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Investment Grade, Asset Prices and Changes in the Source of Systematic Risk

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Keywords: Investment grade; Systematic risk; Asset pricing

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April 11, 2014

Abstract

Global institutional investors face constraints, in the form of either external regulations or internal firm policies, with regard to investing in countries rated speculative grade. As a consequence, when a country receives (loses) its investment-grade status, a significant inflow (outflow) of foreign investment is likely to occur and, thus, a global portfolio should increase (diminish) in importance as a source of systematic risk for stocks traded in that country. We study how stock prices behave around such events. Our results are consistent with theory.

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1 Introduction

According to asset pricing theory, the expected return of an asset should be proportional to its risk, which is determined by its exposure to systematic risk factors. This theoretical prediction is typically tested by correlating assets' average returns and their exposure to risk. In the present paper we perform an alternative test. We study how asset prices are adjusted around events that change the source of systematic risk and, by consequence, assets' risk levels. Thus, instead of testing the risk-return relationship in levels, we test it in differences.

Our empirical exercise is inspired by Chari and Henry (2004), who analyze the dynamics of asset prices in small countries that undergo financial liberalizations. Following such events, if the foreign investor becomes the marginal investor in the country (i.e., the investor who defines the equilibrium level of asset prices), the relevant source of systematic risk switches from the local portfolio to the global portfolio; thus, assets should be repriced according to the difference between their exposure to the local portfolio and their exposure to the global portfolio. Such changes in assets' risk levels are labeled $DIFCOV$. The higher an asset's $DIFCOV$, the safer the asset becomes. As a consequence, firms with higher $DIFCOV$ should experience higher positive repricing around these financial liberalization events. According to Chari and Henry (2004), focusing on such events is particularly advantageous because, around them, the true variation in the data tends to be more important than noise, guaranteeing a clearer identification of the risk-return relationship.

In the present paper, we follow a similar approach. However, we explore a different set of events that allows for a more complete evaluation of the theoretical predictions: changes in sovereign ratings, specifically movements of countries between the statuses of speculative and investment grade. As in Chari and Henry (2004), this setting allows us to analyze situations in which the global portfolio increases in importance as a source of systematic risk (when countries are upgraded to investment-grade status). The advantage of our exercise, however, is that we can also analyze situations in which the source of systematic risk moves the other way, switching from the global to the local portfolio, which should happen when countries are downgraded from investment- to speculative-grade status. In this case, theory implies that we should observe a negative relationship between changes in stock prices and $DIFCOVs$, and we can also test this prediction.

The link between changes in sovereign credit ratings and changes in the source of systematic risk is direct. Global institutional investors often face constraints (either from external regulations or from their own internal firm policies) for investing in countries rated speculative grade (Cantor and Packer, 1994; Adams, Mathieson and Schinesi 1999; Rigobon 2002; White, 2010). As a consequence, when a small country receives (loses) its investment-grade status, a significant inflow (outflow) of foreign investment is likely to occur.[1]

In our baseline empirical exercises, we call a country "market-wise investment grade" (MIG) if it is rated investment grade by at least two of the three main rating agencies: Standard and Poor's, Moody's and Fitch. We analyze two types of events: upgrades, i.e., when countries become MIG; and downgrades, i.e., when countries lose their MIG status. Our sample consists of stocks listed in countries that experienced such events between 1997 and 2012. There are a total of 11 events (2,094 stocks) in our analysis; 6 of these are upgrades and 5 are downgrades.

Our results are consistent with theory. Around upgrade events, firms with higher $DIFCOVs$

[1] For instance, when Brazil received investment-grade status from Standard & Poor's in 2008, the "Debt Report" of the Treasury of Brazil (May 2008) wrote that "The classification of a rating agency reflects its opinion on the capability and disposition of a sovereign government to honor, completely and on time, its debt obligations. An investment grade country is considered low risk regarding its assets. That allows better financing conditions, particularly by reducing issuance costs, to public sector – increasing public bonds demand by large institutional investors which are restricted to invest in non investment grade countries – *and to private sector, because sovereign ratings works as a reference for domestic companies risk assessment and reflects improved financing conditions*" (italics included by us). Concurrently, on May 1, 2008, the following claim appeared on Bloomberg Businessweek: "The long-awaited move will make it possible for a wider universe of international investors, including massive U.S. pension funds, to plunge into the Brazilian stock market."

experience greater increases in their stock prices, whereas the opposite is true for downgrade events. The precision of the relationship between returns and $DIFCOVs$ around upgrade events is similar to that obtained by Chari and Henry (2004). However, around downgrade events, the relationship is much stronger: $DIFCOV$ accounts for a large fraction of the variation in stock prices when downgrades occur.

Whereas both the analysis of Chari and Henry (2004) and our analysis using upgrades rely on situations of foreign investment *inflows*, the empirical exercise using downgrade events is based on the occurrence of foreign investment *outflows*. This may be the reason behind the stronger results for downgrades. It is reasonable to imagine that outflow events should occur more abruptly than inflow events. Before a country receives the investment-grade status (or opens its stock market as in Chari and Henry 2004), it should have already experienced smooth and favorable dynamics. In this case, domestic investors may have had time to incorporate into stock prices the expectation of a possible future inflow of foreign investment; thus, when the event happens, a significant part of the repricing may have already occurred. On the other hand, facts that lead to countries being downgraded are likely to be more abrupt, which leaves less time for investors to reprice assets before the event occurs.

We perform a number of robustness and placebo tests. In particular, we find that the relationship between stock prices and $DIFCOVs$ is weaker for stocks that have American or Global Depository Receipts (ADR or GDR, respectively) traded abroad. This result is to be expected. Even when few foreigners invest in a country, stocks that have ADR or GDR should already present a significant part of their systematic risk related to the world market: when the same asset is traded in multiple locations, its price should co-move at some level across the different markets by no-arbitrage. As a consequence, when the country moves from non-MIG to MIG or from MIG to non-MIG, the price of stocks with ADRs or GDRs should be less affected by their $DIFCOV$.

Under the CAPM (Sharpe 1964; Lintner 1965; Black 1972), in a regression of changes in stock prices against $DIFCOVs$, the coefficient of this variable (in absolute value) approximates the degree of risk aversion of the average investor. Thus, our setting also allows us to evaluate another hypothesis, namely that risk aversion is higher during periods of financial or economic distress (Campbell and Cochrane, 1999; Barberis, Huang and Santos, 2001; He and Krishnamurthy 2012; Guiso, Sapienza and Zingales 2013). Consistent with this idea, the coefficient of $DIFCOV$ is more than 10 times larger (in absolute value) in regressions with downgrade events than in regressions with upgrade events.

