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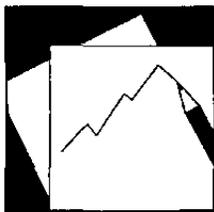
IMF Working Paper

The Link Between Adherence to
International Standards of Good Practice,
Foreign Exchange Spreads, and Ratings

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The Link Between Adherence to International Standards of Good Practice, Foreign Exchange Spreads, and Ratings

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Abstract

This paper examines the relationship between adherence to international standards of good practice in policy-making and two key indicators of access to capital markets and the cost of this access: spreads and sovereign ratings. In contrast to other work, this study reviews a broad set of indicators for adherence to international standards. The estimations are conducted for emerging market economies, and pay particular attention to issues of persistence in spreads and ratings and nonlinearities in the relationships. The main finding confirms the expectation that standards are indeed relevant. Accounting standards and property rights are especially important for spreads, in addition to data transparency (SDDS subscription). Accounting standards and corruption are especially important in explaining ratings in addition to trade protectiveness (not a standard).

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I. INTRODUCTION

In the wake of the Asian crises, the international community promoted the adoption of international standards as a key component of the new "international financial architecture." It was hoped that countries' adoption of internationally recognized standards of good practice would help to foster financial market stability and better risk assessment. More recently, accounting scandals in a number of advanced economies have further underscored the importance of adhering to benchmarks of good practice. The process of developing and agreeing on international standards, however, has been challenging— involving much collaboration between policymakers and various technical bodies. In early 2001, this process reached a milestone with the endorsement by the Executive Boards of the IMF and World Bank of a list of 11 areas for standards assessments (IMF, 2001). In November 2002, Fund and Bank Directors agreed to add anti–money laundering and combating the financing of terrorism (AML/CFT) to this list (Box 1).[2]

The twelve standards cover three broad areas: (1) policy transparency, (2) financial sector soundness; and (3) market integrity (e.g. corporate governance, accounting etc.).

While the literature assessing the policies underlying these standards is extensive, there has been little cross-country empirical work attempting to measure the impact of all the three categories of standards—not surprising given the infancy of the standards initiative.[3] The Institute for International Finance in a recent study (IIF, 2002) examined the impact of one of the transparency standards subscription to the Fund's Special Data Dissemination Standard (SDDS)—on US Dollar Eurobond spreads for emerging-market countries. The study reports a large reduction in spreads (by some 300 basis points) resulting from SDDS subscription, but fails to control for other standards or relevant macroeconomic fundamentals. Sundararajan, Marston, and Basu (2001), in contrast, found no impact of adherence to Basel Core Principles on spreads.

The goal of this paper is to advance the existing empirical research, by examining a larger set of standards-related measures representing the three broad categories of standards, and their relation with key indicators of the cost of capital for a cross-country sample of emerging market economies. We focus here on emerging-market economies because spreads and ratings differ significantly across these countries (in contrast to industrial countries), while there are considerable gaps in explaining these differences with the usual macro economic variables.

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[2] At that time, IMF Directors called for more research to assess the benefits of standards and codes in reducing vulnerability to macroeconomic and financial shocks.

[3] It should be stressed that, according to the theoretical literature, the impact of individual standards on crises may not be unambiguous (see the next section).

Box 1. List of Standards and Codes Useful for Bank and Fund Operational Work and for Which Reports on the Observance of Standards and Codes are Produced

Transparency Standards: (1) **Data Transparency**: The IMF's *Special Data Dissemination Standard/General Data Dissemination System*; (2) **Fiscal Transparency**: The IMF's *Code of Good Practices on Fiscal Transparency*; (3) **Monetary and Financial Policy Transparency**: The IMF's *Code of Good Practices on Transparency in Monetary and Financial Policies*.

Financial Sector Standards: (1) **Banking Supervision**: The Basel Committee's *Core Principles for Effective Banking Supervision*; (2) **Securities**: The International Organization of Securities Commissions' (IOSCO) *Objectives and Principles for Securities Regulation*; (3) **Insurance**: The International Association of Insurance Supervisors' (IAIS) *Insurance Supervisory Principles*; (4) **Payments Systems**: Committee on Payments and Settlements Systems' (CPSS) *Core Principles for Systemically Important Payments System; (5)* **Anti-Money Laundering and Combating the Financing of Terrorism**: *FATF's 40+8 Recommendations*

Market integrity standards: (1) **Corporate Governance:** The OECD's *Principles of Corporate Governance* (1999); (2) **Accounting**: The International Accounting Standards Committee's *International Accounting Standards*; (3) **Auditing**: The International Federation of Accountants' *International Standards on Auditing*; (4) **Insolvency and Creditor Rights**: The World Bank's *Draft Principles and Guidelines for Insolvency and Creditor Rights Systems* and the United Nations Commission on International Trade Law's *Legislative Guide on Insolvency Law.* There is no agreed upon standard in this area yet: Staffs of the World Bank and UNCITRAL in consultation with IMF staff are working towards a single standard

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Following a short review of the existing literature on the benefits of standards, we present our empirical results, which outline the impact of standards adherence on the cost of capital, as measured by spreads on foreign currency-denominated sovereign bonds, and on a measure of credit ratings. Both sovereign spreads and credit ratings are indicators of the ability to access capital markets and the costs countries face for such access. Both approaches have their empirical and practical advantages and drawbacks. For example, more observations are available for ratings, while spreads better reflect market conditions in the short run.

In estimating models of spreads and ratings we pay particular attention to the nonlinearity of the relation between spreads and explanatory variables, the dynamic structure of spreads, testing for a full range of relevant macroeconomic variables, and building where possible on current best practice.

Both for spreads and ratings we find important beneficial effects of adherence to international standards. We find that countries with better observance of standards in general have lower spreads and higher credit ratings. Particularly, accounting standards,

anticorruption and property-rights-related standards are important. In interpreting the results it should be kept in mind that standards are closely correlated and that the sets of empirically significant standards should be treated like indicative sets of standards.

Section II briefly outlines the range of standards under consideration, and summarizes previous empirical work in this field, while Section III reports on the data on standards. Section IV presents our findings on the impact of standards adherence on foreign currency spreads, while section V presents our results for their impact on credit ratings. Section VI concludes.

II. STANDARDS: AN OVERVIEW

A. Brief Description of Standards

As noted there are twelve areas for standard assessments recognized by the international community as important for the functioning of countries' economic and financial systems. Box 1 presents the 12 areas, grouped into the three mentioned categories: transparency; financial sector regulation; and market integrity. The dividing line between the categories is not sharp—for example fiscal and monetary transparency includes governance aspects that could fall under the category of market integrity. Similarly, there are aspects of the market integrity standards that involve transparency. Countries are assessed on a voluntary basis vis-à-vis these standards and the results are reported in Reports on the Observance of Standards and Codes (ROSCs). As of end-December 2002, 343 ROSCs had been completed for 89 countries of which 43 had been published.

B. Theory and Previous Empirical Research on Standards

Economic theory generally suggests that adherence to an appropriate standard should have a favorable impact on economic outcomes. Lack of *transparency* creates inefficiency by preventing mutually beneficial transactions, for instance in product markets (Akerlof, 1970), labor markets (Spence, 1974), and credit markets (Stiglitz and Weiss, 1981).[4] Poor *financial sector regulation*, in a world of high information costs for small depositors, asymmetric information, incomplete contracts, and (sometimes implicit) government guarantees, can lead to bank runs, moral hazard and contagion. Further, bank failures in turn may lead to external crises (Kaminsky and Reinhart 2000). Finally, weak *corporate governance and market integrity* will tend to worsen the agency problems arising from the fact that shareholders, as owners of the firm, must delegate the day-to-day running of the company to managers. There is an extensive literature on the impact of poor corporate governance and weak balance sheets on the severity of external crises (Krugman 1999).

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[4] The impact of transparency on crises is not unambiguous. Badly designed transparency, for example a poorly-timed improvement in transparency that reveals a country is on the verge of crisis might itself precipitate a crisis (see Prati and Sbracia, 2001 and Furman and Stiglitz 1998).

Turning to empirical work on standards, the focus is primarily on the allocative impact of standards, although some researchers emphasize the effects on economic stability. Moreover, much of this empirical work focuses on testing specific standards rather than systematically reviewing the impact of all three identified categories of standards.

