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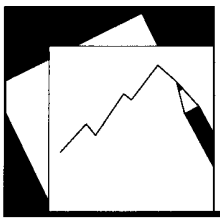

IMF Working Paper

How Does the Global Economic Environment Influence the Demand for IMF Resources?

Selim Elekdağ

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Research Department

How Does the Global Economic Environment Influence the Demand for IMF Resources?

Prepared by Selim Elekdağ[1]

Authorized for distribution by Gian Maria Milesi-Ferretti

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Abstract

The main objective of this paper is to quantify the relationship between the global economic environment and the number of Stand-By Arrangements (SBAs). The results suggest that oil prices, world interest rates, and the global business cycle are the most influential indicators that affect the number of SBAs being requested. In addition, the empirical model seems to have reasonable accuracy when predicting SBAs. Furthermore, when oil prices, interest rates, and the global business cycle are adversely shocked by one standard deviation, the conditional probability of a SBA nearly doubles, implying an increase from about six to 12 SBAs. More critically, the model suggests that even a steady deterioration of the global economic climate would imply increasingly harsher conditions for developing and emerging market countries which may in turn significantly increase the demand for IMF resources.

JEL Classification Numbers: F01, F33, F34, F42

Keywords: Stand-By Arrangements, prediction, IMF lending capacity, IMF income position

Author's E-Mail Address: selekdag@imf.org

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I. INTRODUCTION

Considering the favorable global economic environment over the last few years, it is probably not much of a surprise that the number of IMF arrangements approved recently is well below historical averages. But what—if any—is the link between global economic and financing conditions and a country's potential request for Fund financial assistance? The main objective of this paper is to rigorously quantify the relationship between the global economic environment and the number of Stand-By Arrangements (hereinafter SBAs).

Formal econometric analysis is required to quantify the relationship between global economic conditions and the potential demand for SBAs. Using panel data techniques, this paper reports results based on 412 SBAs among 169 members over a period spanning 1970–2004. We focus on SBAs because they are the main nonconcessional IMF facility designed to provide short-term balance of payments (BOP) assistance to members (see Appendix I).

Global activity and liquidity indicators as well as country-specific factors were used to identify determinants influencing the number of SBAs. The three main global factors affecting the probability of requesting Fund financial assistance were found to be oil prices, world interest rates, and the global business cycle. The most important country-specific factors identified include the member's real GDP growth, the depreciation of its currency vis-à-vis the U.S. dollar, its international reserve cover, and whether or not it is an energy exporter. The estimates are robust to changes in model specification, as well as choice of global and country-specific explanatory variables.

Changes in global economic conditions significantly affect the probability of a country's demand for Fund resources. A scenario in which the three global factors are adversely shocked from their respective averages by one standard deviation nearly doubles the conditional probability of a SBA. Furthermore, when oil prices and interest rates are evaluated at their respective historical peaks, and the global business cycle is set at its deepest trough in the sample, the conditional probability almost quadruples to about 14 percent, implying an increase from approximately 6 to 23 SBAs.

The results are intuitive and consistent with economic theory. Among other things, a rise in world interest rates may increases a member's debt service costs as well as limit access to capital markets, higher oil prices would raise the import bill (for net oil importers), and a global recession could decrease international demand for a member's exports. More critically, even if global economic conditions worsen gradually, the probability of an approved SBA increases disproportionately owing to the underlying non-linear nature of the econometric model. Such adverse developments would cause a deterioration in a member's current account balance and could lead to acute BOP problems. If a country does not have sufficient access to international capital markets, that member may request an IMF arrangement to mitigate the consequences of potentially severe macroeconomic adjustment.

The estimated regressions may also be used to predict the numbers of SBAs. There are indications that the framework has reasonable predictive accuracy. Whereas the actual number of SBAs approved in 2004 was six, the model predicts between 5.0 to 5.7 SBAs in 2004. Furthermore, out-of-sample predictions for 2005 ranged between 5.7 and 6.1, whereas the actual number of approved SBAs was six.

Despite the importance of this topic, research on the empirical link between global economic conditions and Fund financing is scarce. In line with the surveys of Brukoff, Kozack, Pitt, and Rother (2006) as well as Joyce (2004), only Bird and Rowlands (2002) and Conway (1994) included global economic factors—which was in both cases only a measure of world interest rates. In this context, this paper builds upon the literature by emphasizing the importance of global economic conditions. It is also the only study that finds a critical role of oil prices in the demand for Fund financial assistance. Even though Barro and Lee (2005), Joyce (1992), and Knight and Santaella (1997) include time dummies to control for common effects of external factors—in contrast to Bird, Hussain, and Joyce (2004) and Marchesi (2003)—these frameworks may not be well suited for prediction.[2]

Further reviewing the literature also indicates that most of the studies rely on short sample periods and therefore miss important events, including the financial crises of the late 1990s. In fact, only Barro and Lee (2002), Bird and Rowlands (2004), Sturm, Berger, and de Haan (2005), and Trudel (2005) include a sample period through at least the year 2000. Furthermore, as discussed in detail below, the country coverage in this paper exceeds that in other studies, which could be critical to avoid econometric issues such as selection bias. Lastly, other than this paper, only Barro and Lee (2005) and Oatley and Yackee (2000) distinguish between the various types of IMF facilities.

The results of this paper have relevance for the IMF, for policymakers throughout the Fund membership, and for capital market analysts. The framework developed here underscores cyclical factors that are relevant for future IMF lending capacity. This is especially important because unusually harsh economic conditions would likely imply a bunching of SBA requests—some of which may be exceptional access cases. In this context, this paper is also pertinent for assessing the prospects for the Fund's future income position, which depends on the amount of IMF credit outstanding.

The next two sections provide an overview of IMF arrangements and the main indicators of the global economic environment, respectively. Section IV provides an outline of the empirical methodology used, and the following section presents the results. Robustness of the results is presented in Section VI. Then before concluding, Section VII briefly discusses the challenges associated with predicting access levels.

[2] For example, Barro and Lee (2005) partition their sample into five 5-year periods, whereas Knight and Santaella (1997) use an indicator variable that takes the value of unity from 1979–91 when using a sample only spanning 1973–91.

II. IMF ARRANGEMENTS FROM 1970 TO 2004

The International Monetary Fund is best known as a financial institution that provides resources to member countries experiencing temporary BOP problems. The Fund makes financial resources available to members in the general resources account (GRA) under a range of policies and facilities, including the credit tranches. More than a decade after its creation, the Fund developed policies on the use of its resources in what came to be known as the credit tranches. SBAs were developed as the main instrument through which members would access the credit tranches and are available for any BOP need. Access under SBAs is subject to limits of 100 percent of quota annually and 300 percent of quota cumulatively, although access beyond the limits in exceptional circumstances has been granted.

Although the Fund has used a variety of instruments to support member's BOP needs, the most utilized facility is the SBA. Figure 1 depicts the number of SBAs, Extended Fund Facilities (EFFs), first credit tranche arrangements (FCTAs), as well as the concessional facilities (SAF, ESAF, and PRGF) against the backdrop of the Fund membership. Appendix I provides further details on IMF policies and facilities including the various arrangements used to access Fund credit. Table 1 provides the distribution of facilities across selected time periods. Even though SBAs historically outnumber other facilities, concessional Fund financing is increasing in importance. Although not shown, during the past decade exceptional access (especially in response to financial crises) and precautionary arrangements have gained in prominence, whereas blended arrangements have been approved much less frequently.[3] Against this background, we now explore below how global economic and financial developments affect the potential demand for IMF resources.

[3] The 412 SBAs identified from 1970–2004 does not include blended arrangements.