Although we are not directly interested in the effects of sovereign credit ratings on financial markets (we use changes in sovereign credit rating simply as the driving force for changes in the source of systematic risk), our study also contributes to this literature (e.g., Kaminsky and Schmukler 2002; Brooks et al 2004; Gande and Parsley 2005; Michaelides et al 2013). We are more closely related to papers such as Martell (2005) and Correa et al (2012), which use firm-level data to estimate the effect of rating changes, allowing such effect to depend on firms' characteristics. As in our case, most of this literature finds particularly robust effects for downgrades. Importantly, a feature that differentiates our paper is the use of theory to guide the empirical analysis.

The remainder of this paper is organized as follows. Section 2 presents the theory and hypotheses to be tested. Section 3 describes the events and the data. Section 4 presents the empirical results. Section 5 concludes.

2 Testable Hypotheses

The following theoretical discussion builds on Stultz (1999) and Chari and Henry (2004). Suppose a small country whose equity market receives no (or few) investments from foreigners. According to the CAPM, because domestic investors care only about domestic market returns, for a stock i in this country we should have

$$E(r_i) = r_f + \frac{Cov(r_i, r_M)}{Var(r_M)} (E(r_M) - r_f), \tag{1}$$

where $E(r_i)$ is the expected return of stock i, $E(r_M)$ is the expected return of the domestic market portfolio, r_f is the domestic risk-free rate of return, $Cov(r_i, r_M)$ is the covariance between the return of stock i and the domestic market return, and $Var(r_M)$ is the variance of the domestic market return. If the representative investor has constant relative risk aversion γ, equation (1) can be approximated as

$$E(r_i) = r_f + Cov(r_i, r_M) \times \gamma. \tag{2}$$

Suppose now that this small country begins to receive a substantial amount of investment from foreigners. In this case, the foreign investor becomes the marginal investor and, hence, the world market becomes the relevant source of systematic risk. Assuming that risk aversion is homogenous around the world, for a stock i in this country we should then have

$$\widetilde{E}(r_i) = r_f^* + Cov(r_i, r_M^*) \times \gamma, \tag{3}$$

where $\widetilde{E}(r_i)$ is the expected return of stock i with a sufficiently large number of foreign investors in the country, r_f^* is the world risk-free rate and r_M^* is the return of the world market portfolio.

By subtracting equation (2) from equation (3), we conclude that, when a country faces an event that generates a significant increase in the amount of international investment, we should observe the following change in the required rate of return on firm i :

$$\widetilde{E}(r_i) - E(r_i) = -DIFRF - DIFCOV_i \times \gamma, \tag{4}$$

where $DIFRF \equiv r_f - r_f^*$ and $DIFCOV_i \equiv Cov(r_i, r_M) - Cov(r_i, r_M^*)$.

If the expectation of future earnings of firm i is unaltered by the sudden inflow of foreign investments, changes in expected returns are directly reflected in stock prices: a decrease (increase) in a security's expected return produces an increase (decrease) in its price. Under this assumption, $E(r_i) - \widetilde{E}(r_i)$ is equal to the rate of change of firm i's stock price. Thus, when there is an increase in the amount of international investment (or when there is an expectation of such an increase to happen), prices should then adjust as follows:

$$\Delta lnp_i = DIFRF + DIFCOV_i \times \gamma, \tag{5}$$

where Δlnp_i is the change in the log price of security i.

Equation (5) highlights two complementary channels for the repricing of domestic securities around such events. The first channel, which derives from the difference between the domestic and the international risk-free rate ($DIFRF$), is common to all firms. The second channel, which derives from the difference between the historical covariance of firm i's return with the local market index and the historical covariance of firm i's return with the world market index ($DIFCOV$), is firm-specific. For instance, suppose that $DIFRF > 0$ and $DIFCOV_i > DIFCOV_j > 0$. In this case, the price of both security i and security j should increase, but the price of security i should increase more than the price of security j.

Analogously, in events when international investors must exclude a small country from their portfolios, we should observe the opposite change in the price of security i:

$$\Delta lnp_i = -DIFRF - DIFCOV_i \times \gamma. \tag{6}$$

In events such as these, assuming that $DIFRF > 0$ and $DIFCOV_i > DIFCOV_j > 0$, the prices of both security i and security j should decrease, but the price of security i should decrease more than the price of security j.

Define an "inflow event" as an event that generates a significant increase in the amount of international investment, and an "outflow event" as an event that generates a significant decrease in the amount of international investment. With a data set of countries that faced inflow and outflow events, we can test the following two hypotheses:

- Hypothesis 1 (H1): Within each country, securities with more positive $DIFCOV$ should present stronger increases in their prices around inflow events.
- Hypothesis 2 (H2): Within each country, securities with more positive $DIFCOV$ should present stronger reductions in their prices around outflow events.

In their work, Chari and Henry (2004) can only test H1, since they focus on liberalizations of local financial markets. In contrast, our setting allows us to evaluate both H1 and H2.

In this paper, we use changes in the investment-grade status of countries as the driving forces behind such inflow and outflow events. Our main assumption is that the marginal investor in a small country that is rated speculative grade (investment grade) is the domestic (foreign) investor.

A number of studies and relevant facts support this idea. First, large pension and mutual funds around the world face strong restrictions on investing in countries that are rated speculative grade. Adams, Mathieson and Schinasi (1999) show that credit ratings have been used extensively by regulators to restrict the types of investments that financial institutions can make. According to these authors, the United States pioneered the regulatory use of ratings in 1931, when the Federal Reserve Board prohibited banks from holding bonds not rated investment grade by at least two rating agencies. This investment-grade distinction was also adopted by the National Association of Insurance Commissioners in 1951 and, in the late 1980s, the regulation spread to pension funds, savings and loans, and money market funds (see Table A6.1 in Adams, Mathieson and Schinasi 1999).[2] Rigobon (2002) shows that after the upgrade of Mexico to the investment-grade status in 2000, the correlation of

[2]See also Cantor and Packer (1994) and White (2010).

sovereign yields between Mexico and other Latin American countries fell considerably. He interprets this result as evidence of an expansion in the pool of foreign investors induced by the upgrade. IMF (2010) and Jaramillo and Tejada (2011) find that country spreads change significantly when a country crosses the investment-grade threshold. This effect is much stronger than those associated with movements across other ratings, which suggests that the investment-grade status serves as "certification" of a country's creditworthiness. Reinhart and Rogoff (2004) investigate why rich countries do not invest more in poor countries, given the potential mutual benefits. They present evidence that the key explanation relies on credit and political risks. Because the perception of such risks is updated when a country moves from speculative to investment grade, our story is in line with their evidence.

3 Events and Data

Our empirical analysis is based on (i) upgrades in credit ratings for sovereign bonds that move countries from speculative-grade status to investment-grade status, and on (ii) downgrades that move countries from investment-grade status to speculative-grade status. We consider ratings produced by Fitch Group, Moody's and Standard & Poor's (S&P), the so-called "Big Three" agencies by market practitioners. Together, they control approximately 95% percent of the credit rating market.[3]

In our main event study, we say that a country is "market-wise investment-grade" (MIG) if it is rated investment-grade by at least two of the three rating agencies considered. Otherwise, we say that the country is non-MIG. We define an "event" as the month when a country moves from non-MIG to MIG, or from MIG to non-MIG.[4] In the first case, the country should receive (or expect to receive) a significant inflow of foreign investment and, according

[3] See White (2010).