In the area of *transparency*, Gelos and Wei (2002) find that emerging- market funds hold fewer assets in less transparent countries. Kuttner and Posen (2000) find that increased transparency by the U.S. Federal Reserve and the Bank of Japan has reduced exchange rate volatility. Alt and others (2001) find that fiscal transparency is associated with lower levels of debt and spending. The IIF (2002) finds that emerging-market countries that subscribe to the SDDS have significantly lower spreads. In contrast. Chortareas and others (2001) find no impact of transparency, as measured by the degree of detail contained in central bank forecasts, on output volatility.

In the area of *financial-market regulation*, Demirguc-Kunt and Detragiache (1998) find that, although financial liberalization leads to more rapid development of financial markets, it is also associated with a higher probability of financial crises. They also find that standards can help reduce the probability of a crisis in these circumstances. Rossi (1999) finds that better prudential regulation and lower deposit guarantees are associated with fewer banking crises, and that more supervision and lower deposit guarantees are associated with fewer external crises. These results contrast, as noted, with Sundararajan, Marston, and Basu (2001) who do not find any evidence that observance of Basel Core Principles reduces spreads or the level of non-performing loans. Similarly Barth, Caprio, and Levine (2001) find that regulations, to the extent that they restrict banks' activities, also hinder their development and efficiency, and so increase the probability of crisis.

In the area of *market integrity*, there is substantial micro-level empirical evidence of the benefits of observing standards, but there is less work at the macroeconomic level. The limited work that exists suggests that emerging-market countries are less prone to crisis if they have strong shareholder rights (Mulder, Perrelli, and Rocha, 2002) and perform better in terms of exchange rate depreciation and stock market movements (Johnson *et al* 2000).

In general, however, these studies do not conduct a review of the combined impact of observance standards across all the three main areas, and only a few studies focus on overall macroeconomic conditions (e.g., output volatility, external crisis indicators or spreads). This paper will take a first step in the direction of systematic treatment of the three categories of standards, and the role of standards observance in a country's ability to borrow abroad.

III. Data on Standards and Estimation Issues

Measurement of countries' observance of standards is still in its infancy, with most of the literature using either indicators collected by pioneers La Porta *et. al.* (1998), or data the authors collect on a specific standard. Nevertheless, progress has been made and several institutions have started measuring various aspects of observance. E.g., Oxford Analytica has commenced using ROSCs (where available) to measure some standards. Here we will use a full range of quantitative measures compiled by dedicated observers of standards, without

necessarily endorsing these measures, to ensure a wide coverage of standards. In particular, we use standards related indicators identified in a recent exercise by Wilshire Associates (2002) for CalPERS aimed at discriminating between emerging market countries for investment; and those indicators prepared by Price Waterhouse-Coopers (PWC), Transparency International, the World Economic Forum (WEF), Oxford Analytica, and La Porta *et. al.*

In Table 1, we present the indicators that we found to be most closely related to the twelve recognized international standards, categorizing them as transparency, financial sector, or market integrity related standards. This exercise unavoidably involves some degree of judgment, as few indicators directly measure the standards themselves, and institutions such as the WEF collect data across a wide range of topics. Testing all of these simultaneously would undermine the utility of our results, as we would necessarily face a significant multi-collinearity problem. Therefore, the focus of our paper is on variables that most closely resemble the twelve key standards, or the theoretical arguments underpinning their significance. In addition to the measurement of standards, we control for a trade-policy indicator to reflect the institutions that define the important external relations of a country—noting that trade openness is often closely related to capital account openness.

In the transparency category, there is a close match between indicators and the relevant standards— SDDS subscription, and adherence to the fiscal- and monetary-transparency codes (compiled by Oxford Analytica and used by Wilshire/CalPERS) are direct measures of the three international standards included in this area.

Surprisingly few quantitative indicators cover adherence to *financial sector regulation*, as the databases containing financial-sector information in this area focus nearly exclusively on descriptive material. Nevertheless, one key indicator from the WEF, used also by Wilshire Associates, tries to capture the adequacy of financial regulation, and thus in principle covers the combined standards in this category.

Of the various available indicators, most concern *governance*, with various indicators covering each of the standards falling in this area. In view of the large number of indicators and diverse nature of the standards in this area it is useful to subdivide this class of variables into: a) corporate governance (and corruption); b) accounting and auditing standards and; c) creditor and property rights—including creditor and shareholder protection and contract enforcement. Here we include government corruption-related issues with corporate

Table 1. Category of Standards and Available Indicators

Standards argument	Description	Acronym	Range	Source of underlying data	In sample: 1/ Minimum		Maximum		Mean	Std. Dev
Transparency	Whether a country subscribes to the SDDS or not.	SDDS	1 for subscription, 0 for non-subscription	IMF	0.0	Bulgaria	1.0	Argentina	0.7	0.5
	Adherence to Monetary Transparency code	WILs Monetary	Scale from 1 to 4, with 4 most transparent	Oxford Analytica	2.0	China, PR	4.0	Argentina	3.4	0.8
	Adherence to Fiscal Transparency code	WILs Fiscal	Scale from 1 to 4, with 4 most transparent	Oxford Analytica	1.0	China, PR	4.0	Argentina	2.7	1.0
Financial sector regulation	Adequacy of Financial Regulation.: survey question addressing regulation and supervision of financial institutions.	WILs Financial Regulation	Regulations and supervision of financial institutions are (1=inadequate for financial stability, 7= the most stringent)	WEF	0.0	Pakistan	5.7	Chile	4.2	1.1
	Banking and Finance: undue government control (government ownership, credit allocation) and protectionist regulations.	WILs Financial Interference	Scale from 1 (least economic freedom) to 5 (most conductive to economic freedom).	Heritage/WSJ Index of Economic	1.0	Czech. Rep	4.0	China	2.9	0.8
Market Integrity — Accounting	Accounting Standards: extent to which public companies utilize US GAAP or IAS and membership of IAS council.	WILs Accounting	Scale from 1 (does not follow) to 3 (follows).	IAS Website	1.0	Brazil	3.0	Jordan	1.9	0.7
	Accounting Standards: based on inclusion of 90 items in annual reports for 1990, such as balance sheet detail.	LaP Accounting	Number of items included.	La Porta et. al, 1998.	24	Egypt	76	Malaysia	54	13.0
	Accounting opacity: consistency and adherence of accounting standards and disclosure	PWC Accounting	High numbers indicate a high degree of opacity and low numbers indicate a low degree of opacity.	PriceWaterhouse Coopers	2.2	Korea	3.4	Chile	2.7	0.3
Creditor Property rights	Confidence in the judicial system and the enforcement of laws, regulations, property rights, and shareholder protection	PWC Enforcement	Low numbers indicate a high degree of opacity and high numbers indicate a low degree of opacity.	PriceWaterhouse Coopers	2.0	China, PR	3.4	Chile	2.7	0.3
	Anti-director Shareholder Rights	WILs Anti- Director Rights	Scale from 0 (weak) to 5 (strong).	La Porta et. al (1996)	0.0	China, PR	4.0	Argentina	1.9	1.4
	Property Rights	WEF Property Rights	Financial assets and wealth are (1=poorly delineated and not protected by law, 7=clearly delineated and protected by law)	WEF	3.2	Ukraine	5.8	Jordan	4.6	0.7
	Intellectual Property Protection	WEF Intellectual Property Rights	Intellectual property protection is (1=weak or non-existent, 7=equal to the world's most stringent)	WEF	2.4	Ukraine	4.6	Jordan	3.6	0.6
	Government Commitments	WEF Government Commitment	New governments honor the contractual commitments and obligations of previous regimes (1=not true, 7=true)	WEF	2.5	Ukraine	5.6	South-Africa	4.6	0.6
and shareholder rights	Creditor Rights: Reflects administration of property by debtor during bankruptcy, automatic stay, restrictions on filing debt reorganization, ranking of secured creditors in payouts.	LaP Creditor Rights	Scale from 0 (low) to 4 (high).	La Porta et. al, 1998.	0.0	Colombia	4.0	Egypt	2.3	1.6
	Shareholder Rights: reflects aspects such as proportional representation, shares needed to call shareholder meeting, anti-director rights, voting by mail.	LaP Shareholder Rights	Scale from 0 (low) to 6 (high).	La Porta et. al, 1998.	1.0	Egypt	5.0	Chile	2.7	1.4
	Enforcement index: average of five variables: the efficiency of the judicial system, the rule of law, the level of corruption, the risk of expropriation, and the risk of contract repudiation.	LaP Contract Enforcement	Scale from 0 (low) to 10 (high)	La Porta et. al, 1998.	4.1	Philippines	7.7	Malaysia	5.8	0.9
Corruption	Degree to which corruption is perceived to exist among public officials and politicians, by businesses and country analysts	TPI Corruption	CPI ranges between 0 (highly corrupt) and 10 (highly clean).		1.9	Indonesia	7.5	Chile	3.8	1.1
	Overall opacity index. Summary indicator of corruption in government bureaucracy based on sub indices included in this table and index of macroeconomic policies.	Opacity index	Variables range from 1 (low transparency/high opacity) to 4 (high transparency/low opacity)	PriceWaterhouse Coopers	2.4	Russia	3.4	Chile	3.0	0.2
	Judicial Independence	WEF Judicial Independence Index	The judiciary is independent and not subject to interference by the government and/or parties to disputes (1=not true, 7=true)	Global Competitiveness Report	1.7	Venezuela	5.7	South-Africa	3.9	1.1
	Favoritism in Decisions of Government Officials	WEF Favoritism	When deciding upon policies and contracts, government officials (1=usually favor well-connected firms and individuals, 7=are neutral among firms and individuals)	Global Competitiveness Report	2.1	Ukraine	4.0	Chile	3.1	0.4
	Regulatory opacity: effectiveness and consistency in applying regulations	PWC Business Regulations	High numbers indicate a high degree of opacity and low numbers indicate a low degree of opacity.	PriceWaterhouse Coopers	2.0	China, PR	3.3	Chile	2.7	0.3
PM	Restrictiveness of trade policy based on non-tariff and tariff barriers.	Trade Restrictiveness	Index is measured on a scale of 10, where 10 is the closets and 1 the most open to trade.	IMF	1.0	Chile	8.0	Egypt	4.2	2.0