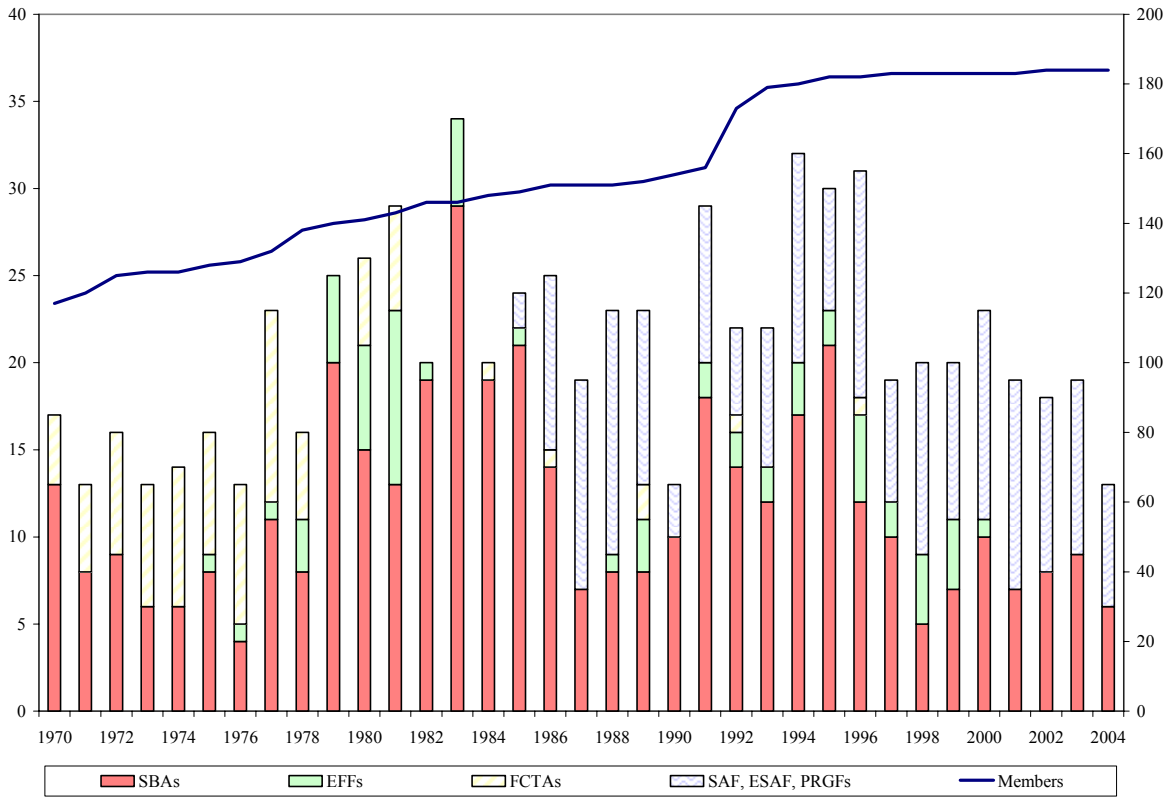
Table 1: IMF Arrangements, 1970–2004

	Total	1970–1979	1980–1989	1990–1999	2000–2004	1995–2004
Approved	739	166	243	238	92	212
GRA	556	166	195	154	41	114
SBAs	412	93	153	126	40	95
FCTAs	79	62	15	2	0	1
EFFs	65	11	27	26	1	18
SAFs, ESAFs, and PRGFs	183	0	48	84	51	98
Blended Arrangements	33	0	25	7	1	4

Source: IMF Policy Development and Review Department Stand-By Operations Division's database and author's calculations.

Note: SBA, FCTA, EFF, SAF, ESAF, and PRGF denote Stand-By Arrangement, First Credit Tranche Arrangment, Extended Fund Facility, Structural Adjustment Facility, Enhanced Structural Adjustment Facility, and Poverty Reduction and Growth Facility, respectively. Approved refers to the total number of arrangements approved in the year under consideration. Blended arrangements are concessional arrangements (SAF, ESAF, PRGF) combined with an EFF or SBA to supplement Fund financial assistance to a member.

Figure 1: Facilities and IMF Members, 1970–2004



Source: Author's calculations.

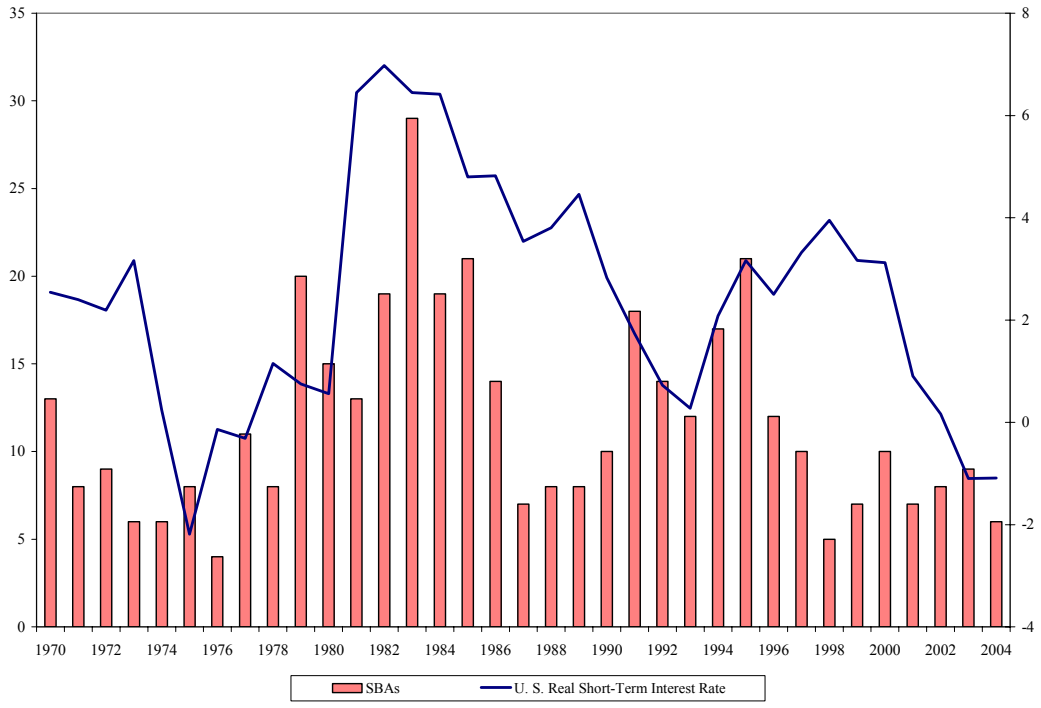
III. Indicators of the Global Economic Environment

Determinants of the global economic environment can broadly be grouped into activity and liquidity indicators. Controlling for country-specific policies and developments, the main conjecture of this paper is that world interest rates, oil prices, and the global business cycle are the most robust indicators of the global economic environment that influence the demand for Fund financial resources.[4]

Interest Rates

Shown in Figure 2 is the U.S. federal funds rate adjusted by U.S. CPI inflation against the backdrop of SBAs from 1970-2004. Notice that with the onset of the Volker disinflation in the early 1980s, both the real federal funds rate and the number of SBAs reach their historic peaks. The parallel movements between SBAs and the interest rate in the early 1990s is also noteworthy.

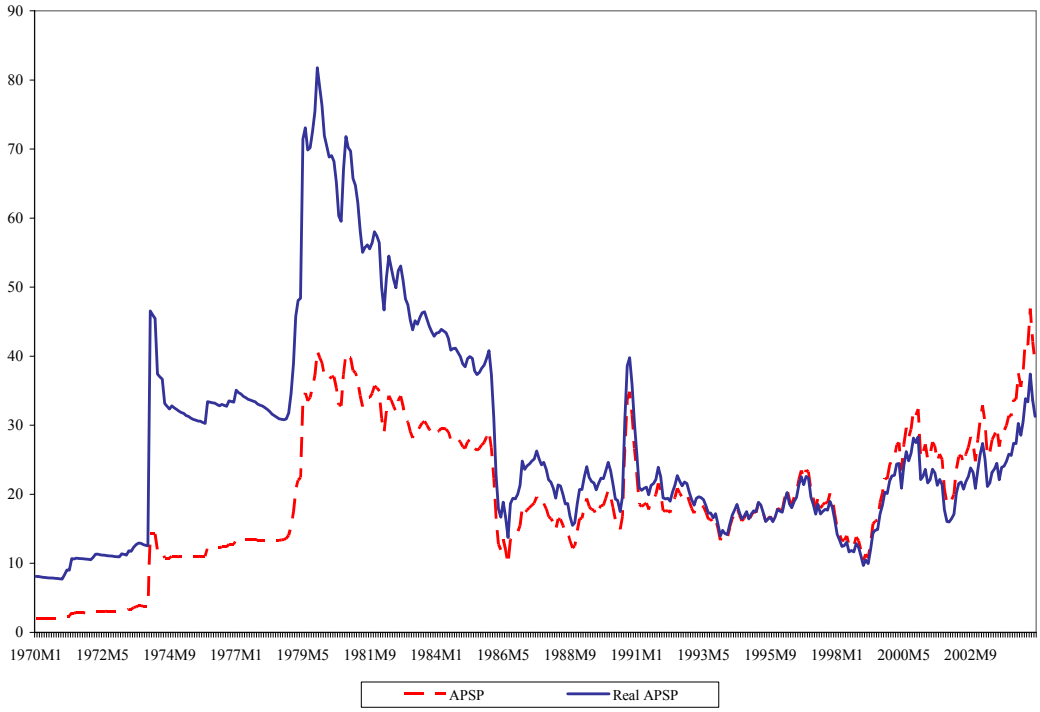
Figure 2: Interest Rates and Stand-By Arrangements, 1970–2004



Source: Author's calculations.

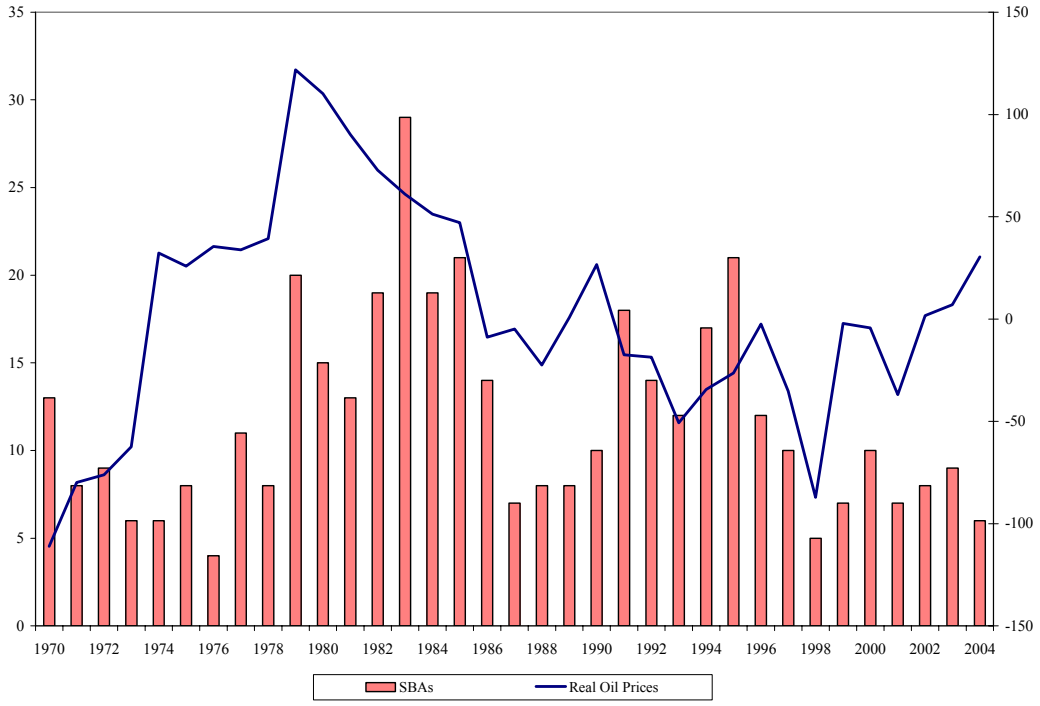
[4] Appendix Table 3 contains comprehensive descriptions of the data.