[4] Our definition of event, therefore, explores situations when an agency confirms the decision of another agency to upgrade or downgrade the country. Consistent with this assumption, Cantor and Packer (1996) show that the impact of an agency's announcement on the stock market is greater if it confirms another agency's rating or a previous rating announcement.

to theory, assets should begin to be priced as a function of their covariances with the global portfolio (H1). In the second case, we should observe the opposite: because many foreign investors should be expected to leave the country, systematic risk should be redefined as the covariance of asset returns with the return of the local portfolio (H2).

Our sample of countries is constructed following two criteria. First, to be included in the sample, the country must have experienced at least one event (as defined above) from 1997 to 2012. Second, the country must have a liquid stock market. We proxy liquidity using the stock market turnover ratio of a country in 2012, which is defined as the total value of shares traded during the year, divided by the average market capitalization for that period. Countries turnover ratios are available on the World Bank Databank.[5] We say that a country has a liquid stock market if its turnover ratio is above 25%.[6] Thus, we end up with 11 countries in our sample: South Korea (with a turnover equal to 195%), Russia (127%), Hungary (84%), Brazil (69%), India (56%), Portugal (50%), Greece (47%), Ireland (45%) South Africa (40%), Indonesia (37%) and Mexico (26%).[7] Table 1 reports the history of changes in sovereign credit ratings in these countries between 1997 and 2012.

[Table 1 about here]

Table 2 provides a graphic view of the events in our sample. The second column reports the initial situation of each country regarding its classification as investment grade by the three rating agencies: for instance, if a country has three positive signs (+ + +), then at the end of 1996 it was classified as investment grade by all three agencies; if a country has two positive signs and one negative sign, then only two agencies considered it to be investment

[5] The variable code is CM.MKT.TRNR. The variable can be downloaded from the World Bank website at http://data.worldbank.org/indicator/CM.MKT.TRNR?display=default (as in March 2014).

[6] Although this is an arbitrary value, there is a clear discontinuity at this level: the first country above the threshold is Mexico, with turnover equal to 26%; the first country below Mexico is Colombia, with turnover equal to 13%.

[7] Because of lack of data to calculate covariances (see discussion below), we excluded two other countries with high turnover ratio, namely Thailand (85%) and Egypt (34%). Baseline empirical exercises do not include data from Ireland because it experienced a downgrade from only one agency during the sample period.

grade, and so on. The remaining columns report changes in investment-grade classification that occurred in the following years. A blank entry indicates that there was no change. One positive sign (+) indicates that one agency upgraded the country to investment-grade status in that year; two positive signs (++) indicate that two agencies upgraded the country to investment-grade status. Analogously, one negative sign (−) indicates that one agency downgraded the country in that year, and so on. Finally, the line of the country is gray in years when at least two agencies considered it to be investment grade; otherwise, it is white. Thus, the events, as defined above, occur in years when the color of the line changes: when the line turns gray (white), it indicates that the country went from non-MIG to MIG (from MIG to non-MIG) in that year.

[Table 2 about here]

To test hypotheses H1 and H2, as defined in the previous section, we require historical returns of individual stocks and of local markets for the countries in question. Furthermore, we require the historical return of a global portfolio. Stock returns are from Bloomberg and market returns (local and global) are from MSCI. We only consider firms whose stocks have been traded in the local market every month during the 30 months prior to the event. We define the monthly return of a firm as the log price of its share on the last day of the month minus the log price on the last day of the previous month.

The covariances of stock returns in each country with local and global portfolios at the moment of the event are central to our analysis. The computation of such covariances produces a last filter for our sample. For each country, define t_0 as the first month for which we have data on individual stocks, t^* as the month in which a given event (as defined above) occurred, and t^{**} as the month in which a previous event occurred (if the event is the first one in the sample for the country, set $t^{**} = t_0$). We then compute the covariances of each stock with local and global portfolios using monthly returns from month $t^{**} + 1$ to month $t^* - 1$

(inclusive). It is reasonable not to mix different regimes (MIG and non-MIG) to compute the covariances, given that covariance risks are known to be time varying (Jagannathan and Wang 1996; Ang and Chen 2007; Adrian and Franzoni, 2009).

To guarantee some precision in the estimation of covariances, if the number of months between month $t^{**}+1$ and month $t^{*}-1$ is less then 30, we drop the event from our study. Under this criterion, the 1999 South Korean upgrade (displayed in Figure 1) was excluded from our baseline regressions because of the short period between this event and the 1997 downgrade. We are then left with 11 events, of which 5 are downgrades – South Korea (1997), Indonesia (1997), Greece (2010), Hungary (2011) and Portugal (2011) – and 6 are upgrades – South Africa (2000), Mexico (2002), Russia (2004), India (2006), Brazil (2008) and Indonesia (2012).

Table 3 presents some descriptive statistics regarding these events. The first column indicates country and year of each event. The second column reports the number of eligible firms in the specified country. The third column presents the simple average of individual covariances of firms with the local market in the specified country. The fourth column shows the simple average of individual covariances of firms with the global market. The fifth column reports the average of individual $DIFCOVs$, i.e., the difference between the two previous columns. The last two columns display, respectively, the average and the standard deviation of returns in the month of the event, in the specified country.

[Table 3 about here]

On average $DIFCOVs$ are positive: stock returns tend to co-move more with the local market than with the global market. Downgrade events are characterized by highly negative returns. Average returns are positive in upgrade events, with the exception of Russia (for which we have few observations). Furthermore, average volatility tends to be higher in downgrade events.

4 Empirical Analysis

Given equations (5) and (6), our main regression is

$$\Delta lnp_{ij} = \beta \times DIFCOV_{ij} + \alpha_j + \varepsilon_{ij,} \tag{7}$$

where Δlnp_{ij} is the change in the log price of security i in country j (where firm i belongs to country j) during the month of the event in that country; $DIFCOV_{ij} = cov(r_{ij}, r_{Mj}) - cov(r_{ij}, r_M^*)$, where $cov(r_{ij}, r_{Mj})$ is the historical covariance of firm i's return with the local market index of country j; and $cov(r_{ij}, r_M^*)$ is the historical covariance of firm i's return with the world market index. Finally, α_j are country-specific dummies that account for the variable $DIFRF$ in equations (5) and (6), and ε_{ij} is the error term.

Equation (5) indicates that if we estimate regression (7) using the months in which countries moved from non-MIG to MIG (upgrade events), we should find $\beta > 0$ (H1). Equation (6) indicates that if we use months in which countries moved from MIG to non-MIG (downgrade events), we should find $\beta < 0$ (H2).