1/ The country examples fpor the minima and maxima are the first in the alphabetical listings that meet the criterion.

governance, as they are closely associated, although corruption issues might also be associated with the fiscal transparency standard.

Finally, it should be noted that the various standards do tend to correlate with each other, which will complicate our ability to distinguish their individual effects. The last section in the paper contains a correlation matrix that gives an indication as to the size and direction of these correlations.

IV. ADHERENCE TO STANDARDS AND FOREIGN EXCHANGE SPREADS

A. Introduction

Spreads on foreign currency-denominated sovereign bonds are a key indicator of a country's access to private foreign capital—particularly over the short run—with high spreads associated with external vulnerability and the "capital account" crises of the 1990s. In terms of economic welfare, prohibitively high spreads can lead to unsustainable debt dynamics, which can then choke off access to capital and force a sharp, often painful, current account adjustment.

This section examines the relationship between foreign exchange spreads and countries' observance of international standards, including membership in the SDDS. A related study by the Institute of International Finance (IIF 2002) examined the impact of SDDS membership, but did not examine *other* measures of adherence to standards. As a starting point, we estimate a core econometric model that relates foreign exchange spreads to a range of fundamental macroeconomic variables including those of the IIF study, and those found in the literature more generally (e.g. Edwards 1984, Goldman Sachs 2000, and models of ratings discussed in the next section). These variables include: inflation; investment as a percent of GDP; the GDP growth rate; fiscal balances, inflation, terms of trade; overall external debt ratios; the debt service ratio; and a dummy variable that indicates whether the country was involved in restructuring its external debt.

We pay special attention to the time-series properties of the data, as foreign exchange spreads typically exhibit considerable persistence over time. Spreads are especially prone to long periods of gradual decline following burst of crises, possibly because policies gradually improve following crises or periods of contagion. Our specification allows for persistent shocks (through a serially correlated error structure) as well as for the sluggish adjustment of market participants (modeled through the inclusion of a lagged dependent variable as a regressor). In this our study is considerably more general than, e.g., the IIF study.

B. Study Design and Estimation

A preliminary investigation of our dataset reveals that the distribution of foreign exchange spreads is especially skewed. While the median spread from our sample is 234 basis points, the mean is substantially larger at 590 points, and some spreads are extraordinary high. E.g., Russia's spreads reach a peak of 7063 basis points. Stylized facts

moreover suggest that explanatory variables (e.g., debt ratios) are not proportionally higher for countries with higher spreads with the exception of inflation (e.g., debt ratios do not increase tenfold for countries with spreads of 400 rather than 40 basis points). We consider, therefore, that the relationship between macroeconomic variables and adherence to standards, on the one hand, and foreign exchange spreads, on the other, may be non-linear. After examining the residuals of various alternatives, our preferred specification includes as the dependent variable the natural log of foreign exchange spreads, rather than their level.

We note that the IIF study considered a regression of the *levels* of spreads. Although we do not list all our findings here, we also examined a model of spread levels—both replicating the IIF study and extending it, but find the log specification to indeed function better. The results of replicating the IIF study are outlined in Appendix I. (Comparing with the results below underscores how important addressing the issues of persistence, non-linearity and including a full set of standards are.)

The stylized equation for our panel regression is shown below.

$$y_{it} = \sum_{j=1}^{p} \beta_j y_{it-j} + \gamma X_{it} + \delta Z_i + \alpha_i + \varepsilon_{it} \tag{1}$$

where

$$\varepsilon_{it} = \rho_i \varepsilon_{it-1} + v_{it} \tag{2}$$

The dependent variable, y_{it}, is the (log) spread of country i at time t. There are $i=1..N$ countries, with $t=1..T_i$ time periods available for each country. The independent variable, X_{it}, denotes a range of time- and country-specific macroeconomic fundamentals, whereas Z_i denotes the range of standards-related indicators that we wish to investigate. The latter variables are time invariant.[5] The symbols ε_{it} and v_{it} represent the error terms, where ρ_i is the error autocorrelation coefficient, which we allow to differ between countries. The symbol α_i represents a country-specific effect, which is also time invariant.[6]

The two equations represent two different ways of accounting for the observed persistence in foreign exchange spreads over time. Equation (1) allows for the possibility that the shocks themselves may be persistent, which might be the case if information were

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[5] A few standards-related measures did actually vary by time, but generally the time variation was very small. For the purposes of this study, all standards are measured as of the end-period for which they were available.

[6] We include a country-specific effect to allow for the possibility that our model does not account for *all* the variation across countries. However, given that both the country-specific effect and our standards-related variables are time invariant, identifying their separate impacts is impossible. We therefore adopt a random-effects estimation procedure which generates the country-specific effect by fitting them to a stochastic distribution across the panels.

revealed to the market slowly. Equation (2), on the other hand, allows for the possibility that market participants may only adjust gradually to new information. The parameter p denotes the number of lags in the model. As shown in Table 2, we first look at a "static" model in which only the shocks are persistent, and where spreads adjust fully to new information within a single observation. As measured by a panel-framework indicator of serial correlation,[7] there is still considerable persistence unaccounted for — the p-values in the table are from a null hypothesis of zero remaining serial correlation. In fact, in our preferred specification, it requires two lags of the dependent variable before we can comfortably fail to reject the null. [8]

The inclusion of a lagged dependent variable within a panel-data framework, however, presents a potential problem. As pointed out by Anderson & Hsiao (1981), when we allow for a country-specific effect α_i, both fixed- and random-effects estimators of β will be biased. This is the case because y_{it-1} and estimates of α_i are correlated by construction, ensuring that at least one of the regressors is endogenous. Leaving out the lagged dependent variable, on the other hand, would also be problematic, as the presence of uncorrected serial correlation may make our standard error estimates significantly less efficient. In case of spreads, excluding lags is particularly problematic because the spreads vary considerably over time, much more than ratings, where variation across countries is much more important. Thus, loss of efficiency is relatively important.

Considering the trade-offs we therefore choose to retain the lagged variable, taking comfort from the fact that the theoretical bias is of the order 1/T, and so is unlikely to have a large practical impact in our case where the panel length is typically greater than 10 observations.[9] [10] Specifically, we will use iterated Feasible Generalized Least Squares, so as

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[7] See Baltagi (2001) p.98.

[8] Goldman Sachs (2000) adopt the Pooled Mean Group methodology suggested by Pesaran, Smith and Shin (1999). Unlike our approach, this methodology allows the dynamic coefficients (β) to vary across countries. However, as pointed out by Pesaran et al, this method is best suited to datasets with a large T – our dataset only includes semi-annual observations, and so is somewhat limited in this dimension. Moreover, on a priori grounds, while it is plausible to suggest that the persistence of new information (ρ) may differ across countries, the market's adjustment to that information reflects common conditions in the global capital market, and so is likely to be the same across countries.