Figure 3: Monthly Average Petroleum Spot Price
(U.S. dollars per barrel)



Source: Author's calculations.

Figure 4: Oil Prices and Stand-By Arrangements, 1970–2004

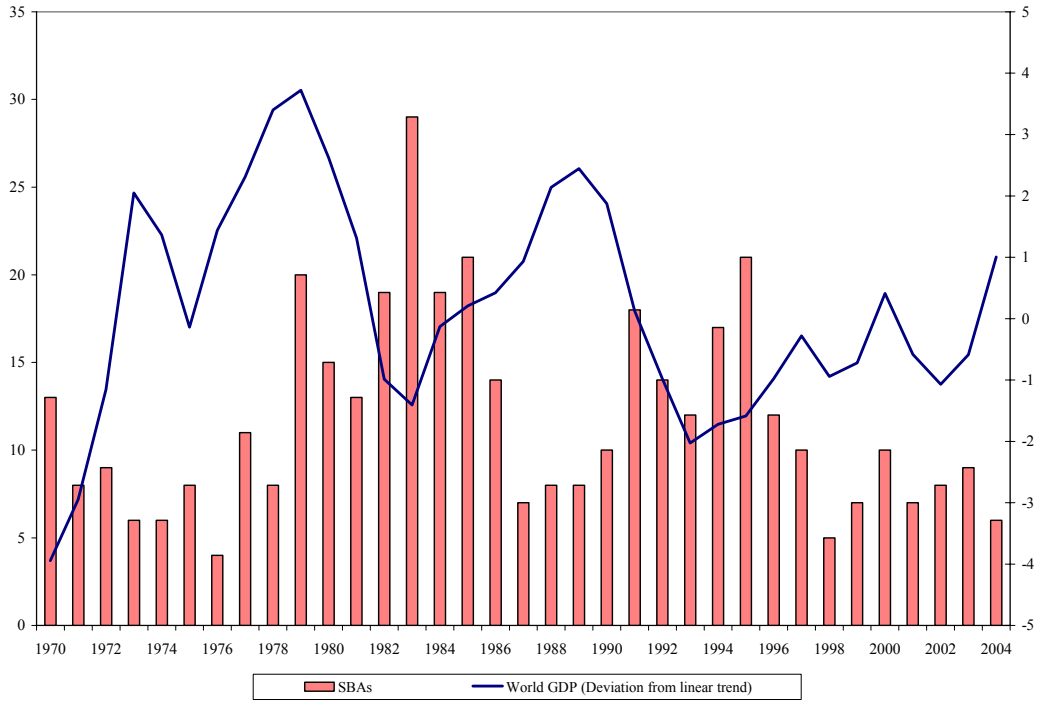


Source: Author's calculations.

Oil Prices

The monthly nominal and real average petroleum spot prices (APSP) are displayed in Figure 3.[5] Even though nominal oil prices have reached record levels, prices adjusted for inflation are still below the peaks of the late 1970s. Against the background of SBAs, Figure 4 shows the real APSP as a deviation from trend.[6] Notice that with the rise in oil prices, there is a trend increase in SBAs from the mid-1970s up until the early 1980s. With the spike in oil prices in 1979, the number of approved SBAs more than doubles, increasing from eight in 1978 to 20 in 1979. It is also worth highlighting how oil prices and SBAs move in tandem during the 1990s. With the gradual decline in the APSP in the mid-1990s, the number of SBAs decreased from 21 in 1995 to 5 in 1998.

Figure 5: The Global Business Cycle and Stand-By Arrangements, 1970–2004



Source: Author's calculations.

[5] The average petroleum spot price (APSP) is calculated using a simple average of U.K. Brent, West Texas Intermediate, and Dubai Fateh spot petroleum prices. The real APSP was scaled using U.S. CPI since world inflation is contaminated by episodes of hyperinflation.

[6] To avoid running spurious regressions, the (log) real APSP is detrended using a log-linear trend to ensure stationary of the real APSP. Deviations from trend were used rather than, growth rate, for example, to capture the burden of increased fuel costs more accurately. Consider Figure 3 which shows that after the 1973 OPEC shock when oil prices roughly tripled, prices did not revert back to their original single digit levels. The first differenced series would not capture this persistence, whereas the linearly detrended series does.

Global Business Cycle

As the main measure of the global business cycle, the deviation of the logarithm of real world GDP from trend is used.[7] Figure 5 displays the global business cycle with the number of SBAs in the backdrop. Notice that the two global recessions in the early 1980s and 1990s correspond to the two peaks in the number of SBAs approved during the 1970-2004 period. While these figures provide casual evidence in favor of a link between the global economic environment and SBAs, formal econometric analysis is required for a rigorous assessment.

IV. METHODOLOGY

The estimation strategy used to uncover the empirical relationships between global economic conditions and IMF credit is based on two broad strands of research. The first, based on Albuquerque, Loayza, and Serven (2005), uses two sets of explanatory variables: global and country-specific. The global variables are indicators of the world economic and financial climate, whereas the country-specific variables control—among other things—for domestic policies and idiosyncratic shocks.[8] The second strand, building on the vast literature on early warning systems and financial crisis prediction—as summarized by Berg, Borensztein, and Pattillo (2004)—regresses a binary independent variable on a set of relevant variables thought to be good predictors of economic crises.[9]

Although the analysis in this paper is also related to the second strand of the literature, it is important to note that an approval of an SBA does not necessarily imply that the requesting member is experiencing a financial crisis. Whereas financial crises are infrequent events, IMF support may be requested for many other reasons, including, for example, to signal sound policies through low-access precautionary SBAs. In Section VII we discuss the relationship between SBAs, financial crises, and exceptional access arrangements.

[7] The log-linear trend implies an annual real global growth rate of about 3.4 percent.

[8] The global explanatory variables try to explicitly capture time-specific effects and their impact is the main focus of this paper. For further details see Baltagi (2005) and the references therein. Yet other notable references include Greene (2003), Hsiao (2003), and Wooldridge (2002).

[9] Another notable contribution is Frankel and Rose (1996), and in the context of predicting defaults see Manasse, Roubini, and Schimmelpfennig (2003), as well as Manasse and Roubini (2005). Goldstein, Kaminsky, and Reinhart (2000) is another notable contribution.

Against this background, the objective is to assess the influence of the global economic environment on the probability of a member requesting a SBA by estimating the following equations:

$$y_{it} = Z'_{t-1}\gamma + X'_{i,t-1}\beta + \xi_{it}$$

$$\xi_{it} = \mu_i + \nu_{it}$$

where the indices *t* and *i* are time and country indexes, respectively. The dependent variable y_{it} is binary and takes the value unity when a SBA is approved.[10] The indicators of the global economic and financial environment are contained in Z_t and are the same for each country. The matrix X_{it} contains the individual country-specific time series that covers a broad range of economic, financial, and political quantitative as well as qualitative variables. To avoid simultaneity issues, among other things, each explanatory variable is lagged by one year.[11] In the second equation, the error component model for ξ_{it} is composed of an unobservable country-specific effect, μ_i, and a remainder disturbance, ν_{it}. The time-invariant term, μ_i, accounts for any country-specific effects that are not included in the regression, whereas ν_{it} varies across time and countries and can be thought of as the usual disturbance in the regression.[12] Summary statistics of the three main global factors and a selected set of country controls are depicted in Table 2.[13] Furthermore, Section VI discusses the robustness of the results.

[10] This implies that the model is non-linear. In essence, a curve—typically a logistic or normal cumulative distribution function—is fitted so that the predicted values of the dependent variable (probability of a SBA) are constrained to the [0,1] interval.

[11] Once source of simultaneity could be due to the following circular argument: IMF credit supports a member's reserve cover, and because reserve cover is a key indicator of whether or not a BOP need has arisen, this in turn influences the probability that a member approaches the Fund for a SBA.

[12] For further details, see, for example, Baltagi (2005).

[13] It is interesting to note that most of the extreme values depicted in Table 2 have important justifications. Most of the extreme plummets in growth correspond to periods of war or post-conflict periods. Whereas sharp increases represent the following recovery periods. Extreme variations in nominal variables—including broad money growth, inflation, and the depreciation of the exchange rate—are usually due to hyperinflationary episodes, which may also overlap with times of civil strife.

