Stock Market Integration, Cost of Equity Capital and Corporate Investment

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Abstract

We study the effects of stock market integration on the cost of equity capital and investment. First, we estimate international asset pricing models using fifteen years of monthly data on Brazilian stocks portfolios sorted by size, book-to-market ratio, momentum, illiquidity, industry and corporate governance quality. Our results show that integration (proxied by foreign ownership) reduces the cost of capital, as enhanced risk sharing between domestic and foreign investors brought about by increased levels of integration reduces systematic risk, lowering expected returns. The effects of integration are unevenly distributed. Portfolios of firms with small market capitalisation, high book-to-market ratios, high liquidity and better governance quality experienced a greater drop in expected returns. Second, we estimate corporate investment models using quarterly investment data. We find that stock market integration increases corporate investment rates, but only for firms adopting best governance practices. Such evidences taken together, stock market integration is found to have a positive impact on the financing side, by lowering equity risk and reducing firms' cost of capital, and also on the real output side, by increasing investment and boosting economic activity, provided integration is accompanied by improvements in corporate governance.

Keywords: Stock Market Integration, Cost of Capital, International Asset Pricing, Investment

1. Introduction

The past thirty years have seen a gradual erosion of financial and economic barriers on global investment, which has led to greater integration between emerging and developed countries' capital

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markets. A major side effect of integration is higher levels of foreign stock ownership. According to neoclassical theories of international finance, when emerging economies liberalise equity markets and foreign investment flows to weakly integrated capital markets, risk sharing takes place between local and foreign investors. In an autarkic regime, local asset are priced in excess of the domestic market risk premium, under the traditional CAPM. After liberalisation, the global market risk premium takes on more importance, and local assets are repriced under the World CAPM, resulting in lower systematic risk, lower expected returns, higher stock market valuations and an overall reduced cost of equity capital (Henry, 2000a; Bekaert & Harvey, 2000; Stulz, 2005).

On a slight different perspective, theories of imperfect financial integration assert that despite of liberalisation landmarks, emerging stock markets remain mildly segmented. In this setting, not all assets can be freely traded by foreign investors, and risk sharing is limited to a number of so-called investable assets. The existence of large subsets of non-investable assets, which remain ineligible for foreign investors' trading, creates hedging pressures on investable stocks, with positive covariance between returns of investable and non-investable assets partially offsetting risk sharing and marginally undermining the beneficial effects of integration. (Errunza & Losq, 1989; de Jong & de Roon, 2005).

The purpose of our paper is to empirically examine the effects of stock market integration on the cost of equity capital and on corporate investment, using Brazil as a case study. Differently from most of prior work, we take imperfect integration as our theoretical perspective. The bulk of empirical evidence on the effects of stock market integration on asset prices took the neoclassical approach, examining whether specific liberalisation events (often related to legal reforms in emerging markets) affected stock prices (Henry, 2000a; Bekaert & Harvey, 2000; Patro & Wald, 2005; Christoffersen *et al.* , 2006). However, inherent to the nature of event studies, this literature is silent about how the relationship between stock market integration and the cost of capital evolves over time, whereas asset pricing models of time-varying imperfect integration provide a more suitable framework to investigate the problem in a longer time range. Common to both perfect and imperfect integration regimes, global market risk premiums become the relevant source of systematic risk after integration, replacing for the local market risk premium. But the level of integration is relevant only on an imperfect integration setting, as these models contain an additional risk factor capturing pricing imperfections caused by pervasive segmentation (or lack of integration), which changes over time, depending on the pace of the integration process.

Our study makes four contributions to the literature. First, building on an international asset pricing developed by de Jong & de Roon (2005), we estimate the effects of stock market integration on stock returns for Brazilian stocks' portfolios on a monthly basis, between years 2001 and 2015. We use foreign ownership as a proxy for the level of stock market integration, a time-varying measure of foreign investors' presence in the domestic stock market. Second, we study the role of assets' characteristics in the integration process, as we estimate separate models for portfolios of stocks sorted by size, book-to-market ratios, momentum, illiquidity, industry and corporate governance practices adopted by firms, and compare the magnitude of the effects across portfolios. A couple of papers examined the role of assets' characteristics under a neoclassical - liberalisation design (Patro & Wald, 2005; Christoffersen *et al.* , 2006), but to our best knowledge we add a new contribution by examining the role played by assets' characteristics under a time-varying and imperfect integration setting, shedding light on the relevant issue of whether some types of assets benefit more or less from integration.

Third, we go beyond examining the effects of stock market integration solely on financial variables, by studying how integration affects corporate investment, a real economic variable. This is a very controversial issue, because despite of some evidence documented in favour of positive effects of liberalisation events on investment and economic growth (Henry, 2000b; Laeven, 2002; Bekaert *et al.* , 2005; Chari & Blair Henry, 2008), others argue that it is dubious whether financial liberalisation has truly contributed to real economic activity (Bosworth & Collins, 1999; Stiglitz, 2000; Stulz, 2005; Aizenman *et al.* , 2007). Moreover, the main benefit attributed to stock market integration is that it boosts investment by reducing the cost of capital, but evidence is biased towards the financing side, and very often it is simply assumed that firms will increase their investments because stock prices have soared and expected returns dropped. As we study the effects of stock market integration on both the cost of capital and on investment for the same sample of firms during the same time period, our view is that we offer robust evidence on how these three variables are related to one another.

Fourth, we study the role of corporate governance, a key variable in financial economics, in making integration more efficient both at the financing and at the real side. An interesting feature of the Brazilian equity market is that firms are listed on different market segments, contingent on the quality of corporate governance rules they follow. We take advantage of this clearcut distinction which is based solely on governance criteria, examining in detail how integration affects the cost of equity and investment for the portfolio of constituents' firms of the *Novo Mercado* (New Market) Special Corporate Governance Index, and how these effects differ with respect to firms observing less stringent governance rules.

On the financing side, we document strong evidence that stock market integration decreases the cost of equity capital. We show that foreign ownership, our measure of integration, was about 10% of stock market capitalisation at the beginning of the period studied, in the early 2000s, rising steadily and reaching levels close to 30% by the end of year 2015. Such increase in foreign ownership was accompanied by marginal reductions in expected returns, as we find a negative partial effect of lagged foreign ownership on stock returns for the vast majority of portfolio studied. We also show that the benefits of integration are split unevenly, as some firms benefit more than others. Portfolios of stocks with small market capitalisation, high book-to-market ratios, high liquidity and firms observing best corporate governance practices benefited relatively more than their peers. We also find that integration reduces the domestic market risk premium, hence integration conditionally reduces systematic risk over time, and that the causality runs unidirectionally from integration to equity prices and not the other way around.

On the real side, we estimate a neoclassical investment model employing Vector Autoregressive Models. We split the sample of Brazilian equities in two portfolios, clustering firms according to Corporate Governance practices they follow: *Novo Mercado* and *Ex-Novo Mercado* portfolios. Our findings provide support for positive effects of stock market integration on investment, but only for the portfolio of constituents of the *Novo Mercado* listing segment. This finding is backed by the coefficients fitted in our VAR model, Granger Causality tests, Impulse-Response functions and Forecast Error Variance Decomposition analysis. The economic effects of integration are fairly modest, though, explaining away 13% of fluctuations on investment, whereas lagged investment and growth opportunities are the main determinants of investment, explaining 45% and 40% of variations in investment, respectively. For the *Ex-Novo Mercado* portfolio, we find that an impulse to integration produces a negative response in investment. Therefore, corporate governance quality is key in making integration beneficial, as financial integration will produce higher investment only if integration comes accompanied by improved corporate governance quality.

The rest of our study is organised as follows. In section two, we discuss theories of stock market integration. In section three we present our dataset, whereas in section four we describe the methodology employed in our asset pricing analysis. In section five we present and discuss our main findings related to integration and the financing side, some additional analyses and robustness checks. In section six, we analyse the effects of stock market integration on the real economic side, by studying the effects of integration on corporate investment. Finally, section seven concludes.

2. Theory

Two important theories have been proposed to explain the effects of equity market integration and foreign equity investments on the cost of equity capital of emerging markets' firms. First, neoclassical theories suggest that as emerging equity markets adhered to financial globalisation, foreign investors gained access to previously segmented markets, introducing risk sharing among domestic and foreign investors, as in segmented equity markets domestic investors have to bear all risks alone (Henry, 2000b; Bekaert & Harvey, 2000; Sloek *et al.* , 2002). In neoclassical models, risk sharing occurs almost instantaneously, and markets become perfectly integrated. Improved risk sharing decreases expected returns, leading to lower cost of equity capital (Bekaert *et al.* , 2005). As a result, stock prices soar, reflecting lower levels of risk and increased demand for local stocks brought by integration. Such increase in stock prices due to foreign capital flows was best described as a revaluation effect. (Errunza & Miller, 2000; Chari & Henry, 2004; Patro & Wald, 2005; Christoffersen *et al.* , 2006; Reis *et al.* , 2010).

Second, theories of partial integration assert that the process of integration is imperfect in itself, and emerging equity markets remain mildly segmented, or imperfectly integrated. First, integration is negatively affected by episodes of financial turmoil, like during financial crisis, suffering reversals when risk aversion escalates, and by the persistence of other barriers related to institutional quality, corporate governance and political risk, which are secular institutions that may be improved over time, but not overnight (Carrieri *et al.* , 2007; Bekaert *et al.* , 2010). Second, despite of liberalisation events, local equity markets are not instantaneously globally integrated, but integration follows a time-varying process (Errunza & Losq, 1989; Bekaert & Harvey, 1995; de Jong & de Roon, 2005). Although after integration a large number of financial assets can be freely traded by foreign investors, assets referred to as investable stocks, other types of assets, named non-investable stocks, remain traded only by domestic investors (often non-investable assets are micro-caps, highly illiquid stocks and equities with restrictions on foreign ownership imposed by local governments).

In this setup, foreign investors will naturally hold the portfolio of investable stocks. Local investors will hold both portfolios, but they will hold the investable portfolio with the purpose of hedging against the idiosyncratic risk from the non-investable portfolio. This hedging pressure creates pricing imperfections which get in the way of integration, partially offsetting the benefits stemming from risk sharing (Errunza & Losq, 1989). We follow this concept of imperfect and time-varying equity market integration in our analysis of the effects of integration on expected returns, having an international asset pricing model proposed by de Jong & de Roon (2005) as a benchmark for our empirical modelling. We now turn to a simplified exposition of this model.

2.1. A model of imperfect equity market integration

Initially, consider that a segmented market goes through several liberalisation events, becoming perfectly integrated with the global equity market. For simplicity, we will not make any assumption about the level of integration of debt markets, so along the theory and empirical sections, both asset returns and market premiums are gross returns (we do not subtract risk-free rates from returns). When the market is completely segmented, assets are priced in excess of the domestic market risk premium, and the standard CAPM holds. In this case, expected returns are given by the equation $E_{t-1}[R_{it}] = \beta_i^m E_{t-1}[R_t^m]$, where $\beta_i^m = Cov[R_{it}, R_t^m]/Var[R_t^m]$.

When the market becomes integrated, assets are priced in excess of the world market risk premium, and global covariance risk immediately replaces local covariance risk (Solnik, 1974; Stulz, 1981; Brennan & Solnik, 1989; Buckberg, 1995; Henry, 2000a; Bekaert & Harvey, 2000; Chari & Henry, 2004). If the market is perfectly integrated, expected returns are given by the equation $E_{t-1}[R_{it}] = \beta_i^w E_{t-1}[R_t^w]$, where $\beta_i^w = Cov[R_{it}, R_t^w]/Var[R_t^w]$. Provided that the covariance between assets' returns and the local market risk premium is higher than the covariance between assets' returns and the world market risk premium, expected returns drop after integration, for systematic risk is now lower, and firms enjoy a lower cost of equity capital. In this case, given risk sharing occurs instantaneously and global risk premiums immediately replaces for local risk, the level of integration is irrelevant for asset prices, or in other words, the equity market becomes perfectly integrated right away.

But in practice, there are frictions in the integration process. Despite of liberalisation events, stock markets in emerging economies remain fairly segmented from global markets (Errunza & Losq, 1985, 1989; de Jong & de Roon, 2005; Bekaert *et al.* , 2010). We address these frictions following an international asset pricing model proposed by de Jong & de Roon (2005). According to this model, an imperfectly integrated emerging market is characterised by two classes of assets, investable and non-investable stocks, and by two types of agents, foreigner (restricted) and domestic (unrestricted) investors. The cost of equity capital of investable assets is given by $E_{t-1}[R_t^I]$, whereas the cost of capital of non-investible assets is given by $E_{t-1}[R_t^X]$. Domestic investors can hold both the investable and the non-investable portfolios. Foreign investors can hold only the investable portfolio.

As a fraction of local assets remain held only by domestic investors, these assets are partially excluded from the process of financial integration, and do not benefit from increased risk sharing directly. In this case, not all assets are priced against the world market risk premium, and the international asset pricing model does not hold for all equities in the market. However, local investors can make use of the investable portfolio to hedge against the idiosyncratic risk from the non-investable portfolio. Because investable assets are priced in excess of the world market premium, they have lower covariance risk. Hence, local investors will price non-investable assets in excess of returns earned on the investable assets' portfolio. But such hedging pressure will affect the pricing of investable assets too. Under imperfect market integration, the cost of equity capital of investable assets is given by the equation:

$$k_t^I = E_{t-1}[R_t^I] = (1 - q_t) \cdot \gamma^m Cov_{t-1}[R_t^I, R_t^w] + q_t \cdot \gamma^m Cov_{t-1}[R_t^I, R_t^X] \tag{1}$$

As in the World CAPM model, expected returns on investable assets depend on the covariance between investable assets returns and world risk premiums ($Cov_{t-1}[R_t^I, R_t^w]$), and on a risk aversion coefficient, γ^m. Moreover, expected returns are affected by an additional risk premium which arises if the asset provides a hedge against the risk of non-investible assets, captured by the covariance of the returns of investable assets with the returns of non-investable assets ($Cov_{t-1}[R_t^I, R_t^X]$). The extent to which investable assets are priced globally under the influence of world risk premiums or locally under the influence of non-investable assets risk premiums is weighted by the fraction of assets in the local market which cannot be traded by foreign investors, defined as q_t in the equation above. It provides a measure of segmentation (or lack of integration), capturing how much integration is undermined by local pricing imperfections arising from non-investable assets.

Considering that $\gamma^m Cov_{t-1}[R_t^I, R_t^w] = \beta_i$ and that $\gamma^m Cov_{t-1}[R_t^I - \beta_i R_t^w, R_t^X] = \theta_i$, Equation (1) can be expressed in a beta-model representation. In words, the first term refers to the sensitivity of investable assets returns to the global risk premium, whereas the second term reflects additional risk premiums caused by the hedging demand by investors for their positions on non-investable stocks. Such increased risk premium is proportional to the covariance of the residual of the global beta pricing equation (the fraction of investable assets returns which does not covariate with global risk premiums) with the returns of non-investable assets (the pricing imperfection). Hence, the beta representation of the asset pricing model is given by:

$$E_{t-1}[R_t^I] = \beta_i E_{t-1}[R_t^w] + \theta_i q_{t-1} \tag{2}$$

Clearly, higher the lack of integration (segmentation), higher is the pricing imperfection and higher is the cost of equity capital. [2] We slightly change the original model, by replacing the variable segmentation or lack of integration (q_{t-1}) by its opposite, the level of integration in the market, given by $I_{t-1} = 1 - q_{t-1}$. The asset pricing equation becomes:

$$E_{t-1}[R_t^I] = \beta_i E_{t-1}[R_t^w] + \delta_i I_{t-1} \tag{3}$$

The cost of capital of investable assets, $E_{t-1}[R_t^I]$, is an increasing function of (i) the sensitivity of returns, β_i, with respect to expected global risk premiums, $E_{t-1}[R_t^w]$; (ii) a decreasing function of the sensitivity of returns, δ_i, with respect to the level of integration in the equity market, I_{t-1}. In the original model, expected return is an increasing function of segmentation. When replacing segmentation for integration, expected return is a decreasing function of integration, as higher the level of integration, lower is the impact of the pricing imperfection caused by non-investable assets on the cost of capital. Hence, the theoretical sign of coefficients are given by $\beta_i > 0$ and $\delta_i < 0$.