[9] The usual panel-data remedies for lagged dependent variable bias are unavailable in our case, as they typically remove any endogeneity by taking the first difference of the data and then applying an instrumental variables technique on the resulting lagged difference — see Anderson & Hsiao (1982), Arellano & Bond (1991), Ahn & Schmitt (1995). This, of course, would also remove any time-invariant variables, making it impossible to estimate the impact of our standards-related measures. As a cross check, however, we re-estimate our preferred specification using OLS with panel-corrected standard errors and allowing for serial correlation. This specification does include a lagged dependent variable, but does not contain a country-specific term α_i and so is not subject to the same source of bias (although omitting country effects may entail its own problems). We do not report our results here, but the different estimation method produces similar results when compared to our preferred specification.

to allow for lagged variables in addition to the panel-specific autocorrelation and heteroskedasticity across panels as specified in equation (2).[11]

Of the 29 emerging-market countries in our initial study design, only 24 had sufficient data on foreign exchange spreads to be included.[12] Data used is on a semi-annual basis (the highest available frequency for our data set), starting in the second half of 1992 and ending in the first half of 2001. Spreads are measured as at the end of the period, whereas most of the macroeconomic variables reflect activity for the entire period. There is therefore unlikely to be any obvious issue of reverse causation. Also, given that we are estimating a dynamic model, our reported coefficients in Table 3 reflect the *long-run* impact of our standards-related measures for ease of interpretation — i.e. estimated coefficients are multiplied by $1/(1-\beta_1-\beta_2)$.

C. Estimation Results —Core Macroeconomic Model

We start with a model that seeks to explain spreads via a standard set of macroeconomic fundamental variables. The IIF study serves as an initial template — though we improve the design significantly to account for the time-series properties of the data, to incorporate a wider set of variables, and to use a larger dataset. Owing to the interest in the IIF study, we also attempt to replicate their results as closely as possible using our dataset. As mentioned above, Appendix II presents the outcome of that exercise in more detail.

Table 2 reports the results of our macroeconomic model. The first few columns of the table outline a model that incorporates all appropriate macroeconomic variables. As can be seen from the serial-correlation p-values, it requires two lags of the dependent variable before we can comfortably fail to reject the null hypothesis of no residual autocorrelation.

In deriving a more parsimonious "core" macroeconomic model, we adopt a Hendry-style general-to-specific procedure, in which insignificant variables and those with incorrect

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[10] System GMM estimators have been proposed that use instrumental variables and mix information from changes and levels of variables that may be able to overcome some of the theoretical difficulties with the original Arellano-Bond estimator (see Arellano and Bover, 1995). Future research is needed to determine whether they can be implemented successfully given the relatively short sample size available, and given the lower efficiency of GMM estimators relative to maximum likelihood estimators that were used in our case. Also, in practice it may be difficult to construct appropriate instruments.

[11] We do not allow for contemporaneous correlation across panels, as that would not be feasible within a GLS framework (with $T < N$ each correlation would have to be estimated using less than two observations).

[12] See next section for the full set of countries (Table 6), and data sources. Of the 29 countries (see next section) we omitted Bulgaria, Egypt, India, Czech Republic, Slovak Republic, Ukraine because of problems with the availability of sovereign spread data. For spreads we use where available EMBI index and otherwise data on individual bonds reported by Bloomberg.

signs are omitted until only a set of significant regressors remains. The robustness of the resulting specification is then examined by testing the omitted variables one by one to ensure that they remain insignificant. The final core model for spreads is outlined in the table, and includes: the ratio of investment to GDP; the GDP growth rate; the rate of inflation; and a dummy variable to reflect whether the country was currently restructuring its existing debt obligations. These results are fairly similar to those found for credit ratings (see next section).

The results differ from the IIF results which did not find (or test) the significance of investment to GDP or growth, but rather found short-term debt to reserves, the current account balance to GDP, external debt to GDP, and the fiscal balance to GDP to be relevant in explaining spreads. No doubt the lagged spreads in our approach takes away the significance from these additional variables.

D. Estimation Results—Standards-Related Measures

Table 3 outlines our estimation results when we control for adherence to standards. Starting with the core macroeconomic model, we first add our available standards-related measures individually. For ease of presentation, when more indicators from the same broad topic are significant, we only display the results for one of those indicators. Interpreting the (long-run) coefficients, estimation (2) suggests that, for an average country, subscription to the SDDS will tend to lower foreign exchange spreads by about 88 percent *over the long run*. This is of course exceedingly large, and we might expect that the estimated impact may fall considerably once we control for other institutional standards. Moving to estimation (3), the coefficient on the Wilshire Index of Financial Market Regulation suggests that a one standard deviation deterioration in the index—moving, for example, from the level in Malaysia to the level in Turkey—will tend to increase spreads by ($52.4 \times 1.24 =$) 65.0 percent over the long run. Similar interpretations apply to the other indicators.

Table 2. Results for Foreign Exchange Spreads: Macro Model

Dependent Variable: Log of Foreign Exchange Spreads (in basis points)

Variable 1/	Exp. Sign	Full Macro Model 2/			Core Macro Model 2/		
		Static	One Lag	Two Lags	Static	One Lag	Two Lags
Constant		4.797	1.152	1.295	5.812	1.336	1.499
		(17.27)	(4.16)	(4.58)	(34.56)	(5.87)	(5.79)
ln(FISB₁)		-	0.753	0.784	-	0.779	0.809
			(19.29)	(11.81)		(21.28)	(12.23)
ln(FISB₂)		-	-	-0.074	-	-	-0.057
				(1.19)			(0.93)
DEBTX	(+)	0.104	0.024	0.056	-	-	-
		(3.01)	(0.89)	(1.97)			
FBGDP	(-)	-0.417	0.027	0.029	-	-	-
		(1.40)	(0.08)	(0.08)			
DSX	(+)	-0.211	-0.049	-0.225	-	-	-
		(1.29)	(0.39)	(1.69)			
XGR	(-)	-0.077	-0.079	-0.040	-	-	-
		(0.96)	(1.27)	(0.73)			
IGDP	(-)	-2.582	-0.533	-0.743	-2.740	-0.654	-0.697
		(3.73)	(1.47)	(2.15)	(4.20)	(1.98)	(2.01)
GRGDP	(-)	-0.423	-0.201	-0.095	-1.445	-0.455	-0.492
		(2.21)	(1.26)	(0.54)	(9.66)	(4.69)	(4.61)
INFL	(+)	0.843	0.452	0.504	0.721	0.414	0.446
		(3.91)	(3.44)	(3.93)	(3.76)	(3.23)	(3.26)
TOT	(-)	0.831	0.366	0.474	-	-	-
		(3.41)	(2.33)	(3.04)			
DEBTGDP	(+)	0.113	-0.005	-0.019	-	-	-
		(0.62)	(0.05)	(0.17)			
CAGDP	(-)	0.774	1.622	2.338	-	-	-
		(0.78)	(2.71)	(3.82)			
RSCH	(+)	0.649	0.269	0.299	0.723	0.196	0.199
		(6.20)	(4.45)	(4.90)	(7.50)	(4.13)	(3.98)
No. Obs		264	242	219	281	256	231
Serial Corr. p-value 3/		0.000	0.085	0.167	0.000	0.096	0.157
Log Likelihood		-103.34	-76.65	-68.17	-113.02	-88.31	-81.96

Notes: Based on Fund-staff estimates and various data sources.

1/ z-statistics are shown below the coefficients, in parentheses, without regard to sign.

2/ Model is estimated using iterated feasible GLS, allowing for panel-specific serial correlation and heteroskedasticity across panels.

3/ P-value is from Baltagi's (1995) test of serial correlation in panels. Null hypothesis is of no serial correlation (rho=0).

Key: FISB = Foreign Exchange Spread; DEBTX = Debt-to-Exports
    FBGDP = Fiscal Balance to GDP; DSX = Debt Service-to-Exports
    XGR = Growth Rate of Exports; IGDP = Investment-to-GDP
    GRGDP = GDP Growth Rate; INFL = Inflation Rate; TOT = Terms of Trade
    DEBTGDP = Debt-to-GDP; CAGDP = Current Account Balance/GDP
    RSCH = Dummy for Debt Restructuring Within the Sample.