Table 2: Descriptive Statistics of Selected Economic Indicators, 1970–2004

			Percentile				
	Average	Standard Deviation	5th	25th	Median	75th	95th
Global Economic Indicators:							
U.S. Real Short-Term Interest Rate	2.39	2.31	-1.1	0.6	2.5	3.7	6.4
Real Average Petroleum Spot Price	3.02	54.33	-82.1	-30.4	-2.1	34.7	96.1
Real World GDP	0.16	1.77	-2.3	-1.0	-0.1	1.4	2.9
Country-Specific Controls:							
Real GDP Growth	3.5	6.2	-5.4	1.5	3.9	6.1	11.0
Reserve Cover	3.8	4.8	0.2	1.4	2.7	4.6	10.5
Nominal Exchange Rate Depreciation	-6.4	38.5	-46.6	-10.2	-1.4	0.4	12.3
Inflation	49.6	511.1	0.0	2.6	7.1	15.0	76.9
Broad Money Growth	59.8	1,257.7	-0.1	7.6	14.5	25.3	76.8
Government Balance	-3.9	7.7	-16.1	-6.1	-3.1	-0.5	4.6
Current Account Balance	-4.0	14.9	-23.1	-7.3	-2.8	0.7	11.9

Source: Author's calculations.
Notes: The real average petroleum spot price (APSP) and real world GDP are deviations from a linear trend. The government (or fiscal) balance and the current account balance are in percentages of GDP. Reserve cover is in months of goods and services imports. Although the membership grew in size, the maximum number of countries considered was 169. See text for further details.

To avoid selection bias, the random effects estimator was used for the benchmark specification. Initially, there appears to be a trade-off regarding the choice of error specification. The unobservable country-specific effect, μ_i, can be modeled assuming either random- or fixed-effects specifications. However, the latter can only be estimated using the conditional fixed effects estimator that drops countries from the sample that have never had a SBA.[14] This estimation procedure assesses how the explanatory variables influence the probability of switching to a SBA. Since countries that have never had a SBA do not switch by definition, they do not provide any information towards the optimization of the likelihood function and are thus dropped. Therefore the consequence of the fixed-effects estimator will be selection bias—since the model is estimated using only members that have had at least one SBA. This would potentially bias coefficients upwards as the countries most vulnerable to external shocks are likely to be the ones that have sought recourse to Fund financial assistance. Section VI elaborates on these issues in further detail.

[14] This is because with a binary dependent variable, the fixed effects estimator conditions on the realization of an SBA. Baltagi (2005) provides an intuitive exposition.

V. EMPIRICAL RESULTS

This section presents the main results linking the global economic indicators and the number of SBAs. Robustness to alternate specifications, country-specific controls, and other possible measures of the global economic environment are explored in the next section.

The main regression results are tabulated in Table 3 and include specifications with and without world GDP (the mnemonic for the global business cycle) under columns [1] and [2], respectively.[15] Oil prices, interest rates, and world GDP fluctuations have important implications for the probability of a SBA being approved. This conjecture is supported by Table 3 since all coefficients have the expected signs and are statistically significant. Even when world GDP is omitted the results are similar.

The estimation results are intuitive and consistent with economic theory. For a net energy importer, higher oil prices could create a BOP need by raising the import bill. Table 3 indicates that a one percent deviation of the real APSP from trend would increase the probability of a SBA by up to 0.031 percent. For debtor countries, higher international interest rates could create BOP problems by increasing debt servicing costs, as well as limiting access to capital markets. The impact of a one percent increase in the real U.S. short-term interest rate would increase the likelihood that a country approaches the Fund for a SBA by up to 0.25 percent. A global recession would most likely decrease the demand for exports, particularly from developing and emerging market countries, also creating a potential BOP need. For the regression that includes world GDP, a one percent *decrease* in global output from trend would raise the probability of a SBA by about 0.24 percent.

The results regarding country-specific controls are also statistically significant and have the appropriate signs. As expected, when GDP growth is on the rise, the chances that a country will approach the Fund for a SBA decreases. In fact, a one percent increase in real growth decreases that probability by about 0.2 percent as shown in Table 3. A one percent rise in the foreign reserve cover is associated with a 0.5 percent decline in the likelihood that a country will seek Fund financial assistance, whereas a one percent depreciation of the domestic currency decreases that probability by about 0.05 percent. International reserve cover, the exchange rate, and a BOP need are closely related concepts. Typically, a BOP need arises when a country can not accumulate enough foreign reserves to meet a certain policy objective, and may prompt recourse to Fund financial assistance. Relatedly, countries that do not allow their currencies to depreciate sufficiently may deplete their reserves so much, that a BOP need triggers a request for a SBA.[16]

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[15] Since unadjusted probit coefficients are not easily interpretable, Table 4 reports the effects of one-unit changes in the explanatory variables on the probability of an approved SBA (expressed in percentage points) when evaluated at the means of the data (the marginal effects). In addition, diagnostic statistics follow at the bottom of the table testing the joint significance of all explanatory variables as well as the contribution of the panel variability and also includes a measure of the goodness-of-fit.

[16] By letting the exchange rate depreciate, a country may be able to insulate the economy from external shocks. But, in the case of fixed exchange rate regimes, a large enough shock, may deplete international reserves so much that it may jeopardize the peg, thus requiring IMF assistance and/or switching to a float.

Table 3: The Global Economic Environment and Stand-By Arrangements

	[1]			[2]		
Independent Variables	$\partial\Phi(x)/\partial(x)$	*z*	*p-value*	$\partial\Phi(x)/\partial(x)$	*z*	*p-value*
Real APSP	0.0305	4.41	0.000	0.0261	4.44	0.000
Real Short-Term U.S. Interest Rate	0.2068	1.93	0.053	0.2493	2.39	0.017
Real World GDP	-0.2384	-1.39	0.165			
Real GDP Growth	-0.1917	-4.31	0.000	-0.1946	-4.36	0.000
Reserve Cover	-0.5250	-4.44	0.000	-0.5205	-4.40	0.000
Exchange Rate Depreciation	-0.0485	-3.66	0.000	-0.0499	-3.75	0.000
Hydrocarbon Exporter and APSP Interaction	-0.0298	-2.79	0.005	-0.0302	-2.81	0.005
Pseudo-R^2	0.128			0.128		
ρ	0.289			0.289		
p -value of likelihood ratio testing H_0: ρ=0	0.000			0.000		
H_0: Slopes=0; χ^2(-)	144.3			142.1		
p -value of likelihood ratio testing H_0: Slopes=0	0.000			0.000		
Observations	5199			5199		
Countries	169			169		
Stand-By Arrangements	412			412		
Log-likelihood	-1211.1			-1212.1		

Summary of the conditional probability of SBAs and the implied number of SBAs when evaluated at:

	Probability	SBAs	Probability	SBAs
Sample means	3.50	5.9	3.51	5.9
Mean plus one standard deviation	6.93	11.7	6.02	10.2
Mean plus two standard deviations	12.51	21.1	9.75	16.5
Historical extremes	13.71	23.2	10.33	17.5

Source: Author's calculations.

Notes: The dependent variable is binary, taking the value of unity if a Stand-By arrangement was approved in a given year. The slope derivatives which correspond to the one-unit change in the regressor on the probability of a Stand-By arrangement (binary dependent variable) evaluated at their sample means were multiplied by 100 to convert into percentages. The *t* -statistics are in brackets. The conditional probability of a Stand-By arrangement (SBA) is evaluated at the means for all variables (which includes setting the random-effects error component to zero) unless otherwise specified. Only the global indicators are augmented by their respective standard deviations, the country specific controls are still evaluated at their individual means. The symbol ρ indicates the proportion of the total variance contributed by the panel-level variance component, if zero, then the panel estimator is not different from the pooled estimator. The degrees of freedom for the chi-squared distribution are 7 and 6 for columns [1] and [2], respectively.

The last variable in the baseline regressions controls for energy exporters. This term interacts the real APSP with a dummy variable that indicates if a country is a net hydrocarbon exporter. Notice from Table 3 that this variable is statistically significant and has the appropriate sign. Intuitively, when there is a rise in oil prices, this improves the external position of net energy exporters, decreasing the likelihood that they may need Fund financial assistance.[17]

Although the slope coefficients may at first seem small, it is important to bear in mind the non-linear nature of the model. The marginal effects presented in Table 3 were evaluated at the respective means of the data. In the case of higher than average oil prices, for example, the marginal effects would need to be re-evaluated using the new prices if accurate slope estimates are desired owing to the underlying non-linear specification of the econometric framework. This implies that even if oil prices rise gradually, the probability of a SBA associated with these higher prices increases at a faster rate. The extreme volatility of oil prices shown in Table 2 adds another source of vulnerability and highlights how a seemingly manageable global economic environment could quickly become very harsh.

The worsening of the global economic environment has important implications for the potential number of requested SBAs. Previously, by focusing on the slope coefficients, we considered the effects of oil prices, interest rates, and world GDP in isolation. But what would the impact of adverse developments on all of these indicators be simultaneously? The lower section of Table 3 considers such experiments.

When all of the variables are evaluated at their respective means, the conditional probability of a SBA is about 3.5 percent. However, if oil prices, interest rates, and world GDP are adversely shocked by one standard deviation, the conditional probability of a SBA nearly doubles. Focusing on column [1] in Table 3, this implies that the numbers of SBAs increases from six to about 12, when these less favorable global economic conditions are simulated. The fact that we use one standard deviation shocks implies that this outcome is not unlikely. Yet harsher conditions (two standard deviation shocks) increases the implied number of SBAs further. Moreover, when oil prices and interest rates are evaluated at their respective historical peaks, and global business cycle is set at its deepest trough in the sample, the conditional probability almost quadruples, implying an increase from approximately 6 to 23 SBAs.

[17] Further note that for net hydrocarbon exporters the net impact of oil prices on SBAs is virtually zero.