[2] In their paper, de Jong & de Roon (2005) also develop an asset pricing equation for the valuation of non-investable assets. Given we are working with portfolios of stocks sorted by specific characteristics, we are naturally assuming that the median asset within each portfolio has the status of an investable stock. This is realistic in our case because we have screened the assets in the market beforehand, dropping those with severe levels of illiquidity and very tiny market capitalisations, precisely those strong candidates for fitting the profile of non-investable assets. Hence non-investable stocks are by and large absent from our portfolios.

3. Data

Data on equity market integration is manually collected from monthly reports documented by Brazilian regulators (Brazilian Securities and Exchange Commission - CVM and Brazilian Central Bank - BACEN). The stocks' dataset used comprised portfolios of stocks from the Brazilian Center for Research in Financial Economics of the University of Sao Paulo (NEFIN, 2016), and other sources as the Sao Paulo Stock Exchange (BMF&Bovespa) and MSCI Global Equity Indexes and Datastream. We analyse monthly data for the years between 2001 and 2015, covering a time series of 180 consecutive months.

To dynamically capture equity market integration (I_t), a measure of foreign ownership was employed. We calculate stock market integration as: $I_t = \frac{MV_t^f}{MV_t^{f+d}}$. In each month, the value of the portfolio of equities held by foreign investors, MV^f, is divided by the total stock market capitalisation, MV^{f+d}, the market capitalisation of the portfolio held by domestic plus foreign investors. According to the methodology of the Brazilian Securities and Exchange Commission (CVM), this measure of integration considers only the holdings of foreign investors on stocks, but not foreign investments on corporate and government bonds and derivatives.

In the context of the asset pricing models we fit, stock market integration reads as an additional macroeconomic risk factor, with portfolio-specific covariance with returns [3]. As foreign ownership captures how foreign investors' presence in the domestic market has evolved over time, and considering that foreign investors hold only the investable portfolio, higher is the share held by foreigners, higher is the relative weight of investable assets in the overall market, and hence lower is segmentation and higher is the level of integration. Our variable for the world market risk premium is the return on the MSCI World Equity Index, R_t^w. Additionally, we employ two other measures of market risk premium in robustness tests: the domestic market risk premium, which is the return on the MSCI Brazil Equity Index, R_t^m, and the emerging markets risk premium, which is the return on the MSCI Emerging Markets Index, R_t^{ew}.

We examine portfolios of stocks reflecting five sets of assets characteristics: size, book-to-market ratios, momentum, liquidity and industry segment. The portfolios are calculated and sorted as follows. Initially, assets listed in the BMF&Bovespa stock exchange undergo an eligibility screening. A stock is considerable eligible in time t if it meets three criteria: (i) the stock is the most traded stock of the firm, (ii) the stock was traded in at least 80% of days in year *t-1*, with volume greater than R$ 500.000 per day and (iii) the stock was initially listed in the prior period *t-1*. After this screening, ineligible stocks are dropped from the database, and in total 238 stocks are kept in the dataset, corresponding to 60% of listed firms which account for more than 80% of total stock market

[3] As foreign ownership is taken at the aggregate stock market level, it has no portfolio-specific variability, but produces a portfolio-specific regression coefficient

capitalisation. On January of year *t*, eligible assets are ascendingly sorted in terciles according to each characteristic as observed in period *t-1*: from low to high market capitalisation (size), book-to-market ratios (book value of equity divided by market value of equity), momentum (past cumulative returns between t-12 and t-2) and illiquidity (according to the previous twelve months illiquidity moving average, with illiquidity calculated following Acharya & Pedersen (2005)). Then, portfolios are held in period *t*. Portfolio returns are value-weighted, using market capitalisations as weighting parameters. [4]

In our main analysis, we examine size, book-to-market, momentum and illiquidity portfolios. The portfolio size1 includes small caps, whereas size2 includes mid caps and size3 includes large caps. Portfolio bm1 refers to stocks with low book-to-market ratios, whereas bm2 refers to stocks with mid book-to-market ratios and bm3 represents a portfolio of stocks with high book-to-market ratios. Stocks sorted in portfolio mom1 had lower momentum, whereas stocks in portfolio mom2 had intermediary momentum and mom3 had higher momentum. Portfolio illiq1 includes stocks with the lowest levels of illiquidity (more liquid stocks), whereas portfolios illiq2 and illiq3 includes stocks with relatively higher levels of illiquidity (less liquid stocks). We additionally analyse portfolios cross-sorted by size and book-to-market: size1-bm1, size1-bm2, size2-bm1, size2-bm2 ; size and momentum: size1-mom1, size1-mom2, size2-mom1, size2-mom2; and size and illiquidity: size1-illiq1, size1-illiq2, size2-illiq1, size2-illiq2.

We also analyse portfolios sorted by (i) industry segment: basic products, consumer products, energy, finance and industrial goods; (ii) a special corporate governance portfolio, benchmarked by *Novo Mercado (New Market)*, labeled NM, which is a special listing segment in BMF&Bovespa. Briefly characterising the corporate governance environment in Brazil, there are four main listing segments: Traditional, N1 (level 1), N2 (level 2) and Novo Mercado (New Market). The Traditional segment has 211 listed firms, and impose lax and very basic governance rules on participants. N1 segment has 29 constituents, and N2 has 21 constituents, and these two segments are in the middle ground between basic and best governance practices. There are 128 firms listed in the *Novo Mercado* segmented, and these are obliged to follow stringent and fairly differentiated corporate governance rules, whereas in the other three segments firms have to comply to more or less similar and more basic rules.

What differentiates Novo Mercado from the other segments can be briefly summarised as: (i) firms can issue common shares only (no preferential shares); there is a minimum of 25% free floating shares; (iii) firms must comply with share dispersion efforts when publicly distributing shares; (iv) the composition of boards must be such that firms nominate at least 5 directors, out of which

[4]For further methodological details as employed by NEFIN in constructing portfolios, please refer their website: www.nefin.com.br

20% must be independent (external); (v) the CEO cannot accumulate the function of chairman of the board of directors; (vi) financial statements must be translated to english; (vii) 100% tag along, among other rules. Some of these rules are observed in other segments (especially N1), but never all of them together, hence there is a clearcut divergent pattern in terms of quality of governance distinguishing the constituents of Novo Mercado segment from the other firms in the stock market. Thus, by comparing the effects of integration on the broad portfolio (Bovespa) and on the Novo Mercado portfolio, we capture the role of corporate governance. In the Table below we show descriptive statistics for the dataset:

Insert Table 1 here

Figure 1 brings a time series plot for the level of integration of the Brazilian equity market, measured as foreign ownership (%) and the valuation of the MSCI Brazil stock index, measured in basis points:

Insert Figure 1 here

At the beginning of the period covered in our analysis, foreign ownership was around 10%. As integration moved forward, the share of foreigners increased to 25-30%. Also, there is a co-movement between foreign ownership and stock market valuation. However, after testing for stationarity, Integration is found to be trend-stationary and stock market valuation non-stationary. The variable Integration was de-trended [5] (yearly averages were subtracted from monthly values), and log-returns were first-differenced. These transformations produced stationary variables. Figure 2 shows the time series plot of such transformed variables:

Insert Figure 2 here

Even after transforming the variables, the co-movement persists. The correlation between integration and market returns is statistically significant and positive, with correlation coefficient equal to 0.23 and statistically significant at 99% confidence level. However, the structure of the correlation between the two variables shifts from positive to negative when we correlate contemporaneous returns with lagged values of the variable Integration. In Figure 3, we plot the correlation between market returns (R_t^m) and lagged values of Integration:

Insert Figure 3 here

[5] Taking first-differences and using first-differenced foreign ownership as a proxy for integration in the empirical models produces very similar results

The correlation is negative from $t-1$ onwards. It reaches its most negative value in time period $t-5$, with correlation coefficient equal to -0.15, statistically significant at 95% confidence level. After that, the correlation converges towards near-zero and statistically insignificant values. It seems that such a shift in the signal of correlations reflects two different effects of financial integration: a positive contemporaneous correlation, or a pricing revaluation effect, and a lagged negative correlation, due to risk sharing effects brought about by stock market integration. This makes sense because integration occurs by increased supply of foreign capitals by foreign investors. As such capitals must enter the equity market by purchases of stocks, it seems natural that a positive contemporaneous effect should be in place. As equity prices appreciate, expected returns fall, as it is evidenced by the negative lagged correlations. We now proceed to discuss the asset pricing models employed to formally analyse these relationships.

4. Empirical Model

We estimate an empirical version of the international asset pricing equation discussed in the theory section, as per the regression equation:

$$R_{it} = \alpha_i + \beta_i R_t^w + \delta_i I_{t-k} + \epsilon_{it} \tag{4}$$

In the equation shown above, portfolio return is a function of (i) R_t^w, the global risk premium which is proxied by the return on the MSCI World Index; (ii) I_{t-k}, the lagged market integration which is proxied by the value of the portfolio of equities held by foreign investors as a share of total market capitalisation; (iii) α_i, a pricing error or deviation from the ICAPM; (iv) ϵ_{it}, an error term.

In the theoretical model, equity market integration (or segmentation) affects expected returns with a lagged effect, as we conceptualise integration as a time-varying process, and this lagged effect is represented by the I_{t-1} term. However, in practice, the question of when integration kicks in and causes expected returns to fall is an empirical matter. As showed in the Data section, the correlation between stock returns and integration is always negative after the first lagged form, but it is stronger in $t-5$, and after this point, it converges towards zero values. Therefore, our baseline empirical model considers that an increase in the market integration affects asset prices after 5 time periods (In robustness check, we use other lagged forms of integration as well). We fit the following regression equation:

$$R_{it} = \alpha_i + \beta_i R_t^w + \delta_i I_{t-5} + \epsilon_{it} \tag{5}$$

Given we analyse several portfolios of stocks, to obtain consistent and efficient estimates we model asset returns simultaneously via two-steps GMM (Generalised Method of Moments). We estimate one system of equation for each group of asset characteristics (sorted portfolios, cross-sorted portfolios, industry portfolios and governance portfolios). The GMM model was estimated as per the moment condition below:

$$E_t[m(\alpha_i, \beta_i, \delta_i)] = E_t[\frac{1}{t}\sum_{t=1}^{t}(R_{it} - \alpha_i - \beta_i^w R_t^w - \delta_i I_{t-5}] = 0, i = 1, ..., n \tag{6}$$

In the GMM model above, each variable serves as its own instrument, thus the GMM model is exactly identified (one moment condition per parameter estimated). The systems of equations are estimated employing HAC robust standard errors with Bartlett Kernel, for addressing possible issues related to heteroskedasticity and serial autocorrelation in the error term.

After estimating each system of equations, we compare the coefficients fitted for the integration variable across portfolios. We do so by testing a null hypothesis of equality of coefficients across portfolios, employing a χ^2 test. The null hypothesis of the test is that coefficients are statistically equal across portfolios, and thus stock market integration produces no portfolio-specific idiosyncratic effects: $H0 : \delta_i = \delta_j = ... = \delta_n$. Accepting the null hypothesis implies that assets' characteristics are irrelevant in the integration process. Conversely, rejecting the null hypothesis offers evidence in favour of asset-specific integration effects.

5. Results

5.1. Main Results

We begin to analyse and discuss our results by showing the regression estimation of our international asset pricing model for portfolios of stocks sorted by size, book-to-market ratios, momentum and illiquidity. We report these results in Table 2, which is divided in two parts, A and B. In Part A, regression coefficients are shown. In Part B, we display a comparison matrix, in which we compare the fitted coefficients for the variable Integration (I_t) across all portfolios analysed. We test whether these fitted coefficients are statistically different from one another with the purpose of studying whether the effect of stock market integration is stronger (weaker) for assets with peculiar characteristics related to size, book-to-market (growth opportunities), momentum (past stock performance) and illiquidity. [6]

Insert Table 2 here

In the first three columns of Part A of Table 2, we show the results for size-sorted portfolios (s1, s2, s3). The effect of stock market integration on expected returns is statistically significant and negative for all three portfolios, and it is stronger for the small caps portfolio (s1), followed by the mid-caps portfolio (s2), and finally by the large caps portfolio (s3). As shown in Part B of the table, such differences in the magnitude of coefficients are statistically significant when comparing between s1 and s2 and s1 and s3, but not when comparing between s2 and s3. Hence, the benefit of integration is larger for small caps, but split more or less equally between mid and large caps. [7] This finding is in line with those reported by Patro & Wald (2005), who found that the pricing revaluation of small caps after liberalisation events is relatively larger when compared to large caps, but goes in stark opposition to those found by Christoffersen *et al.* (2006), as they found that stock market liberalisation is more beneficial for larger firms. Moreover, if one considers that small firms tend to be more financially constrained, because they have lower collateral to offer when securing debt contracts, the evidence we found is very good news, because foreign portfolio investments seem to be helping out especially those firms in need of cheaper financing. This result concurs with those found by Laeven (2002), in that financial liberalisation alleviates financial constraints especially for smaller firms.

We now turn to the analysis of book-to-market portfolios (bm1, bm2, bm3). Again we find that stock market integration reduces expected returns for all portfolios. We find stronger effects for high book-to-market firms (bm3), followed by mid and low book-to-market firms (bm2 and bm1). The differences in coefficients are statistically significant when comparing bm3 with bm2 and bm1, but not when comparing bm2 with bm1. Firms with high book-to-market ratios normally derive more of their valuation from their ability to generate higher and more stable cashflows, in contrast with firms with low book-to-market ratios and hence higher growth opportunities. This finding is a bit in contrast with the results we found when comparing small versus large firms, because very often small firms are also characterised by higher growth opportunities, hence we expected a similar result when studying book-to-market ratios. We will get back to this issue in our analysis of cross-sorted portfolios.

Our third sorting characteristic is momentum. Firms are sorted based on returns yielded in periods before (cumulative returns between t-12 and t-2 time window), hence the portfolio

[6] We do not focus on assessing models via pricing errors, but for most of models, alphas are equal to zero at the individual portfolio level, but not jointly equal to zero. But as integration is a macro variable and not an excess return factor, we do not see this necessarily as an evidence against the validity of the I-CAPM.

[7] For the sake of completeness, we compare the coefficients with portfolios sorted by other characteristics too, but as the focus of our analysis is on the intra-characteristic dimension, we do not comment on these comparisons.

clustering firms with low momentum refers to stocks with relatively sluggish recent performance, whereas firms with high momentum are winning stocks, posting high returns in preceding periods. Stock market integration reduces expected returns for all momentum portfolios, with stronger effect for stocks with lower profitability in preceding periods (m1), followed by mid and high momentum stocks (m2 and m3). Fitted coefficients for stock market integration are statistically different from one another across all the three portfolios, so here there is a clear ordering in the classes of assets benefiting the most and the least from integration, respectively: m1, m2, m3. This finding is a bit unexpected, in light of other papers which reported evidence of positive feedback trading and momentum strategies employed by foreign funds in emerging markets (Froot *et al.* , 2001; Kaminsky *et al.* , 2004). The most common evidence often found in the literature is that foreign portfolio investors buy winners and sell losers, but we found that losers benefited the most from stock market integration.

Fourth, we examine portfolios sorted by illiquidity levels (i1, i2 and i3). Portfolio i1 includes stocks with lower levels of illiquidity (in other words, more liquid stocks), whereas portfolios i2 and i3 have proportionally higher levels of illiquidity. Again all portfolios benefit from stock market integration, as integration lowers expected returns with statistical significant and negative coefficients for all three portfolios. The negative coefficient is stronger for the less illiquid (more liquid) portfolio - i1, followed by i2 and i3, but this time, such differences in coefficients are not statistically significant, though. It seems that more liquid stocks benefited more from integration, but we leave this as a possibility because coefficients are not statistically different from one another.

In general, our findings corroborate theoretical models of time-varying stock market integration, as increased integration proxied by foreign ownership reduces systematic risk, hence lowering expected returns and allowing firms to enjoy a lower cost of equity financing (Errunza & Losq, 1985; Bekaert & Harvey, 1995; de Jong & de Roon, 2005; Carrieri *et al.* , 2007). Comparing our findings with the results reported by de Jong & de Roon (2005) when they estimate an empirical counterpart of their theoretical model, we find a negative effect of integration on expected returns, whereas they find a positive effect of segmentation on expected returns. As a higher level of integration reduces segmentation, or similarly considering that foreign ownership reduces segmentation, our empirical findings seem perfectly compatible with theirs, and we provide up to date empirical evidence on the validity of the theoretical model. Also, the empirical evidence we show is in line with other papers reporting positive effects of stock market integration in reducing the cost of capital in emerging markets (Henry, 2000a; Bekaert & Harvey, 2000; Chari & Henry, 2004; Patro & Wald, 2005; Christoffersen *et al.* , 2006), and also with specific evidence of beneficial effects of foreign capitals in the Brazilian case (Tabak, 2003; Reis *et al.* , 2010; Sanvicente, 2014; Loncan & Caldeira, 2015).

