-0.027	0.013	0.00
Morocco	59	0.127	-0.144	0.02	0.035	0.668	0.02
Nigeria	59	-0.777	-1.677*	0.12	-0.446	2.319	0.03
Panama	59	0.031	-0.126**	0.04	-0.140	0.449*	0.05
Peru	59	0.140	-0.030	0.01	-0.730	1.321***	0.15
Philippines	52	-0.038	-0.267***	0.14	-0.325	0.201	0.03
Poland	59	-0.168*	-0.170**	0.23	0.089	0.191	0.02
Qatar	11	-0.055	-0.266***	0.52	-0.062	-0.108	0.03
Russia	59	4.478	0.081	0.07	5.585	0.991	0.04
S. Africa	22	-0.406***	-0.374***	0.41	0.563	0.112	0.03
S. Korea	37	-0.209*	0.028	0.06	0.584	0.402	0.06
Turkey	46	0.077	-0.169	0.01	0.177	0.759**	0.04
Ukraine	28	-1.531	-0.327	0.11	-1.762	0.828	0.10
Venezuela	59	0.092	0.065	0.00	-0.316	1.215*	0.02
Panel results:							
Number of countries = 21		0.169	-0.219*	0.04	0.093	0.921***	0.03
Number of observations = 994							

[a] FOMC denotes the Federal Open Market Committee. Events are taken from Gurkaynak, Sack and Swanson (2005). The dependent variable is the change in EMBI spreads between the pre- and post-event.
[b] Events are the FOMC's announcements
[c] Target factor refers to current federal funds rate target
[d] Path factor refers to future path of policy
[e] *, **, *** respectively denote significance at the 10, 5, and 1 percent levels.

4.   Political developments and spreads: evidence from Turkey

Models built on the Barro and Gordon (1983) framework show that when inherited public debt is very high, the time inconsistency of optimal policy can generate multiple equilibria. In such models, a shift in market sentiment can push an economy to a bad equilibrium even if there is no deterioration in fundamentals. This occurs because the costs of honoring public debt depend on private agents' expectations about future policy (Calvo (1988), Sachs *et al.* (1996)).

In mid-May 2001, just three months after the February crisis, Turkey started to implement a new program. The banking sector was in turmoil, calling for immediate action. The rescue program increased the public debt-to-GDP ratio sharply. Other main pillars of the May 2001 program were macroeconomic discipline and an ambitious agenda for structural reforms. The program was supported by large IMF and World Bank credits.

Although the stabilization program and the accompanying structural reforms imposed macroeconomic discipline, reducing the debt-to-GDP ratio to manageable levels required a considerable time period. In the meantime, a highly indebted economy is vulnerable to changes in market sentiment. Any development that increases concerns about the viability of fiscal discipline has the potential to move the economy into a bad equilibrium. One candidate is domestic politics. Note that IMF backed programs have a "checklist" –a detailed timetable of policy actions not only with regard to fiscal and monetary policies, but also in reforming the economy. A public debate about this checklist among members of the cabinet may trigger a political shock and increase concerns about debt sustainability. External shocks such as the war in Iraq can trigger similar effects.

Another candidate is developments in the EU accession process since the EU process has been seen as an anchor to keep structural reforms and macroeconomic discipline on the right track.

Based on these considerations we analyzed the impact of news regarding political discussions on the implemented program, the IMF and the EU on Turkish spreads in the post-crisis period.[4] In addition to international risk variables and domestic variables used in the estimation of Eq. (2), three additional variables are used: aggregated good and bad news dummies and real public domestic debt stock. The frequency of the data is daily and the period covered is May 16, 2001 – December 31, 2004 (a total of 906 observations).[5]

The estimation results are given in Table 12. Unlike the results documented in the preceding section, international factors are estimated to be insignificant. The Fed target rate is neither correctly signed nor significant, while the change in risk appetite of foreign investors (as measured by the US corporate bond spread) is correctly signed but insignificant.