Table 4: One-Year-Ahead Predictions of Stand-By Arrangements

	[1] Probability	[2] Implied SBAs
In-Sample Predictions for 2004		
Sample 1970-2003		
with World GDP	3.30	5.6
without World GDP	2.95	5.0
Sample 1970-2002		
with World GDP	3.36	5.7
without World GDP	2.95	5.0
Actual number of SBAs in 2004		6
Out-of-Sample Predictions for 2005		
Sample 1970-2004		
with World GDP	3.41	5.8
without World GDP	3.36	5.7
Sample 1970-2003		
with World GDP	3.60	6.1
without World GDP	3.51	5.9
Actual number of SBAs in 2005		6

Source: Author's calculations.

Notes: Using the specification depicted in Table 4, the regression equations (both including and excluding World GDP) are estimated using the sample periods shown in the table. The estimated equations are evaluated using actual realizations in the preceding year. The outcome is the conditional probability (converted to percentages by multiplying by 100) of a Stand-By arrangement (SBA), and the implied number of SBAs (which is the probability multiplied by the number of countries in the sample, 169).

Predicting the Number of Stand-By Arrangements

The model may also be used to predict the number of SBAs. As confirmed in Table 4, there are indications that the model has reasonable predictive accuracy. The top panel of Table 4 presents the SBA predictions for 2004 using the data up to and including 2002 and 2003, respectively, then evaluating the regressors using the 2003 actual realizations. Analogously, this procedure is repeated for 2005 as shown in the bottom panel of Table 4. The regressions including the deviation of world GDP from trend seem to predict the six SBAs approved in 2004 relatively well. Although the regressions without the deviation of world GDP from trend are more parsimonious and all regressors are significant at least at the five percent level, omitting this indicator seems costly in terms of prediction. Conducting the same procedure, but evaluating the regressions using the 2004 realizations would imply out-of-sample predictions of six SBAs for 2005, which coincides with the actual number of six SBAs approved in 2005. Naturally, recent trends in oil prices and current developments in the U.S. monetary policy cycle could be used to update these predictions.[18]

VI. Robustness

This section reports the results of various robustness checks. The overall conclusion of the sensitivity analysis strongly supports the benchmark specifications presented in the previous section. The results are presented in Table 5, Appendix Table 1, and Appendix Table 2.[19]

[18] It should be noted that even though prediction on the total number of SBAs is quite accurate, country by country prediction is much more difficult. Although certain papers find a percentage of correct predictions as high as 88 percent (Thacker, 1999), it needs to be stressed that given the incidence of Fund arrangements over the period covered by such studies, a straight guess of "no arrangement" would itself be correct approximately 80 percent of the time (Bird and Rowlands, 2002). This highlights the persistence of unexplained variance in the pattern of IMF lending even in the face of quite sophisticated econometric analysis. Furthermore, the estimations are often far from robust and some use very short samples that do not cover more turbulent periods such as the later half of the 1990s.

[19] Yet further robustness checks were conducted, but in the interest of brevity they have been deferred to a technical appendix which are available from the author upon request. The sensitivity checks include panel and pooled regressions using probit and logit—including rare events logit, regressions testing the exclusion of oil prices and interest rates, tabulation of the marginal effects corresponding to harsher global economic conditions (detailed version of the bottom panel of Table 3), marginal effects along with predictions using the fixed effects estimator (detailed version of Table 5), more detailed versions of Appendix Tables 1 and 2), regressions considering quadratic specifications for oil prices and interest rates, regressions with other arrangement types, and finally regressions across decades.

A. Fixed– Versus Random–Effects

Table 5 contains the baseline results without the measure of the global business cycle for brevity under columns [1]-[2] as well as logit specifications assuming either random- or fixed-effects under columns [3]-[4] and [5]-[6], respectively.[20] For the three specifications under consideration, in contrast to the other tables in the paper, Table 5 also intentionally displays the unadjusted coefficients under the odd columns along with the marginal effects under the even columns. First, note that the marginal effects for the random-effects probit and logit models under columns [2] and [4], respectively, are remarkably similar. Second, note that the unadjusted coefficients for the random- and fixed-effects logit model, under columns [3] and [4] are also very similar. However, notice that the marginal effects for the fixed-effects model, under column [6], are much larger in absolute value than the other two specifications.

It is important to recall that to get the marginal effects, the unadjusted coefficients are weighted by a factor that depends on all of the independent variables evaluated at their respective means as well as the underlying distribution. Therefore, as discussed in Section IV, because the conditional fixed-effects logit specification drops members that have not had a SBA, the number of countries is reduced to 105. This is critical because these are precisely the members that have previously made use of Fund resources, and are therefore the more vulnerable countries in the sample. For example, the members that have had a previous SBA are the countries with lower average levels of international reserves. In other words, using the fixed-effects model induces selection bias, which biases the marginal effects estimates upwards, implying that these countries are much more sensitive to the global economic environment. Relatedly, this implies that using the fixed-effects specification will result in over predicting the number of SBAs.

Even though the fixed-effects model may substantially exacerbate the issue of selection bias, it is an attractive specification because it allows for endogeneity of all the regressors. Therefore a Hausman (1978) test comparing the random- and fixed-effects logit model using the same 105 country sample was conducted. Using 169 countries for the random-effects specification implies that the data fails to meet the asymptotic assumptions of the Hausman test. The test yields $\chi^2(6)=6.84$ with a *p*-value of 0.3362 thus not rejecting the null hypothesis that the difference in coefficients is not systemic. This suggests that the random effects specification is appropriate. Finally, since the probit model has slightly better predictive accuracy as compared to the logit model, in the end, the random-effects probit model was favored as the choice baseline specification.

[20] Recall that a conditional fixed-effects probit model does not exist because there is no sufficient statistic allowing the fixed-effects to be conditioned out of the likelihood function.

Table 5: Fixed– versus Random–Effects Logit and Probit Models

Independent Variables	Random Effects				Fixed Effects	
	Probit		Logit		Logit	
	[1]	[2]	[3]	[4]	[5]	[6]
		$\partial\Phi(x)/\partial(x)$		$\partial\Phi(x)/\partial(x)$		$\partial\Phi(x)/\partial(x)$
Real APSP	0.0034	0.0261	0.0063	0.0211	0.0066	0.1603
	[5.10]	[4.47]	[4.88]	[4.23]	[5.04]	[4.92]
Real Short-Term U.S. Interest Rate	0.0322	0.2494	0.0661	0.2218	0.0707	1.7205
	[2.47]	[2.37]	[2.67]	[2.55]	[2.85]	[2.75]
Real GDP Growth	-0.0251	-0.1947	-0.0453	-0.1517	-0.0448	-1.0900
	[-4.86]	[-4.36]	[-4.61]	[-4.12]	[-4.38]	[-4.46]
Reserve Cover	-0.0672	-0.5206	-0.1629	-0.5460	-0.1421	-3.4584
	[-4.68]	[-4.40]	[-4.83]	[-4.61]	[-3.86]	[-4.18]
Exchange Rate Depreciation	-0.0064	-0.0499	-0.0117	-0.0392	-0.0090	-0.2194
	[-4.15]	[-3.76]	[-3.99]	[-3.59]	[-2.98]	[-2.91]
Hydrocarbon Exporter and APSP Interaction	-0.0039	-0.0302	-0.0076	-0.0256	-0.0079	-0.1932
	[-2.96]	[-2.82]	[-3.00]	[-2.84]	[-3.09]	[-3.06]
Observations	5199		5199		3252	
Countries	169		169		105	
Log-likelihood	-1212.1		-1214.3		-879.0	

Source: Author's calculations.

Notes: The dependent variable is binary, taking the value of unity if a SBA was approved in a given year. The slope derivatives correspond to the one-unit change in the regressor on the probability of a SBA (binary dependent variable) evaluated at their sample means which were multiplied by 100 to convert into percentages. The t-statistics are in brackets. Recall that since 64 members never had a SBA approved in the sample under consideration, the conditional fixed effects logit estimation procedure will omit these observations because members that do not switch between SBAs do not contribute any information towards the optimization of the log-likelihood function. A Hausman (1978) test comparing the fixed effects logit model (under columns [3] and [4]) and the random effects logit model (under columns [5] and [6]) using the same 105 country sample for each specification was used because the sample of 169 countries for the random effects model implies that data fails to meet the asymptotic assumptions of the test. The test yields c2(6)=6.84 with p-value of 0.3362 thus not rejecting the null hypothesis that the difference in coefficients is not systemic. This suggests that the random effects specification is appropriate.

B. Alternative Indicators of the Global Economic Environment

The choice of the indicators measuring the global economic environment is crucial. The appropriateness of using oil prices, world interest rates, and the global business cycle is verified in this section by using alternative measures of the global economic environment. The results are presented in Appendix Table 1 with the benchmark regressions reproduced under the first column.

Commodity Prices

Columns [2]-[5] use the commodities, metals, agricultural raw materials, and food price indexes, respectively, instead of the average petroleum spot price. Only the commodities price index is reasonably statistically significant (column [2]). This is most likely due to the fact that the energy component of the commodities index has a weight of about 40 percent. [21]

Interest Rates

Columns [6]-[8] use the real U.S. deposit rate, as well as the real U.S. and G-7 long-term interest rates as alternates. The results are consistent with the benchmark specification, which can partly be explained by the high correlations between the various interest rate series used, theoretically consistent with the term structure hypothesis and interest rate parity conditions.[22]

Global Business Cycle

For alternative measures of the global business cycle, other GDP aggregations as well as global import volume fluctuations were used. Columns [9]-[12] use narrower measures of global GDP, which are less significant statistically, as expected. Since industrialized country import volumes have important implications for many developing and emerging market countries' exports, this variable is used in columns [13]-[15]. As expected, the coefficients are smaller (and statistically insignificant), reflecting the importance of real GDP relative to import volumes.