5.2. *Cross-Sorted Portfolios*

We now analyse cross or double-sorted portfolios. We split our sample at the median for each characteristic (s1,s2, bm1, bm2, m1,m2, i1,i2), and next we double-sort the assets creating twelve new portfolios cross-sorted by size and book-to-market (s1b1, s1b2, s2b1, s2b2), size and momentum (s1m1, s1m2, s2m1 s2m2) and size and illiquidity (s1i1, s1i2, s2i1, s2i2). We show the results from our regression models in Table 3:

Insert Table 3 here

First we look at size and book-to-market cross-sorted portfolios (s1b1, s1b2, s2b1, s2b2). Our results corroborate those from the previous analysis, as all portfolios underwent reductions in expected returns due to increased stock market integration. We find that the strongest reduction was experienced by the s1b2 portfolio (small caps with high book-to-market ratios), followed by s2b2 (large caps with high book-to-market ratios), s1b1 (small caps with high growth opportunities) and s2b1 (large caps with high growth opportunities). Out of these four coefficients, only s1b2 is statistically smaller than s2b1. It seems that the greatest winners from stock market integration were small caps with relatively higher book to market ratios, as this portfolio scored the lowest coefficient and hence experienced the highest reduction in expected returns due to increased integration.

This finding from our cross-sorted analysis corroborates the evidence we reported in the previous section, in which we showed that small caps and high book-to-market firms were those benefiting the most from integration. After double-sorting our assets, we find similar evidence, as the portfolio which jointly has the two aforementioned characteristics turned out to have experienced the strongest reduction in the cost of equity. It seems that foreign investors reveal preferences for stocks offering these two attributes, small size, which may be a promising investment in terms of capital gains, and mature businesses, with lower market-based growth opportunities, but normally with higher and more stable cash flows.

Second, we analyse portfolios cross-sorted by size and momentum (s1m1, s1m2, s2m1, s2m2). All cross-sorted portfolios underwent reductions in the cost of equity capital, and we find stronger effects for the s1m2 portfolio, which clusters small caps with high momentum, or in other words, stocks with small market capitalisation but posting high cumulative returns. It is followed by portfolio s1m1 (small caps with low momentum), s2m1 (large caps with low momentum), and finally by s2m2 (large caps with high momentum). However, the difference in coefficients is statistically significant only when comparing with portfolio s2m2, which experienced the mildest reduction in the cost of capital amongst the size-momentum portfolios. But as we can safely state that small caps with high momentum enjoyed a stronger reduction in the cost of equity financing than large caps with high momentum, it seems that stocks' size is the relevant attribute mediating the effect of stock market integration on expected returns.

Third, we study size and illiquidity cross-sorted portfolios (s1i1, s1i2, s2i1, s2i2). Stock market integration reduced expected returns for all cross-sorted portfolios, and the strongest reduction was experienced by portfolio s1i1, with small caps and less illiquid (more liquid) stocks, followed by s1i2, s2i1, s2i2. Interestingly, the effect of integration on returns is statistically different between s1i1 and all other three portfolios, thus the evidence is clear that small caps with higher levels of liquidity benefited the most from stock market integration. Also, there's statistical difference between the fitted coefficients of s1i2 and s2i2, and the reduction in the cost of equity capital was stronger for portfolio s1i2. In other words, as both portfolios cluster more illiquid stocks, this evidence shows that amongst illiquid stocks those with small market capitalisation benefited more from integration.

5.3. Industry and Corporate Governance Portfolios

In this section, we study the effects of stock market integration on 5 portfolios sorted by industrial sector and two portfolios marked by differences in corporate governance practices. First, we study five industries: basic materials, consumer goods, energy, finance and banking and industrial goods. Next, we compare the effects of stock market integration between a portfolio with stocks from firms observing best corporate governance practices, those listed in the *Novo Mercado* segment of BMF&Bovespa and the broad market portfolio, which includes all firms listed in the stock market (labelled Bovespa). Results are shown in the Table below:

Insert Table 4 here

Some industry segments benefited more than others from stock market integration, as not all coefficients are statistically significant, and amongst those industries with statistical significant effects of integration on returns, some enjoyed higher reductions in the cost of equity. Expected returns dropped for firms from Basic Materials, Energy and Finance sectors, but not for firms in Consumer and Industrial goods. Moreover, the effect is statistically stronger for Energy and Finance firms, when comparing with the other three portfolios, but not when comparing one against the other. Considering that firms enjoying lower cost of capital can invest more, apparently stock market integration is playing some role of industrial policy on its own, favouring some specific segments in creating better financing conditions.

When analysing the role of corporate governance, we can see that the effect of stock market integration on expected return is twice as strong for the Novo Mercado portfolio than for the broad stocks portfolio (Bovespa), and the difference in the coefficients is highly statistically significant. Therefore, firms observing best corporate governance practices enjoyed a reduction in the cost of equity financing substantially stronger than their peers following less stringent governance rules. This result is in line with the arguments of Stulz (2005), in that financial integration is more efficient when contracting is more transparent, with mitigated agency costs and consequently lower risk of expropriation is incurred by foreign investors. Also, it is in synergy with Chinn & Ito (2002), in that financial systems with higher levels of financial and institutional quality tend to benefit more from integration, and with Byrne & Fiess (2016), in that the quality of institutions (reflected in governance quality here) matter a great deal for emerging countries to receive foreign equity capital.

5.4. Robustness checks

5.4.1. Causality and Endogeneity

Thus far we have followed international asset pricing theory in assuming that stock market integration affects expected returns, with unidirectional causality running from integration to stock returns. Yet, as previously discussed, some empirical contributions have provided evidence that stock prices may actually drive foreign capital flows (positive feedback and momentum trading). As stock market integration is ultimately caused by foreign capitals continuously flowing to the stock market, as such foreign capitals might be driven by price levels in the first place, it is worth double checking the direction of causalities.

The problem is that usual tools often employed in endogeneity checks, like instrumental variables methods, are unsuitable to our case, because as integration occurs via purchases of stocks, whatever affects integration will affect stock prices as well, thus we don't see how one could find a truly exogenous instrument. We tackle the problem with another method, though. The domestic market premium is a rate of return on the overall stock index, and it is a benchmark to the returns of all other portfolios that one can build using domestic stock data, following the standard CAPM theory. If foreign investors observe current stock price levels, and next decide to buy stocks, further increasing the level of integration in the market, then it is probably the case that the domestic risk premium, which encompasses the broad level of stock returns in the market, is causing integration, and not the converse.

To see whether integration affects the domestic market premium, or if instead, the domestic market risk premium drives integration, we run several Granger causality tests between stock market integration and the domestic risk premium, proxied by the returns earned on the MSCI Brazil Index (R_t^m). As the returns to all other portfolios analysed in our study are highly correlated with the domestic market risk premium, this way we check for endogeneity and causality for all portfolios employing a single analysis. There are some details one has to address when studying market premiums instead of individual stock returns, though. One can model individual stock returns employing a CAPM, but to model the market premium, it is required to understand what forces cause changes in the premium. We follow the literature on conditional asset pricing models, and consider that local risk free rates are good predictors of market risk premiums. (Jagannathan & Wang, 1996). Next, we run causality tests between stock market integration (I_t) and the domestic market risk premium (R_t^m), controlling for the effect of risk free rates (ΔRf_t) on the market premium as well.

First, we run optimal lag selection tests based on information criteria, and such tests point to specify a Vector Autoregressive Model (VAR) with either one lag (HQIC, SBIC) or with three lags (FPE, AIC). Though the AIC information criteria usually performs better with monthly data, we estimate our Granger causality tests employing one, two, three and five lags, to be sure lag order is not driving the results, and to be consistent with the various lag orders we have employed in our asset pricing models. The Granger causality test is operationalised by regressing current values of a given variable x_i on its own lagged values and plus on lagged values of another variable x_j. The null hypothesis is that lagged values of x_j are jointly insignificant explanatory variables in a regression equation in which x_i is the dependent variable, after controlling for past values of x_i too. If lagged regressors x_j are jointly statistically significant, then the conclusion of the test is that x_j Granger-causes x_i. In the table below we show the test results:

Insert Table 5 here

When the test is run with a one-lag structure, we don't find any causalities between stock market integration, domestic market risk premiums and local risk free rates. However, when employing lag structures with two, three or five lags, we see that stock market integration always Granger-causes the domestic market risk premium (with negative coefficients, not shown), whereas the market premium never Granger causes stock market integration. Also, we find that risk free rates indeed Granger-cause market risk premiums, but not the converse, and this finding is in line with conditional asset pricing theory. Hence, we believe our test is truly capturing coherent dynamics occurring between these three variables. Moreover, replicating the same test but replacing the domestic market risk premium with portfolio specific returns produces the same outcome (not shown for space constraints). We conclude that causality runs from stock market integration to asset prices, and not the opposite.

Also, this test puts some extra robustness on the role of stock market integration in reducing expected returns, because here our results are independent from the assumption that after integration global risk premiums take on more importance and replace the domestic market premium. In the setting of our VAR and Granger-causality tests, we made the domestic market risk premium conditional on the level of stock market integration, showing that integration gradually reduces the domestic market premium. Therefore, even if the traditional CAPM still holds after integration, a case in which individual stocks and portfolios returns remain priced against the local market premium, given the local premium is gradually reduced by increased presence of foreign investors in the stock market, local assets enjoy a lower cost of equity capital nonetheless.

5.4.2. Alternative Market Risk Premiums

In this set of robustness checks, we relax the assumption that global risk premiums replace local risk premiums in pricing domestic stocks. First, we estimate our asset pricing equations considering that Brazilian stocks are priced in excess of an Emerging Markets risk premium (R_t^{ew}), proxied by the returns earned on the MSCI Emerging Markets Index. In this case, we are imposing that the Brazilian market remains somewhat segmented from wealthier markets, but integrated with other emerging markets peers.

Second, we estimate the asset pricing equations using the local market risk premium (R_t^{m}), relaxing the assumption that under stock market integration regimes, global risk premiums replace local risk premiums. We do this following empirical evidence that, despite of integration, the local market premium still conveys substantial information which is relevant to price domestic assets, yet not fully captured by a global risk premium (Koedijk *et al.* , 2002). Results are shown in the Table below:

Insert Table 6 here

In Panel A, results refer to the asset pricing model estimated with the emerging markets risk premium, whereas in Panel B the models are estimated using the domestic premium. Models are estimated for sorted and cross-sorted portfolios only. In general, the same results obtained when employing the global risk premium remain unchanged. We still find that the majority of portfolios underwent reductions in the cost of equity capital, as the partial effect of stock market integration on expected returns remains statistically significant and negative for most of portfolios analysed. Also, the ordering of such effects within groups of portfolios with specific characteristics remains very similar, as we find again that expected returns fell relatively more as a result of integration for small caps, high book-to-market stocks, stocks with lower momentum and more liquid stocks.

However, when using the local market risk premium, we find insignificant effects of integration on stock returns for a larger number of portfolios. Yet it does not alter the main findings, it seems that there is indeed some informational role which is conveyed by the domestic market premium that is neglected by the global risk premium. Though it is true that such empirical integration model with domestic risk premiums is a clear departure from international asset pricing theory, the simple fact that the two models deliver somewhat different empirical results might suggest that stock market integration does not eliminate the importance of domestic market premiums in pricing local assets. (though in terms of pricing errors, for none of the two alphas are jointly equal to zero, so we cannot tell which one is better).

5.4.3. Different lagged structures for Integration

In the baseline models, integration entered the equation with a 5-periods lagged structure. In this section, additional models are estimated, but this time employing a variety of different lagged structures for integration. Models are tested with t-1, t-2, t-3 and t-4 lag order. We estimate these additional models for the sorted portfolios only (size, book-to-market, momentum and illiquidity). Results are reported below:

Insert Table 7 here

For the vast majority of portfolios, the effect of stock market integration on expected returns remains statistically significant and negative. However, there are some differences in the magnitude of the effects when comparing within groups of portfolios with particular characteristics. For example, in the model in which integration was lagged by one period, we see that large caps seem to have benefited the most (in contrast to the baseline model with five-periods lagged structure in which small caps reaped more benefits) , and that firms with mid book-to-market experienced a larger drop in expected returns (whereas in the baseline model, firms with high book-to-market benefited more). For momentum and illiquidity, results are similar as those from the baseline, with stocks with lower momentum and lower illiquidity experiencing larger drops in returns.

As we include more delayed effects of integration on stock returns, we see small caps reaping more of the benefits, and the same goes for stocks with high book-to-market ratios. On the other hand, these orderings get less clear for momentum and illiquidity portfolios, hence is hard to be sure about a pattern here. But in general, the main findings that expected returns drop as a function of increased stock market integration hold, and evidence is fairly robust pointing for an uneven distribution of the benefits tilted towards small caps and high book-to-market firms.

6. Integration and Real Economic Activity: Effects on Corporate Investment

6.1. Background and Data

In this section, we extend our analysis by studying whether stock market integration produces effects on real economic activity, in addition to the effects on financial variables that we have documented in the previous sections of the paper. There is an unsettled debate about whether financial globalisation has helped emerging markets to expand and develop their capital stocks, by boosting investment. Some authors argue that financial liberalisation has triggered investment booms and boosted economic growth, by alleviating financial constraints and decreasing the cost of capital (Henry, 2000a; Laeven, 2002; Bekaert *et al.* , 2005; Ranciere *et al.* , 2006; Chari & Blair Henry, 2008), whereas other scholars are more skeptical and argue that there is no systematic investment growth bonus linked to increasing the share of foreign equity financing in emerging markets (Singh & Weisse, 1998; Stiglitz, 2000; Aizenman *et al.* , 2007).

Moreover, empirical evidence related to the 2008 financial crisis has documented strong rebalancing of foreign equity portfolios of institutional investors, with sudden reversals of large quantities of capital from emerging economies back to safe haven developed countries, with non-negligible implications for the financing environment in emerging economies (Fratzscher, 2012; Forbes & Warnock, 2012; Aizenman & Pasricha, 2013). In the specific Brazilian case, the question whether foreign equity capital produces good or bad outcomes in terms of real economic activity is so controversial that the government has imposed capital controls during the 2009-2011 period, aiming reducing foreign capital inflows as a response to escalated concerns about a currency crisis (Chamon & Garcia, 2016; Jinjarak *et al.* , 2013). As the ultimate objective of an efficient financial market is to provide resources to be employed in productive activities, the pervasive question of whether stock market integration is linked to real growth and higher investment seems to be a matter of utmost relevance, yet scantly addressed thus far in the literature.

We study this issue by modelling the relationship between integration (again proxied by foreign ownership) and corporate investment rates (capital expenditures divided by property, plant and equipment, i.e, firms' capital stock), employing a Vector Autoregressive Model (VAR). One fundamental problem about estimating how integration affects domestic investment is that foreign equity capital goes to a small subset of firms listed in the stock market, whereas domestic (aggregate) investment reflects the investment behaviour of all firms in the economy (many of such firms never received a single dollar of foreign capital). Especially in the Brazilian case, the government is a very active player in investment, either by funding infrastructure projects directly, or by distributing subsidies to "friendly" large firms. Hence, to see whether stock market integration is boosting investment, we need to study the investment behaviour of economic agents indeed receiving these capitals.

We overcome this difficulty by studying publicly listed firms, instead of aggregate investment. We divide the sample of Brazilian stocks in two broad groups: we create a portfolio with those firms which are constituents of the *Novo Mercado* Corporate Governance Index, labeled *NM*, and next we pool together all the other firms in a portfolio labeled *Ex-NM*. We split the sample based on corporate governance criteria following empirical evidence showing that firms observing best corporate governance practices receive more foreign capital from institutional investors (Leuz *et al.* , 2009). Indeed, as we have shown in the asset pricing analysis, firms listed on the Novo Mercado segment benefited more from integration, experiencing larger reductions in the cost of equity capital. Therefore, if integration causes any beneficial impact on investment, our hunch is that such effect would be stronger for firms following good governance. [8].

