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Financial Frictions and Monetary Transmission Strength: A Cross-Country Analysis

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Abstract

This paper examines the effect of financial frictions on the strength of the monetary transmission mechanism. The financial accelerator model of Bernanke, Gertler, and Gilchrist (1999) implies that the transmission mechanism of monetary policy should be stronger in countries with high levels of financial frictions. The intuition is that in these countries, external finance premiums are more sensitive to firms financial leverage. By affecting asset prices, therefore, monetary policy has greater impact on external finance premiums and output. We test this models result by estimating SVAR models on cross-country data to generate indicators for the strength of monetary transmission. We find a positive relationship between various measures of financial frictions and the strength of monetary transmission, confirming the predictions of the model.

Journal of Economic Literature Classification: E44; F31; F41

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1. Introduction

According to the credit channel theory of the monetary transmission mechanism, frictions in credit markets that generate a wedge between the costs of raising funds externally and internally, the external finance premium, help explain the effect of monetary policy on real variables. For example, the cost of monitoring in credit markets suggests poorly-collateralized borrowers will pay a higher premium for external funds than larger, more-collateralized borrowers. The credit channel of monetary policy is the mechanism through which monetary policy impacts the real economy by altering the external finance premium. In particular, by affecting this wedge countercyclically, monetary policy has an additional impact on real variables beyond its standard effect through the cost of capital. Thus, the credit channel is an enhancement mechanism that amplifies conventional channels of monetary transmission (Bernanke and Gertler, 1995).

Credit channel effects have been widely incorporated into general equilibrium models through costly state verification to enhance the empirical relevance of these models (Bernanke et al., 1999). A key result from these models is that the strength of monetary transmission increases with the level of financial frictions. In particular, in financial systems where financial frictions such as the cost of monitoring (state verification cost) are more pronounced, monetary policy has a larger impact on output. Cross-country empirical tests of this result, however, are scarce.

In this paper, we investigate the cross-country relationship between financial market frictions and the strength of monetary policy transmission (hereafter MTS). Using cross-country data is preferable to comparing MTS within a specific country at different time periods. The reason is that financial frictions are relatively stable over time, especially compared to monetary

policy.[1] One potential issue, however, is that it is difficult to identify monetary policy shocks using the same model specification for countries that are at different stages of development.[2] Nevertheless, we find similar results using various methodologies.

In our baseline model, we use bankruptcy recovery rates, the proportion of a firm's value creditors can recover from a defaulting firm, as an indicator of financial frictions. This variable provides a close match to the source of financial frictions in costly state verification models. Our paper therefore represents, to the best of our knowledge, a first attempt at using comprehensive cross-country data (including both developing and developed countries) to test the empirical relevance of these models.

We then generate proxies for MTS in each country by obtaining the maximum amplitude of output responses to a one standard deviation monetary policy shock. Impulse responses are obtained from a structural vector autoregressive (SVAR) model, and monetary policy shocks are identified using the strategies of Kim (1999) and Hoffman (2007) for G-8 and non-G-8 countries, respectively. For most of the countries, the impulse responses do not show any evidence of the price and liquidity puzzles (the increase in prices and money aggregates following an increase in interest rates), providing some validation for our approach.

Next, we use our measure of MTS in a pooled regression of up to 61 countries from 1984 through 2008 to test the effect of recovery rates on the MTS variable. Our results reveal a negative and statistically significant relationship between recovery rates and MTS that is robust to alternative specifications. Thus this study provides cross-country evidence on the importance of financial frictions in explaining the transmission mechanism of monetary policy.

[1] See for example Djankov et al. (2007, 2008) for empirical evidence that support the stability of financial frictions.
[2] See the discussion in Elbourne and de Haan (2006) on the usefulness of estimating structural VARs in comparing the monetary transmission mechanisms across countries.

As an additional test of this relationship, we generate an alternative measure of financial frictions and determine whether this measure affects MTS. As mentioned above, the financial accelerator model predicts that as the level of financial frictions increases, the external finance premium becomes more sensitive to firm leverage, i.e. leverage sensitivity increases. We can therefore use leverage sensitivity as another proxy for financial frictions. Using financial market data to predict financial frictions is an alternative to measuring financial frictions from survey data and is a contribution of this paper. To capture leverage sensitivity for each country, we estimate, using firm level data from 47 countries, the effect of firm leverage on the external finance premium. We approximate external finance premiums with corporate bond spreads. Using these estimated leverage sensitivities, we reinvestigate the relationship between financial frictions and MTS and again find support for the model's predictions.

A key implication of our results is that lowering the level of financial frictions may weaken the ability of central banks to affect economic activity. While MTS in the United States has been questioned, monetary transmission may be more potent in other countries depending on the characteristics of a country's financial institutions. In countries with greater financial frictions, borrowers may be more sensitive to a shift in the health of their balance sheet, making them sensitive to a rise in the external finance premium.[3]

Our paper complements the relatively few studies that have looked at the effect of financial frictions on MTS specifically. Cecchetti (1999), for example, finds a positive relationship between financial frictions (measured using legal institutional quality) and MTS using data from 11 European countries. In this paper, we substantiate Cecchetti's (1999) general finding by providing broader evidence for the effect of financial market frictions on MTS, using

[3] Indeed, a significant number of studies point to a stronger monetary transmission outside of the U.S. (Angelopoulou and Gibson, 2009; Arena et al., 2006; Atta-Mensah and Dib, 2008; Braun and Larrain, 2005; Gambacorta, 2005).

data from 61 countries, including both advanced and developing nations. In contrast, Elbourne and de Haan (2006), who use a similar approach to Cecchetti (1999) and consider the effect of institutional quality on 10 Central and Eastern European countries, conclude that there is little relationship between financial institutions and the monetary transmission mechanism. Our results suggest institutional quality may, in fact, matter for the transmission mechanism over a broader sample of countries.

Our paper also complements a broader literature on the effect of institutions on the effectiveness of monetary policy. Many studies focus on the effect of central bank independence (CBI) on inflation or the impact of financial market development on MTS. CBI is in general found to be associated with the lower levels of inflation observed in the last couple of decades (c.f. Berger et al., 2001; Klomp and de Haan, 2007), while the evidence is mixed for the effect of financial market development on MTS. We incorporate this broader literature by including as controls measures of CBI and financial market development. We find that financial frictions have an independent effect on MTS. Moreover, many studies have pointed to the effect of deregulation in financial markets in the 1980s on the potency of the monetary transmission mechanism in the United States (Gertler and Gilchrist, 1993; Bernanke and Gertler, 1995). Specifically, deregulation and the ensuing financial innovation may have decreased monetary policy's impact on banks' ability to raise funds. Our findings are consistent with such an inverse relationship between more efficient financial markets and a weaker transmission mechanism.