Table 3. Estimation Results for Foreign Exchange Spreads: Standards

Dependent Variable: Log of Foreign Exchange Spreads (in basis points)

	Obs.	Transparency (-)	Fin. Mkt. Reg. (-)	Accounting (-)	Creditor and Property Rights				Corruption (-)	Protectionism (+)	Robustness	
Expected Signs: Variables 1/ 2/					(+)	(-)	(-)	(-)	(-)	(+)	(-)	(+)
(1) Core Macro	231	-	-	-	-	-	-	-	-	-	-	-
(2) Core + SDDS Membership	231	-0.878 (5.13)	-	-	-	-	-	-	-	-	-	-
(3) Core + Wilshire Financial Regulation	207	-	-0.524 (5.30)	-	-	-	-	-	-	-	-	-
(4) Core + PWC Accounting	164	-	-	-1.340 (3.92)	-	-	-	-	-	-	-	-
(5) Core + WEF Property Rights	190	-	-	-	-0.628 (5.32)	-	-	-	-	-	-	-
(6) Core + Wilshire Anti-Director Rights	198	-	-	-	-	0.062 (1.08)	-	-	-	-	-	-
(7) Core + La Porta Shareholder Rights	161	-	-	-	-	-	0.192 (2.22)	-	-	-	-	-
(8) Core + WEF Govt. Commitment	190	-	-	-	-	-	-	-0.223 (1.98)	-	-	-	-
(9) Core + Transparency Int. Corruption Index	223	-	-	-	-	-	-	-	-0.441 (6.28)	-	-	-
Core + Trade Restictiveness	223	-	-	-	-	-	-	-	-	0.064 (1.08)	-	-
(11) Core + All Standards	147	-0.044 (.31)	0.464 (5.38)	-0.531 (4.53)	-1.254 (6.30)	-	-	-	-0.113 (1.54)	0.077 (1.82)	-	-
(12) Core+ Select Standards	147	-0.187 (1.36)	-	-0.721 (4.39)	-0.762 (5.55)	-	-	-	-	-	-	-
Robustness Tests:												
(13) Core+ Standards + Per-capita Income	147	-0.121 (1.45)	-	-0.968 (8.03)	-0.897 (12.29)	-	-	-	-	-	0.000 (6.00)	-
(14) Core + Standards + Short-term Debt to Reserves Ratio	147	-0.366 (2.39)	-	-0.335 (1.48)	-0.810 (5.86)	-	-	-	-	-	-	0.336 (2.88)
(15) Core + Standards + Short-term Debt to Reserves Ratio 3/	120	-0.153 (1.34)	-	0.300 (1.37)	-1.075 (8.00)	-	-	-	-	-	-	0.794 (5.82)
Memo: Std. Dev of Regressor		n/a	1.24	0.36	0.58	1.47	1.35	0.57	1.21	1.60		

Notes: Based on Fund-staff estimates and various data sources.

1/ z-statistics are shown below the coefficients, in parentheses, without regard to sign. Reported results are long-run coefficients.

2/ Model is estimated using iterated feasible GLS, allowing for panel-specific serial correlation and heteroskedasticity across panels.

3/ Estimated for 1998:1 - 2001:2 as a robustness test for post-Asia crisis data.

Indicators from nearly all categories are significant, individually, in explaining spreads. An interesting result, however, is that the standards concerning shareholder protection do not seem to have an effect (the La Porta index is significant, but has the wrong sign). Broader indices of property-rights protection, in contrast, are significant and have the expected sign. This suggests that, although property rights in general are important, there may be a split between the interests of foreign bondholders compared with shareholders.

Estimation (11) describes a model that includes standards-related indicators, one for each area of standards including the sub-categories for market integrity (accounting, property rights, and corruption). As expected, the impact of SDDS subscription is reduced considerably. Surprisingly, financial market regulation appears to have the wrong sign, once we control for other institutional measures. Trade protectiveness remains unimportant, while corruption becomes much less so. We then build a more parsimonious specification by applying the same general-to-specific approach that we used with core macroeconomic model—dropping insignificant variables one at a time, and then examining the resulting model by adding the omitted variables individually. Our preferred specification is outlined in estimation (12). The remaining key standards concern accounting practices and protection of property rights.

To test the robustness of our preferred model, we further control for the ratio of short-term debt to reserves and per-capita income. Although the level of short-term debt is significant and has the expected sign — lower reserve coverage increases spreads — per-capita income has an incorrect sign. Interestingly the inclusion of per capita income actually strengthens the coefficients of the various standards except the SDDS, suggesting that multi-collinearity is particularly important in this case.

As a final test, in estimation (15) we consider only post-Asia crisis observations to see if our results change. It appears that, while accounting practices are no longer as important, the impact of short-term debt is now much more prominent as is the protection of property rights. This finding is consistent with previous work on ratings, which found evidence to suggest that investors paid much more attention to short-term debt indicators following the Asia crisis.

In estimating the impact of subscription to the SDDS, it is interesting to note that the SDDS indicator is strengthened when the estimation controls for reserves and other standards in estimation (15) even controlling for other standards. Overall, these robustness tests indicate a clear role for standards, but that parameter estimates are not terribly robust for small variations in the specification, limiting the ability to quantify with much exactness the benefit from introducing these standards.

E. Conclusions

Our results give broad support for the importance of standards, particularly those associated with property rights and sound accounting practices. Moreover, our findings also provide some qualified support for the IIF results concerning the role of positive role of the SDDS. The estimated impact is significant, but specific results still lack some robustness owing in part to the lack of data issues and in part to difficulty in capturing the complex dynamic processes of spreads.

Figure 1: Behavior of Near-Default Spreads

Sovereign Bond Spreads (log) and
Composite Ratings Index
(Average 1992:2 to 2001:1)
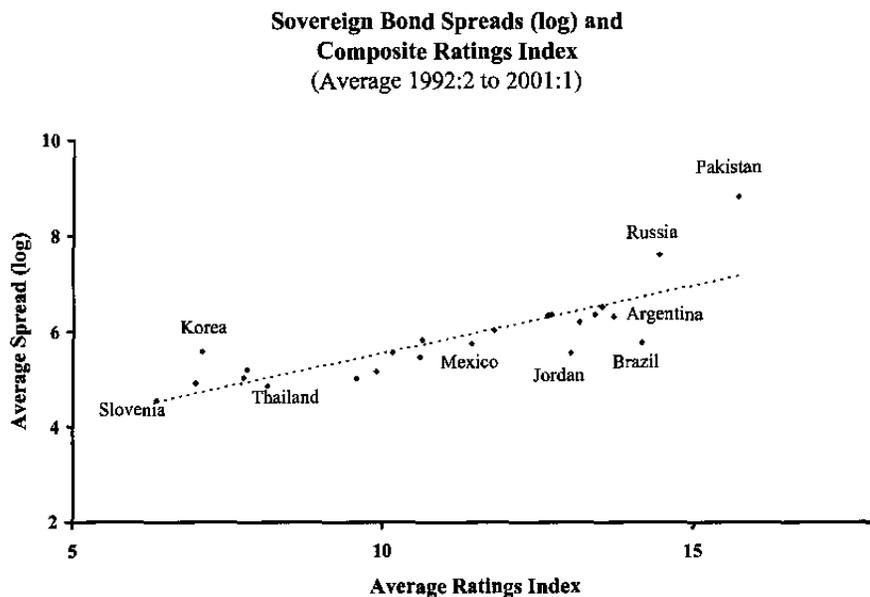
A specific caveat, and potential area for further research, is suggested from our use of a log-spread specification. As noted in the beginning of this section, the log specification was chosen owing to the skewed nature of spreads in our sample. If we examine the data, we see that spreads are particularly skewed for a few countries which, for a time, experienced somewhat daunting spreads on their sovereign bonds. Figure 1 plots average sovereign spreads (log) against average ratings for each country (see next section for the transformation of ratings into the index). Even in the plot of log spreads, Russia and Pakistan are still outliers. The plot suggests that perhaps the pricing behavior of investors is especially non-linear in cases of default. A topic for future research, therefore, might be to better capture such extreme nonlinearities, and whether the impact of near-default on spreads is itself mitigated by a country's adherence to international standards. Similarly further work could address the shift in focus on liquidity in the wake of the Asia crisis.

V. THE ADHERENCE TO STANDARDS AND SOVEREIGN RATINGS

A. Introduction

This section examines the relationship between sovereign ratings and the observance of international standards using a full range of indicators of standards. A study of ratings is warranted, as they provide another key indication of access to private capital and the cost at which this access is obtained. Moreover, such a study is facilitated by the fact that ratings became widely available in the nineties — in fact, they are more widely available than spreads and they can be observed more consistently as they are not dependent on the composition of borrowing. While the IIF study looks at the impact of one standard on spreads, no studies have (yet) been conducted examining the impact of standards on credit ratings.