[8] We check this assumption by comparing levels of institutional ownership across the two portfolios, and indeed we find that on average institutional ownership is about 30% for the Novo Mercado Portfolio and around 12% for the Ex Novo Mercado Portfolio

Our vector autoregressive model traces the predictions of the neoclassical model of investment. We follow Romer (2012) and model investment rates (IK_t) as a function of growth opportunities (Tobin's Q), as Q summarises most of the information required for firms to make decisions on investments, plus our additional variable capturing stock market integration (I_t). We model investment, stock market integration and investment opportunities simultaneously and endogenously within the VAR system. The problem with the neoclassical model is that Tobin's Q is often operationalised using stock market-based measures of growth opportunities (various different measures of market-to-book ratios, with or without leverage and normalised either by book value of equity or assets), and this has been strongly criticised because stock prices tend to diverge from fundamentals, especially in an emerging market context. To overcome this problem, we employ a sales-based measure of Tobin's Q (YK_t), by calculating growth opportunities as net revenues divided by the capital stock. This measure returns how much output firms get per unit of invested capital, thus similarly proxying for the expected marginal contribution of capital. Again, we calculate the simple median of this variable for the two portfolios analysed.

Additionally, we included in the model a vector of exogenous variables which may potentially affect investment: local interest rates, proxied by the Swap PRE-DI rate (the Brazilian interbank deposit rate), international risk free rates, benchmarked by the U.S 3-months T-bill, the exchange rate between the Brazilian Real and the U.S Dollar, the natural logarithm of the Brazilian Retail Sales Index, to capture economic expectations and confidence, a dummy for the 2008 financial crisis, to absorb the negative shocks caused by the financial turmoil, and finally quarterly dummies to absorb any seasonal effects.

We use quarterly data, as investment data is available on a quarterly basis only, following the disclosure of quarterly financial statements. Data used on investment models is from Datastream, WorldScope and *Economatica*. In every quarter between years 2005 and 2015, we calculate the simple median investment rate (IK_t) and sales-based Q (YK_t) for the two aforementioned portfolios. The Novo Mercado segment has 128 constituents, whereas we cluster the remaining 261 firms out of 389 firms listed in the BOVESPA stock exchange in the Ex-NM portfolio. For stock market integration, we use the same measure of foreign ownership as in the previous section, this time calculated on quarterly basis, and taken on first-differences. Below we show quarterly descriptive statistics for investment data, and next we plot time series for investment rates, investment opportunities and integration:

Insert Table 8 here

Insert Figure 4 here

The first information we get from the time series plot is that investment rates are fairly higher for the Novo Mercado portfolio: median quarterly investment is 5.3% for the NM portfolio and

3.5% for the Ex-NM portfolio. These quarterly rates correspond to yearly rates of 21% and 14%, respectively. These numbers are similar as those reported in other papers studying corporate investment in emerging economies (Laeven, 2002; Chari & Blair Henry, 2008). With respect to investment opportunities, we show the time series plot of YK for both portfolios in Figure 5. Clearly, firms in the Novo Mercado portfolio enjoy a substantially higher growth opportunity set than their peers (quarterly medians are 1.20 and 0.59, respectively). As we can see from the time series plot, corporate investment was severely hit in the 2008 financial crisis (for both Novo Mercado and Ex-Novo Mercado portfolios), whereas integration kept growing, despite of the financial instabilities of the period. As the variables have divergent trends in levels, for the crisis clearly hit harder on investment than on integration, we inspect the time series again after first-differencing the variables, shown in figure 6:

Insert Figure 5 here

Insert Figure 6 here

After first differencing, we see that the change in all three variables became negative during the crisis, but right after that a wedge opens, as integration turns positive again, whereas investment rates remain low for both portfolios. Indeed, the change in investment swings around zero in all periods following the crisis, whereas integration resumed growing. The correlation between differenced integration and investment is negative, -0.13 with respect to Novo Mercado (statistically insignificant) and -0.26 with respect to Ex-Novo Mercado (statistically significant). But given the clear effect of the 2008 financial crisis here, we need to net out several concomitant effects to establish any causal relation between these variables. To do so, we model the relationship between investment and integration by employing a vector autoregressive model (VAR).

6.2. VAR specification and tests

We fit a Vector Autoregressive Model with additional exogenous covariates. The vector of endogenous variables is summarised as $\mathbf{y}_t = [IK_t, I_t, YK_t]$, and includes corporate investment rates, stock market integration and growth opportunities. The vector of exogenous variables is summarised as $\mathbf{x}_t = [Rf_t, Rf_t^{us}, Fx_t, S_t, d2008, Qt1, Qt2, Qt3, Qt4]$, and contains domestic and international risk free rates, the exchange rate between the Brazilian Real and the U.S dollar, the natural logarithm of the Brazilian Retail Sales Index, and dummies for the 2008 financial crisis period and financial quarters. Our VAR model is specified as:

$$\mathbf{y}_t = \boldsymbol{a} + A_1\mathbf{y}_{t-1} + \ldots + A_n\mathbf{y}_{t-n} + B_1\mathbf{x}_t + B_2\mathbf{x}_{t-1} + \ldots + B_m\mathbf{x}_{t-m} + \boldsymbol{e}_t \tag{7}$$

In the system of equations above, $\mathbf{y}_t$ is a vector of endogenous variables, producing a vector of coefficients $\mathbf{A}$, whereas $\mathbf{x}_t$ is vector containing exogenous covariates, producing a vector of coefficients $\mathbf{B}$; $\mathbf{a}$ is a vector of intercepts, and $\mathbf{e_t}$ is the error vector. Before proceeding to the VAR estimation, we conduct standard tests to assess stationarity of the variables. We test for unit root following the Augmented Dickey-Fuller test, and all variables (except investment rate for the NM portfolio) are found to have unit root at 95% level. Hence, we first-differenced all such variables, thus meeting the stationarity condition. With respect to investment rate for the NM portfolio, it is stationary at 90% confidence level, but we prefer to be conservative and employ the first difference, which yields a stationary variable with 99% confidence. But even when we used the linear form of investment, the estimated VAR passed all specification tests, so inference is valid also when employing linear investment rate too.

We conduct several tests of optimal lag selection based on information criteria, and all tests unanimously pointed to a model with four lags (FPE, AIC, HQIC and SBIC). After running the VAR, we carried out standard tests to ensure a correct model specification. The first test is related to the so-called Eigenvalue stability condition, and we find that all Eigenvalues lie within the unit circle, hence the VAR is stable. Second, we test for serial correlation in the lag structure of the model, by employing a Lagrange Multiplier test in which the null hypothesis is of absence of serial correlation at $t-1,..,t-4$ lag order. We strongly accept the null hypothesis, hence no serial correlation is affecting the estimates. Finally, we test for the normality of disturbances in the endogenous equations by employing the Jarque-Bera normality test, and it turns out all equations passed the test, hence residuals are normally distributed.

6.3. Results

Our VAR analysis is based on four components, following guidelines often found in the time series literature (Stock & Watson, 2001; Kilian *et al.* , 2013; Luetkepohl, 2011). First, we inspect the coefficients fitted by our VAR model, though acknowledging the inherent complicated dynamics that arise from multiple lags. Second, we conduct Granger Causality tests to pin down the directions of causalities running in the model. Third, we study the Forecast Error Variance Decompositions, which tells us what is the variance of the error which is incurred when forecasting a variable by means of shocks to another endogenous variable inside the system. In other words, it is informative about how much of the variance of an endogenous variable can be explained away by unexpected shocks to another variable in the model. Finally, we compute Impulse-Response functions for investment rates, which correspond to the impact of a one-time, unitary shock to one variable in the current and future values of another variable in the system. We show the full results for the Novo Mercado portfolio, and compare it with the Ex-Novo Mercado portfolio by graphical inspection of impulse response functions. The table shown below brings the results of our VAR model:

Insert Table 9 here

We show the coefficients fitted for the investment rate equation in the first column of the table (as our goal is to explain investment, we focus on this column). Investment has some substantial degree of persistence, as lagged investment statistically explains current investment. However, the third lag has a positive coefficient (0.34), whereas the fourth lag has a negative coefficient (0.21). The positive effect is stronger though (both quantitatively and statistically), and indeed lagged investment is positively associated to current investment, as shown later when employing impulse response functions. The effect of stock market integration on corporate investment is statistically significant and unambiguously positive, as both the first (0.25) and third (0.30) lags of integration cause increases to investment.

The same holds for the effects of growth opportunities, as both the second (0.016) and fourth (0.017) lags are statistically significant and positive. With respect to the exogenous variables, we find that investment is a decreasing function of international risk free rates (proxied by the U.S rate), slightly increase with respect to the exchange rate, was negatively affected by the 2008 financial crisis (in line with the graphical analysis previously shown) and tends to be marginally lower in the second quarter of the year (having the first quarter as a baseline).

In the second part of the table, we show Granger Causality tests. We find that both integration and growth opportunities Granger-cause investment, at 99% confidence level. Interestingly, integration and investment have a mutual feedback relationship, as past levels of investment also Granger-cause integration, but in this case the effect is negative (as per the fitted VAR coefficients shown in column 2). It seems that increased integration affect investment positively, but foreign investors build their positions in the market following periods when corporate investment was low. A possible explanation is that foreign investors buy stocks in periods of lower economic activity, when equity valuations are relatively depressed, to profit from high capital gains in the future. This seems in line with one of our findings from the asset pricing models, in which stocks with low momentum benefited more from integration. Moreover, growth opportunities also Granger-cause investment, with a positive effect as shown later when analysing IRFs, corroborating the predictions from neoclassical investment functions.

At the bottom of the table, Forecast Error Variance Decompositions are shown. This analysis is informative with respect to how much of the variance in current investment can be attributed to movements in past investment, stock market integration and growth opportunities. In a 10-quarters horizon, we find that lagged investment explains 45% of fluctuations in current investment, whereas changes in growth opportunities explain 40% of variance, and another 13% is explained away by stock market integration. We limit the horizon to 10 quarters further ahead because after that the decomposition of variance stabilises around the values shown. Hence, we conclude that lagged investment and growth opportunities explain most of fluctuations in current investment (87% all together), but stock market integration plays a non-negligible role as well (13%).

We now turn to the analysis of impulse-response functions (IRFs). Because IRFs are usually correlated, we show cumulative orthogonalised impulse response functions (COIRFs), hence each COIRF captures the effect of impulses to each endogenous variable alone. It is worth noticing that because physical investment responds with delay, inherent to the investment life cycle and time-to-build constrains, we impose a restriction that investment can only respond to lagged impulses in other variables (contemporaneous changes in growth opportunities and stock market integration affect investment only tomorrow). First, we show the response of investment to a one-time, unitary shock on stock market integration, for both the Novo Mercado and Ex Novo Mercado portfolios:

Insert Figure 7 here

Insert Figure 8 here

Figure 7 shows the IRF for the Novo Mercado portfolio, whereas Figure 8 refers to the Ex Novo Mercado portfolio. In line with the previous findings from the VAR, Granger Causality and FVED analyses, we find that for firms in the Novo Mercado portfolio, a one standard deviation impulse to stock market integration shifts investment rates upwards by 0.40-0.60%. The cumulative effect rises until 6-8 periods forward, and then stabilises. Interestingly, when analysing the Ex Novo Mercado portfolio, the response of investment is actually negative (-0.20-0.30%). Indeed, when fitting the VAR coefficients for the Ex Novo Mercado portfolio (not shown for space constraints), the effect of stock market integration on investment was also negative. Therefore, this result sheds light on a very important issue, with relevant economic consequences: stock market integration increases investment only for firms following best corporate governance practices, and might actually hinder investment for the other firms.

We finish the analysis by showing COIRFs of impulses to lagged investment and growth opportunities in Figures 9 and 10. We find that unexpected shocks to both variables shift current investment upwards, again in line with the results found previously. It is worth noticing that the response of current investment to shocks to past investment and growth opportunities is much stronger than the response to equity market integration, similarly as the result we found when analysing Forecast Error Variance Decompositions. Therefore, the main forces behind investment growth are lagged investment and our measure of Sales-Based Q, but stock market integration also produces beneficial economic effects, though such effects are quantitatively more modest.

Insert Figure 9 here

Insert Figure 10 here

6.4. A robustness test with firm-level regressions

We check the robustness of our findings from the VAR model with firm-level regressions. We proxy for financial integration by using a measure of foreign ownership at the firm level (the value of stocks held by foreign portfolio investors as a share of firm's market capitalisation, F_{it}). On average, foreign portfolio investors hold 16% of firms' equity in the sample. To overcome the problem of endogeneity between foreign ownership and investment, we build an instrumental variable for foreign ownership. The instrumental variable $MSCI_{it}$ is a dummy variable taking the value of 1 if the firm is a constituent of MSCI Emerging Markets Index, and zero otherwise. As inclusions (deletions) in MSCI indexes are usually unexpected, this variable captures exogenous variations in foreign ownership. This variable is correlated with foreign ownership $(0.19, p < 0.01)$, but uncorrelated with investment, hence it is a relevant and presumably exogenous instrument.

To capture corporate governance, we include a dummy taking the value of one if the firm is listed in Novo Mercado segment (NM_i), and zero otherwise. We control for growth opportunities (YK_{it}) and for firm size (log sales, lnS_{it}). We estimate the model below via ordinary least squares and via instrumental variables, with results shown in the table below:

$$IK_{it} = \alpha + \beta_1 YK_{it} + \beta_2 F_{it} + \beta_3 lnS_{it} + \beta_4 NM_i + \beta_5 F_{it} \cdot NM_i + e_{it} \tag{8}$$

Insert Table 10 here

In the fist column of the table, we show the results for the OLS mode. Foreign ownership marginally increases investment, and investment is an increasing function of growth opportunities (sales to capital), but a decreasing function of firm size, hence small firms have higher investment to capital ratios. In the second column, we estimate the model via instrumental variables using the MSCI constituency dummy as an instrument for foreign ownership. Again, we find that foreign ownership causes increases in investment, and the coefficients for the control variables remain unchanged.

In the third column, we include the dummy for firms observing best governance, those listed in the novo mercado segment, and an interactive term between this dummy and foreign ownership. The dummy is statistically significant and positive, implying firms with best corporate governance invest marginally more. The interaction of foreign ownership and best governance is statistically significant and positive, and after including this interaction the linear term of foreign ownership becomes negative (though not statistically significant). This implies that foreign ownership increases investment only for firms following best corporate governance practices, which is highly in line with the result we found in our VAR models. This robustness finding stresses the crucial role played by corporate governance in the relationship between stock market integration and investment.

6.5. Discussion on Investment Results

In general, the findings from our investment exercises are in line with the predictions of the neoclassical model of investment, as investment responds positively to innovations in the expected marginal contribution of capital (Romer, 2012), with relevant lagged investment effects stemming from persistent adjustment costs (Eberly *et al.* , 2012). Also, we show that stock market integration shifts investment rates upwards, according to predictions from theories of financial integration and optimal response of physical investment. In line with our asset pricing analysis, our findings related to investment are consistent with the idea that stock market integration reduces the cost of equity capital, and physical investment responds accordingly, for investment is a decreasing function of the cost of capital.

Our empirical evidence concurs with findings from other papers which have reported positive effects of financial integration on investment and real economic activity, both at aggregate and firm level (Henry, 2000b; Laeven, 2002; Bekaert *et al.* , 2005; Chari & Blair Henry, 2008). Yet, we provide an alternative perspective to the question by studying integration as a time-varying process, covering a period of 10 years of increased integration activity in the Brazilian stock market, hence complementing the findings previously reported in the liberalisation literature. Moreover, the evidence we provide on the crucial role played by corporate governance is in line with the argument in Stulz (2005), corroborating the idea that financial globalisation is optimal in boosting investment only if contracting is efficient too, and agency costs which reduce the ability of firms in taking advantage of financial integration are mitigated by more transparent corporate governance policies, reducing the risk of expropriation incurred by foreign investors.

7. Conclusions

The purpose of our paper was to study the effects of stock market integration on the cost of equity capital and on corporate investment, using the Brazilian equity market as a case study. First, we conduct an asset pricing analysis, estimating series of international asset pricing models, using portfolios of stocks sorted by size, book-to-market ratios, momentum, illiquidity, industry segment and corporate governance levels. Our empirical evidence shows that increased levels of stock market integration (proxied by foreign ownership) decreases expected returns, by lowering systematic risk, hence allowing local firms to benefit from a lower cost of equity capital.