The rest of the paper is organized as follows: in Section 2 we generate our indicator of MTS. In Section 3 we estimate the effect of the bankruptcy recovery rate, our main indicator of financial frictions, on MTS. Sections 4 and 5 present robustness tests, including alternative measures of financial frictions. Section 6 concludes.

2. Approximating MTS

We begin our empirical analysis by approximating MTS in different countries. It is important to note here that our goal in this section is to generate a proxy for MTS that is comparable across countries. This task is difficult, however, since variables that represent the stance of monetary policy or the external finance premium are likely to vary across countries. Nevertheless, we use the same definitions for monetary policy (the discount rate) and economic activity (the monthly production index) for each country to facilitate a cross-country comparison of MTS.

Some previous attempts to quantify MTS have estimated VAR models to measure the responses to an unanticipated tightening of monetary policy and then used forecast error variance decompositions (FEVD) obtained from this model for inference. MTS in these studies (c.f. Christiano et al., 1996; Kim, 1999; Kim and Roubini, 2000) is then measured by the percentage of variations in output explained by monetary policy. Most of these studies analyze one country or a group of similar countries. Alternatively, Ceccheti (1999) uses the maximum response of output and inflation as a measure of monetary policy effectiveness. We choose to follow this latter approach and approximate MTS by the maximum amplitude of output responses to a one standard deviation shock to interest rates. This method is preferable to FEVDs for our cross country analysis since the countries in our sample are at different stages of development and face different degrees of shocks to output and monetary policy. In addition, using maximum amplitudes allows us to take account of the sign of the impulse responses.

SVAR Models

To derive our measure for MTS, we estimate a SVAR model for each country. Each country specification includes the following variables: the industrial production index, ip_t, the

consumer price index (CPI), cpi_t, the monetary aggregate, m_t, the central bank rate (discount rate), r_t, and the world export price index (measured in local currency), $wxpi_t$. This SVAR model can be represented by the following vector: $Y_t = [ip_t, cpi_t, m_t, r_t, wxpi_t]'$.

These variables are widely-used in the open economy literature. The industrial production index and the CPI measure overall economic activity and prices, respectively. We include the monetary aggregate to separate money demand and money supply shocks. The interest rate variable captures the monetary authority's reaction to the other variables in the model. The world export price index is included to account for the monetary responses to external price shocks and to external developments that affect the exchange rate. This variable helps us identify monetary policy shocks that are not induced by external developments.

The data are monthly and span the period 1984:1-2008:5.[4] The data were obtained from the International Financial Statistics (IFS) database for the 61 countries listed in Appendix A.[5]

Identification

The main shortcoming of using SVAR methods to study monetary policy is the difficulty in identifying policy shocks. Indeed, the literature seems to be far from a consensus on this subject. Moreover, comparing the effects of monetary policy across countries (as we do in this paper) amplifies the level of difficulty.

We follow two strategies to increase the soundness of our analysis. First, we choose an identification strategy similar to Kim (1999) for G-8 countries and Hoffmann (2007) for others. The appeal of these strategies has been their ability to find responses to monetary policy shocks that are fairly similar to the predictions of theory. Furthermore, using different identification

[4] The industrial production index was available for a majority of the countries in our data set. When this data were not available, we used other indicators for monthly economic activity. These indicators (by country) are provided in Appendix A.
[5] This appendix also provides the IFS definitions of the macroeconomic variables used in our analysis.

strategies enhances our ability to capture the effects of monetary policy in economies that are dissimilar. The drawback to this approach, however, is that differences across countries may be generated artificially by the differences in model specification. Therefore, as a robustness test, we use the same strategy (Kim, 1999) for industrialized and developing countries to identify monetary policy shocks. We proceed by discussing our benchmark identification strategy.

G-8 countries

To identify monetary policy shocks, we follow an identification strategy similar to that in Kim (1999). To measure these shocks (monetary policy shocks that are not correlated with shocks to the other variables in the model), we assume that the monetary policy variable does not respond to output and prices contemporaneously and only responds to these variables with a lag, which is mainly due to lags in announcement. We also assume that output and prices are not affected contemporaneously by financial variables due to adjustment costs associated with these variables. The monetary aggregate is included to account for the liquidity puzzle and to minimize the risk that the monetary policy shock is independent of money demand shocks. Consistent with economic theory, money demand is assumed to depend contemporaneously on real income and the interest rate. The world export price index is affected by shocks to every other variable. Although individual countries are not large enough to affect the world commodity price index, domestic developments can affect exchange rates and therefore the price of exports in local currency units.

These identifying restrictions on the contemporaneous structural parameters are summarized in the equations below.

$$\begin{bmatrix} e_{ip} \\ e_{cpi} \\ e_{md} \\ e_{ms} \\ e_{wxpi} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ P_{21} & 1 & 0 & 0 & 0 \\ P_{31} & P_{32} & 1 & P_{34} & 0 \\ 0 & 0 & P_{43} & 1 & P_{45} \\ P_{51} & P_{52} & P_{53} & P_{54} & 1 \end{bmatrix} \begin{bmatrix} u_{ip} \\ u_{cpi} \\ u_{m} \\ u_{r} \\ u_{wxpi} \end{bmatrix}$$

where e_{ip}, e_{cpi}, e_{ls}, e_r, e_{wxpi} are the structural disturbances and u_{ip}, u_{cpi}, u_{ls}, u_r, u_{wxpi} are the residuals obtained from the reduced form equations. P_{ij} denote the contemporaneous structural parameters.

Non G-8:

The above restrictions used to identify shocks have done reasonably well in replicating the response of the economy to monetary shocks in G-8 countries. Although one can argue that these restrictions would be valid for smaller economies as well, the literature (c.f. Hoffmann, 2007) has in general relied on different strategies to identify monetary shocks in developing countries. In particular, these studies assume (reasonably) that advance economy variables such as output prices and interest rates are exogenous to the model that describes a developing economy. In this section, we follow this approach and estimate the following for non G-8 countries.

$$Y_t = B(L)Y_t + C_0 X_t + C(L)X_t + e_t \qquad (1)$$

where Y_t is the endogenous domestic variable vector given by: $Y_t = [ip_t, cpi_t, m_t, r_t, wxpi_t]'$. X_t is the exogenous foreign variable vector given by $X_t = [y^*, r^*]'$, and *B(L)* and *C(L)* are the matrix polynomials in the lag operators. The vector X_t includes the foreign industrial production index and the discount rate. To obtain impulse responses, we assume that the foreign variables are exogenously determined and that the identifying restrictions for the domestic economy are

similar to Kim (1999). We use the U.S. industrial production index and discount rate for y^* and r^*, respectively.[6]

For a majority of the countries in our sample, Augmented Dickey-Fuller (ADF) tests suggested non-stationarity of the industrial production, consumer price, and world export price indices. However, we do not impose any cointegrating restrictions and instead estimate an unrestricted VAR in levels since this is a convenient setup for measuring the effects of monetary policy in the short run.[7] A lag length for estimating each VAR is chosen according to the corrected-AIC (Hurvich and Tsai, 1989).