Furthermore, under the theoretical assumptions of Section 2, $|\beta|$ should approximate the level of relative risk aversion of the representative investor, which produces a second testable implication of the model. According to the time-varying risk-aversion literature, risk aversion should be higher during periods of recession or financial distress. For instance, Campbell and Cochrane (1999) show that risk aversion increases during periods of low consumption, if agents exhibit habit persistence. Barberis, Huang and Santos (2001) find similar effects with preferences featuring loss aversion. He and Krishnamurthy (2012) propose a model in which financial turmoil reduces liquidity and therefore agents' capacity to bear risk, which resembles an increase in risk aversion. Finally, Guiso, Sapienza and Zingales (2013) find evidence that average risk aversion has risen during the recent financial crisis, but this result does not seem to be related to the fall in wealth and income, or to increased income volatility. Instead, these authors attribute such finding to psychological factors.

Based on this literature, we expect the estimate of β under upgrade events to be smaller, in absolute terms, than the estimate under downgrade events. Notice that all the downgrade events in our sample are associated with major financial crises: South Korea and Indonesia, during the Asian crisis of the late 1990s; and Greece, Hungary and Portugal, during the recent European sovereign debt crisis.

Considering our 6 upgrade events, we obtain

$$\begin{aligned} \Delta lnp_{ij} &= \underset{(2.3)}{5.0} \times DIFCOV_{ij} \\ R^2 &= 4\%,\ N = 1352 \end{aligned} \tag{8}$$

Considering the 5 downgrade events, we obtain

$$\begin{aligned} \Delta lnp_{ij} &= \underset{(4.7)}{-66.2} \times DIFCOV_{ij} \\ R^2 &= 69\%,\ N = 740 \end{aligned} \tag{9}$$

In equations (8) and (9), estimates of country dummies are not reported for simplicity and robust standard errors of β are in parentheses. The coefficient of $DIFCOV$ is highly significant in both cases: the p-values of β in equations (8) and (9) are 0.028 and 0.000, respectively. For the sake of comparison, all regression results of this paper are summarized in Table 4. Regressions (8) and (9) are in columns 1 and 2, respectively.

Consistent with hypotheses H1 and H2, $\beta > 0$ in equation (8) and $\beta < 0$ in equation (9). Moreover, consistent with the proposition that risk aversion should be higher during periods of economic or financial distress, the absolute value of β during downgrade events is more than 12 times higher than during upgrade events.

The equations also show that the relationship between change in log price and $DIFCOV$ is much more precise around downgrade than upgrade events. Whereas the R^2 of equation (8) is only 4%, it is equal to 69% in equation (9). To illustrate this last point, Figures 1 and

2 plot pairs $(\Delta lnp_{ij}, DIFCOV_{ij})$ for upgrade and downgrade events respectively, controlling for country fixed effects.

[Figures 1 and 2 about here]

Interestingly, the scatterplot presented in Figure 1 is very similar to that reported in Figure 1 of Chari and Henry (2004). In both cases, although statistically significant, the relationship between change in log prices and $DIFCOV$ is rather noisy. However, the scatterplot we present in Figure 2 is much more precise. A possible explanation is as follows. Whereas both Figure 1 of the present paper and Figure 1 of Chari and Henry (2004) use events when an inflow of foreign investment may have happened, our Figure 2 is based on events with investment outflows. It is reasonable to imagine that outflow events should occur more abruptly than inflow events. Before a country receives investment-grade status (or opens its stock market as in Chari and Henry 2004), it should have already experienced smooth and favorable dynamics. In this case, domestic investors may have had time to incorporate into stock prices the expectation of a possible future inflow of foreign investment; thus, when the event happens, a significant part of the repricing may have already occurred. On the other hand, facts that lead to countries being downgraded are likely to be more abrupt, which leaves less time for investors to reprice assets before the event occurs. Indeed, in all outflow events in our sample, countries that were initially classified as investment grade by all three agencies became non-MIG within one year. However, inflow events generally occur years after the first agency upgraded the country (see Table 2).

According to Table 3, the number of stocks used in the regressions above varies considerably across countries. For instance, our sample has 396 firms from South Korea, and only 8 from Russia. Thus, a natural concern is related to the generalization of the results: are the obtained estimates driven by some specific countries?

To address this question, Figure 3 presents scatterplots of pairs $(\Delta lnp_{ij}, DIFCOV_{ij})$

for each country. On block 1, we plot countries that experienced upgrade events. Block 2 presents downgrade events. According to the plots, the results discussed above are fairly robust for each country individually. Specifically, in all countries with upgrade (downgrade) events, the correlation between change in log prices and $DIFCOV$ is positive (negative).

[Figure 3 about here]

4.1 Repricing by the time of the first upgrade or the first downgrade

We have defined a country as MIG when it is rated investment grade by at least two rating agencies and non-MIG otherwise. Although the "second investment grade" seems to be a standard rule among investors, it may be the case that, following the first upgrade of a country to investment grade, local investors should already update their expectations regarding an upgrade by a second agency. In this case, stocks would already be (partially) repriced by the time of the first upgrade. Analogously, in outflow events there may also be some repricing as a function of $DIFCOVs$ following the first downgrade of a country to speculative grade.

To check this conjecture, we re-estimate equation (7) using the month when a country receives its first upgrade to investment grade and the month when a country receives its first downgrade to speculative-grade. Specifically, in our upgrade (downgrade) events, we consider countries that are initially rated speculative (investment) grade by all three agencies and receive their first upgrade (downgrade) to investment- (speculative-) grade status.

In the first regression (first upgrade), using the stocks from Mexico (March 2000), Russia (October 2003), India (January 2004), Brazil (April 2008) and Indonesia (December 2011), we obtain

$$\Delta lnp_{ij} = \underset{(1.9)}{-4.1} \times DIFCOV_{ij} \tag{10}$$
$$R^2 = 32\%,\ N = 1076$$

In the second regression (first downgrade), using the stocks from Hungary (November 2011), Portugal (July 2011), Greece (April 2010), and Ireland (July 2011), we obtain[8]

$$\Delta lnp_{ij} = \underset{(3.6)}{-30.2} \times DIFCOV_{ij} \tag{11}$$
$$R^2 = 44\%,\ N = 370$$

In equations (10) and (11), as before, estimates of country dummies are not reported for simplicity and robust standard errors of β are in parentheses (the regressions are reported in columns 3 and 4 of Table 4). The p-values of β in equations (10) and (11) are 0.030 and 0.000, respectively. These results indicate that, in downgrade events, stocks are already repriced (at some extent) by the time of the first movement in countries' rating. The coefficient remains significant and high in magnitude, although 45% smaller than that of our baseline regression (9).