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[21] The primary commodities index is split between non-fuel and energy, with weights of 52.2 and 47.8 percent, respectively, of which the weight of petroleum (APSP) is 39.9 percent. The non-fuel index is further split between edibles (food and beverages, with weights of 21.7 and 3.1, respectively) as well as industrial inputs (agricultural raw materials and metals, with weights of 11.3 and 16.1, respectively). All indexes were scaled by U.S. CPI, then logged and linearly detrended exactly as the average petroleum spot price (APSP) was. See Appendix Table 3 and http://www.imf.org/external/np/res/commod/index.asp for further details.

[22] The correlation coefficients between the real U.S. short-term interest rate and the other interest rate series ranges from 70 to 75 percent.

C. Robustness to Alternative Quantitative Country Controls

Although not the primary focus of the paper, other readily accepted country-specific controls would likely include inflation, money growth, fiscal balance, and the terms of trade. However, as depicted under columns [2]-[5] in Appendix Table 2, none of these variable are statistically significant when included in the benchmark regression. Country-specific real growth, international reserve cover, the exchange rate depreciation, and the hydrocarbon interaction term seem to capture the relevant information contained in the alternative country-specific controls. It seems that the impact of terms of trade shocks (after controlling for net energy exporters) can be largely inferred from exchange rate, international reserve, and real growth developments. Also consistent with economic theory, seigniorage financed government deficits would likely increase the rate of broad money growth and thus the rate of inflation, which would be summarized by a large depreciation of the exchange rate or a rapid depletion of international reserves.

The Current Account Balance

One of the most important criteria governing the approval of a SBA is an actual BOP need. To this end, a measure of the current account balance would seem a natural country-specific control. However, as can be seen from Appendix Table 2 under columns [6]-[9], the current account balance as a percent of GDP is only statistically significant at the five percent level when the reserve cover variable is omitted. This is intuitive since countries running large current account deficits would not be faced with a BOP need if the financing stemming from the capital and financial accounts allows a sufficient accumulation of foreign reserves. In this context, the information contained in the reserve cover and the exchange rate depreciation variables seems to largely summarize whether a BOP need has arisen or not.

Robustness to Qualitative Country Controls

There may be other factors that influence the request for a SBA that are qualitative in nature. These include election years, whether a country had implemented a fixed exchange rate regime, and whether debt restructuring took place. The baseline regression is augmented with these variables and the results are tabulated in Appendix Table 2.

Elections

The regression with a dummy variable denoting parliamentary and presidential elections under columns [10] is statistically significant, and seems to be an important predictor for a request of a SBA. However, a bit of caution is warranted since the sample size is much smaller as there is election data for only 75 countries. Nonetheless, this highlights the potential importance of political factors that influence the request for SBAs.[23]

[23] Relatedly, Aisen (2004) argues that a member's political cycle influences the modalities of the requested stand-by arrangement, particularly the choice of anchor in the context of inflation stabilization.

Debt Restructuring

The IMF provided financial assistance to support countries that were engaged in debt restructuring. A dummy variable was used to account for SBAs that were approved under these conditions. It is interesting to note, that the real short-term interest rate loses its significance in these specifications as shown under column [11]. This is intuitive since when a countries external debt burden is reduced, its debt service obligations are much smaller and are less vulnerable to international interest rate fluctuations. However, these results should be interpreted with some caution as the sample size is drastically reduced.

Fixed Exchange Rate Regime

The fact that a country was implementing a fixed exchange rate regime does not seem to be important, even when we exclude the depreciation of the exchange rate as shown under columns [12] and [13].[24] International reserve cover and currency depreciations in the baseline regression seem to capture distress related to speculative attacks, large capital outflows, or other disruptive shocks.

VII. PREDICTING ACCESS LEVELS

Once the main factors determining the approval of an SBA are identified, the logical next step is trying to predict the access levels needed to support a country's BOP need. Based on the work presented in this paper, Joshi and Zalduendo (2006) estimate access levels in a second stage regression after controlling for selection bias. In summary, their main result is that the estimated access levels fall way short of the actual amount granted during periods of financial crises. Intuitively, this reflects the findings in the early warning systems literature that attempts to forecasting financial crisis, which concludes that predicting crises (which usually involves exceptional access arrangements) is notoriously difficult. In other words, although predicting the number of SBAs is promising, the associated access levels are, in contrast, very challenging to foretell owing to the possibly of infrequent but large BOP needs arising from financial crises.

[24] Because of breaks in the data and limited country coverage, the definition of a country's exchange rate regime is based on both the de jure definitions of Ghosh and Gulde-Wolf (2002) as well as the de facto definitions of Bubula and Ötker-Robe (2002) who retroactively updated IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*. For further details see Appendix Table 3 as well as the IMF's Monetary and Financial Surveillance Department's Exchange Rate Regime Classification database.

VIII. CONCLUDING REMARKS

This paper set out to rigorously quantify the relationship between the global economic environment and requests for Stand-By Arrangements (SBAs). Formal econometric analysis based on a panel of 412 SBAs among 169 members over a period spanning 1970-2004 indicate that the main global economic factors affecting the probability of requesting IMF credit were oil prices, world interest rates, and a measure of the global business cycle.

Most critically, even if the global economic environment gradually worsens, the probability of requesting a SBA increases disproportionately due to the underlying non-linear nature of the model. The empirical framework implies that a steady deterioration of the global economic climate will imply increasingly harsher conditions for developing and emerging market countries, which may in turn significantly increase the demand for IMF resources. In this context, when oil prices and interest rates are evaluated at their respective historical peaks, and the global business cycle is set at its deepest trough in the sample, the conditional probability almost quadruples, implying an increase from approximately 6 to 23 SBAs.

The estimated regressions can be used to predict the numbers of SBAs with reasonable accuracy. Whereas the actual number of SBAs approved in 2004 was six, the model predicts between 5.0 to 5.7 SBAs in 2004. Furthermore, using only 2004 data, out-of-sample predictions imply between 5.7 and 6.1 SBAs compared to an actual number of six approved SBAs in 2005.

Despite the importance of the topic, research on the empirical link between global economic conditions and IMF financing is scarce. This paper has attempted to address this issue and has relevance for the IMF, for policymakers throughout the Fund membership, and for capital market analysts. The framework developed in this paper highlights cyclical factors that are pertinent for future IMF lending capacity. This is especially important because unusually harsh economic conditions would likely imply a bunching of SBA requests—some of which may be exceptional access cases, where certain members may exceed their quotas by large margins. In this context, this paper is also relevant for assessing the prospects for the IMF's future income position, which depends on the amount of outstanding Fund credit.

APPENDIX I. BACKGROUND ON IMF ARRANGEMENTS

The International Monetary Fund is best known as a financial institution that provides resources to member countries experiencing temporary balance of payments (BOP) problems. The Fund makes financial resources available to members in the general resources account (GRA) under a range of policies and facilities.[25] These include the credit tranches, special policies within the credit tranches, and special facilities.[26] The policies and facilities differ mainly in the type of BOP need they address and in the degree of conditionality they involve.[27] Purchases are available only for actual BOP needs—typically through a Stand-By Arrangement (SBAs)—historically the Fund's most utilized facility (Figure 1).[28]

Policies and Facilities

As stated in the Articles of Agreement, the IMF is charged with developing policies on the use of its general resources.[29] More than a decade after its creation, the Fund developed policies on the use of its resources in what came to be known as the credit tranches. The Fund makes available resources in the credit tranches under SBAs to help resolve a member's general BOP problems.[30] The Fund has also adopted special policies to allow credit tranche

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[25] The general resources account (GRA) is the principal account of the IMF and handles the largest share of transactions between the Fund and its membership. The GRA can be best described as a pool of currencies and reserve assets (readily available currencies—U.S. dollar, euro, Japanese yen, and pound sterling) built up from member' fully paid capital subscriptions in the form of quotas. Quotas are the basic building blocks of the IMF. They broadly reflect each member's relative economic size, taking into account the quotas of similar countries. Quotas determine the maximum amount of financial resources that a member is obligated to provide to the IMF, voting power in Fund decision making, and a member's share of SDR allocations. The financial assistance a member may obtain from the IMF is also generally based on its quota. SDRs or special drawing rights are potential claims on freely usable currencies of IMF members, the value of which is calculated daily using a basket of the four major currencies.

[26] For further details, refer to IMF (2001) or visit http://www.imf.org/external/np/exr/facts/howlend.htm.

[27] A balance of payments (BOP) need arises if a member's foreign reserves would fall short of a targeted level without exceptional financing. Exceptional financing includes Fund purchases (disbursements of IMF credit), BOP support loans from other multilateral or official bilateral creditors and donors (including debt relief and rescheduling), and debt service arrears. The need for exceptional financing arises because the overall BOP (the sum of the current account as well as the capital and financial account excluding exceptional financing) is in deficit, or has a surplus too small to accumulate adequate foreign reserves.

[28] However, arrangements are available also for potential balance of payments needs in the form of precautionary arrangements. A precautionary arrangement is a stand-by or extended arrangement (see below) where the member expresses its intention not to make a purchase at the beginning or during the period of the arrangement.

[29] Article V, Section 3(a).