The first row of Table 2 displays summary statistics for MTS. As mentioned above, the identification of monetary policy shocks is far from straightforward in the empirical monetary economics literature. For example, the positive response of inflation to an increase in interest rates (the price puzzle) and the positive response of monetary aggregates to an increase in interest rates (the liquidity puzzle) are the two widely-documented shortcomings of some identification strategies. Although the identification strategy used in Kim (1999) and followed in this paper solves these puzzles by including a monetary aggregate to separate money demand and money supply shocks and by including inflation, most of the countries in our sample do not match those in Kim (1999). Nevertheless, we found that the price puzzle was observed in only 3 out of the 61 countries in our sample, and the liquidity puzzle in only 2 countries.[8]

Furthermore, historical forecast error variance decompositions (forecast error variance attributable to monetary policy shocks) measured using our model were within the ranges of values found in the literature with the exception of a few cases, as shown in Table 1. The

[6] Replacing the U.S. with Germany for countries in the European Union did not change our results significantly. For countries in the European Monetary Union (EMU), we estimated the VAR model prior to EMU membership.
[7] Alternatively, we measured variables in logs and detrended them using a quadratic time trend and obtained similar results.
[8] For brevity, we do not report the impulse responses functions for each country. We provide summary statistics for the presence of the price and liquidity puzzles in each country. This information is available online at http://homepages.uconn.edu/~ula06001/online_Appendix_puzzles.pdf

measures are similar despite the different identification schemes, forecast horizons, frequencies and measures for output and monetary policy stance. This provides further support for the soundness of the impulse responses obtained using the identification strategy described above.

3. Financial frictions and MTS

In this section, we investigate the relationship between MTS and financial frictions. We use the maximum amplitudes of output responses generated in the previous section as proxies for MTS. We capture the level of financial frictions by the percentage of the value of a loan recovered by lenders (the recovery rate) when there is default. In particular, the higher the recovery rate, the lower the level of financial frictions. Of course the recovery rate is only one aspect of financial frictions. We focus on this variable, however, because it provides a close match to the source of financial frictions discussed in BGG (1999) (the monitoring cost coefficient) and therefore allows us to more accurately test the predictions of the financial accelerator model.

Let RR_i and MTS_i denote the recovery rate and MTS for country *i,* and let x_i denote the vector of country specific control variables. The bottom panel of Table 2 shows that the simple correlation between these two variables is -0.37. In this section we determine whether this negative relationship holds after controlling for other factors. We estimate the following model:

$$MTS_i = \alpha_0 + \alpha_1 RR_i + \beta x_i + \varepsilon_i \qquad (2)$$

As control variables we include the log of real GDP per capita and a more general institutional quality variable, GOVQ, that averages measures of law and order, corruption, and bureaucratic quality, obtained from the ICRG. The inclusion of these variables ensures that RR_i is not picking up the effects of the overall level of development or other measures of institutional quality. We also include stock market capitalization (% of GDP) to control for financial market development.

By doing so, we are able to account for the dampening effect that a developed financial market would have on MTS by providing alternative sources of finance during contractions. We also include the real interest rate since high real interest rates could indicate that monetary policy is more influenced by fiscal sustainability and the neutralization of capital inflows and outflows (especially in small open economies). Finally, it is reasonable to assume that a more independent central bank can have a greater impact on the real economy. Therefore, we control for CBI using the index in Cukierman et al. (1992), which is based on the turnover rate of central bank governors.[9]

The sample includes 61 countries for which all necessary data were available. We use annual data averaged over the years 1984 to 2008 for the right hand side variables to match the sample period used to generate the dependent variable. Thus there is only one observation per country. We estimate equation (2) using OLS with robust standard errors.[10]

Data on financial frictions: the bankruptcy recovery rate

The key parameter in the financial accelerator model that captures financial frictions is the bankruptcy recovery rate, which measures the percentage of the value of a loan that banks can recover when there is default. The closest match for this parameter is from the World Bank's Doing Business database, which contains the variable, "recovery rate (%)", defined as "how

[9] Turnover is the average number of changes in the central bank governor per year in each decade. For example, if turnover = 0.2, there are 2 changes per decade for an average tenure of 5 years. CBI is also commonly ranked using legal aspects of independence. We present results using central bank governor turnover because data are available for 20 more countries. In Cukierman et al. (1992), both indices are generally available until 1989 for both advanced and developing economies and assume one value per decade. They range from 0 to 1, with higher values indicating greater CBI for the legal index and lower CBI for the turnover index. We obtained updated data for these indices.

[10] Note that using *MTS* without considering its standard deviation may lead to invalid inferences. This problem is more commonly known as the generated regressors problem. We accounted for the measurement error in *MTS* and adjusted the standard errors of the coefficients in equation (2) using the methodology of Gawande (1997). Results were very similar to those from our baseline model although developing country observations were given smaller weights due to large variation in the *MTS* variable for these countries. Results are available upon request.

many cents on the dollar claimants (creditors, tax authorities, and employees) recover from an insolvent firm."[11]

It is important to highlight a potential caveat in our analysis at this point. Notice that, due to data availability, we are using a shorter period (2004-2008) to measure financial frictions than we use to estimate our VAR models (1984-2008). However, there is little time series variation in the recovery rate data and so it is possible that the data that are available may be a good representation of earlier values. While we cannot be sure, Djankov et al. (2007) find that a more broad creditor rights index is very stable over the past 30 years (we focus on recovery rates since it matches the financial friction parameter in the financial accelerator model and because it is a continuous variable as opposed to creditor rights which is an index from 0 to 4).[12] This might suggest that bankruptcy recovery rates are also fairly time-invariant.

To the extent that recovery rates are fairly constant over time, they can provide a source of exogenous variation in MTS across countries. In particular, potential endogeneity, arising from reverse causality for example, should be mitigated if recovery rates are mostly time invariant.