We also found evidence that assets' characteristics play an important role in the integration process, as the benefits from integration are unevenly distributed. Portfolios of small caps, of firms with higher book-to-market ratios, of small caps with higher liquidity and of firms observing best corporate governance practices experienced a relatively greater drop in expected returns, hence benefiting more than their peers. We also show that stock market integration decreases the domestic market risk premium, hence the reduction in the cost of capital brought about by stock market integration holds for both the ICAPM and the CAPM asset pricing models.

Second, we estimate the effect of stock market integration on corporate investment rates. We develop quarterly VAR (Vector Autoregressive Models) models, splitting the sample of Brazilian equities based on corporate governance practices, creating two portfolios: Novo Mercado (firms following best governance practices), and Ex-Novo Mercado (all other firms pooled together). Next, we fit a neoclassical model of investment for the two portfolios, in which investment rates (capital expenditures divided by capital stock) are modelled as a function of investment opportunities (a sales-based measure of Tobin's Q), lagged investment and stock market integration. We analyse the coefficients fitted in our VAR, Granger-causality tests, Forecast Variance Error Decompositions and Impulse-Response functions.

The findings from our investment models provide evidence for an active role of stock market integration in fostering corporate investment. We show that the effect of increased integration on investment rates of firms listed on the Novo Mercado segment is positive, and that stock market integration Granger-causes investment, with positive responses of investment to impulses in stock market integration. Moreover, stock market integration explains 13% of unexpected shocks to investment, what we consider a relatively modest economic effect, as lagged investment (45%) and growth opportunities (40%) are the main forces explaining fluctuations in investment, in line with the predictions from the neoclassical model.

However, integration increases investment only for firms following best corporate governance. For the Ex-Novo Mercado portfolio, impulses to stock market integration produce negative responses, hindering investment. As the real economic effects of stock market integration are enjoyed only by a subset of firms following best corporate governance practices, the benefits of stock market integration should be advertised carefully. In the Brazilian context, only around 1/3 of listed firms are enforcing good governance, thus the median listed Brazilian firm has not benefited from integration by increasing investments. Hence, for the equity market as a whole, a downside of integration appears to be that it causes a shift of resources towards the subset of firms following better governance, possible diverting instead of increasing investments.

On the other hand, as the evidence we found on the beneficial effects of integration on the financing side holds also for firms observing less stringent governance rules (yet the effects are weaker for such firms), it seems that there is something hampering firms' ability to convert such lower cost of capital into higher investment rates. The evidence corroborated in our models is that the missing element is transparency in corporate governance and efficiency in contracting. Our main conclusion is that stock market integration is beneficial for investment only if accompanied by improvements in corporate governance, institutional quality and the general efficiency of contracting, which help reducing agency costs and expropriation risks.

Our paper leaves important messages to firms' managers and policy makers, in Brazil and in other emerging economies. There is a strong controversy about the pros and cons of stock market integration, reflected in the long dated and unsettled debate of whether financial integration is good only for foreign investors, or if instead, local domestic markets reap the benefits as well. The evidence we provide is robust in that by increasing integration of local stock markets, firms will enjoy a lower cost of capital, and provided they also improve on corporate governance practices, such decreased cost of equity financing will translate into higher investments.

With firms increasing their investments, they hire more workers, purchase more inputs, and put the economic wheel to roll faster, stimulating economic growth. As we establish a direct link between finance and the real economy, especially in the context of financial globalisation, our view is that corporate managers might feel incentivised to internationalise the ownership structure of their firms and adopt better and more transparent corporate governance policies, and public policy makers may see stock market integration with more friendly eyes. But regulators and firms have to team up and work together to improve the overall quality of the institutional environment, otherwise only a subset of firms will reap the benefits from stock market integration.

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Appendix - Tables

Table 1: Descriptive Statistics - Monthly (2001-2015)

	Mean %	Med. %	St.dev %	Min %	Max %
Integration and Market Risk Premium Variables					
I_t (Integration)	13.37	12.06	5.14	5.78	22.54
ΔI_t	0.08	0.05	0.64	-2.06	2.21
R_t^w (Global Risk Premium)	0.37	1.02	4.62	-20.99	10.72
R_t^m (Domestic Risk Premium)	0.90	1.09	6.59	-28.97	17.81
R_t^{ew} (Emerging Risk Premium)	0.71	0.99	6.69	-31.95	15.82
R_f (Risk Free Rate)	1.10	0.98	0.33	0.48	1.97
ΔR_f	-0.00	0.00	0.11	-0.33	0.33

	Mean %	Med. %	St.dev %	Min %	Max %
Portfolios Returns					
s1	0.87	0.47	7.8	-33.1	29.8
s2	0.76	0.38	6.6	-20.6	20.5
s3	0.98	1.06	6.3	-27.2	18.3
b1	1.22	1.33	5.8	-20.3	17.8
b2	0.98	1.08	7.0	-28.9	17.0
b3	0.59	1.11	7.8	-29.8	22.5
m1	0.35	0.71	8.3	-24.0	31.1
m2	1.02	1.13	6.2	-23.2	17.5
m3	1.27	1.12	6.7	-29.4	18.3
i1	0.92	1.00	6.9	-29.6	19.0
i2	1.18	1.59	6.0	-18.6	16.6
i3	0.96	0.92	6.3	-28.8	24.3
s1xb1	0.73	0.77	7.6	-30.7	28.7
s1xb2	1.26	1.29	7.8	-27.2	23.5
s2xb1	0.63	0.92	7.3	-18.7	21.8
s2xb2	0.49	0.25	7.3	-30.3	20.8
s1xm1	0.28	0.33	8.6	-30.1	31.8
s1xm2	1.32	1.91	7.3	-27.1	20.3
s2xm1	0.96	0.92	6.3	-28.8	24.3
s2xm2	1.18	1.28	6.2	-29.8	18.4
s1xil1	0.50	0.55	9.4	-30.0	35.2
s1xil2	1.05	1.09	7.4	-30.0	24.5
s2xil1	0.95	0.94	6.5	-28.9	19.3
s2xil2	1.26	1.37	5.6	-22.1	18.7
Basic Products	1.27	0.54	7.6	-24.6	25.2
Consumer	0.84	0.94	5.8	-25.5	18.8
Energy	0.57	0.86	8.5	-32.2	18.7
Finance	1.13	1.61	8.3	-29.4	22.6
Industry	1.24	1.51	9.5	-34.1	24.3
Bovespa (all firms)	0.19	0.43	5.6	-26.1	11.0
NM (Best Governance)	0.53	1.11	10.2	-35.9	26.2

Table 2: Equity market integration and expected returns - Sorted Portfolios

This table reports the results of the estimation of an international asset pricing model as per the equation $R_{it} = \alpha_i + \beta_i R_t^w + \delta_i I_{t-k} + \epsilon_{it}$. Expected return, R_{it}, is the dependent variable, modelled as a function of: global expected returns, R_t^w; equity market integration, I_{t-k}; a pricing error, α_i; an error term, ϵ_{it}. Portfolios of stocks are sorted by specific characteristics of size (s1, s2, s3), book-to-market (bm1, bm2, bm3), momentum (m1, m2, m3) and illiquidity (l1, l2, l3). Integration is calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation. In Panel A, fitted coefficients are shown. In Panel B, coefficients for the variable I_{t-k} are compared across portfolios, by testing the null hypothesis of whether these coefficients are statistically equal to one another ($H0 : \delta_i = \delta_j = ... = \delta_n$). All the equations are estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Models are estimated on a monthly basis, between years 2001 and 2015, covering a time series of 180 consecutive months.

A	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
R_t^w	1.128***	0.972***	0.960***	0.812***	1.073***	1.022***	1.244***	0.929***	0.840***	0.998***	0.846***	0.764***
	(0.099)	(0.069)	(0.070)	(0.097)	(0.068)	(0.075)	(0.076)	(0.084)	(0.074)	(0.054)	(0.101)	(0.075)
I_{t-5}	-1.147***	-0.809***	-0.619***	-0.396*	-0.526***	-1.399***	-1.088***	-0.773***	-0.327***	-0.890***	-0.604***	-0.518**
	(0.192)	(0.137)	(0.141)	(0.158)	(0.102)	(0.230)	(0.205)	(0.188)	(0.099)	(0.194)	(0.151)	(0.176)
α_i	0.004	0.004	0.006	0.009***	0.005	0.002	-0.002	0.006	0.009**	0.005	0.008+	0.007
	(0.007)	(0.005)	(0.004)	(0.002)	(0.004)	(0.007)	(0.007)	(0.006)	(0.004)	(0.005)	(0.004)	(0.005)

B	s1	s2	s3	b1	b2	b3	m1	m2	m3	l1	l2	l3
s1	1											
s2	9.20***	1										
s3	9.35***	1.93	1									
b1	19.24***	11.41***	8.87**	1								
b2	17.06***	8.45**	0.62	0.80	1							
b3	1.29	7.90**	33.84***	41.72***	16.10***	1						
m1	0.09	2.19	7.17**	10.47**	11.42***	1.46	1					
m2	4.96*	0.06	5.11*	12.11***	2.95+	24.49***	3.04+	1				
m3	16.52***	10.12**	3.10+	0.17	2.20	18.25***	10.46**	4.18*	1			
i1	1.44	0.20	16.37***	27.56***	4.21*	22.26***	0.81	2.01	6.66**	1		
i2	5.75*	2.24	0.01	1.28	0.27	9.58**	3.49+	0.53	3.42+	1.42	1	
i3	17.40***	4.20*	0.19	0.27	0.00	8.56**	5.61*	1.06	1.18	1.66	0.23	1

$+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

Table 3: Equity market integration and expected returns - Cross-Sorted Portfolios

This table reports the results of the estimation of an international asset pricing model as per the equation $R_{it} = \alpha_i + \beta_i R_t^w + \delta_i I_{t-k} + \epsilon_{it}$. Expected return, R_{it}, is the dependent variable, modelled as a function of: global expected returns, R_t^w; equity market integration, I_{t-k}; a pricing error, α_i; an error term, ϵ_{it}. Portfolios of stocks are cross-sorted by specific characteristics of size and book-to-market (s1b1, s1b2, s2b1, s2b2), size and momentum (s1m1, s1m2, s2m1, s2m2) and size and illiquidity (s1i1, s1i2, s2i1, s2i2). Integration is calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation. In Panel A, fitted coefficients are shown. In Panel B, coefficients for the variable I_{t-k} are compared across portfolios, by testing the null hypothesis of whether these coefficients are statistically equal to one another ($H0 : \delta_i = \delta_j = ... = \delta_n$). All the equations are estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Models are estimated on a monthly basis, between years 2001 and 2015, covering a time series of 180 consecutive months.

A	s1b1	s1b2	s2b1	s2b2	s1m1	s1m2	s2m1	s2m2	s1i1	s1i2	s2i1	s2i2
R_t^w	1.170***	1.061***	0.909***	0.983***	1.288***	0.987***	1.015***	0.872***	1.313***	0.983***	0.979***	0.530***
	(0.106)	(0.067)	(0.078)	(0.073)	(0.122)	(0.092)	(0.102)	(0.060)	(0.145)	(0.121)	(0.054)	(0.053)
I_{t-5}	-0.657**	-1.120***	-0.375**	-1.036***	-1.003***	-1.252***	-0.878***	-0.358***	-1.520***	-1.072***	-0.784***	-0.336+
	(0.241)	(0.259)	(0.138)	(0.149)	(0.208)	(0.269)	(0.188)	(0.085)	(0.229)	(0.292)	(0.163)	(0.186)
α_i	0.002	0.009	0.008*	0.001	-0.003	0.009	0.003	0.008*	-0.002	0.007	0.005	0.010**
	(0.005)	(0.009)	(0.003)	(0.005)	(0.007)	(0.006)	(0.006)	(0.004)	(0.007)	(0.006)	(0.005)	(0.004)

B	s1b1	s1b2	s2b1	s2b2	s1m1	s1m2	s2m1	s2m2	s1i1	s1i2	s2i1	s2i2
s1b1	1											
s1b2	1.96	1										
s2b1	1.02	17.26***	1									
s2b2	1.51	0.15	51.30***	1								
s1m1	1.66	0.83	15.16***	0.03	1							
s1m2	2.77+	0.87	29.21***	1.40	1.73	1						
s2m1	0.80	0.76	8.36**	1.01	0.41	1.97	1					
s2m2	1.37	9.10**	0.02	24.16***	9.38**	13.49***	7.07**	1				
s1i1	6.61**	9.16**	45.21***	6.78**	24.20***	2.48	7.47**	25.78***	1			
s1i2	1.09	0.27	12.92***	0.03	0.14	2.29	0.39	6.58*	9.06**	1		
s2i1	0.17	2.76+	49.07***	13.27***	1.30	9.09**	0.30	9.36**	15.06***	2.00	1	
s2i2	1.73	6.18*	0.02	7.37**	6.80**	6.38*	4.85*	0.01	16.14***	4.08*	2.45	1

$+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

Table 4: Equity market integration and expected returns - Industry and Governance Portfolios

This table reports the results of the estimation of an international asset pricing model as per the equation $R_{it} = \alpha_i + \beta_i R_t^w + \delta_i I_{t-k} + \epsilon_{it}$. Expected return, R_{it}, is the dependent variable, modelled as a function of: global expected returns, R_t^w; equity market integration, I_{t-k}; a pricing error, α_i; an error term, ϵ_{it}. Portfolios of stocks are sorted by industry (basic materials, consumer products, energy, finance and industrial goods) and by corporate governance: Bovespa, which includes all listed firms and is the baseline portfolio, whereas NM is the a special Corporate Governance segment, which includes firms observing best corporate governance practices. Integration is calculated as the value of the portfolio held by foreign investors as a share of total market capitalisation. In Panel A, fitted coefficients are shown. In Panel B, coefficients for the variable I_{t-k} are compared across portfolios, by testing the null hypothesis of whether these coefficients are statistically equal to one another ($H0 : \delta_i = \delta_j = ... = \delta_n$). All the equations are estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Models are estimated on a monthly basis, between years 2001 and 2015, covering a time series of 180 consecutive months.

A	Basic Materials	Consumer Products	Energy	Finance	Industry	Bovespa	NM
R_t^W	0.778***	0.774***	1.014***	1.127***	1.304***	0.829***	1.467***
	(0.124)	(0.152)	(0.081)	(0.058)	(0.113)	(0.038)	(0.058)
I_{t-5}	-0.714+	-0.202	-1.382***	-1.002***	-0.361	-0.471*	-0.976**
	(0.405)	(0.178)	(0.415)	(0.140)	(0.484)	(0.207)	(0.325)
α_i	0.008	0.005***	0.001	0.007	0.007	-0.001	0.001
	(0.008)	(0.001)	(0.008)	(0.005)	(0.011)	(0.005)	(0.013)

B	Basic Prod.	Consumer Prod.	Energy	Finance	Industry	Bovespa	NM
Basic Prod.	1						
Consumer Prod.	1.26	1					
Energy	1.03	5.82*	1				
Finance	0.41	12.95***	1.40	1			
Industry	1.29	0.09	3.04+	1.84	1		
Bovespa						1	
NM						14.92***	1

$+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001$.

Table 5: Granger Causality Tests (χ^2) - Equity Market Integration and Domestic Risk Premium

Note: This table presents the results of the Granger-causality tests (χ^2) between Stock Market Integration (I_t), the Domestic Risk Premium (R_t^m) and domestic risk free rates (ΔRf_t). The test inspects whether each variable Granger-Cause one another by estimating series of regressions between x_i, $i = 1, ..., t$ on its own lags and on lagged values of x_j, $j = 1, ..., t$ variables. The null hypothesis of the test is that the fitted coefficients of the lagged values of x_j are jointly statistically equal to zero. Rejecting the null hypothesis implies that x_j Granger-causes x_i. The Model is estimated on a monthly basis, between years 2001 and 2015, covering a time series of 180 consecutive months.

lag order: $t-1$	Equations		
Excluded	R_t^m	I_t	ΔRf_t
R_t^m	1	0.04	3.223+
I_t	2.161	1	0.061
ΔRf_t	0.770	0.06	1
ALL	2.785	0.124	3.253
lag order: $t-1, t-2$	**Equations**		
Excluded	R_t^m	I_t	ΔRf_t
R_t^m	1	0.886	4.976+
I_t	5.921+	1	0.065
ΔRf_t	4.381	0.084	1
ALL	9.721*	1.056	5.058
lag order: $t-1, ..., t-3$	**Equations**		
Excluded	R_t^m	I_t	ΔRf_t
R_t^m	1	1.482	1.099
I_t	9.264*	1	0.564
ΔRf_t	11.775**	0.275	1
ALL	19.241**	1.903	2.193
lag order: $t-1, ..., t-5$	**Equations**		
Excluded	R_t^m	I_t	ΔRf_t
R_t^m	1	2.067	1.213
I_t	13.970*	1	2.066
ΔRf_t	14.263*	0.841	1
ALL	24.695**	3.552	4.339

$+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.$

Table 6: Alternative model specifications - Different Market Risk Premiums

Note: This table reports the results of estimations of alternative specifications of the asset pricing models. In Panels A and B, we assume emerging markets equities remain segmented from developed markets, by replacing the world market premium (R_t^w) by the emerging markets risk premium, R_t^{ew} (returns on the MSCI Emerging Markets Index portfolio). We then estimate our baseline equation $R_{it} = \alpha_i + \beta_i R_t^{ew} + \delta_i I_{t-5} + \epsilon_{it}$. In Panels C and D, we assume equities remain priced against the local market risk premium, replacing the world market premium (R_t^w) by the local market premium (R_t^m). We then estimate our baseline equation $R_{it} = \alpha_i + \beta_i R_t^m + \delta_i I_{t-5} + \epsilon_{it}$ All the equations were estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Models are estimated on a monthly basis, between years 2001 and 2015, covering a time series of 180 consecutive months.