We did not find the same result for upgrade events. The coefficient of $DIFCOV$ is actually negative and significant at 5%. Nevertheless, this negative sign is driven entirely by Indian firms. When we run the same regression separately by country, the estimated coefficient for all other countries is positive, although it is insignificant in most cases.

[8]Ireland was not included in our baseline sample (section 4), since it received only one downgrade between 1997 and 2012. South Korea and Indonesia were downgraded by all three agencies in the same month, December 1997. Consequently, they are not included in this regression.

4.2 Firms with ADR or GDR

When the same asset is traded in multiple locations, its price should co-move at some level across these different markets (by no-arbitrage). Thus, stocks primarily listed in a non-MIG country, but with ADR or GDR traded abroad, should already have a significant part of their systematic risk related to the world market. As a consequence, when a country moves from non-MIG to MIG or from MIG to non-MIG, we expect the price of such stocks to be less affected by their $DIFCOV$.

To test this, we estimate an augmented version of regression (7)

$$\begin{aligned} \Delta lnp_{ij} &= \beta_1 \times DIFCOV_{ij} + \beta_2 \times ADR_{ij} \times DIFCOV_{ij} \\ &\quad + \beta_3 \times ADR_{ij} + \alpha_j + \varepsilon_{ij}, \end{aligned}$$

where ADR_{ij} is a dummy variable equal to 1 when stock i, primary listed in country j, has ADR or GDR by the time of the event.[9] If the presence of ADR or GDR attenuates the effect of $DIFCOV$, we should then observe $\beta_2 < 0$ in upgrade events, and $\beta_2 > 0$ in downgrade events. There are 160 stocks with $ADR = 1$ in our sample (118 stocks in the 6 upgrade events and 42 stocks in the 5 downgrade events).

Considering the 6 upgrade events, we obtain

$$\begin{aligned} \Delta lnp_{ij} &= \underset{(2.5)}{5.4} \times DIFCOV_{ij} - \underset{(3.3)}{2.3} \times ADR_{ij} \times DIFCOV_{ij} + \underset{(0.02)}{0.01} \times ADR_{ij} \\ R^2 &= 4\%,\ N = 1352 \end{aligned} \tag{12}$$

Considering the 5 downgrade events, we obtain

[9] Information on firms' ADRs and GDRs were obtained on Citigroup's website, https://wwss.citissb.com/adr/guides/uig.aspx?pageID=8&subpageID=34, as in March 5th 2014.

$$\begin{aligned}\Delta lnp_{ij} &= \underset{(4.7)}{-67.6} \times DIFCOV_{ij} + \underset{(9.2)}{29.8} \times ADR_{ij} \times DIFCOV_{ij} - \underset{(0.07)}{0.09} \times ADR_{ij} \quad (13)\\ R^2 &= 70\%,\ N = 740\end{aligned}$$

Our results are consistent with the conjecture above, especially for downgrade events. When the country moves from MIG to non-MIG, according to equation (13), the price of a stock with $ADR = 1$ is 45% less affected by its $DIFCOV$ than the price of a stock with $ADR = 0$. This difference (β_2) is significant at the 1% level. For upgrade events, according to equation (12), the estimated coefficients also indicate that stocks with $ADR = 1$ are almost 45% less affected by their $DIFCOVs$. However, in this case, β_2 is not statistically significant. Consistent with the previous sections, the results are stronger with respect to downgrade events. Regressions (12) and (13) are reported in columns 5 and 6 of Table 4.

4.3 Placebo exercise

The results above demonstrate a relationship between stock returns and their $DIFCOVs$ for the months when countries cross the investment-grade threshold. We now present a placebo exercise for this result. Because stock prices should adjust reasonably quickly to new information, a natural placebo test is to study the relationship between returns and $DIFCOVs$ (i) some months after a country became rated speculative grade by all three agencies or (ii) some months after a country became rated investment grade by all three agencies. Indeed, after events such as these, no new information regarding credit ratings should be expected to arrive. As a consequence, there should be no relationship between returns and $DIFCOVs$ anymore.

For instance, Greece was downgraded to speculative grade by S&P in April 2010, by

Moody's in June 2010 and, finally, by Fitch in January 2011. Some months after January 2011, when all uncertainty about credit ratings was resolved and prices were adjusted in such dimension, we should find no relation between the returns of Greek stocks and their $DIFCOVs$.

Under this idea, we now estimate the relationship between returns and $DIFCOVs$ three months after the third agency (following the other two) changes the classification of the country from speculative to investment grade.[10] Accordingly, we end up with the following fake events: Brazil in December 2009 (third upgrade: Moody's in September 2009), Mexico in May 2002 (third upgrade: S&P in February 2002), Russia in April 2005 (third upgrade: S&P in January 2005), South Africa in May 2005 (third upgrade: S&P in February 2005), and India in April 2007 (third upgrade: S&P in January 2007).

With these data, we estimate equation (7) and obtain

$$\begin{aligned} \Delta lnp_{ij} &= \underset{(2.3)}{1.6} \times DIFCOV_{ij} \\ R^2 &= 45\%, \; N = 1506 \end{aligned} \tag{14}$$

where, as before, estimates of country dummies are not reported for purposes of simplicity and the robust standard error of β is in parentheses (regression reported in column 7 of Table 4). As expected, the coefficient β is insignificant in this case, with a p-value of 0.50.

Analogously, we estimate the relation between returns and $DIFCOVs$ three months after the third agency, following the other two, changes the classification of the country from speculative- to investment-grade. We use the following fake events: South Korea in March 1998 (third downgrade: S&P in December 1997), Indonesia in March 1998 (third downgrade: S&P in December 1997), Greece in April 2011 (third downgrade: Fitch in January 2011),

[10]For these placebo exercises, covariances of stocks with local and global portfolios were computed using monthly returns from one month after the previous actual event (as defined in Table 2) to one month before the fake event. As before, if the number of months in this period is lower than 30, we do not use the fake event in the placebo test.

Hungary in April 2012 (third downgrade: Fitch in January 2012) and Portugal in April 2012 (third downgrade: S&P in January 2012).

With these data, we estimate equation (7) and obtain

$$\begin{aligned} \Delta lnp_{ij} &= \underset{(2.0)}{-1.7} \times DIFCOV_{ij} \\ R^2 &= 27\%,\ N = 759 \end{aligned} \tag{15}$$

As expected, β is also insignificant in this case, with a p-value of 0.39 (regression reported in column 8 of Table 4).

4.4 Long-window returns

Thus far, we have analyzed only the relationship between returns and $DIFCOVs$ in single months, specifically, (i) the month of the second upgrade (downgrade), (ii) the month of the first upgrade (downgrade) and, for the placebo exercise, (iii) the third month after the third upgrade (downgrade) in a row. However, as previously discussed, expectations should play an important role in our study. In the period between the first and third upgrade (downgrade) in a row of a country, the dynamics of expectations about possible new changes in the rating should generate a relationship between returns and $DIFCOVs$ that extrapolates a single month. In this subsection, we evaluate this hypothesis.