As the domestic factor, the sovereign ratings of Turkey seem to be an important determinant of spreads. To a certain extent, changes in real public domestic debt stock had an impact on spreads in the period analyzed. Note that such variables are indicators of the current stance of macroeconomic policies. As discussed above, more important for investors are whether the current stance of macroeconomic policy is going to change and the direction of such a change. The news variables that we have considered in this study can be used to find an answer to this question. Our estimation results show that news variables are always

highly significant (at a level of one percent) and correctly signed. This shows the important

impact of news releases, which give an idea of the intentions of policymakers on spreads.

Table 12
Impact of political developments on the Turkish component of the EMBI spreads
(May 16, 2001 - December 31, 2004)[a]

	Coefficients[b]						
	I	II	III	IV	V	VI	VII
Constant	0.069	0.014	0.163**	0.050	0.345**	0.355**	0.359***
First lag of EMBI spread	-0.007*	-0.006	-0.015**	-0.006*	-0.018***	-0.018***	-0.018***
FED target rate							
First lag	-0.001	-0.002	0.003	-0.002	0.001		
First difference	-0.027	-0.028	-0.025	-0.027	-0.024		
US Treasury 2-year bond yield							
First lag						0.003	
First difference						-0.203***	
US Treasury 10-year bond yield							
First lag							0.006
First difference							0.443***
US corporate bond spread[c]							
First lag	0.014	0.012	0.001	0.013	0.009	0.008	0.01
First difference	0.024	0.023	0.018	0.024	0.023	0.01	0.007
Institutional Investor rating							
First lag		0.006		0.002			
First difference		0.101		0.096			
S&P rating							
First lag			-0.036**		-0.049**	-0.051**	-0.051**
First difference			-0.104		0.114	-0.04	-0.085
Real public debt stock							
First lag	-0.003			-0.002	-0.013	-0.013	-0.014*
First difference	0.098*			0.097*	0.096	0.108*	0.105*
Good news dummy	-0.064***	-0.064***	-0.063***	-0.064***	-0.062***	-0.061***	-0.061***
Bad news dummy	0.071***	0.070***	0.070***	0.070***	0.070***	0.066***	0.067***
Number of observations	905	905	905	905	905	905	905
Adjusted R^2	0.17	0.17	0.17	0.17	0.18	0.23	0.24

[a] The dependent variable is the log first difference of EMBI spread. All of the explanatory variables are in logarithms.
[b] *, **, *** respectively denote significance at the 10, 5, and 1 percent levels.
[c] The spread of US corporate bonds with BBB+ rating and a maturity of 10 years over 10-year US Treasury bond yields

5. Conclusion

Using daily data from the end of December 1997 to the end of December 2004 for 21 emerging countries, we have investigated the determinants of sovereign bond spreads. We have made a distinction between short and long-run determinants. Both individual country regressions and panel regressions are estimated. In order to compare our results with results given in the cited studies monthly data are used as well.

The individual country long-run estimation results that use daily data show that the appetite for risk of international investors is the most important common determinant of spreads. This appetite is measured by the spread of US corporate bonds with a BBB+ rating with a maturity of 10 years over 10-year US treasuries. The usage of high frequency data limited our search for the impact of domestic macroeconomic variables. However, the sovereign ratings of countries are found to have a significant impact on spreads. The panel estimates (both daily and monthly) reinforced these results. In monthly panel estimates, total public debt, net foreign assets and total exports all as ratios to GDP are also found to be important determinants of spreads. When individual country regressions are estimated by monthly data, the risk appetite variable remained highly significant. For other variables, the evidence is mixed.

Both for individual country and panel estimates and regardless of the frequency of the data, the contemporaneous change in the US corporate bond spread has an important effect on the short run fluctuations of the EMBI spread. The Fed target rate does not play an important role in the short-run evolution of spreads. Domestic macroeconomic variables

have an important impact on the short-run behavior of spreads, as well. These results show that with the exception of the Fed target rate the short-run deriving forces of spreads are similar to the long-run derivers.