Results

The top panel of Table 3 presents results from the estimation of equation (2). We find a negative relationship between recovery rates and MTS. In particular, the coefficient of *RR* is negative and significant at the 5% level. The coefficient of the recovery rate variable implies that a one percentage point increase in the recovery rate leads to a 0.017 percentage point drop in the response of output to a monetary policy shock. A value of 0.017 implies that if Bolivia were to increase its recovery rate to the level of the UK's, it would reduce the response of output from

[11] This survey follows the methodology developed by Djankov et al. (2008).
[12] This was true for the countries in our sample as well. 81% of our countries experienced no change in this index from 1978 to 2003.

0.7% to 0.2%, a change which is almost half a standard deviation of the output response across our sample. This change is also almost three times larger than the median value for the response of output and almost as large as the mean value. The results are similar when we include stock market capitalization, the real interest rate, CBI, and various combinations of these variables.[13]

In the bottom panel of Table 3 we test whether the effect of financial frictions on MTS varies depending on the prevalence of small firms in the economy. Small firms are more likely to be credit constrained and so monetary policy should have a larger effect in economies with many small firms (Bean et al., 2002; Cecchetti, 1999; Kashyap and Stein, 1997). We therefore interact *RR* with indicators of small firm presence. The first indicator is the percent of firms using banks to finance investment, with higher values suggesting more small firms. We therefore expect a negative sign for the interaction term. We also use the % of workers employed by small and medium firms (Ayyagari et al., 2007). Finally, we use stock market capitalization as a % of GDP since small firms tend to depend more on bank finance. In this case, higher values suggest more large firms, and so we expect a positive coefficient on the interaction term.[14]

To facilitate a comparison with the base specification results, we first present results including only the variables in the base specification but limiting the sample to countries with data on the interaction variables. We then present results for the regressions including the interaction terms. Comparing columns 1 and 2, we see that when we include the interaction term of *RR* with the percent of firms using banks to finance investment, the coefficient of *RR* becomes insignificant while the coefficient of the interaction term has the predicted negative sign and is

[13] When we use the legal measure of CBI, the coefficient of *RR* becomes insignificant, although this is a result of the reduced sample size and not the inclusion of the legal variable itself. Specifically, if we run the regression without the legal variable but limit the sample to countries with data for the legal variable, the coefficient of *RR* is insignificant.

[14] There are, however, a number of potential problems with using stock market capitalization as an indicator of the share of large firms. First, large market capitalization could imply that asymmetric information problems are not severe and that it is not difficult to obtain equity finance, implying more small firms. Second, small firms can list in foreign stock exchanges, further weakening the link between market capitalization and large firm presence.

almost significant at the 10% level (p-value = 0.11). This suggests that the initial negative coefficient of *RR* was the result of financial frictions augmenting the effect of monetary policy for smaller firms. Further calculations reveal that the effect of an increase in *RR* is significant but only for countries with the percent of firms using banks to finance investment greater than or equal to 12% (slightly below the average value for the full sample of countries). The size of the predicted impact on *MTS* when the value of this variable is 12% is equal to 0.02 percentage points. The coefficient of *RR* * % of workers employed by small firms has the incorrect sign but is not significant. The coefficient of *RR* * Market Cap (% of GDP) has the predicted positive sign and is significant at the 5% level. Thus there is some evidence that the effect of financial frictions on *MTS* is magnified in countries with a larger presence of small firms. Finally, the coefficients of three variables measuring small firm presence by themselves (i.e. not their interaction with *RR*) have the predicted signs or are insignificant.

4. Robustness Tests

Common Specification for G-8 and non G-8 countries

In this section, we test whether the negative relationship between financial frictions and MTS is artificially generated by applying different empirical models to countries that are at different stages of development. To do so, we use the identification strategy originally applied to only G-8 countries for every country in our sample.

The results are provided in the first column of Table 4. The coefficient of *RR* is again negative and significant. The magnitude of the coefficient is somewhat smaller than in the base case. A coefficient of -0.009 implies that if Bolivia were to increase its recovery rate to the level of the UK's, it would reduce the output response from 0.7% to 0.5%.

Separate Time-Periods

Central banks in recent years have had more success stabilizing the real economy (c.f. Rogoff, 2007; Cecchetti et al., 2006). Indeed, the median value of MTS increases from 0.08 between 1984-91 to 0.13 during 1992-99 to 0.19 between 2000-08. This could be the result of increasing financial frictions, although many other factors may have caused this improvement in monetary policy effectiveness such as rising CBI. Given lack of longer time series data, we cannot use recovery rates to assess the change in frictions over time, although the near time-invariance of the creditor rights index suggests that increasing financial frictions may not be responsible for the increase in MTS. However, it is possible that even if frictions have not changed, their effect on MTS has. In this section we aim to determine whether the *impact* of financial frictions on MTS has changed over time.

Columns 2-4 in the top panel of Table 4 provides results for the base specification but breaking the sample up into the three sub-periods mentioned above. Note that the number of countries in each experiment is smaller than the number of countries in the full sample. Nevertheless, the coefficient of *RR* has the predicted negative sign for all sample periods and is significant for the last two periods and almost significant for the first period (p-value = 0.101). The coefficient for the last two periods is much larger than for the first period, although this is purely a sample size issue. There are only 32 countries for the first period and 50 and 52 for the second and third, respectively. If we estimate the regression for the second and third period, but limit to countries in the first period sample, we also find significantly smaller coefficients. Thus the effect of financial frictions has remained fairly stable over time, perhaps suggesting that other factors such as greater CBI has increased MTS.

Alternative Measures of Financial Frictions

We included a number of alternative measures of financial frictions. The bottom panel of Table 4 presents the results. We include the logarithm of the number of days to enforce a contract and the creditor rights index (higher values mean better rights) from Djankov et al. (2008). The former has the wrong sign but is significant, while the latter has the correct positive sign but is insignificant. The bankruptcy cost as a percent of the estate (from the Doing Business database) has the correct sign and is significant at the 5% level.[15] Finally, the accounting standards variable (in sample range: 31-83) from La Porta et al. (1998) has the predicted negative sign but is insignificant (p-value = 0.19). In unreported regressions, *RR* is still significant even after controlling for these alternative measures of financial frictions. In total, these results provide some further evidence that greater financial frictions increase MTS.

Alternative measures of financial market development

In unreported regressions, we used other measures of financial market development, in addition to stock market capitalization. The results were very similar using the stocks-traded turnover ratio defined as the total value of shares traded during the year divided by the average market capitalization for the year, the total value of stocks traded (% of GDP), and domestic credit to the private sector (% of GDP).