The main findings of this section are that standards are quite important in explaining ratings: in particular, corporate governance and accounting standards are relevant in addition to trade policy. Standards supplement rather than replace the macro economic variables, and are about as significant as the most significant economic variables. The estimated coefficients suggest that the impact is very sizable, a difference of four notches for the key governance variable (i.e. the difference between an A- and the highest speculative grade, BB+; see Table 3 above for ratings scales).

B. Data and Estimation Issues

As a starting point, we build on an existing model of emerging-market ratings developed by Mulder and Perrelli (MP 2001). Using this model provides a good test of the additional explanatory power of new variables as the model has already been tested for a full range of economic variables that the literature suggests to obtain the best fit (Cantor and Packer 1996, Edwards 1984, Ferri, Liu and Stiglitz 1999, Reinhart 2001). MP found that the explanatory variables driving the ratings of the two major rating agencies – Standard and Poor's and Moody's – are the same.

To strengthen the robustness of the results further, the estimations were expanded to cover 29 countries.[13] Moreover, the tests employ a larger sample by combining ratings of Standard and Poor's and Moody's in a single rating. If only a single rating existed, then that rating was used. By combining the ratings into a single indicator, we are able to build a more balanced sample, which is important given the inclusion of countries that were rated only more recently.

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[13] These countries were selected by choosing those with a debt exposure to banks in excess of US$ 2 billion (according to BIS consolidated data), and by including at least the two countries with the highest exposure from each region (Africa, Asia, Eastern Europe and CIS, Middle East, Western Hemisphere).

The ratings are transformed to a linear scale as shown in Table 4. Following the MP approach, the Positive Watch or Outlook qualifications are given a -0.3 weight and Negative Watch or Outlook qualifications a +0.3 weight — rating agencies use these qualifiers to signal a possible upgrade or downgrade. Rating changes follow on average in less than half the cases.

Following MP we use semi-annual data — semi-annual is the highest frequency available for the entire set of data used — and the same data sources. The estimation covers observations from the first half of 1992 (when agencies commenced to rate an increasing number of emerging-market countries) to the end of 2001. All in all, the sample covers a total of 450 semi-annual observations.

Table 4: Mappings of Ratings into a Numerical Scale

S&P's	Moody's	Interpretation	Linear mapping
Investment grade:			
AAA	Aaa	Highest quality	1
AA+	Aa1	High quality	2
AA	Aa2		3
AA-	Aa3		4
A+	A1	Strong payment capacity	5
A	A2		6
A-	A3		7
BBB+	Baa1	Adequate payment capacity	8
BBB	Baa2		9
BBB-	Baa3		10
Speculative grade:			
BB+	Ba1	Likely to fulfill obligations	11
BB	Ba2		12
BB-	Ba3	Ongoing uncertainty	13
B+	B1	High risk obligations	14
B	B2		15
B-	B3		16
Default grade:			
CCC+	Caa1	Current Vulnerability to Default	17
CCC	Caa2		18
CCC-	Caa3		19
C	Ca	In Bankruptcy or Default	20
SD	D		21

The stylized equation for our panel regression is similar to that for spreads, and is shown below.

$$r_{it} = \gamma X_{it} + \delta Z_i + \alpha_i + \varepsilon_{it} \qquad (3)$$

where

$$\varepsilon_{it} = \rho_i \varepsilon_{it-1} + v_{it} \qquad (4)$$

In this case, r_{it} is the ratings index for country i at time t, X_{it} are the macroeconomic variables which may help drive ratings, while Z_i are the time-invariant standards-related measures under study — as in the previous section on spreads, our standards-related variables are time invariant. We estimate this equation using Feasible GLS, allowing for heteroskedasticity across panels and country-specific serial correlation in the error term. Again, this method is well suited for estimation in the presence of autocorrelation and unbalanced panels.

Although ratings, like spreads, are persistent over time, our preferred specification in this case is static — i.e. it does not include any lagged dependent variables. The dynamic properties of credit ratings have been investigated at some length by previous researchers,

and we are guided here by the work of Monfort and Mulder (2000) and MP (2001). They find that usually, far from adjusting slowly as a result of momentum, ratings tend to remain relatively stable in the face of cyclical macroeconomic movements. Indeed, one of the key claims of the ratings agencies is that they attempt to see through the business cycle, and so adjust their ratings relatively infrequently and preferable so in response to substantial new information (e.g. Standard and Poor's 1998).

MP (2001) compare dynamic and static specifications for ratings in detail, outlining the strengths and weaknesses of each. Because ratings aim to see through the cycle, dynamic estimations result in coefficients of the lagged dependent variable of close to one. In effect this then results in ignoring all the cross country information in the initial rating. As the changes in the ratings are very limited, this implies that most of the relevant cross country information is discarded in a dynamic specification and results hence are quite unstable and not robust.

Accordingly, their preferred specification is static and is estimated using FGLS allowing for heteroskedasticity and country-specific serial correlation. The results presented in this paper build on their estimation by adopting the same approach while controlling for standards-related measures.

C. Estimation Results

To start we re-estimate the core macroeconomic MP specification for the larger dataset. Notwithstanding the expanded sample, the results are quite similar to those found in that study. Estimation (1) in Table 6 reports the results for the core macroeconomic model. The results from the MP study are shown below estimation (1) for comparison. The results for the larger sample and combined ratings largely confirm the significance, signs and magnitude of the coefficients of the key variables found relevant by MP: inflation, debt over exports, investment over GDP, the fiscal balance, and the rescheduling history are all significant. In contrast to MP, however, GDP growth is not found to be significant. Noteworthy also is the fact that debt-to-exports strongly outperform debt-to-GDP. Our core model, therefore, excludes GDP growth, but includes with external debt-to-exports, inflation, the fiscal balance, investment-to-GDP, and the rescheduling dummy.[14][15]

Many interesting insights can be gleaned from evaluating one by one the role of standards if added to the core equation with economic variables. Using this approach, 7 out of 23 indicators of standards are significant (see the variables with acronyms in Table 2). In the transparency category, only the dummy for SDDS subscription is significant with the

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[14] The rescheduling dummy reflects the history of rescheduling of the country (it is one when payments were rescheduled before between 1985 and the period in question).

[15] For the entire period, the ratio of short-term debt (by remaining maturity) to reserves is also not significant, but for a shorter period, starting in 1998, this variable is significant. This is similar to the result MP found: since the Asia crisis, this variable has become significant, confirming the professed increased focus of ratings agencies on liquidity risks (Fitch IBCA 1998). The main tests here focus on the entire sample period, and therefore left out this variable (see however, equations (12) and (13) discussed toward the end of this chapter.

correct sign. Of the variables selected by Wilshire Associates for CalPERS (2001) to support its selection of emerging market economies eligible for investment, only one was significant, namely accounting standards. Interestingly, while the accounting variable reported by Wilshire is significant, a similar variable by LaPorta's is not, even though LaPorta et. al. (1998) employs a finer gradation. More generally, none of LaPorta's variables are significant and only one of the World Economic Forum (WEF) variables is significant, namely favoritism extended by government officials – i.e. are government officials neutral among firms and individuals when deciding upon policies and contracts? The Opacity Index, collected by Price Waterhouse-Coopers is also highly significant, but only one of its components — accounting standards — was significant by itself. Similarly, the governance index from Transparency International was highly significant. Finally, the trade restrictiveness index was significant as well.

Overall, these results highlight the importance of accounting standards and more general governance-related variables (favoritism, governance, and opacity) in addition to policies that promote openness to trade and data transparency (SDDS subscription).

Moreover, the results show that the contributions of the individual variables to overall ratings can be economically important. The largest contributions in the single standard estimations come from the governance related variables. The opacity index, favoritism and the transparency index each have an estimated impact of about four ratings "notches" when comparing the lowest and highest observed index for each standard. The other variables have, similarly defined, an impact of about one notch. A difference of four notches implies, for example, the difference between B- (the lowest speculative grade rating) and a BB rating. Such a difference usually implies a significant difference in the cost of private capital (spreads approximately increase by 50 percent, see figure 1). This is in addition to any secondary impact of improved policies on the economic variables included in the model.

In interpreting these results, it should be kept in mind that those standards that are correlated with the key economic variables may not appear to be significant. Therefore, standards that are more orthogonal to the economic variables, i.e. contain more "new" information, will tend to be the most significant.