A	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
R_t^{ew}	0.920***	0.763***	0.748***	0.636***	0.826***	0.821***	0.931***	0.714***	0.699***	0.782***	0.633***	0.650***
	(0.054)	(0.045)	(0.029)	(0.053)	(0.032)	(0.055)	(0.055)	(0.046)	(0.042)	(0.025)	(0.061)	(0.066)
I_{t-5}	-0.746***	-0.507***	-0.330**	-0.146	-0.219*	-1.054***	-0.771***	-0.508***	-0.006	-0.582**	-0.390*	-0.206
	(0.151)	(0.105)	(0.126)	(0.141)	(0.086)	(0.218)	(0.172)	(0.150)	(0.142)	(0.188)	(0.176)	(0.190)
α_i	0.002	0.002	0.004***	0.007***	0.004***	0.000	-0.003	0.005+	0.008***	0.004+	0.007***	0.006*
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.004)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)	(0.003)
B	**s1b1**	**s1b2**	**s2b1**	**s2b2**	**s1m1**	**s1m2**	**s2m1**	**s2m2**	**s1i1**	**s1i2**	**s2i1**	**s2i2**
R_t^{ew}	0.899***	0.873***	0.692***	0.794***	0.980***	0.805***	0.785***	0.701***	0.946***	0.799***	0.762***	0.473***
	(0.045)	(0.046)	(0.042)	(0.044)	(0.051)	(0.058)	(0.067)	(0.036)	(0.075)	(0.076)	(0.026)	(0.070)
I_{t-5}	-0.324+	-0.731***	-0.126	-0.697***	-0.651**	-0.901***	-0.581***	-0.063	-1.241***	-0.725**	-0.491**	-0.086
	(0.195)	(0.218)	(0.128)	(0.140)	(0.209)	(0.229)	(0.138)	(0.119)	(0.266)	(0.260)	(0.162)	(0.229)
α_i	0.000	0.007	0.006***	-0.000	-0.005	0.008**	0.001	0.007***	-0.003	0.005+	0.004*	0.009***
	(0.002)	(0.005)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)	(0.001)	(0.004)	(0.003)	(0.002)	(0.002)
C	**s1**	**s2**	**s3**	**bm1**	**bm2**	**bm3**	**m1**	**m2**	**m3**	**l1**	**l2**	**l3**
R_t^m	0.965***	0.821***	0.950***	0.797***	0.992***	0.988***	1.028***	0.874***	0.894***	1.002***	0.759***	0.689***
	(0.031)	(0.023)	(0.011)	(0.061)	(0.010)	(0.053)	(0.052)	(0.030)	(0.023)	(0.014)	(0.047)	(0.035)
I_{t-5}	-0.622***	-0.373*	0.030	0.143+	0.089	-0.745***	-0.566**	-0.216***	0.339	-0.194***	-0.156	-0.107
	(0.182)	(0.154)	(0.050)	(0.076)	(0.166)	(0.145)	(0.184)	(0.059)	(0.224)	(0.042)	(0.211)	(0.245)
α_i	0.001	0.001	0.001***	0.005*	0.001**	-0.002	-0.005*	0.002	0.005***	0.000	0.005***	0.004*
D	**s1b1**	**s1b2**	**s2b1**	**s2b2**	**s1m1**	**s1m2**	**s2m1**	**s2m2**	**s1i1**	**s1i2**	**s2i1**	**s2i2**
R_t^m	0.921***	0.942***	0.870***	0.972***	1.022***	0.888***	0.941***	0.881***	1.028***	0.873***	0.977***	0.539***
	(0.039)	(0.014)	(0.041)	(0.036)	(0.038)	(0.028)	(0.058)	(0.019)	(0.065)	(0.044)	(0.013)	(0.040)
I_{t-5}	-0.238	-0.572**	0.192**	-0.372***	-0.530*	-0.725***	-0.292+	0.260	-1.059***	-0.564**	-0.110*	0.044
	(0.271)	(0.214)	(0.067)	(0.105)	(0.210)	(0.159)	(0.167)	(0.161)	(0.239)	(0.219)	(0.044)	(0.267)
α_i	-0.001	0.005	0.004**	-0.003**	-0.007**	0.006*	-0.001	0.004***	-0.005+	0.004	0.001+	0.008***
	(0.002)	(0.004)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)	(0.000)	(0.001)

$+p < 0.10; *p < 0.05; **p < 0.01$, *** p<0.001

Table 7: Alternative model specifications - Different Lagged Periods for Equity Integration

Note: This table reports the results of estimations of alternative specifications of the international asset pricing models. In Panels A we included the first lagged value of equity market integration, I_{t-1}; In Panel B the second lagged value, I_{t-2}; In Panel C the third lagged value, I_{t-3}; In Panel D the fourth lagged value, I_{t-4}. All the equations were estimated via generalised method of moments (GMM), using heteroskedasticity and autocorrelation robust standard errors (HAC Bartlett-type errors). Models are estimated on a monthly basis, between years 2001 and 2015, covering a time series of 180 consecutive months.

A	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
R_t^w	1.126***	0.975***	0.965***	0.827***	1.073***	1.012***	1.271***	0.937***	0.831***	1.007***	0.852***	0.765***
	(0.083)	(0.061)	(0.065)	(0.099)	(0.060)	(0.058)	(0.080)	(0.079)	(0.067)	(0.051)	(0.095)	(0.065)
I_{t-1}	-0.480	-0.440+	-0.584***	-0.359+	-0.980***	-0.445	-1.011***	-0.578***	-0.501	-0.642**	-0.098	-0.545+
	(0.327)	(0.230)	(0.170)	(0.185)	(0.241)	(0.288)	(0.257)	(0.170)	(0.328)	(0.212)	(0.203)	(0.293)
α_i	0.004	0.003	0.006	0.009***	0.005	0.001	-0.002	0.006	0.009**	0.005	0.008+	0.006
	(0.006)	(0.004)	(0.004)	(0.002)	(0.004)	(0.007)	(0.006)	(0.006)	(0.003)	(0.005)	(0.004)	(0.004)

B	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
R_t^w	1.111***	0.968***	0.959***	0.816***	1.070***	1.012***	1.247***	0.923***	0.838***	1.002***	0.842***	0.763***
	(0.090)	(0.072)	(0.071)	(0.102)	(0.068)	(0.069)	(0.091)	(0.085)	(0.073)	(0.058)	(0.103)	(0.077)
I_{t-2}	-1.001**	-0.508	-0.423+	-0.428*	-0.362	-0.316	-1.434** *	-0.626	0.148	-0.507+	-0.358	-0.392
	(0.330)	(0.504)	(0.230)	(0.205)	(0.289)	(0.521)	(0.289)	(0.386)	(0.288)	(0.263)	(0.460)	(0.431)
α_i	0.004	0.003	0.006	0.009***	0.005	0.001	-0.002	0.006	0.009**	0.005	0.008+	0.006
	(0.006)	(0.004)	(0.004)	(0.002)	(0.004)	(0.006)	(0.006)	(0.006)	(0.003)	(0.005)	(0.004)	(0.004)

C	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
R_t^w	1.103***	0.948***	0.967***	0.823***	1.070***	1.005***	1.230***	0.929***	0.841***	1.006***	0.841***	0.742***
	(0.086)	(0.060)	(0.069)	(0.098)	(0.064)	(0.061)	(0.070)	(0.078)	(0.078)	(0.056)	(0.100)	(0.056)
I_{t-3}	-0.992***	-0.761**	0.019	0.123	-0.041	-0.747*	-1.017** *	-0.213	0.174	-0.051	-0.397+	-0.367
	(0.271)	(0.262)	(0.214)	(0.191)	(0.224)	(0.365)	(0.272)	(0.225)	(0.350)	(0.248)	(0.215)	(0.285)
α_i	0.004	0.003	0.006	0.009***	0.005	0.001	-0.002	0.006	0.009**	0.005	0.008+	0.006
	(0.006)	(0.004)	(0.004)	(0.003)	(0.004)	(0.006)	(0.006)	(0.006)	(0.003)	(0.005)	(0.004)	(0.004)

D	s1	s2	s3	bm1	bm2	bm3	m1	m2	m3	l1	l2	l3
R_t^w	1.132***	0.977***	0.964***	0.809***	1.080***	1.037***	1.256***	0.931***	0.845***	1.004***	0.847***	0.770***
	(0.096)	(0.069)	(0.070)	(0.095)	(0.070)	(0.077)	(0.077)	(0.081)	(0.077)	(0.054)	(0.099)	(0.076)
I_{t-4}	-0.979***	-0.650***	-0.381*	-0.429**	-0.050	-0.953***	-0.420+	-0.506***	-0.102	-0.466**	-0.524**	-0.381+
	(0.272)	(0.157)	(0.157)	(0.151)	(0.247)	(0.195)	(0.255)	(0.125)	(0.272)	(0.142)	(0.179)	(0.208)
α_i	0.004	0.004	0.006	0.009***	0.006	0.001	-0.002	0.006	0.009**	0.005	0.008+	0.007
	(0.007)	(0.005)	(0.004)	(0.003)	(0.004)	(0.007)	(0.007)	(0.006)	(0.003)	(0.005)	(0.004)	(0.005)

$+p < 0.10; *p < 0.05; **\,p < 0.01$, *** p<0.001

Table 8: Descriptive Statistics - Quarterly Investment Data (2005-2015)

	Mean	Med.	St.dev	Min	Max
Novo Mercado Portfolio					
IK_t % (Investment Rate)	5.75	5.33	1.79	2.85	10.37
ΔIK_t %	-0.04	0.06	1.34	-3.78	2.51
YK_t (Sales Q)	1.23	1.20	0.20	0.87	1.72
ΔYK_t	0.05	-0.01	0.19	-0.53	0.62
Ex Novo Mercado Portfolio					
IK_t % (Investment Rate)	3.52	3.04	1.29	1.70	7.15
ΔIK_t %	-0.01	-0.00	0.09	-2.29	1.98
YK_t (Sales Q	0.70	0.70	0.07	0.49	0.84
ΔYK_t	0.01	0.02	0.09	-0.20	0.16
Integration and Exogenous Variables					
I_t % (Integration)	20.07	20.71	4.75	12.18	27.02
ΔI_t %	0.34	0.49	1.12	-3.97	2.39
Rf_t % (Local Risk Free Rate)	2.74	2.63	0.70	1.58	4.61
ΔRf_t %	-0.02	-0.02	0.25	-0.51	0.42
Rf_t^{us} % (Global Risk Free Rate)	1.28	0.14	1.82	0.00	4.99
ΔRf_t^{us} %	-0.06	-0.01	0.40	-1.54	0.62
Fx_t (Exchange Rate)	2.14	2.06	0.48	1.58	3.87
ΔFx_t	0.02	-0.01	0.18	-0.25	0.68
S_t (Retail Sales Index)	91.65	93.8	18.75	61.20	116.10
ΔlnS_t	0.01	0.01	0.01	-0.02	0.04

Table 9: VAR Model - Stock Market Integration and Corporate Investment (Novo Mercado Portfolio)

Note: We model the relation between investment, integration and growth opportunities for the *Novo Mercado* Corporate Governance Portfolio. We estimate a Vector Autoregressive Model in which Investment (ΔIK_t), integration (ΔI_t) and Sales-based Tobin's Q (ΔYK_t) are modelled endogenously and simultaneously. Additionally, exogenous variables were included as controls: local risk free rates, proxied by the Swap Pre-DI rate (ΔRf_t), U.S risk free rates proxied by the 3 months T-bill (ΔRf_t^{us}), the exchange rate between the Brazilian Real and the U.S dollar (ΔFx_t), the natural log of the Brazilian Retail Sales index, as a proxy for economic expectations (ΔS_t), a dummy variable for the 2008 financial crisis period ($d2008$), and quarterly dummies ($Qt1, Qt2, Qt3, Qt4$), where $Qt1$ is the baseline. In the second part of the table, Granger Causality tests are reported, whereas in the bottom we show Forecasts of Error Variance Decompositions. Models are estimated on a quarterly basis, between years 2005 and 2015, covering a time series of 44 consecutive quarters.

VAR	Investment ($\Delta I/K_t$)	Integration (ΔI_t)	Sales Q ($\Delta Y/K_t$)
ΔIK_{t-1}	-0.010	-0.073	0.326
ΔIK_{t-2}	0.083	-0.368***	1.779
ΔIK_{t-3}	0.345***	-0.246***	1.905
ΔIK_{t-4}	-0.213+	-0.116	-3.297
ΔI_{t-1}	0.251+	-0.652***	.000
ΔI_{t-2}	-0.070	-0.389***	.007
ΔI_{t-3}	0.300*	-0.134	.0150
ΔI_{t-4}	0.074	-0.435***	-.007
ΔYK_{t-1}	0.010	0.008	-0.459***
ΔYK_{t-2}	0.017***	-0.006	-0.133
ΔYK_{t-3}	0.000	-0.019**	-0.126
ΔYK_{t-4}	0.016*	0.017**	0.287+
ΔRf_t	0.838	-0.829+	29.004**
ΔRf_t^{us}	-1.116***	-0.462+	7.364
ΔFx_t	0.014+	-0.008	0.201
ΔS_t	0.111	0.091	4.791***
$d2008$	-0.018***	-0.010***	0.008
$Qt2$	-0.017***	0.016***	-0.204*
$Qt3$	0.001	-0.001	-0.145
$Qt4$	0.003	0.002	0.003
R^2	0.850	0.872	0.716
$RMSE$	0.007	0.006	0.156
χ^2	222.536***	267.223***	98.622***
Granger Causality Tests (χ^2)		Equations	
Excluded	ΔIK_t	ΔI_t	ΔYK_t
ΔIK_t	1	28.46***	5.02
ΔI_t	14.60***	1	7.84+
ΔYK_t	14.64***	32.08***	1
ALL	30.47***	78.39**	14.20+
FVED % (ΔIK_t)	ΔIK_t	ΔI_t	ΔYK_t
$t = 1$	100	0	0
$t = 2$	95.20	3.17	1.62
$t = 3$	81.95	4.93	13.11
$t = 4$	70.97	9.88	19.13
$t = 5$	62,72	8.50	28.77
$t = 6$	60.57	10.89	28.52
$t = 7$	53.97	12.66	33.35
$t = 8$	48.13	13.26	38.59
$t = 9$	48.24	13.23	38.51
$t = 10$	45.76	13.82	40.40

$+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.$

Table 10: Firm-level Investment Regressions

Note: We model the relation between corporate investment and foreign ownership with firm-level regressions. We estimate the model: $IK_{it} = \alpha + \beta_1 YK_{it} + \beta_2 F_{it} + \beta_3 lnS_{it} + \beta_4 NM_i + \beta_5 F_{it} \cdot NM_i + e_{it}$, via OLS and Instrumental Variables (with the variable $MSCI_{it}$ as instrument).