[30] Fund credit has traditionally been provided in "tranches" (segments) equivalent to 25 percent of quota (see below).

resources to be used to address special BOP problems.[31] Still other policies fall under the heading of special policies the Fund has chosen to adopt outside the credit tranches, which are termed facilities, and are designed to address special BOP problems.[32]

Credit Tranche Policies and Stand-By Arrangements

SBAs were developed as the main instrument through which members would access the credit tranches. SBAs are available for any BOP need. The length of SBAs are typically 12-18 months, but have a legal maximum of three years. For a member that has no Fund credit outstanding, the first 25 percent of quota access under a SBA is subject to first credit tranche conditionality.[33] All SBAs beyond the first credit tranche feature phasing of purchases conditional on performance clauses. Access under SBAs is subject to limits of 100 percent of quota annually and 300 percent of quota cumulatively. The Fund may grant access beyond the limits in exceptional circumstances.[34]

The Extended Fund Facility

The Extended Fund Facility was established in 1974 with the purpose of providing medium-term assistance to members suffering from two broad economic symptoms. First, an Extended Fund Facility (EFF) is approved with the purpose of resolving either serious payments imbalances relating to structural maladjustments in production and trade as well as where price and cost distortions have been widespread. The second symptom includes slow growth and an inherently weak BOP position which prevents the pursuit of an active development policy.[35]

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[31] Emergency assistance falls under this category. The Fund provides emergency assistance for natural disasters and post-conflict situations. Emergency assistance is provided in the form of quick outright purchases when a member cannot meet its immediate balance of payments financing needs without serious depletion of its external reserves.

[32] For example the Compensatory Financing Facility (CFF). The main purpose of the CFF—which has not been used since 1999—is to ensure timely financing for members that are experiencing balance of payments difficulties resulting from a temporary decline (rise) in export earnings (cereal import costs).

[33] The Fund's stance to requests in the first credit tranche is liberal (relatively limited conditionality)—provided that the member itself is making reasonable efforts to solve its problems. Requests beyond the first 25 percent of quota require significant justification and resources are made available on the condition that the borrower undertake appropriate policies to address its balance of payments problems.

[34] For example, members experiencing a sudden reversal of capital inflows may require Fund financing that cannot be met within the normal access limits. The purpose of the Supplemental Reserve Facility (SRF) is to provide assistance to members that are experiencing exceptional balance of payments difficulties due to a large short-term financing need resulting from a sudden and disruptive loss of confidence reflected in pressure on the capital account and the member's reserves.

[35] Access limits are the same as SBAs. However, whereas the financial terms of a SBA entail that a member is obliged to make repurchases (repayments) in quarterly installments from 3¼-5 years, under an EFF, the repurchase obligation is based on semiannual installments spanning 4½-10 years.

The Poverty Reduction and Growth Facility

The Poverty Reduction and Growth Facility is the Fund's concessional lending facility for low-income countries. It is the vehicle by which the Fund provides financial support to countries' poverty reduction strategies, including in the form of relief under the HIPC Initiative.[36] The facility's core objectives are to promote sustainable BOP positions and to foster sustainable growth, leading to higher living standards and a reduction in poverty. The Poverty Reduction and Growth Facility (PRGF) is the successor to the Enhanced Structural Adjustment Facility (ESAF), which in turn was the successor to the Structural Adjustment Facility (SAF).

[36] The Enhanced HIPC (Heavily Indebted Poor Country) Initiative helps countries achieve a sustainable external debt position.

Appendix Table 1: Robustness to Alternative Indicators of the Global Economic Environment

Independent Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
		Commodity Prices				Interest Rates			GDP				Import Volume		
	Baseline	All	Metals	Agriculture	Food	Deposit Rate	U.S. Long-Term	G-7 Long-Term	Industrial	EU 25	G-7	U.S	World	G-7	U.S.
Commodity Price Index	0.0305	0.0586	-0.0113	0.0193	0.0298	0.0333	0.0314	0.0386	0.0268	0.0306	0.0268	0.0256	0.0268	0.0244	0.0248
	[4.43]	[3.87]	[-0.57]	[1.04]	[1.51]	[4.83]	[4.50]	[5.16]	[4.52]	[4.42]	[4.53]	[4.38]	[4.46]	[4.13]	[4.02]
Real Interest Rate	0.2070	0.2630	0.3433	0.4157	0.4032	0.1558	0.1601	0.2564	0.2217	0.1954	0.2394	0.2245	0.2205	0.1884	0.2362
	[1.93]	[2.43]	[3.03]	[3.19]	[3.39]	[1.66]	[1.41]	[2.16]	[2.10]	[1.78]	[2.29]	[2.13]	[1.93]	[1.67]	[2.21]
Real GDP or Import Volume	-0.2386	-0.2412	0.2921	0.1182	0.0645	-0.2546	-0.2139	-0.0574	-0.4005	-0.4605	-0.3405	-0.3411	-0.0699	-0.1286	-0.0364
	[-1.39]	[-1.33]	[1.47]	[0.68]	[0.37]	[-1.48]	[-1.15]	[-0.29]	[-1.30]	[-1.38]	[-1.21]	[-1.38]	[-0.61]	[-1.29]	[-0.59]
Real GDP Growth	-0.1919	-0.1943	-0.2045	-0.2045	-0.2048	-0.1909	-0.1889	-0.2047	-0.1948	-0.1952	-0.1953	-0.1905	-0.1923	-0.1891	-0.1916
	[-4.31]	[-4.34]	[-4.50]	[-4.50]	[-4.51]	[-4.30]	[-4.26]	[-4.43]	[-4.35]	[-4.37]	[-4.37]	[-4.28]	[-4.30]	[-4.23]	[-4.27]
Reserve Cover	-0.5254	-0.5508	-0.6077	-0.6086	-0.5978	-0.5407	-0.5388	-0.4729	-0.5209	-0.5189	-0.5226	-0.5121	-0.5132	-0.5057	-0.5135
	[-4.44]	[-4.61]	[-4.95]	[-4.96]	[-4.90]	[-4.57]	[-4.55]	[-3.93]	[-4.40]	[-4.40]	[-4.42]	[-4.34]	[-4.32]	[-4.28]	[-4.33]
Exchange Rate Depreciation	-0.0485	-0.0476	-0.0498	-0.0483	-0.0497	-0.0482	-0.0476	-0.0492	-0.0506	-0.0497	-0.0508	-0.0482	-0.0488	-0.0475	-0.0486
	[-3.67]	[-3.60]	[-3.70]	[-3.61]	[-3.70]	[-3.65]	[-3.59]	[-3.61]	[-3.79]	[-3.75]	[-3.80]	[-3.63]	[-3.65]	[-3.58]	[-3.62]
Hydrocarbon Exporter and APSP Interaction	-0.0299	-0.0247	-0.0087	-0.0080	-0.0104	-0.0302	-0.0301	-0.0414	-0.0300	-0.0299	-0.0300	-0.0303	-0.0304	-0.0304	-0.0304
	[-2.79]	[-2.38]	[-0.91]	[-0.84]	[-1.09]	[-2.80]	[-2.80]	[-3.33]	[-2.80]	[-2.80]	[-2.80]	[-2.82]	[-2.82]	[-2.82]	[-2.82]
Observations	5199	5199	5199	5199	5199	5199	5199	5199	5199	5199	5199	5199	5199	5199	5199
Countries	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Log-likelihood	-1215.4	-1215.0	-1224.0	-1223.6	-1223.0	-1211.6	-1212.0	-1156.2	-1211.2	-1211.1	-1211.3	-1211.1	-1211.9	-1211.2	-1211.9

Source: Author's calculations.

Notes: The dependent variable is binary, taking the value of unity if a Stand-By arrangement was approved in a given year. The slope derivatives which correspond to the one-unit change in the regressor on the probability of a Stand-By arrangement (binary dependent variable) evaluated at their sample means were multiplied by 100 to convert into percentages. The t-statistics are in brackets. Under columns [2]-[5], the APSP is replaced by an alternative commodity price index, under columns [6]-[8] an alternative real interest rate is used, and under columns [9]-[15] and alternative measure of the global business cycle is used. For columns [9]-[12] different aggregations of GDP are used, whereas under columns [13]-[15] import volumes are used. For further details refer to the text.