In addition to the policy actions of the central banks of the developed world, their statements regarding their policies to be followed in the near future can affect spreads of the emerging markets. This possibility has been investigated using the statements of the Fed. We have shown that the statements of the Fed were not effective on the spreads of the emerging countries in our sample.

Political news releases can provide information on the possible future actions of policy makers. We have researched the effects of such news releases on Turkish spreads in the post-crisis period. In addition to political news related to the ongoing program we have investigated the effects of the EU and IMF announcements. It is shown that both negative and positive news releases strongly affected Turkish spreads in the period analyzed. We think that this is an interesting avenue to be followed for future research for other emerging markets as well.

Appendix

Table A1

Origins of market turbulence

Date of Announcement	Type of Announcement		EMBI change	Announcement
July 12, 2001	Bad	Political	66	MHP proposes to PM Ecevit to sack Economy Minister Derviş.
September 13, 2001	Bad	Political	66	US and British aircraft attacking southern Iraq.
September 14, 2001	Bad	Political	53	Congress authorizes use of "all necessary force".
June 14, 2002	Bad	Political	50	DYP opposes moves to lift the death penalty.
July 8, 2002	Bad	Political	103	Deputy PM Bahçeli calls for early elections.
August 1, 2002	Good	EU related	-47	EU reforms to go before Turkish Parliament.
August 2, 2002	Good	EU related	-37	Turkey moves closer to ending death penalty.
September 10, 2002	Bad	Political	37	Deputy PM signals could pull out of government.
November 5, 2002	Good	Political	-56	US congratulates Turkish party on victory.
November 29, 2002	Good	EU related	-59	EU inching towards conditional date for Turkey.
December 18, 2002	Bad	EU related	36	Turkey rejects EU decision to admit Cyprus in 2004
January 7, 2003	Bad	IMF related	47	An IMF team is not expected to arrive in Turkey to complete the latest review, government has yet to take measures.
March 3, 2003	Bad	Political	72	Turk parliament rejects U.S. troop plan.
March 17, 2003	Bad	Political	122	U.S. And Britain tells nationals to leave Kuwait immediately.
March 18, 2003	Good	Political	-84	U.S. has not ruled out Turkey aid, White House says.
March 19, 2003	Bad	Political	120	White House tells public, Congress to prepare for war.
March 20, 2003	Bad	Political	53	U.S.-led war on Iraq starts with raid on leaders.
March 25, 2003	Good	EU related	-106	EU to propose doubling aid to Turkey.
April 3, 2003	Good	IMF related	-61	IMF says to sign letter of intent with Turkey.
July 14, 2003	Good	IMF related	-35	Low salary increase for high earning, high salary increase for low earning civil servants
August 5, 2003	Good	Political	-38	Turkey sees no obstacle to U.S. loan guarantees.
October 16, 2003	Good	EU related	-28	Cyprus says sees no bar to Turkish EU membership.
November 20, 2003	Bad	Political	23	Two blasts hit north Istanbul.
February 12, 2004	Good	Political	-21	İstanbul Approach/Bankruptcy Law amendment has been approved in the Parliament.
April 21, 2004	Bad	EU related	19	EU "deplores" Turkey court decision on ex-MP.
May 6, 2004	Bad	Political	47	Turk military raps government on educational reform.
September 23, 2004	Good	EU related	-25	Verheugen says resolves row with Turkey on reforms.

Source: Reuters.

Endnotes

1. More precisely, we use the EMBI$^+$. The EMBI+ is created by JP Morgan. It covers the external-currency debt markets. In the index, the US dollar and other external currency denominated Brady bonds, loans, Eurobonds, and local market instruments are included. See, for example, JPMorgan (2004).

2. See, for example, Calvo *et al*. (1993) and Calvo (2002).

3. Country specific data are sourced by IMF-IFS and World Bank-GDF database, if not available, then individual country's central bank's website. For the series not available on monthly basis, cubic spline interpolation methodology is used, as in Arora and Cerisola (2001). The database is available upon request.

4. The list of news is given in the Appendix.

5. Details regarding the composition of dummy variables are provided in the second section.

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