5. Leverage Sensitivity as a Proxy for Financial Frictions

Measuring Leverage Sensitivity

The financial accelerator model makes two important predictions. First, there is a positive relationship between MTS and the level of financial frictions in an economy. The previous section showed that this prediction was supported by cross-country data. Second and perhaps

[15] Although this variable is positively correlated with the recovery rate, we expect that the recovery rate measure to be a better representation of the bankruptcy cost parameter in the financial accelerator model. The reason is that the cost variable only measures the legal costs of the bankruptcy proceedings, while the recovery rate in addition to legal fees also considers the loss in the value of firms' assets due to time spent in these proceedings.

more subtle is that external finance premiums are more sensitive to leverage when financial frictions are high. The reason is that when monitoring costs are low, creditors are not as affected by bankruptcy since they can retrieve a greater portion of a bankrupt firm's assets. In this case, the risk free rate is a relatively more important determinant of external finance rates. In contrast, when monitoring costs are high, leverage plays a more predominant role.

The financial accelerator model therefore predicts that as the level of financial frictions increases, the external finance premium becomes more sensitive to firm leverage, i.e. leverage sensitivity increases (we verify that this relationship holds again using recovery rates as a proxy for financial frictions).[16] We can therefore use leverage sensitivity as another proxy for financial frictions.

To capture leverage sensitivity for each country, we estimate the effect of firm leverage on the external finance premium using firm level data. We approximate the external finance premium for each country with corporate bond spreads. We use bond deals of non-financial firms and other firm-specific data from 47 countries over the period 1995:1 to 2008:5. Data were obtained from the Thomson One Banker database. We chose this data range to maximize the number of observations and thus include as many countries as possible in our estimation.

There is ample research on the determinants of corporate bond spreads both in developing and advanced economies (Collin-Dufresne et al., 2001; Cavallo and Valenzuela, 2007; Durbin and Ng, 2005). Usually, this literature attributes the variations in corporate spreads to firm, industry and bond characteristics, macroeconomic variables, sovereign risk, and other country-specific effects. In our estimation, we follow the literature and account for these effects to the extent that data are available. Specifically, we estimate the following equation separately for each country:

[16] Results are available upon request.

$$\widetilde{EFP}_{it} = \gamma_{0k} + \gamma_{1k}\widetilde{LEV}_{it-1} + \xi_{1k} y_{it-1} + \xi_{2k} BC_{it} + \xi_{3k} MC_{tk} + \xi_{4k} SR_{tk} + \xi_{5k} T_k + \xi_{6k} I_k + \nu_{it} \quad (3)$$

where subscripts *i, k* and *t* denote the bond deal, the country and the time period. $\widetilde{EFP}_{it}$ represents the spread on bond *i,* $\widetilde{LEV}_{it-1}$ is the financial leverage of the firm, and y_i denotes a vector of firm specific control variables. T_k and I_k are the time and industry dummy variables and BC_{it}, MC_{tk}, and SR_{tk} represent a vector of bond characteristics, a vector of macroeconomic conditions, and the sovereign risk measured at time *t.* We refer to the coefficient of the leverage variable, $\hat{\gamma}_{1k}$, as leverage sensitivity in the rest of the paper.

We follow the standard practice in the literature and measure corporate bond spreads, $\widetilde{EFP}_{it}$, as the difference between corporate and government bond yields of similar maturity.[17] Let $YTM^{i}_{t,T}$ and $YTM^{g}_{t,T}$ denote yield to maturity at time *t* of corporate and government bonds that mature at time *T*, respectively. Corporate bond spreads can be expressed as,

$$\widetilde{EFP}_{it} = YTM^{i}_{t,T} - YTM^{g}_{t,T} \quad (4)$$

In our benchmark data set, we include bonds that are denominated in local and foreign currency. If a 5 year Brazilian bond is denominated in dollars for example, we use the yield on a 5-year US treasury bond when measuring the spread. Alternatively, we considered only local currency denominated bonds. Despite decreasing the number of countries with sufficient observations, this alteration did not change our results significantly.

The Thomson One Banker database has three ratios that can approximate the financial leverage variable $\widetilde{LEV}_{it}$: total debt/equity, total debt/market capitalization, and proceeds/equity.

[17] Our main reason for using yield to maturity was the availability of data. There is research, however, that highlight the limitations of using this variable. For example, Cavallo and Valenzuela (2007) argue that it is very difficult, especially in developing countries, to find bonds of similar maturity and/or to determine maturity when there are contingent cash flows. The authors use option-adjusted spreads from Bloomberg to make bond spreads more comparable. In our estimation we only use bonds that don't have contingent cash flows due to such features as put or call options. Therefore, using yield to maturity is not unreasonable.

In our analysis, we use all three variables. To limit causality concerns, we use the leverage data that was last reported prior to the issue date. For example, if the issue date is May 23rd 1999, we used the leverage ratio reported at the end of 1998 or the first quarter of 1999 if quarterly data is available.

Recent research finds that firm-specific characteristics explain the largest portion of variation in corporate bond spreads (c.f. Cavallo and Valenzuela, 2007). Therefore, in addition to financial leverage, we follow Altman (2000) and include other firm specific variables. These variables are: return on assets, earnings before interest and taxes/assets, retained earnings before interest and taxes/Assets, liquidity measured by the current ratio, capitalization measured by Equity/Capital, and size measured by Total Assets. Additionally, we accounted for the openness of the firm (foreign sales/total sales) and tried different ratios that proxy liquidity, debt structure and profitability. The results were robust to these alterations.

To capture the non-default component of corporate spreads, we control for several bond-specific characteristics such as issue size, the credit rating of the bond, and time to maturity. We use issue size to proxy for the liquidity of the bond as bonds with higher issue sizes are usually more liquid (Chacko et al., 2008).

Sovereign risk and macroeconomic indicators are included to measure the asymmetric effects these variables may have across firms. For example, Durbin and Ng (2005) find that the sovereign ceiling (the concept that no firm is more creditworthy than its government) does not apply to every emerging market firm in their sample. We included the GDP growth rate, inflation, and the external balance in our estimation to account for macroeconomic conditions. There is recent evidence that there are significant differences -- considerably larger than cross country

differences -- in the transmission of monetary policy across industries. Therefore we include sector specific dummies to account for these differences. We also include annual time dummies.