Table 5: FGLS Estimation Results for Sovereign Ratings (December 1992: December 2001)

Dependent Variable: Average foreign currency credit ratings of Standard & Poor's and Moody's

Models / Variables 1/:	In Inflation (+)	Fiscal balance/GDP (-)	Invest ment/GDP (-)	Debt/ Exports (+)	Reschedu ling history (+)	GDP growth	SDDS Transparency (-)	PWC accoun-ting (-) Accounting	WIL accoun-ting (-)	Favora-tism (-) Corruption	TPI governa nce (-)	Opa-city (-)	Trade policy (+) Protectionism	Per capita income (-)	Debt service ratio (+)	STDebt/ Reser-ves (+)	Const.	Obs	Log-likel.	Schw arz 3/
(1) Core (economic variables)	0.55	-15.07	-10.12	0.28	2.75												10.8	450	-303	1.43
	5.36	-7.76	-10.85	7.42	14.71												32.0			
PM MP: Standard and Poor's	1.33	-18.04	-10.68	0.37	1.89	-7.47											11.3			
	4.09	-5.41	-7.62	3.88	6.63	-4.64											28.9			
(2) Core + SDDS	0.40	-13.80	-9.53	0.28	2.13		-0.89										11.8	450	-304	1.45
	3.59	-6.64	-9.22	5.93	8.47		-2.84										25.8			
(3) Core + PWC acccounting	0.63	-10.53	-12.75	0.32	2.57			-1.16									14.7	335	-247	1.59
	4.46	-4.44	-9.43	6.50	8.33			-2.83									11.6			
(4) Core + WIL accounting	0.55	-11.81	-10.13	0.24	2.88				-0.40								11.8	381	-265	1.50
	4.33	-5.10	-8.98	5.03	10.59				-2.31								22.7			
(5) Core + WEF favoratism	0.51	-14.49	-7.36	0.12	2.95					-2.15							17.4	400	-247	1.34
	5.29	-6.89	-7.51	2.67	11.21					-5.67							13.9			
(6) Core + TPI governance	0.41	-12.90	-10.91	0.27	2.67						-0.80						14.2	450	-310	1.47
	3.79	-6.13	-11.61	5.93	10.98						-8.06						26.5			
(7) Core + PWC opacity index	0.62	-10.34	-13.48	0.31	2.63							-3.64					22.2	335	-249	1.61
	4.65	-4.53	-9.89	7.12	9.27							-5.06					10.0			
(8) Core + TRADE policy index	0.53	-13.85	-10.74	0.28	2.82								0.13				10.4	450	-303	1.44
	5.35	-6.98	-11.75	7.12	15.24								2.14				26.1			
(9) Core + Indiv. sign. stand.	0.46	-10.42	-8.37	0.16	3.31		0.78	-1.55	-0.37	-1.90	-0.17	-1.26	0.14				24.4	304	-185	1.46
	3.59	-4.05	-6.10	2.86	9.93		1.81	-2.10	-1.13	-3.47	-0.50	-0.72	0.92				8.9			
(10) Core + Overall sign. stand.	0.49	-11.14	-8.67	0.15	2.97				-0.34	-2.59		-2.20	0.24				24.8	304	-185	1.40
	3.91	-4.56	-6.00	2.74	9.25				-2.10	-6.08		-2.47	3.98				12.1			
Robustness Tests:																				
(11) Core + PC + sign. Std	0.57	-10.90	-7.72	0.12	3.15				-0.32	-2.74		-2.01	0.22	-0.0001			25.0	304	-183	1.41
	4.44	-4.43	-5.21	2.16	9.65				-1.94	-5.49		-1.92	3.54	-2.55			11.3			
(12) Core + STDR + sign. Std	0.49	-10.82	-8.67	0.13	2.73				-0.33	-2.72		-1.59	0.27			0.07	23.5	304	-189	1.45
	3.79	-3.97	-5.76	2.32	8.60				-1.82	-5.92		-1.67	4.04			0.88	10.7			
(13) Core + STDR + sign. Std 2/	5.61	-1.95	-10.82	0.39	1.21				-0.78	-1.19		-4.62	0.34			0.77	28.3	119	-53	1.34
	6.97	-0.70	-5.76	5.35	3.64				-4.57	-2.84		-5.20	6.53			3.56	14.1			

Expected Signs: (+) (-) (-) (+) (+) (-) (-) (-) (-) (-) (-) (+) (-) (+) (+)

1/ z-Normal statistics below coefficients (underlined).
2/ STDR estimated for 1998-1:2001-2, as a robustness test for post-Asian crisis data. This estimation is based on far fewer of servations. 3/ Schwarz information criterion (the smaller, the better).

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In order to review the relevance of the combined standards and their relative contribution, we estimate a model with the full set of standards that were significant in the single-standard estimations. These seven standards are clearly correlated and some are close substitutes, as the correlation matrix (Table 6) shows. In the presence of such multi-collinearity, we might expect that a specification that includes the complete set of standards-related variables produces poor significance results for the individual standards. This is, in fact, the case, as we can see from estimation (9). To select a more meaningful set of representative standards, the following process was employed: First, all insignificant standards were eliminated. Second, using this core group of standards, all the other standards that were individually significant were tested one by one, to obtain a new core set, and so on until a stable set of significant standards was obtained.

This selection process yields a set of four significant variables (estimation (10)), of which the first three are related to standards: the WEF favoritism variable, the opacity index, the Wilshire accounting variable, and the trade restrictiveness index. The standards-related variables are best characterized as a set of empirically representative standards: i.e. the insignificance of other standards does not mean that they are not important, only that they cannot be differentiated sufficiently to measure their impact.

These results point to the importance of governance-related variables. Both the favoritism variable and the opacity index are significant, but favoritism, an indication of government corruption, is particularly important. The coefficient and impact of favoritism is the same as described above (a four notch movement), but the impact of the opacity index is less (2 ½ notches). Of the two accounting variables, not surprisingly only one remains significant, namely the Wilshire index (one notch impact). In addition, the trade restrictiveness index is also important (two notch impact), but not the SDDS variable. This may not be surprising as the SDDS yes/no variable (subscribe or not subscribe) is a fairly crude indicator of data quality and transparency.

Table 6: Pairwise correlation matrix for the cross-section of standards and ratings (June 2000)

	Ratings	Trade policy	Favoratism	Opacity	PWC accounting	WIL accounting	TPI governance	SDDS
Ratings	1.00							
Trade policy	0.23	1.00						
Favoratism	-0.65	0.21	1.00					
Opacity	-0.51	-0.03	0.65	1.00				
PWC accounting	0.01	-0.24	-0.04	0.40	1.00			
WIL accounting	-0.13	-0.10	-0.05	0.09	-0.30	1.00		
TPI governance	-0.71	-0.30	0.68	0.79	0.32	-0.05	1.00	
SDDS	-0.49	-0.33	0.06	0.23	0.14	-0.10	0.38	1.00

D. Robustness and Fit

To test the robustness of these results, the selected equation was re-estimated including several additional economic variables (notably per capita income and the short-term debt to reserves ratio). Indeed, one of the more powerful tests is to check whether per

important, and it is indeed highly significant in our core economic specification without standards. However, when we add standards this variable loses much of its influence, while other variables (notably the standards) remain roughly unaffected (estimation (11)). This result mirrors the findings on spreads. Another test is to check for the significance of the ratio of short-term debt to reserves, both for the entire period and for the post-Asia crisis period. As it turns out, this variable is only significant for the shorter post Asia crisis period, while all the empirically representative standards remain significant (estimations (12) and (13)). Finally, when other economic variables suggested in the literature were again added (the debt service ratio, debt over GDP and the terms of trade) no significant results were found among these variables, whereas standards remained significant.

Last but not least, it is interesting to examine country-by-country how the core macroeconomic model (estimation (1)) compares to a model that includes standards (estimation (10)). Table 7 shows actual and fitted ratings for these two specifications. The core model with standards (estimation (10)) tracks the actual ratings for June 2001 quite well, with an average absolute error of just 1.4 notches, about half a notch better than the core model without standards.[16] Especially noteworthy are the differences for Chile, Indonesia, and Ukraine. The specification with standards shows a rating that is four notches better for Chile than the specification without standards, and is able to explain why Chile obtains the second-best rating in the sample (A-/BBB+). Similarly, the model with standards, explains two of the lowest ratings in the sample — Indonesia and Ukraine — much better than the core economic model without standards. Indeed, it is noteworthy that, out of sample, Ukraine was upgraded by Moody's in January 2002 to the equivalent of B, the rating implied by the specification with standards, while Standard and Poor's assigned a new B rating to Ukraine in December 2001.

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[16] For countries for which data on standards are available, the core model with standards performs even better, with an average error of just over one notch. Comparison of the fit is, for these countries, more reliable as the standards were not replaced by the sample average.