Appendix Table 2: Robustness to Alternative Country Controls

Independent Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
	Baseline	Quantitative Controls				Current Account Balance				Qualitative Controls			
Real APSP	0.0261	0.0261	0.0267	0.0269	0.0268	0.0260	0.0250	0.0254	0.0249	0.0303	0.0095	0.0334	0.0327
	[4.47]	[4.46]	[4.48]	[4.48]	[4.52]	[4.44]	[4.29]	[4.80]	[4.67]	[2.14]	[1.84]	[4.99]	[4.87]
Real Short-Term U.S. Interest Rate	0.2494	0.2490	0.2444	0.2317	0.2467	0.2528	0.2981	0.2510	0.3212	0.6385	-0.0094	0.2996	0.3444
	[2.38]	[2.37]	[2.29]	[2.19]	[2.31]	[2.40]	[2.79]	[2.57]	[3.17]	[2.19]	[0.12]	[2.57]	[2.91]
Real GDP Growth	-0.1947	-0.1947	-0.1974	-0.1919	-0.1929	-0.1940	-0.2498	-0.1898	-0.2651	-0.5058	-0.0321	-0.2140	-0.2666
	[4.36]	[4.36]	[4.36]	[4.18]	[4.22]	[4.36]	[5.39]	[4.77]	[6.18]	[4.15]	[0.90]	[4.39]	[5.33]
Reserve Cover	-0.5206	-0.5207	-0.5350	-0.5244	-0.4850	-0.5060	-0.5642			-2.1111	-0.4242	-0.5736	-0.6431
	[4.40]	[4.40]	[4.43]	[4.34]	[4.13]	[4.26]	[4.61]			[6.12]	[2.78]	[4.29]	[4.67]
Exchange Rate Depreciation	-0.0499	-0.0503	-0.0543	-0.0496	-0.0553	-0.0498		-0.0671		-0.0642	-0.0288	-0.0501	
	[3.76]	[3.60]	[3.77]	[3.70]	[3.97]	[3.75]		[5.14]		[1.91]	[2.10]	[3.40]	
Hydrocarbon Exporter and APSP Interaction	-0.0302	-0.0303	-0.0310	-0.0308	-0.0361	-0.0296	-0.0295	-0.0289	-0.0292	-0.0486	-0.0116	-0.0356	-0.0357
	[2.82]	[2.82]	[2.83]	[2.81]	[3.17]	[2.74]	[2.73]	[2.88]	[2.87]	[1.82]	[1.16]	[2.98]	[2.97]
Inflation		0.0000											
		[0.08]											
Broad Money Growth			-0.0004										
			[0.72]										
Government Balance				-0.0243									
				[-0.65]									
Terms of Trade					0.0002								
					[0.03]								
Current Account Balance						-0.0171	-0.0181	-0.0347	-0.0372				
						[-0.92]	[-0.97]	[-2.13]	[-2.21]				
Elections										5.1847			
										[2.68]			
Debt Restructuring											-1.1736		
											[-2.42]		
Fixed Exchange Rate Regime												1.0188	0.5780
												[1.68]	[0.94]
Observations	5199	5199	5199	5199	5086	5199	5199	5199	5742	2269	2222	4850	4850
Countries	169	169	169	169	165	169	169	169	169	75	168	169	169
Log-likelihood	-1212.1	-1212.1	-1210.1	-1207.7	-1182.3	-1211.6	-1220.4	-1275.7	-1294.4	-816.6	-354.1	-1177.9	-1184.8

Source: Author's calculations.

Notes: The dependent variable is binary, taking the value of unity if a Stand-By arrangement was approved in a given year. The slope derivatives which correspond to the one-unit change in the regressor on the probability of a Stand-By arrangement (binary dependent variable) evaluated at their sample means were multiplied by 100 to convert into percentages. The t-statistics are in brackets. Under columns [2]-[5] alternative country-specific quantitative controls are added to the baseline regression, in columns [6]-[9] the current account balance is further added to the baseline and alternative specifications are tabulated, whereas under columns [10]-[13] alternative qualitative country-specific controls are added to the baseline. For further details refer to the text.

Appendix Table 3: Data Sources, Descriptions, and Transformations

Variable	Description	Source
	Dependent variables indicating the approval of an arrangement.	
sba	Binary variable that takes the value unity only if an arrangement was a SBA. Blends and concessional arrangements are excluded from this concept. Other aggregations of arrangements were used and these results can be obtained from the author. For example, another binary dependent variable was "gra" which includes SBAs, EFFs (Extended Fund Facility), and FCTAs (First Credit Tranche Arrangements).	PDR
	Quantiative Country Specific Controls	
real_gdp	Real GDP growth of a member. Denoting GDP measured at constant prices [NGDP_R] with Y, the transformation used was $100*((Y_t/Y_{t-1})-1)$.	WEO
inflation	CPI inflation of a member. Denoting the CPI [PCPI] with P, the transformation used was $100*((P_t/P_{t-1})-1)$.	WEO
gov_balance	Government budget balance as a percent of GDP. Central or general government overall balance [GCB or GGB] was used depending on data availability. Primary balance data for members is exceptionally scarce for the entire sample period. Denoting the government balance with G, and nominal GDP with PY [NGDP], the transformation used was 100*G/PY.	WEO
ca_balance	Current account balance as a percent of GDP. Denoting the external current account balance [BCA] with CA, and nominal GDP with PY, the transformation used was 100*CA/PY.	WEO
reserve_cover	International reserve cover in months of current year imports of goods and services. Denoting reserves with RES [BRASS], and imports with IM [NM], the transformation used was 12*RES/IM. For example, if a country imports $100 million of goods and service in a given year, and its stock of international reserves is $50 million, then the reserve cover in months of imports is 6.	WEO
broad_money	Broad money growth of a member. Denoting the broad money with M [FMB], the transformation used was $100*((M_t/M_{t-1})-1)$.	WEO
ex_dep	Exchange rate depreciation . Since the exchange rate is measured in U.S. dollars per national currency unit, a decline implies a depreciation of the national currency unit.	WEO
dtot	The percentage change in a member's terms of trade. Denoting the terms of trade with TOT [TT], the transformation used was $100*((TOT_t/TOT_{t-1})-1)$.	WEO
	Qualitative Country Specific Controls	
flex	Binary variable that takes the value unity if a member's exchange rate regime was flexible.	MFD [3]
PP_Elec	Binary variable that takes the value unity if a Parliamentary or Presidential elections took place during the current year.	MR05 [4]
hydro	Binary variable that takes the value unity if a member is a net hydrocarbon exporter.	WEO [5]
debt_restruct	Binary variable that takes the value unity if an arrangement was to facilitate debt restructuring.	PDR [6]
	Internation interest rates	
Int_ST_US	U.S. real short-term interest rate. This OECD [E111IRS] short-term interest (Federal Funds) rate is adjusted for U.S. CPI inflation. Denoting the short-term interest rate with "i" and CPI inflation with π, the transformation used was simply $i-\pi$.	OECD [8]
DepInt_US	U.S. real short-term deposit rate [W111FIDR_R].	WEO
IntLT_US	U.S. real long-term bond yield [W111FIGB].	WEO
IntLT_G7	G-7 real long-term bond yield [W119FIGB_R].	WEO

Appendix Table 3: Data Sources, Descriptions, and Transformations *(concluded)*

Variable	Description	Source
	International Commodity Prices [10, 11, 12]	
Comm	Commodity Price Index, 1995 = 100, includes both Fuel and Non-Fuel Price Indices.	COMM [9]
APSP	Crude Oil (petroleum), Price index, 1995 = 100, simple average of three spot prices; Dated Brent, West Texas Intermediate, and the Dubai Fateh.	COMM
Food	Commodity Food Price Index, 1995 = 100, includes Cereal, Vegetable Oils, Meat, Seafood, Sugar, Bananas, and Oranges Price Indices.	COMM
Metal	Commodity Metals Price Index, 1995 = 100, includes Copper, Aluminum, Iron Ore, Tin, Nickel, Zinc, Lead, and Uranium Price Indices.	COMM
Agr	Commodity Agricultural Raw Materials Index, 1995 = 100, includes Timber, Cotton, Wool, Rubber, and Hides Price Indices.	COMM
	Global GDP Indicators [10, 11]	
GDP_W	World Gross domestic product, constant prices [W001NGDP_R]	WEO
GDP_IND	Industrialized Country Gross domestic product, constant prices [W110NGDP_R]	WEO
GDP_EU25	EU 25 Gross domestic product, constant prices [W998NGDP_R]	WEO
GDP_G7	G7 Gross domestic product, constant prices [W119NGDP_R]	WEO
GDP_US	U.S. Gross domestic product, constant prices [W111NGDP_R]	WEO
	Global Real Import Demand Indicators [10, 11]	
IMVOL_W	World Volume of imports of goods & services [W001TM_R]	WEO
IMVOL_G7	G7 Volume of imports of goods & services [W119TM_R]	WEO
IMVOL_US	U.S. Volume of imports of goods & services [W111TM_R]	WEO

Notes:

1 WEO denotes the IMF's World Economic Outlook database, series codes within [ ].

2 PDR denotes the IMF's Policy Development and Review Department (PDR), Stand-By Operations Division database.

3 MFD denotes the IMF's Monetary and Financial Surveillance Departments Exchange Rate Regime Classification.

4 MR05 refers to data used in Manasse and Roubini (2005).

5 WEO data complemented by IMF's "Oil Market Developments and Issues," (March 2, 2005), SM/05/75.

6 PDR data complemented by IMF's "Fund Policy on Sovereign Arrears to Private Creditors," (Jan. 9, 1998), SM/98/8.

7 Primary reference was the IMF's World Economic Outlook publication, October 2000.

8 OECD denotes the OECD's Economic Outlook and Analytic Database, series codes within [ ].

9 COMM denotes that this variable can be obtained from: http://www.imf.org/external/np/res/commod/index.asp

10 For variables used in the text preceeded by the letter "D", this indicates that the variable is a percentage change. For example, DGDP_W denotes World real GDP growth. Denoting World GDP measured at constant prices with GDP_W, the transformation used was 100*((GDP_Wt/GDP_Wt-1)-1).

11 For variables used in the text that have a "_LIN" appended to them, this indicates that the variable is a percentage deviation from a (log-) linear trend. For example, GDP_W_LIN denotes the deviation of World GDP from a linear trend (a measure of the global business cycle). Denoting World GDP measured at constant prices with GDP_W, first the variable is logged, then filtered using a linear trend. If we denote the linear trend of the log(GDP_W) with log(GDP_W)_hat, then the GDP_W_LIN corresponds to 100*(log(GDP_W)-log(GDP_W)_hat).

12 For variables used in the text preceeded by the letter "R", this indicates that the variable is real, that is deflated by U.S. CPI (U.S. CPI is used to avoid the hyperinflationary episodes in the transition countries in the mid-1990s which contaminate World CPI inflation). Using 2004 as the base year, these series are deflated using the U.S. CPI, that is R_Commodity Price Index = 100*Commodity Price Index/CPI.

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