Dep. Var: IK_{it}	OLS	IV	OLS
Foreign Ownership (F_{it})	0.124***	0.390**	-0.099
	(0.042)	(0.168)	(0.064)
Sales to Capital (YK_{it})	0.286***	0.278***	0.278***
	(0.024)	(0.025)	(0.024)
Size (lnS_{it})	-2.019***	-2.059***	-1.728***
	(0.458)	(0.460)	(0.442)
Novo Mercado (NM_i)			4.316**
			(1.880)
$F_{it} \cdot NM_i$			0.214***
			(0.082)
Intercept	43.701***	40.138***	37.215***
	(6.809)	(6.844)	(6.717)
Years Fixed Effects	Yes	Yes	Yes
R^2	0.262	0.227	0.282
N obs	823	823	823
N firms	173	173	173
χ^2	223.6951	216.7389	272.4623

$+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001.$

Appendix B - Figures

Figure 1: Stock Market Integration (Foreign Ownership) and Stock Valuations

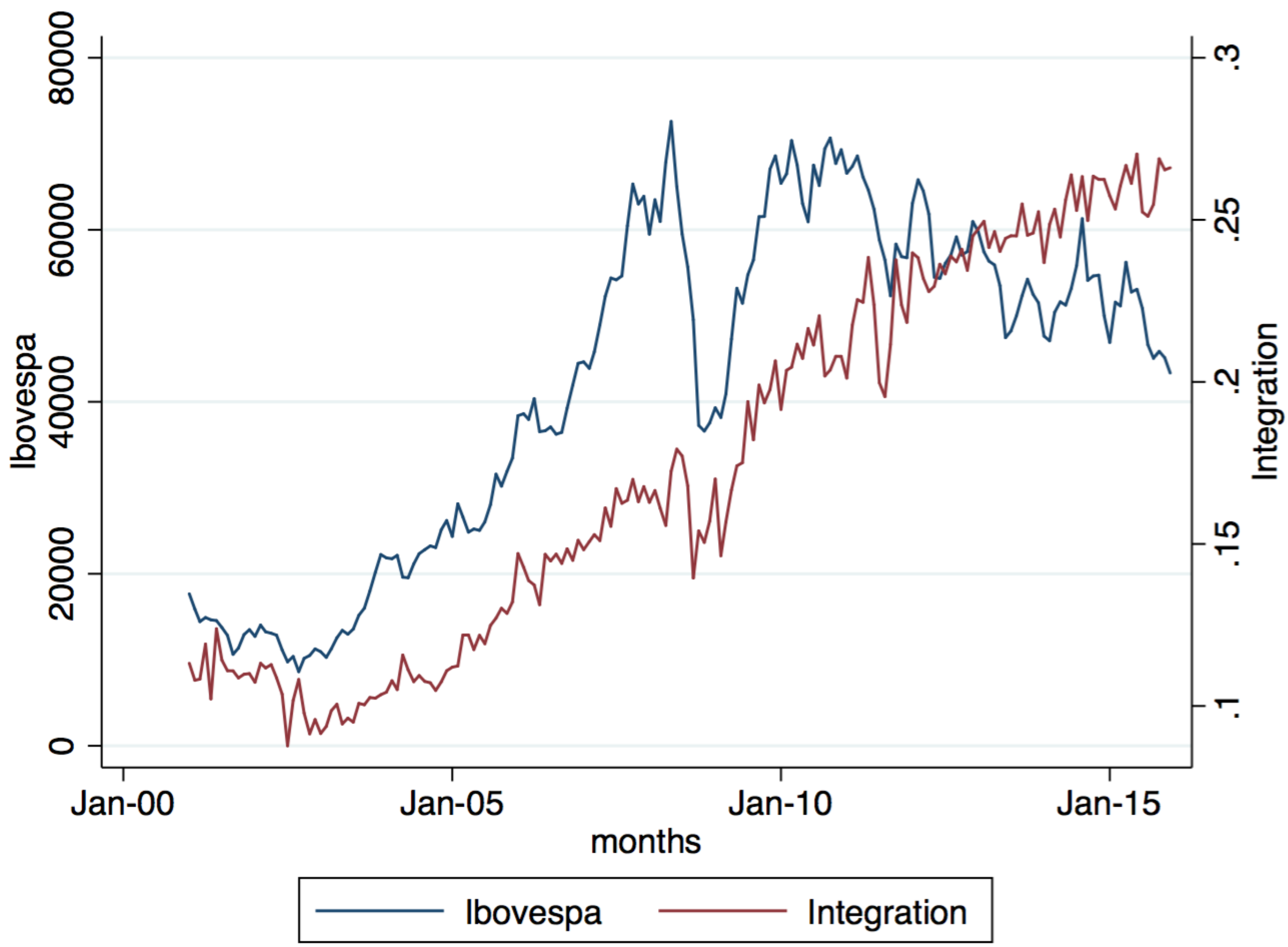

Figure 2: Stock Market Integration (de-trended) and Stock Returns

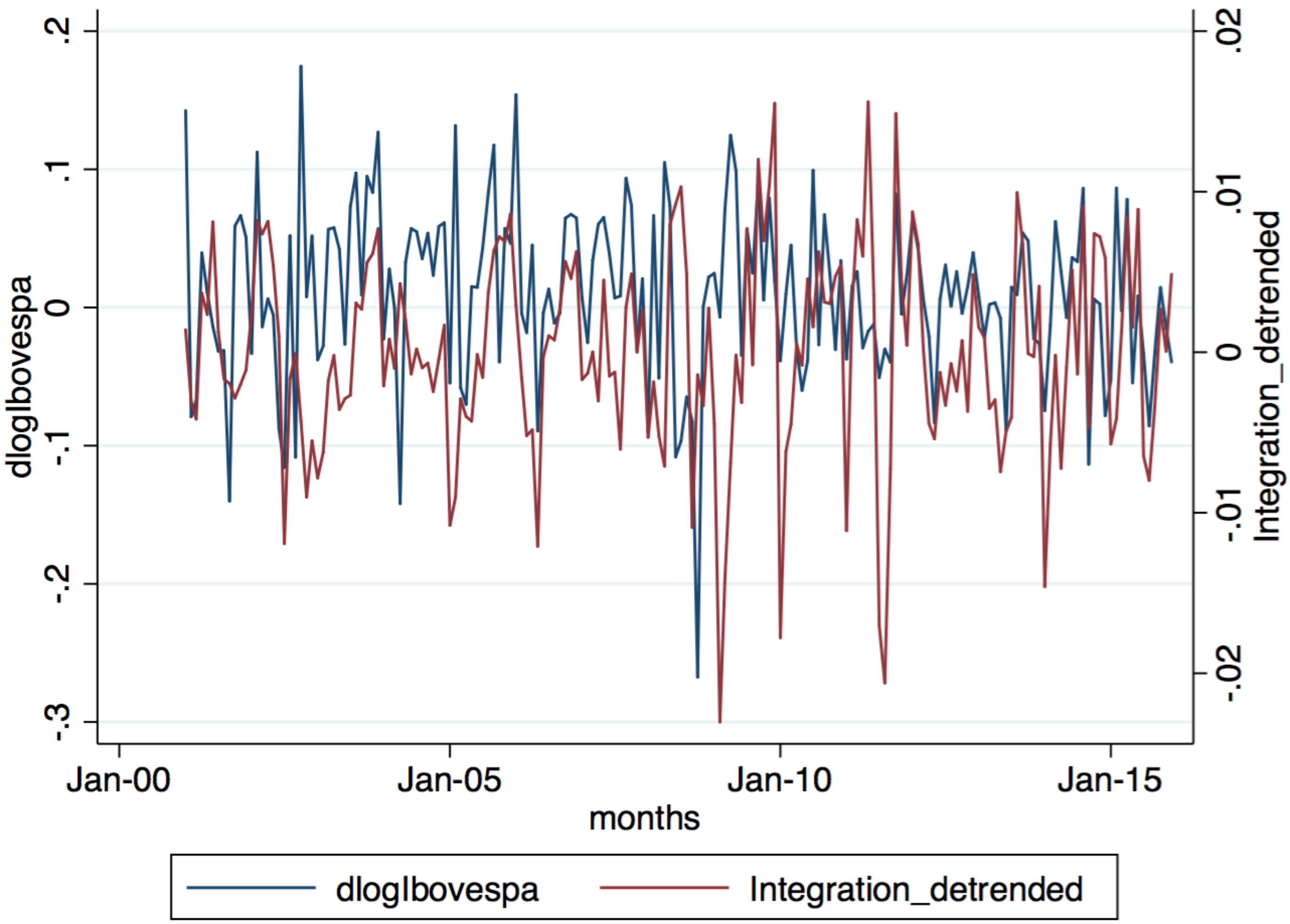

Figure 3: Time-varying Correlation between Integration and Stock Returns

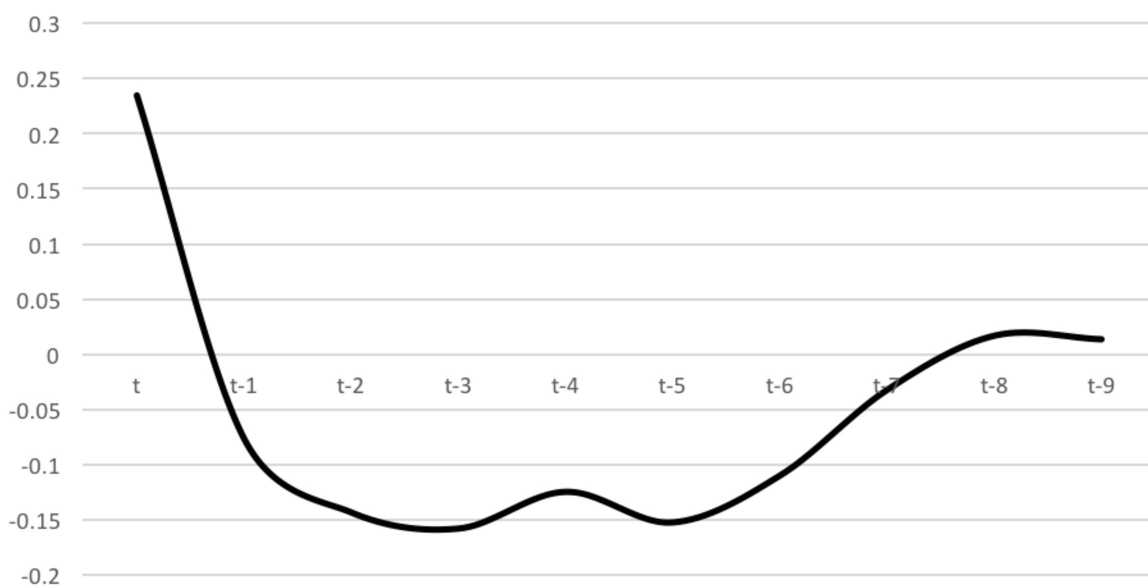

Figure 4: Stock Market Integration (Foreign Ownership) and Corporate Investment Rates

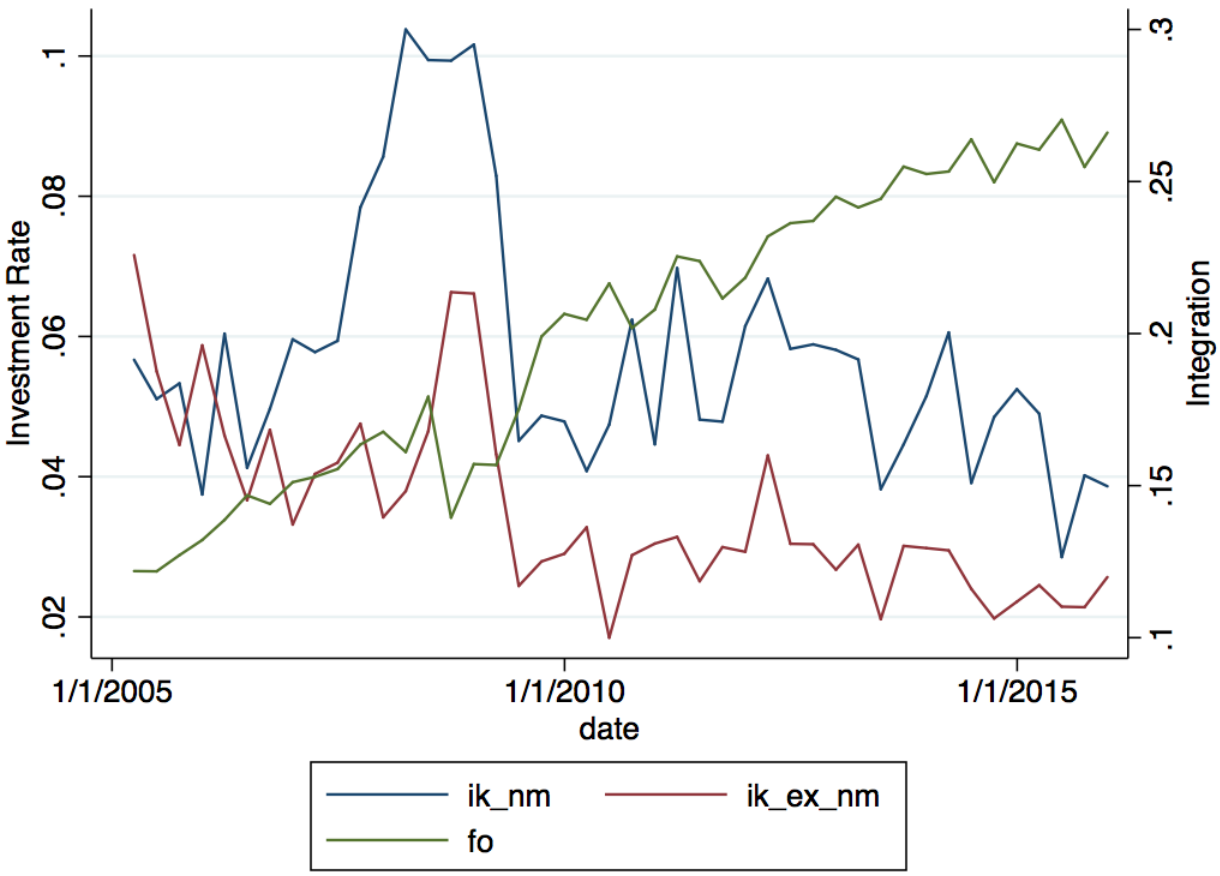

Figure 5: Sales-based Tobin's Q (YK)

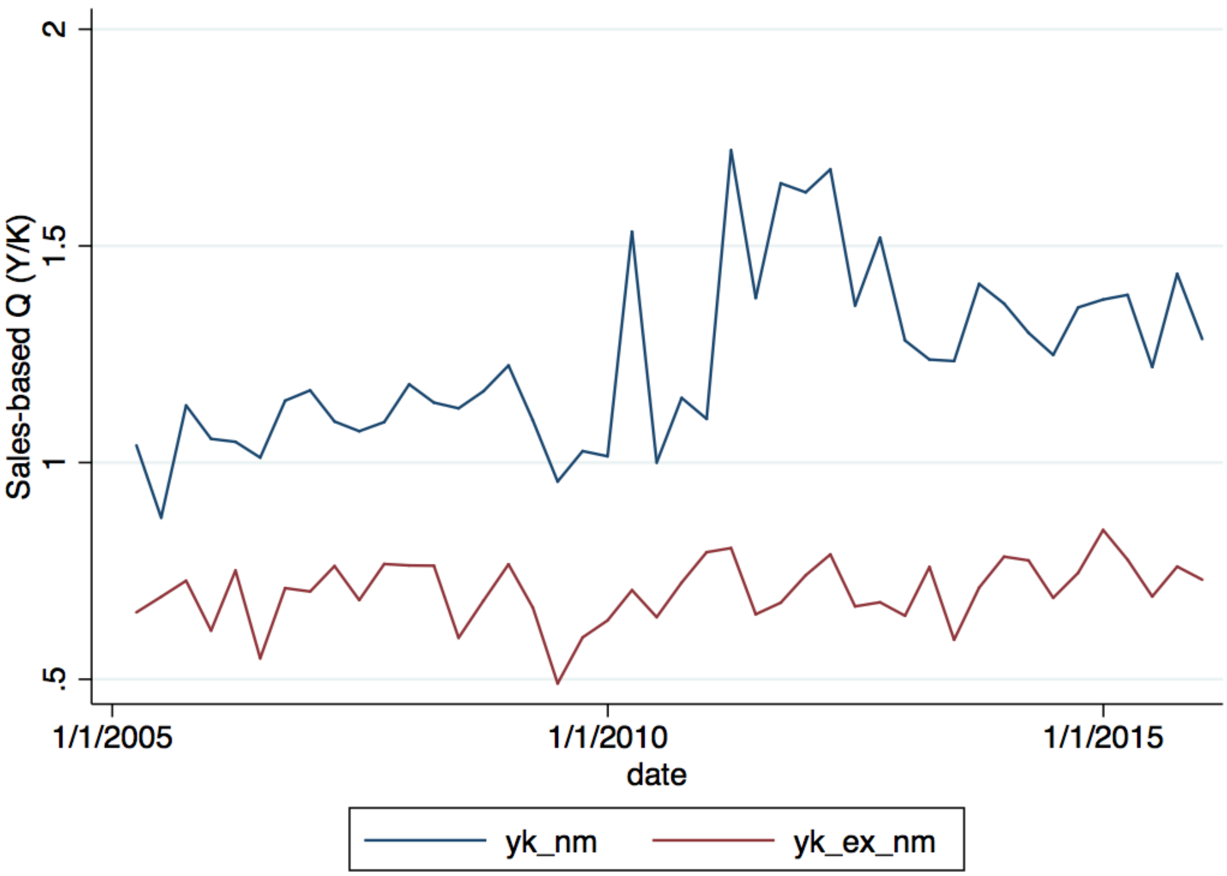

Figure 6: Stock Market Integration and Corporate Investment Rates (First Differences)