Table 7. Actual and Estimated Sovereign Ratings (for end-June 2001)

	Actual Rating (June 2001)		Estimated Rating Using:		1/
		Numerical scale	Core (Economic variables) plus standards	Core (Economic variables) only	
Argentina	B	15.3	14.9	14.1	*
Brazil	BB- / B+	13.5	14.2	13.9	*
Bulgaria	B+	14.3	12.8	12.6	
Chile	A- / BBB+	7.5	8.4	12.2	*
China, Peoples Republic of	A- / BBB+	7.5	7.9	7.9	*
Colombia	BB	12.2	11.9	11.1	*
Croatia	BBB	10.2	12.2	13.2	
Czech Republic	A- / BBB+	7.5	7.9	8.6	*
Egypt	BB+	10.7	10.6	13.2	*
Hungary	A-	7.0	8.4	9.2	*
India	BB	11.8	10.9	10.8	*
Indonesia	CCC+	16.7	15.0	12.8	*
Jordan	BB-	12.8	11.1	13.2	
Kazakhstan	BB	11.8	12.7	12.8	
Korea	BBB	8.8	7.3	8.1	*
Malaysia	BBB	9.0	9.0	8.8	
Mexico	BBB-	10.2	12.8	12.8	
Pakistan	CCC+	16.7	14.2	14.2	
Peru	BB-	13.2	12.2	13.2	*
Philippines	BB+	11.3	13.5	13.0	
Poland	BBB+	7.8	8.8	9.4	*
Russian Federation	B	15.0	14.0	12.2	
Slovak Republic	BB+	10.7	7.7	8.8	
Slovenia	A	6.0	7.6	8.4	
South Africa	BBB-	9.8	9.7	10.0	*
Thailand	BBB-	10.0	8.8	9.4	*
Turkey	B	15.2	11.3	12.2	*
Ukraine	CCC+	17.3	15.1	12.2	
Venezuela	B	15.0	11.7	10.1	*
Average absolute error:					
Compared to June 2001 rating 2/			1.39	1.88	
(Starred) countries with available standards data only			1.13	1.73	*

1/ Countries for which indicators of significant (core) standards are available.
2/ Assumes that indicators of standards for which no observations are available are equal to sample average.

VI. CONCLUSIONS

Our results show that standards-related indicators contribute significantly to the explanation of spreads and sovereign ratings for emerging market economies. For spreads we find strong results, especially for the role of property rights and accounting standards. Our study of spreads provides some support for the IIF (2002) study, in that SDDS subscription may reduce spreads significantly, but the results are insufficiently robust to provide specific estimates of the SDDS impact.

For ratings, the empirical results similarly underscore the role of accounting standards and the role of corruption. In particular, favoritism by government officials (i.e. governance/fiscal transparency) accounts for a large, fournotch difference in ratings (corresponding to a 50 percent increase in spreads) when comparing the lowest-and-highest rated countries.[17] But also the opacity index, a general (corporate) governance-related indicator, is significant. Furthermore, there is some support for the relevance of SDDS subscription (when tested separately).

From a policy perspective, it should be kept in mind that standards-related measures tend to be correlated, so that it may be difficult to distinguish the precise impact of any single standard—the key goal of this paper has therefore been to control for as broad a range of standards as possible. The paper has adopted the strategy of testing and using as broad a set of macroeconomic and standards' related variables as possible also in order to minimize the omitted variables bias. The use of standards that are constant over time further reduces the risk that standards are correlated with short-term political changes which in turn drive changes in spreads and ratings. The risk of omitted-variables bias is further reduced by using random effects to compensate for other country-specific effects. The robustness test for a key potential determinant of standards (per capita income) was passed well for the ratings estimation. Overall, the results seem consistent across specifications, although to the degree that some residual omitted-variables bias persists the individual coefficients might remain somewhat overstated.

In sum, our findings suggest that improved adherence to standards, and the higher ratings that result, could help a country mitigate the impact of an external crisis by supporting continued access to external borrowing. Adherence can help *prevent* crises by reducing spreads and helping the authorities remain solvent in cases it otherwise might not have remained solvent. Further work will be helpful in improving these results: in particular, work on examining longer data sets will be helpful, in addition to expanding the inclusion of non-standard-related institutional factors. Longer data sets would also facilitate the use of more demanding techniques (such as system IV-GMM) that may help compensate for some of the estimation problems at the cost of reduced efficiency. More work could also be done on examining what effect crises have on adhering to standards.

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[17] Our study only measures the direct effect of standards observance. To the extent that there is also an indirect effect, through better macroeconomic policies, our results will tend to underestimate the effects of standards on ratings and spreads.

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Replicating the IIF (2002) Work on the Relationship between SDDS Membership, Macroeconomic Fundamentals, and Spreads

As one key first test of the robustness of the IIF work, which has generated considerable interest, this appendix attempts to replicate the results. This exercise also helps to better understand and document the assumptions that underlie the results, which is helpful when trying to extend the results by incorporating additional standards related variables.

The key IIF empirical findings can be summarized as follows:

- After controlling for macroeconomic fundamentals (short-term debt to reserves, current account balance, external debt, inflation, and restructuring history), SDDS subscription was found to reduce spreads by about between 200-300 basis points (depending on the empirical specification) for their sample of emerging market economies.

- The statistical significance of the result was high according to the usual benchmarks.

How to interpret the seemingly implausibly large estimates of SDDS subscription on spreads? Countries that are subscribers to the SDDS are likely to have better institutions in a number of areas compared to non-subscribers—reflecting the fact that countries with better institutions find it easier to subscribe to the SDDS and that there is in general a high correlation between indicators of institutional strength in different areas (see Table 5 in the previous section). As SDDS subscription is the only institutional or standards related variable added to the IIF equation, it is quite possible that it proxies for observance of standards more generally, other good institutions such as trade policy, the history of default, or even living standards that may influence the capacity for repayment.

The empirical methodology underlying the IIF annual data results is "least squares" estimates with a correction factor applied to the covariance matrix for heteroskedasticity and autocorrelation. The closest replication was achieved here, following some experimentation, by utilizing a random-effects panel estimator, where the coefficient vector is estimated using Feasible GLS. [18]

How do the basic results of the IIF compare to their replication? Table 8 compares the results. For most variables the results are quite close. Most notably the coefficient for the SDDS variable is within one standard deviation from the IIF result, and the same applies for the short-term debt to reserves ratio, the external debt ratio, the restructuring history, and a fortiori for the quite insignificant current account deficit. However, the impact of inflation

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[18] The replication was hampered because we had only averages available of the IIF data. Their study used annual data for 1998-2001. The replication in Table 8 uses a set of 23 countries derived from the WEO definition of emerging markets and uses annual data for the same period as the IIF, using data sources that for the purposes of the replication were matched as close as possible to the IIF averages they reported in their study. This e.g. involves using a dummy for defaults within the reference period. This contrast to the historic dummy based on past defaults employed for the estimation reported in the main text to avoid bias due to reverse causality.

and fiscal balance is reversed, with the fiscal balance featuring much more prominently in our sample. This may reflect the especially large data differences for the fiscal data.

Interestingly the impact of the SDDS subscription, in our sample and after controlling for the same set of macroeconomic fundamentals, reduces spreads by between about 380-430 basis points, about 140-180 basis points more than in the IIF results. However, the statistical significance is somewhat lower (with t-statistics ranging from 1.71-1.96) and borderline significant according to standard practice. In both specifications the standard errors are about 220 basis points, underscoring that these results, are not quite robust—apart from omitted variables misspecification, this points to the relevance of persistence and non-linearity concerns addressed in the main text.

Table 8. Reproduction of IIF Results

Specification:	IIF Results IIF	Replication IIF
Dependent Variable: Credit Spread		
Intercept	258.55	342.25
	(1.95)	(1.73)
SDDS Subscriber Dummy Variable	**-297.84**	**-431.39**
	(3.52)	**(1.96)**
Short-term debt to Reserves	237.78	233.5
	(2.46)	(2.21)
Current Account Balance to GDP	3.45	1.58
	(0.75)	(0.25)
External Debt to GDP	3.73	2.41
	(1.90)	(1.04)
Inflation	15.35	7.50
	(3.15)	(3.29)
Fiscal Balance to GDP	-12.68	-26.53
	(1.54)	(2.19)
Default in Sample Period	681.70	682.89
	(2.60)	(1.77)
Adjusted R^2	0.79	0.91
Total Observations	89	100
Useable Observations	89	53

Note: T-statistics in parenthesis