A table reporting leverage sensitivities that are estimated using equation (3) for each country is available online.[18] The results indicate for the most part a positive and statistically significant relationship between leverage and corporate bond spreads. Furthermore, changes in leverage have a considerable effect on corporate spreads. In particular, a 1 percentage point increase in leverage leads to a 0.23 percentage point increase in bond spreads on average. These results are consistent with recent findings in the literature (Cavallo and Valenzuela, 2007; Collin-Dufresne et al., 2001; Durbin and Ng, 2005; Huang and Kong, 2003) and clearly imply that firm specific effects play an important role in determining corporate bond spreads.

There are two main advantages of using leverage sensitivity instead of recovery rates as a measure of financial frictions. First, this approach allows financial market data to predict the level of financial frictions as an alternative to measures based on survey data, such as recovery rates. Second, we were forced to estimate equation (2) using recovery rates from 2004 to 2008, while the monetary policy proxy was estimated using data from 1984-2008. The data on leverage sensitivity, on the other hand, is available beginning in 1995. This longer time period allows us to estimate panel regressions in which the sample period 1995-2008 is divided into two sub-periods. This gives us two observations per country for MTS and leverage sensitivity. The main disadvantage of using leverage sensitivity, however, is that data availability restricts the sample considerably, reducing the number of countries in the base regression from 61 to 24-31. We therefore use recovery rates as our default measure of financial frictions.

Leverage Sensitivity and MTS

[18] http://homepages.uconn.edu/~ula06001/online_Appendix_leverage_sensitivities.pdf

To determine the effect of leverage sensitivity on the strength of monetary transmission, we estimate the following panel regression:

$$MTS_{it} = \alpha_{0i} + \alpha_1 \hat{\gamma}_{1it} + \beta x_{it} + \varepsilon_{it} \quad (5)$$

where $\hat{\gamma}_1$ denotes leverage sensitivity. Table 5 presents the results. We present pooled OLS, random effects (RE) and fixed effects (FE) estimation results. The three groups of columns correspond to which measure of financial leverage was used to generate the leverage sensitivity variable. Under all estimation procedures, the coefficients of the different leverage sensitivity variables are positive and significant (or very close to it) in explaining the strength of monetary transmission. A one percentage point increase in leverage sensitivity leads to a 0.015 percentage point increase (on average) in the maximum response of output to a monetary policy shock. The results were similar when we excluded the government quality variable and GDP per capita. These results therefore provide further evidence that greater financial frictions lead to a stronger transmission mechanism of monetary policy.

6. Conclusion

In this paper we focus on two predictions of general equilibrium models characterized by agency costs and financial frictions. First of these is the well documented positive relationship between the level of financial frictions and the effects of monetary policy shocks on the economy. This paper, to the best of our knowledge, is the first attempt at examining the relationship between MTS and financial frictions across a broad group of countries. Using data on bankruptcy recovery rates for 61 countries, we confirm the prediction of the financial accelerator model that financial frictions augment the strength of the monetary transmission mechanism.

The financial accelerator model also predicts a positive relationship between financial frictions and the leverage sensitivity of borrowing costs. Based on this prediction, we proxy

financial frictions with leverage sensitivity. Using firm level data, we measure the sensitivity of bond spreads (our measure for borrowing costs) to financial leverage of firms that issue these bonds. The results again indicate a positive relationship between financial frictions and MTS.

One important implication of our results is that as institutions improve, perhaps as part of the process of joining political unions with countries with stronger institutions (Djankov et al. 2008), or through the deregulation of financial markets within a country, monetary policy becomes less effective if these improvements center on reducing financial frictions. For example, deregulation is cited to have reduced MTS in the United States (Gertler and Gilchrist, 1993; Bernanke and Gertler, 1995). More recently, the link between deregulation and MTS is found in other countries as well (c.f. Juselius and Toro, 2005).

Of course, if there are more broad improvements in institutional quality that bring more credibility to central banks, the *overall* impact on the effectiveness of monetary policy is ambiguous. For example, Krause and Rioja (2006) argue that well-developed financial markets provide monetary policy broader scope for stabilization policy.[19]

At the very least therefore, our results imply that the effect of institutional improvement on the strength of monetary policy is not clear-cut and that any analysis in this area requires a nuanced approach. Moreover, the uncertainty on the relationship between monetary policy, institutional factors, and deregulation may be more deserving of attention given the global financial crisis of 2007 to 2009. Given the evidence in our paper, any political movements towards increased regulation of financial markets certainly have implications for MTS.

[19] One example of such an effect is that interest rate deregulation appears to have strengthened the "pass-through" of a change in policy rates to other interest rates in the economy. Singh et al. (2008) find evidence of strong interest rate channels in developed countries with advanced financial systems relative to countries with less-advanced systems. Sellon (2002) finds the removal of interest rate ceilings in the U.S. (known as "Regulation Q") has made the interest rate channel more potent.

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Table 1: Forecast Error Variance Decompositions: Ours vs. Literature

Country	FEVD	Literature
Canada	15.7%	Kim (1999) 5.9% -17.0%, Italiano (2001) 2.0% - 20.6%, Bordo and Redish (2003) 16.0%-17.9%
Czech Republic	7.2%	Anzuini and Levy (2007) 2.0%-11.9%
France	4.2%	Anzuini and Levy (2007) 5.6%-17.7%, Kim (1999) 6.2% - 17.7%
Germany	15.8%	Anzuini and Levy (2007) 9.3%-23.1%, Holtemoller (2003) 21%, Kim (1999) 7.6% - 26.9%
Greece	2.7%	Markidou and Nikoladou (2008) 1.1% - 7%
Hungary	26.0%	Anzuini and Levy (2007) 12.0%-18.1%
India	13.2%	Roy and Darbha (2000) 0.8%-11.43%
Italy	7.2%	Anzuini and Levy (2007) 4.3%-8.9%, Kim (1999) 4.3% - 8.9%
Japan	2.4%	Kim (1999) 1.8% - 8.8%
Nigeria	16.2%	Olusegun (2001)18.2%-24%
Poland	13.5%	Anzuini and Levy (2008) 7.5%-17.3%
Tunusia	13.3%	Boughrara (2008) 2%-12%
U.K.	7.2%	Anzuini and Levy (2007) 9.8%-15.3%, Kim (1999) 9.8% - 15.3%
U.S.	5.8%	Bernanke, Boivin, Eliasz (2005) 5.4%, Kim (1999) 7.6% - 26.9%, Christiano et al. (1996) 29.4%, Rossi and Zuabiry (2009) 3.5%-27.1%, Bordo and Redish (2003) 10.85%-13.5%

NOTE: This table compares our FEVD with those found in other studies. The FEVD column shows the forecast error variance decomposition of output explained by shocks to the policy rate.