We estimate equation (7) using changes in log prices between one month before the first upgrade (downgrade) and one month after the third and final upgrade (downgrade). The returns over such a long window should capture the full dynamics of expectations about credit rating changes. The drawback is that longer windows tend to incorporate other shocks besides rating changes.

The first regression (upgrades) uses stocks from Mexico (returns between February 2000 and March 2002), Russia (from September 2003 to February 2005), India (from December 2003 to February 2007) and Brazil (from March 2008 to October 2009).[11] We obtain

$$\begin{aligned} \Delta lnp_{ij} &= \underset{(0.30)}{0.35} \times DIFCOV_{ij} \\ R^2 &= 65\%,\ N = 1196 \end{aligned} \tag{16}$$

The second regression (downgrades) uses stocks from Greece (returns between March 2010 and February 2011), Portugal (from June 2011 to February 2012) and Hungary (from October 2011 to February 2012).[12] We obtain

$$\begin{aligned} \Delta lnp_{ij} &= \underset{(1.01)}{-4.62} \times DIFCOV_{ij} \\ R^2 &= 44\%,\ N = 290 \end{aligned} \tag{17}$$

Not surprisingly, the coefficients β are now less precisely estimated (regressions also reported in columns 9 and 10 of Table 4) in comparison with our previous exercises, because longer windows typically include noisier information. This issue is particularly evident for upgrades, which feature long time intervals (for instance, the window for India has 75 months). In this case, β is actually insignificant (p-value of 0.243). In spite of that, for both upgrades and downgrades, point estimates are once more consistent with theory. Moreover, the coefficient of $DIFCOV$ remains highly significant for downgrades (p-value of 0.000).

[11] In the regressions below, we divide the change in log prices by the number of months of each window.

[12] South Korea and Indonesia were downgraded by all three agencies in the same month, December 1997. As a result, they are not included in this regression.

5 Concluding Remarks

In this paper, we empirically evaluate the relationship between assets' returns and their exposures to risk, using an approach similar to that pioneered by Chari and Henry (2004). Specifically, we analyze how asset prices react when there is a change in the source of systematic risk. In our case, such a change is induced by movements in the investment-grade status of countries' sovereign debt. This is motivated by the fact that financial institutions face constraints to invest in countries that are rated speculative grade. As distinguished from Chari and Henry (2004), the advantage of our exercise is that we can also explore situations in which these constraints on foreign investment are tightened (i.e., downgrades from investment- to speculative-grade status). Such a possibility provides a better setup for the empirical exercise, since downgrade events occur abruptly.

Our baseline empirical exercises use 11 events between 1997 and 2012. In five of these events, countries lose their investment-grade status. We correlate changes in firms' stock price with the variable $DIFCOV$, which proxies for the change in firms' exposure to risk around the event. Our results are consistent with theory for both upgrade and downgrade events. This conclusion is especially robust for downgrade events. Additionally, $DIFCOV$ explains a large portion of the observed variation of asset prices around events of this type. We also show that effect of $DIFCOV$ is weaker for firms with ADR or GDR. This result is to be expected, given that such firms' systematic risk should be, to a large extent, related to the world market.

Furthermore, our setting allows us to evaluate the hypothesis that risk aversion is higher during periods of financial or economic distress (Campbell and Cochrane, 1999; Barberis, Huang and Santos, 2001; He and Krishnamurthy 2012; Guiso, Sapienza and Zingales 2013). Consistent with this idea, the coefficient of $DIFCOV$ is more than 10 times larger (in absolute value) in regressions with downgrade events than in regressions with upgrade events.

References

Adams, C.; Mathieson, D. J.; Schinasi, G. (1999). *International capital markets: developments, prospects, and key policy issues.* International Monetary Fund.

Adrian, T.; Franzoni, F. (2009). "Learning about beta: time-varying factor loadings, expected returns, and the conditional CAPM." *Journal of Empirical Finance* 16: 537-556.

Ang, A.; Chen, J. (2007). "CAPM over the long run: 1926-2001." *Journal of Empirical Finance* 14: 1-40.

Barberis, N.; Huang, M.; Santos, T. (2001). "Prospect Theory and Asset Prices." *Quarterly Journal of Economics* 116: 1-53.

Black, F. (1972). "Capital market equilibrium with restricted borrowing." *Journal of Business* 45: 444-455.

Brooks, R.; Faff, R. W.; Hillier, D.; Hillier, J. (2004). "The National Market Impact of Sovereign Rating Changes." *Journal of Banking and Finance* 28: 233-250.

Campbell, J. Y; Cochrane, J. H. (1999). "By force of habit: a consumption-based explanation of aggregate stock market behavior." *Journal of Political Economy* 107: 205-251.

Cantor, R.; Packer, F. (1994). "The credit rating industry." *Federal Reserve Bank of New York Quarterly Review*, vol.19, no.2.

Cantor, R; Packer, F. (1996). "Determinants and Impact of Sovereign Credit Ratings." *New York Fed Economic Policy Review*, October 1996.

Chari, A.; Henry, P. B. (2004). "Risk sharing and asset prices: evidence from a natural experiment." *Journal of Finance* 59: 1295-1324.

Correa, R.; Lee, K.; Sapriza, H.; Suarez, G. (2012). "Sovereign Credit Risk, Banks' Government Support, and Bank Stock Returns around the World." Board of Governors of the Federal Reserve System, International Finance Discussion Paper #2012.

Gande, A.; Parsley, D. C. (2005). "News Spillovers in the Sovereign Debt Market" *Journal of Financial Economics* 75: 691-734.

Guiso, L.; Sapienza, P.; Zingales, L. (2013). "Time varying risk aversion." NBER Working Paper #19284.

He, Z.; Krishnamurthy, A. (2012). "A Model of Capital and Crises." *Review of Economic Studies* 79: 735-777.

International Monetary Fund (2010). *Global Financial Stability Reform: Sovereigns, Funding and Systemic Liquidity.* World Economic and Financial Surveys, IMF.

Jagannathan, R.; Wang, Z. (1996). "The conditional CAPM and the cross-section of expected returns." *Journal of Finance* 51: 3-53.

Jaramillo, L.; Tejada, C. M. (2011). "Sovereign Credit Ratings and Spreads: Does Investment Grade Matters?" IMF Working Paper 11/44.

Kaminsky, G.; Schmukler, S. L. (2002). "Emerging Market Instability: Do Sovereign Ratings Affect Risk and Stock Returns?" *World Bank Economic Review* 16: 171-195.

Lintner, J. (1965). "The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets." *Review of Economics and Statistics* 47: 13-37.

Martell, R. (2005). "The Effect of Sovereign Credit Rating Changes on Emerging Stock Markets." Working Paper, Purdue University.