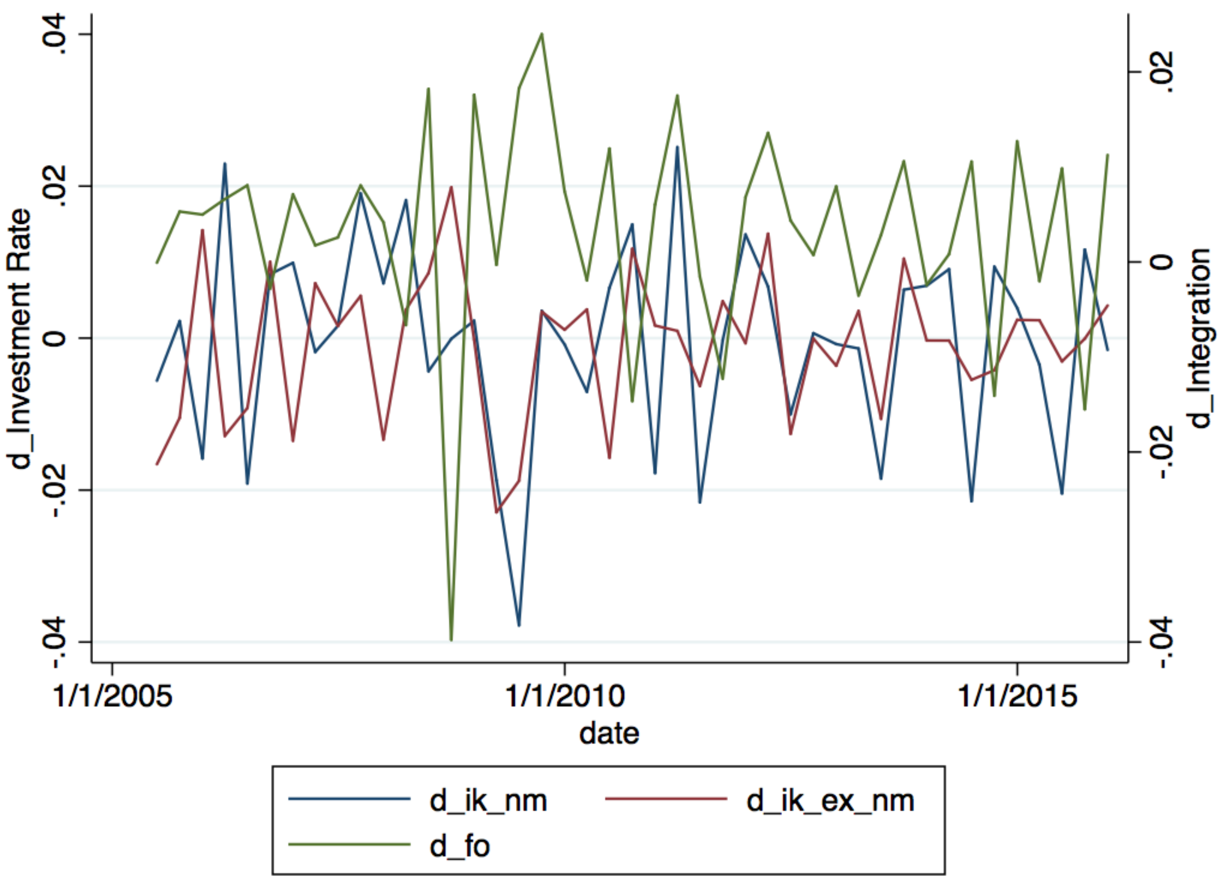

Figure 7: Impulse Response Function: Stock Market Integration and Investment Rate (Novo Mercado)

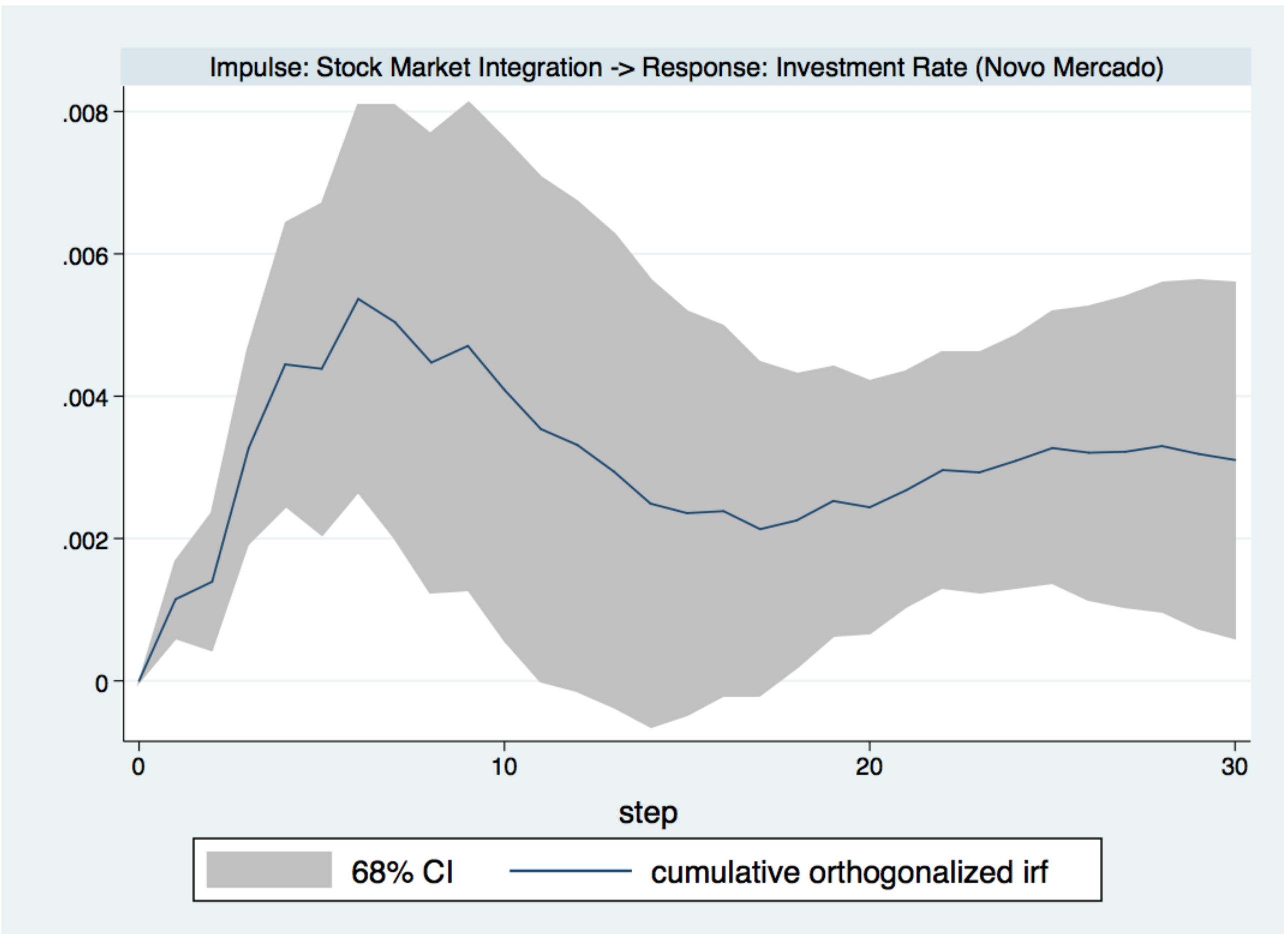

Figure 8: Impulse Response Function: Stock Market Integration and Investment Rate (Ex Novo Mercado)

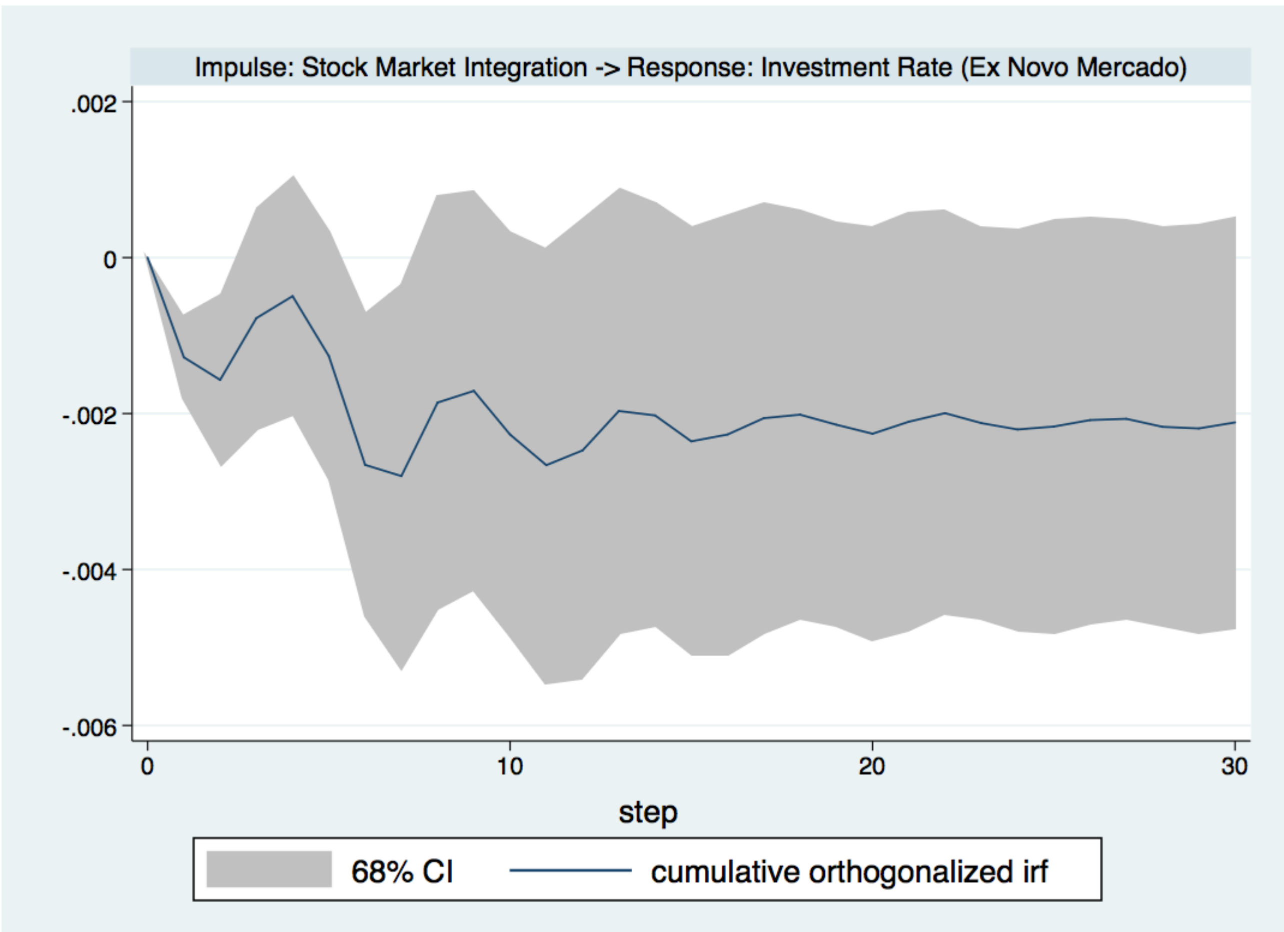

Figure 9: Impulse Response Function: Growth Opportunities and Investment Rate (Novo Mercado)

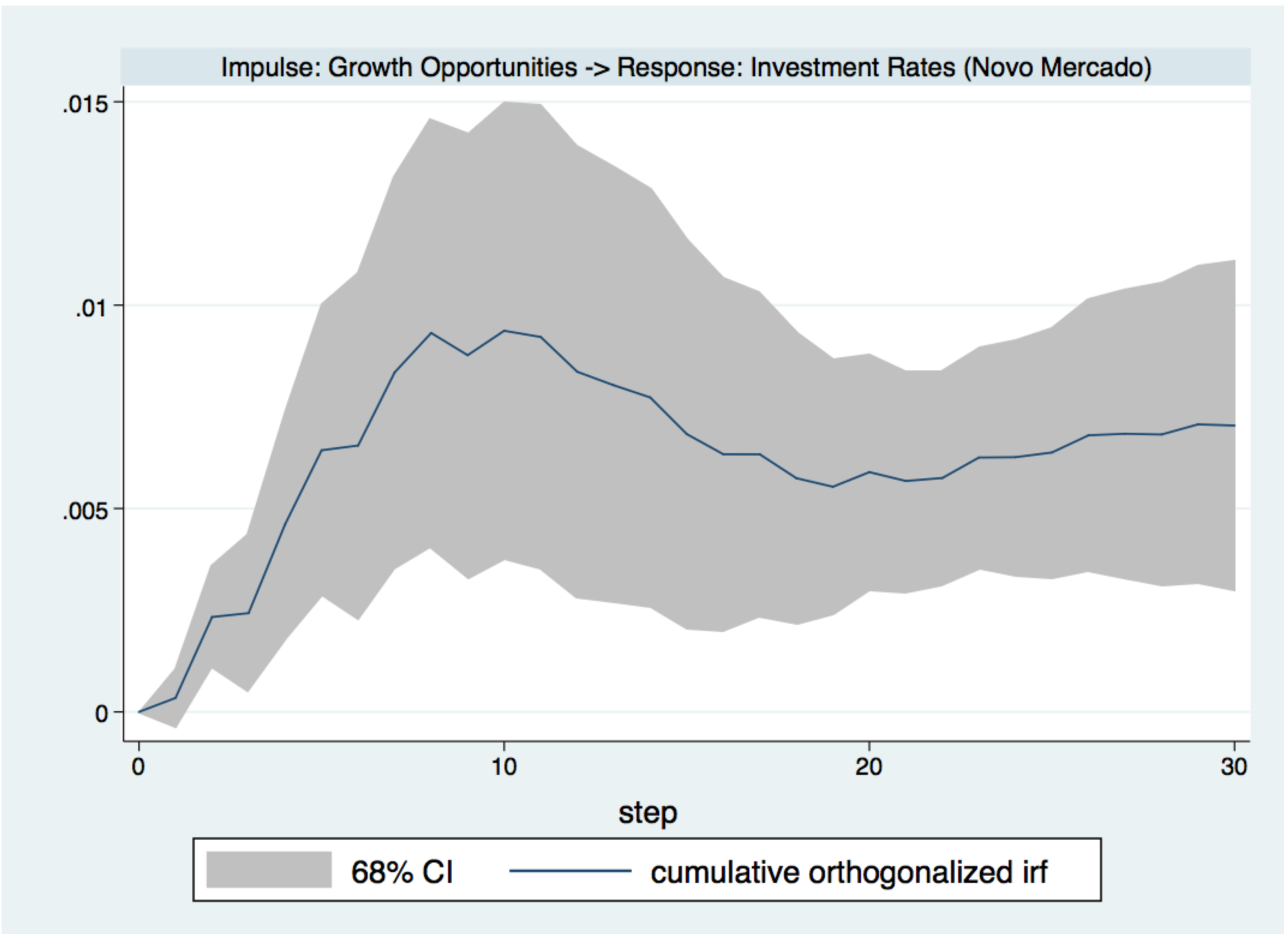

Figure 10: Impulse Response Function: Lagged Investment Rate and Investment Rate (Novo Mercado)