Table 2: Summary Statistics and Correlation Matrix

	obs.	mean	median	s.d.	min.	max.
MTS	61	0.59	0.18	1.22	0.00	7.22
RR	61	44.10	38.54	25.89	0.00	92.62
GDP per capita	61	14,531	10,718	10,662	663	38,574
GOVQ	61	3.84	3.79	1.24	1.54	5.95
Market Cap. % GDP	59	53.06	32.27	54.32	0.71	280.07
real interest rate	60	6.33	5.79	9.54	-28.82	51.61
CBI-Turnover	56	0.21	0.20	0.12	0.00	0.68
days to enforce a contract	61	559	510	303	120	1,442
creditor rights	58	2.14	2.00	1.05	0.00	4.00
cost of bankruptcy (% of estate)	60	13.07	9.00	9.55	1.00	42.00
accounting standards	33	62.12	64.00	12.72	31	83
% firms using banks to finance investment	42	19.66	17.70	13.03	2.61	74.55
% workers employed by small firms	47	58.59	60.00	17.87	12.74	89.30

Correlation Matrix

	MTS	*RR*	creditor rights	days to enforce a contract	accounting standards
RR	-0.37				
creditor rights	0.04	0.16			
days to enforce a contract	-0.11	-0.29	-0.16		
cost of bankruptcy (% of estate)	0.54	-0.58	0.07	0.10	
accounting standards	-0.44	0.49	0.28	-0.32	-0.21

NOTES:

1. Unless otherwise noted, all data are annual. Growth rates and ratios are expressed in percentage terms. All variables are averaged over the sample period.

Table 3: Equation 2 - Strength of Monetary Transmission (*MTS*) and the Recovery Rate

Dependent variable: *MTS*						
RR	-0.017	-0.016	-0.019	-0.017	-0.018	-0.020
	(0.008)**	(0.008)**	(0.008)**	(0.008)**	(0.008)**	(0.009)**
log GDP per capita	-0.140	-0.122	-0.142	-0.257	-0.088	-0.157
	(0.382)	(0.392)	(0.384)	(0.440)	(0.400)	(0.466)
GOVQ	0.091	0.093	0.117	0.132	0.088	0.193
	(0.231)	(0.241)	(0.233)	(0.254)	(0.247)	(0.273)
Market Cap. % GDP		-0.002			-0.002	(0.005)
		(0.002)			(0.002)	(0.002)**
real interest rate			-0.035		-0.044	-0.057
			(0.016)**		(0.024)*	(0.029)*
CBI-Turnover				-0.063		1.287
				(1.155)		(1.176)
Obs.	61	59	60	56	58	53
R^2	0.14	0.14	0.22	0.16	0.24	0.29
RR	-0.028	-0.011	-0.015	-0.067	-0.017	-0.032
	(0.013)**	(0.016)	(0.009)*	(0.058)	(0.008)**	(0.013)**
log GDP per capita	-0.014	0.000	0.325	0.252	-0.138	-0.120
	(0.523)	(0.535)	(0.289)	(0.298)	(0.386)	(0.362)
GOVQ	0.040	0.040	-0.183	-0.057	0.078	0.176
	(0.380)	(0.408)	(0.212)	(0.163)	(0.238)	(0.230)
% firms using banks to finance investment		0.041				
		(0.024)				
RR * % firms using banks to finance investment		-0.001				
		(0.001)				
% workers employed by small firms				-0.037		
				(0.039)		
RR * % workers employed by small firms				0.001		
				(0.001)		
Market Cap. % GDP						-0.017
						(0.007)**
RR * Market Cap. % GDP						0.0003
						(0.000)**
Obs.	42	42	47	47	59	59
R^2	0.14	0.16	0.11	0.19	0.14	0.21

NOTES:
1. See Appendix A for variable definitions and sources.
2. * significant at 10%; ** significant at 5%; *** significant at 1%.
3. Cross-section regressions estimated by Ordinary Least Squares (OLS). Robust standard errors in parentheses. Robust standard errors in parentheses.

Table 4: Equation 2 - Strength of Monetary Transmission (*MTS*) and the Recovery Rate - Robustness Tests

Dependent variable: *MTS*	Kim	sub-sample (1)	sub-sample (2)	sub-sample (3)
RR	-0.009	-0.003	-0.011	-0.011
	(0.004)**	(0.002)	(0.006)*	(0.006)*
log GDP per capita	-0.257	0.120	-0.143	0.015
	(0.181)	(0.130)	(0.295)	(0.153)
GOVQ	0.125	-0.003	0.082	-0.035
	(0.124)	(0.071)	(0.196)	(0.102)
Obs.	61	32	50	52
R^2	0.19	0.15	0.15	0.19

Dependent variable: *MTS*	Alternative financial friction variables			
log of days to enforce a contract	-0.064			
	(0.205)			
creditor rights		0.088		
		(0.097)		
cost of bankruptcy (% of estate)			0.068	
			(0.033)**	
accounting standards				-0.013
				(0.010)
log GDP per capita	-0.187	-0.165	0.053	0.308
	(0.422)	(0.416)	(0.371)	(0.291)
GOVQ	-0.168	-0.175	-0.089	-0.246
	(0.335)	(0.292)	(0.217)	(0.220)
Obs.	58	58	60	33
R^2	0.09	0.10	0.30	0.23

NOTES:
1. See Appendix A for variable definitions and sources.
2. * significant at 10%; ** significant at 5%; *** significant at 1%.
3. Cross-section regressions estimated by Ordinary Least Squares (OLS). Robust standard errors in parentheses. Robust standard errors in parentheses.
4. The dependent variable is the FEVD (the percentage of output response explained by discount rate shocks) measured using the Kim/Hoffman identification.