Michaelides, A.; Milidonis, A.; Nishiotis, G.; Papakyriakou, P. (2013). "Sovereign Debt Rating Changes, Institutional Quality and the Stock Market." Mimeo.

Reinhart, C. M.; Rogoff, K. S. (2004). "Serial default and the paradox of rich-to-poor capital flows." *American Economic Review Papers and Proceedings* 94: 53-58.

Rigobon, R. (2002) "The curse of non-investment grade countries." *Journal of Development Economics* 69: 423-449.

Sharpe, W. F. (1964). "Capital asset prices: a theory of market equilibrium under conditions of risk." *Journal of Finance* 19: 425-442.

Stultz, R. M. (1999). "Globalization, corporate finance, and the cost of capital." Ohio State University.

White, L. J. (2010). "Markets: the credit rating agencies." *Journal of Economic Perspectives* 24: 211-226.

Tables and Figures

Table 1: Changes in Sovereign Credit Ratings between 1998 and 2012

This table presents the changes in sovereign credit ratings that occurred between 1997 and 2012 for the countries in our sample. To be included in the sample, the country (i) must have experienced at least one event, as defined in Section 3, from 1997 to 2012, and (ii) must have a liquid stock market. We proxy stock market liquidity by the stock market turnover ratio of the country in 2012. This variable is defined as the total value of shares traded during the year divided by the average market capitalization for that period.

	Upgrades			Downgrades		
Country	S&P	Fitch	Moody's	S&P	Fitch	Moody's
Brazil	April 2008	May 2008	September 2009			
Greece				April 2010	January 2011	June 2010
Hungary				December 2011	January 2012	November 2011
India	January 2007	August 2006	January 2001			
Indonesia	never IG	December 2011 (M)	January 2012	December 1997	December 1997	December 1997
Ireland				always IG	always IG	July 2011
Mexico	February 2002	January 2002	March 2000			
Portugal				January 2012	November 2011	July 2011
Russia	January 2005	November 2004	October 2003			
South Africa	February 2005	June 2000	always IG			
South Korea				December 1997	December 1997	December1997

Table 2: Events

This table reports the evolution of our "events". The column labeled "Initial Situation" reports the initial situation of each country regarding its classification as investment grade by the three rating agencies: for instance, if a country has three positive signs (+++) in this column, then in the end of 1996 it was rated investment grade by all three agencies; if a country has two positive and one negative sign, then only two agencies rated it investment grade, and so on. The remaining columns report changes in the classification. A blank entry indicates that there was no change in that year for that country. One positive sign (+) indicates that one agency upgraded the country to the investment-grade level in that year. Two positive signs (++) indicate that two agencies upgraded the country to the investment-grade level in that year. Analogously, one negative sign (-) indicates that one agency downgraded the country to speculative-grade status in that year, and so on. The line of the country is gray when at least two agencies consider it to be investment grade; otherwise, it is white. Events happen when the color of the line changes: when the line turns gray (white), it indicates that the country went from non-MIG to MIG (from MIG to non-MIG) in that year. We did not include the 1999 South Korean upgrade in our baseline sample, given the short period (less than 30 months) between this event and the 1997 downgrade.

Country	Initial Situation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
South Africa	+ - -				+					+							
Brazil	- - -												+ +	+			
South Korea	+ + +	- - -		+ + +													
Greece	+ + +														- -	-	
Hungary	+ ++															- -	-
India	+ - -		-						+		+	+					
Indonesia	+ + +	- - -														+	+
Mexico	- - -				+		+ +										
Portugal	+ + +															- -	-
Russia	- - -							+	+	+							

Table 3: Descriptive Statistics of the Events

This table presents some descriptive statistics of the events. Columns 1 lists country and year of each event. The variable "Number of Firms" is the number of eligible firms in the specified country. For a firm to be eligible it must have been traded in the local market at least once a month in the 30 months prior to the event. The column labeled $Cov(r_i, r_M)$ reports the average covariance of firms' returns with the local market in the specified country. The column labeled $Cov(r_i, r_M^*)$ reports the average covariance of firms' returns with the global market in the specified country. The column labeled $DIFCOV$ is the difference between the two previous columns. The column labeled $E(r_i)$ is the average return in the month of the event in the specified country. The column labeled $\sigma(r_i)$ is the standard deviation of returns in the month of the event in the specified country. All variables are computed at a monthly frequency. Averages are weighted by the number of firms in each country.

Event	Number of Firms	$Cov(r_i, r_M)$	$Cov(r_i, r_M^*)$	$DIFCOV$	$E(r_i)$	$\sigma(r_i)$
Downgrade events						
South Korea (1997)	396	0.011	0.001	0.010	-0.622	0.353
Indonesia (1997)	37	0.024	0.002	0.022	-0.484	0.285
Greece (2010)	248	0.010	0.005	0.005	-0.015	0.149
Hungary (2011)	26	0.013	0.005	0.008	-0.080	0.127
Portugal (2011)	33	0.007	0.004	0.003	-0.135	0.188
Average		0.011	0.003	0.009	-0.371	0.266
Upgrade events						
South Africa (2000)	111	0.003	0.002	0.005	0.048	0.153
Mexico (2002)	38	0.014	0.003	0.007	0.081	0.141
Russia (2004)	8	0.009	0.002	0.007	-0.026	0.047
India (2006)	904	0.005	0.002	0.003	0.111	0.114
Brazil (2008)	158	0.005	0.001	0.004	0.098	0.152
Indonesia (2012)	135	0.013	0.006	0.007	0.065	0.093
Average		0.006	0.002	0.004	0.098	0.120

Figure 1: Stock Returns vs. DIFCOV (Upgrade Events)

This figure presents the scatterplot of Δlnp_{ij}, the change in the log price of stock i in country j during the month of the event in that country, and $DIFCOV_{ij}$, the historical covariance of firm i's return with the local market index of country j minus the historical covariance of firm i's return with the world market index. Only upgrade events (i.e., countries moving from non-MIG to MIG) are considered. The plot is controlled for country fixed effects.

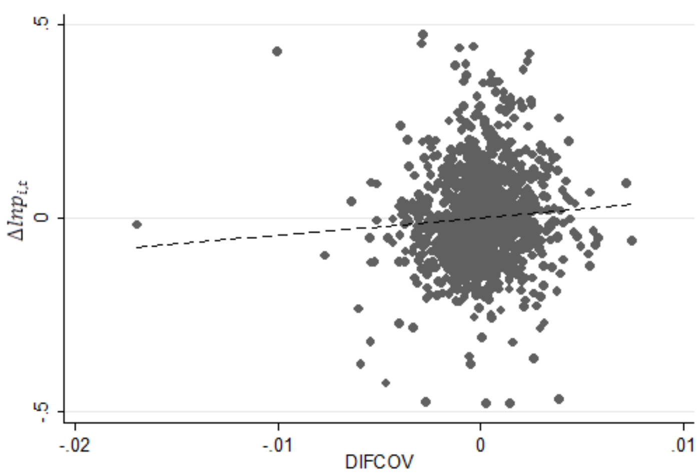

Figure 2: Stock Returns vs. DIFCOV (Downgrade Events)

This figure presents the scatterplot of Δlnp_{ij}, the change in the log price of stock i in country j during the month of the event in that country, and $DIFCOV_{ij}$, the historical covariance of firm i's return with the local market index of country j minus the historical covariance of firm i's return with the world market index. Only downgrade events (i.e. countries moving from MIG to non-MIG) are considered. The plot is controlled for country fixed effects.