Table 5: Equation 5 - Strength of Monetary Transmission (*MTS*) and Leverage Sensitivity

Dependent variable:	financial leverage measured using:								
MTS	Proceeds/Equity			debt/capitalization			debt/equity		
	OLS	RE	FE	OLS	RE	FE	OLS	RE	FE
leverage sensitivity	0.014	0.013	0.016	0.009	0.013	0.015	0.017	0.021	0.025
	(0.007)*	(0.008)*	(0.010)	(0.006)*	(0.003)***	(0.003)***	(0.008)**	(0.005)***	(0.006)***
log GDP per capita	0.120	0.115	1.827	0.111	-0.023	0.753	0.002	-0.146	0.829
	(0.256)	(0.217)	(0.891)*	(0.249)	(0.187)	(0.686)	(0.215)	(0.194)	(0.709)
GOVQ	-0.198	-0.201	0.801	-0.155	-0.045	0.736	-0.087	0.016	0.974
	(0.228)	(0.145)	(0.442)*	(0.236)	(0.125)	(0.318)**	(0.195)	(0.133)	(0.339)**
Obs.	43	43	43	50	50	50	50	50	50
Countries	24	24	24	31	31	31	31	31	31
Hausman p-value		0.12			0.02			0.01	
R^2	0.21		0.29	0.26		0.62	0.32		0.59

NOTES:
1. See Appendix A for variable definitions and sources.
2. * significant at 10%; ** significant at 5%; *** significant at 1%.
3. Panel regressions, standard errors in parentheses.

Appendix A: Data Summary

Table A1: Variables and Data Sources

Variable	Description and Source
RECOVERY RATE	The recovery rate is recorded as cents on the dollar recouped by creditors through the bankruptcy or insolvency proceedings. The calculation takes into account whether the business emerges from the proceedings as a going concern as well as costs and the loss in value due to the time spent closing down. If the business keeps operating, no value is lost on the initial claim, set at 100 cents on the dollar. If it does not, the initial 100 cents on the dollar are reduced to 70 cents on the dollar. Then the official costs of the insolvency procedure are deducted (1 cent for each percentage of the initial value). Finally, the value lost as a result of the time the money remains tied up in insolvency proceedings is taken into account, including the loss of value due to depreciation of the hotel furniture. Consistent with international accounting practice, the depreciation rate for furniture is taken to be 20%. The furniture is assumed to account for a quarter of the total value of assets. The recovery rate is the present value of the remaining proceeds, based on end-2006 lending rates from the International Monetary Fund's International Financial Statistics, supplemented with data from central banks. Source: World Bank Doing Business database.
Bureaucracy Quality	Bureaucratic Quality, scale of 0-4. Source: International Country Risk Guide, published by The PRS group.
Corruption	Corruption in Government, scale of 0-6. Source: International Country Risk Guide, published by The PRS group.
Law and Order	Measures law and order tradition, scale of 0-6. Source: International Country Risk Guide, published by The PRS group.
Real GDP per capita	GDP per capita, (constant 2000 international $). Source: WDI
real interest rate	Source: WDI.
M1	Source: IFS. The sum of currency outside deposit money banks (line 14a) and demand deposits other than those of the central government (lines 14d, 14e, 14f, 14g, and 24) plus, where applicable, lines 24..i and 24..r.
TURNOVER	*TURNOVER* is the average number of changes in the central bank governor per year in each decade. For example, if *TURNOVER* = 0.2, there are 2 changes per decade for an average tenure of 5 years. One observation per decade (1950's to 1980's). Source: Cukierman, et al., (1992). Data after 1990 obtained from Crowe and Meade (2007) and Dreher, et al. (2008).
LEGAL	One observation per decade (1950's to 1980's). Source: Cukierman, et al., (1992). Data updated by Jácome and Vázquez (2005) and Siklos (2008).
Stock market capitalization (% of GDP)	Source: WDI.
Domestic credit provided by banking sector (% of GDP)	Domestic credit provided by banking sector (% of GDP): includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available. Source: WDI.
Stocks traded, total value (% of GDP)	Total value of stocks traded as percent of GDP. Source: WDI.
Stocks traded, turnover ratio %	The total value of shares traded during the year divided by the average market capitalization for the year. Average market capitalization is calculated as the average of the end-of-year values for the current year and the previous year. Source: WDI.
% of firms using banks to finance investment	Source: WDI.
% of workers employed by small and medium enterprises.	Source: Ayyagari et al. 2003). Data averaged over certain years during the 1990s. The years vary by country.
creditor rights	Source: Djankov et al. (2007).
logarithm of days to enforce a contract	Source: Djankov et al. (2007).
COSTESTATE	The cost of the bankruptcy proceedings as a percentage of the estate's value. The cost is calculated on the basis of survey responses by insolvency practitioners and includes court fees as well as fees of nsolvency practitioners, independent assessors, lawyers and accountants. Respondents provide cost estimates from among the following options: less than 2%, 2–5%, 5–8%, 8–11%, 11–18%, 18–25%, 25–33%, 33–50%, 50–75% and more than 75% of the value of the business estate. Source: World Bank Doing Business database.

accounting standards	Accounting standards in 1990. Source: La Porta, et al. (1998).
Industrial Production Index	Source: IFS. Generally, the coverage of industrial production indices comprises mining and quarrying, manufacturing and electricity, and gas and water, according to the UN International Standard Industrial Classification (ISIC). The indices are generally compiled using the Laspeyres formula. For many developing countries the indices refer to the production of a major primary commodity, such as crude petroleum. Monthly indicators for economic activity when industrial production index is not available: Bahamas: tourist arrivals index; Bahrain: refined petroleum production; Belarus: number of employed; Bolivia, Ecuador, Gabon, Kuwait, Oman, Venezuela: crude petroleum production; Botswana, Congo Dem. Rep.: mining production; Chile, Latvia, Peru, Russia, Ukraine: industrial employment index; Colombia, Indonesia, Panama, Philippines, Singapore, South Africa, Uruguay, Zimbabwe: manufacturing production; Estonia, Hong Kong, Moldova, Thailand: number of employed; Taiwan: employees on payroll (source: Directorate-General of Budget, Accounting and Statistics).
CPI	Source: IFS.
World Export Price Index	Source: IFS. Indices for export prices are compiled from survey data for wholesale prices or directly from the exporter or importer (called "direct pricing").
Bond characteristics and firm level data	Thomson One Bankers Database

Table A2: Countries

Algeria	Hong Kong	Portugal
Armenia	Hungary	Romania
Australia	Indonesia	Russia
Austria	Italy	Serbia & Montenegro
Bahrain	Japan	Singapore
Bangladesh	Jordan	Slovakia
Belarus	Kenya	Slovenia
Bolivia	Korea, South	South Africa
Botswana	Kuwait	Spain
Brazil	Lithuania	Sweden
Bulgaria	Malawi	Switzerland
Canada	Malaysia	Thailand
Chile	Mexico	Trinidad & Tobago
China	Moldova	Turkey
Colombia	Netherlands	Ukraine
Croatia	New Zealand	United Kingdom
Czech Republic	Nigeria	United States
Denmark	Norway	Uruguay
Estonia	Peru	Venezuela
France	Philippines	
Germany	Poland	