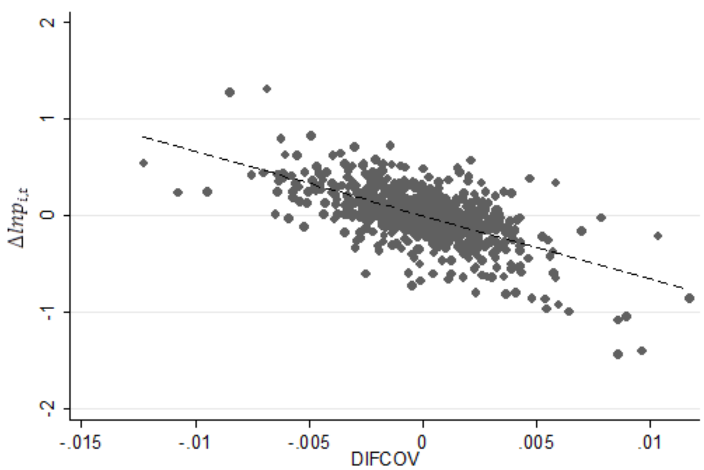

Figure 3: Stock Returns vs. DIFCOV by Country

This figure presents scatterplots by country of Δlnp_{ij}, the change in the log price of stock i in country j during the month of the event in that country, and $DIFCOV_{ij}$, the historical covariance of firm i's return with the local market index of country j minus the historical covariance of firm i's return with the world market index.. Block 1 presents upgrade events (i.e. countries moving from non-MIG to MIG). Block 2 presents downgrade events (i..e. countries moving from MIG to non-MIG).

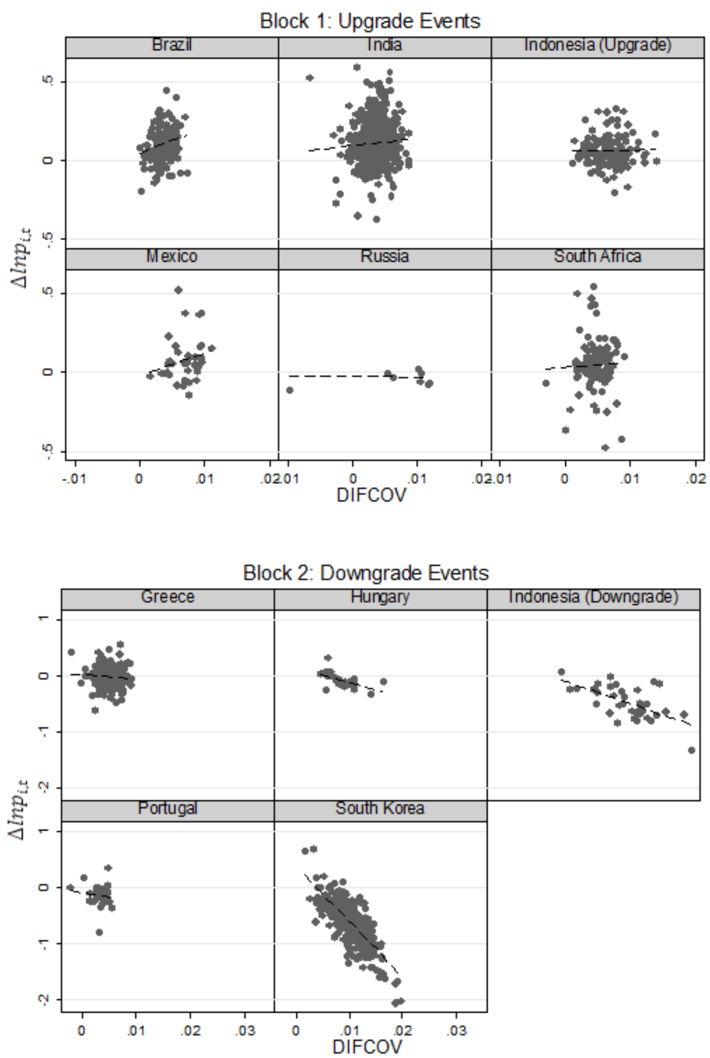

Table 4: **Regressions**

This table presents regression results. The dependent variable (Δlnp_{ij}) is the change in the log price of stock i in country j during the month of the event in that country. The variable $DIFCOV_{ij}$ is the difference between the historical covariance of firm i's return with the local market index of country j and the historical covariance of firm i's return with the world market index. An event happens when a country moves from MIG to non-MIG (downgrade event) or from non-MIG to MIG (upgrade event). In columns (1) and (2), a country is MIG if it is rated investment grade by at least two rating agencies (otherwise, it is non-MIG). Column (1) reports regression results for upgrades, while column (2) focuses on downgrades. Columns (3) and (4) are analogous to the previous two columns, but consider the first upgrade or first downgrade of countries as events. Columns (5) and (6) replicate columns (1) and (2), respectively, allowing for a different effect of $DIFCOV_{ij}$ on Δlnp_{ij} for stocks that have ADR or GDR. In column (7), we run a placebo test, using data from the third month after the third agency upgrades the countries in a row. Column (8) replicates the exercise in column (7) for downgrades. Column (9) presents regressions for long windows (one month between the first investment grade to one month after the third investment grade) for upgrades. Column (10) exhibits results for this same exercise, but for downgrades. All regressions are controlled for country-specific effects. Robust standard errors are reported in parentheses. Significance level: *** (significant at 1%), ** (significant at 5%), * (significant at 10%).

	Dependent Variable: Δlnp_{ij}									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$DIFCOV_{ij}$	4.97**	-66.17***	-4.11**	-30.23***	5.35**	-67.56***	1.57	-1.74	0.34	-4.62***
	(2.26)	(4.70)	(1.89)	(3.56)	(2.53)	(4.71)	(2.35)	(2.00)	(0.30)	(1.01)
$ADR_{ij} \times DIFCOV_{ij}$					-2.33	29.80***				
					(3.58)	(9.24)				
ADR_{ij}					0.008	-0.091				
					(0.023)	(0.071)				
N	1352	740	1076	370	1352	740	1506	759	1196	290
R^2	0.04	0.69	0.32	0.44	0.04	0.70	0.46	0.27	0.59	0.44