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The Real Effects of Capital Controls:¸ Financial Constraints, Exporters, and Firm Investment
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ABSTRACT

In aftermath of the global financial crisis of 2008–2009, emerging-market governments have increasingly restricted foreign capital inflows. The data show a statistically significant drop in cumulative abnormal returns for Brazilian firms following capital control announcements. Large firms and the largest exporting firms appear less negatively affected compared to external finance-dependent firms, and capital controls on equity have a more negative announcement effect than those on debt. Real investment falls following the controls. Overall, the results suggest that capital controls segment international financial markets, increase the cost of capital, reduce the availability of external finance, and lower firm-level investment.

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1. Introduction

The massive surge of foreign capital to emerging markets in the aftermath of the global financial crisis of 2008–2009 has led to a renewed debate about the merits of international capital mobility (Stulz 2005; Fratzscher, Lo Duca, and Straub 2013). While the free flow of international capital has many benefits such as reducing the cost of capital, increasing investment and economic growth (Chari and Henry 2004, 2008; Bekaert, Harvey, and Lundblad 2003, 2005), and international diversification gains for foreign investors (Brennan and Cao 1997, French and Poterba 1991, Adler and Dumas 1983), it also poses significant risks for the recipient economies when the flows are volatile, show reversals, or are subject to sudden stops (Jotikasthira, Lundblad, and Ramadorai 2012, Forbes and Rigobon 2002, Forbes and Warnock 2012).

Although the monetary policy decisions of the U.S. Federal Reserve, European Central Bank, Bank of England, and Bank of Japan during the crisis had a primarily domestic focus, they led to substantial spillover effects for emerging-market economies (Fratzscher, Lo Duca, and Straub 2013). As interest rates in developed economies remained low, investors were attracted to the higher rates in Brazil, Chile, Taiwan, Thailand, and South Korea and many other emerging economies (Fratzscher 2012). The governor of Taiwan's central bank, Perng Fai-Nan, explained, "The US printed a lot of money, so there's a lot of hot money flowing around. We see hot money in Taiwan and elsewhere in Asia. . . . These short-term capital flows are disturbing emerging economies."[1]

To stem the flow of capital and manage the attendant risks, several emerging markets have recently imposed taxes or controls to curb inflows of foreign capital. South Korea has also implemented caps on the percentage of foreign reserves banks can hold. In December of 2012, the International Monetary Fund (IMF) released an official statement endorsing a limited use of capital controls (IMF 2012).[2] The case for capital controls primarily rests on prudential measures

[1] See http://www.theguardian.com/business/2010/oct/06/expert-views-currency-wars for a list of central banker views on the destabilizing effects of portfolio flows to emerging markets in the aftermath of the global financial crisis.

[2] "For countries that have to manage the risks associated with inflow surges or disruptive outflows, a key role needs to be played by macroeconomic policies, as well as by sound financial supervision and regulation, and strong institutions. In certain circumstances, capital flow management measures can be useful. They should not, however, substitute for warranted macroeconomic adjustment."

designed to mitigate the volatility of foreign capital inflows. However, controls also have an implicitly protectionist aspect aimed at maintaining persistent currency undervaluation. Policy makers from emerging Asia and Latin America have expressed concerns that massive foreign capital inflows can lead to appreciation of the exchange rate and loss of competitiveness, with potential lasting effects on the export sector.[3]

While the literature documents important benefits of international financial liberalization and the welfare impact of investability restrictions (Bekaert and Harvey 2000, Chari and Henry 2004, 2008, Bekaert, Harvey, and Lundblad 2003, 2005, Henry 2007, Karolyi and Wu 2014), the shift in emerging market governments renewed policy focus on implementing capital controls is striking. Related to this shift, there is a growing theoretical macro literature positing the benefits of capital controls albeit focusing exclusively on debt rather than equity to motivate the model frameworks (Bianchi and Mendoza 2010, Farhi and Werning 2014, Korinek 2010).[4] Our paper is the first to provide direct empirical evidence of the costs of capital controls using firm-level data from Brazil seen as a poster child for the recent policy changes (Jeanne, Subrahmanian and Williamson, 2013). Studies about the effects of capital controls on firm finance and real activity are scarce. Most closely related is Forbes (2007a) which studies the impact of capital controls as opposed to the benefits of liberalization using Chilean data from the 1990s.[5]

In this paper we investigate the effects of capital controls on firm-level stock returns and real investment using data from Brazil. We focus on Brazil because it has taken center stage as a country that has implemented a series of extensive controls on capital flows between 2008 and

[3] In September 2010, the finance minister of Brazil, Guido Mantega, used the term *currency war* to describe the efforts of nations to devalue their currencies in order to augment the competitiveness of their exports in international markets. In particular, Mantega blamed the monetary policies of the world's major central banks, such as the U.S. Federal Reserve and the European Central Bank, for the currency war. While these trends preceded the Great Recession of 2008, following the recovery from the 2008 subprime crisis low interest rates in developed countries have continued to exacerbate this trend. Jonathan Wheatley and Peter Garnham in "Brazil in 'currency war' alert," *Financial Times*, September 27, 2010.

[4] Further the empirical literature in macro-finance has focused on characterizing the macro effects of capital controls on exchange rates, interest rates and capital flows. See Magud, Reinhart, and Rogoff (2011) for recent survey on capital controls. The evidence on the effectiveness of controls on reducing the volume of flows is mixed and stronger for effects on the composition of flows.

[5] Forbes (2007a) uses an Euler-equation framework to show that during the Chilean encaje, smaller traded firms experienced significant financial constraints. These constraints decreased as firm size increased. See also Forbes 2007b.

2012.[6] The stock market in Brazil is well developed, and the country has firm-level export data that allow us to examine both the firm-level response to capital flows as well as the impact of capital controls on the competitiveness of exporting firms.[7] Importantly, firm-level data have the advantage that they can shed light on the channels through which capital controls can affect the cost of external finance, credit constraints, and real investment at a dis-aggregated level.

Theory suggests that the imposition of capital controls can drive up the cost of capital and curb investment (Stulz 1999, Chari and Henry 2004). Credit constraints at the firm level are also more likely to bind for firms that are more dependent on external finance (Rajan and Zingales 1998, Forbes 2007a). In particular, if production is associated with fixed costs and dependent on external finance, financial constraints at the firm level become relevant. Firms with easier access to external finance or greater access to low-cost funds may be able to overcome the barriers associated with these fixed costs and experience increased investment and sales.[8] Capital controls, on the other hand, can increase uncertainty while reducing the availability of external finance, which can lower investment at the firm level.

We conduct an event-study analysis around the dates when the various capital control measures were announced using stock prices and firm-level data from Datastream and Worldscope. The main results are as follows. First, there is a significant decline in cumulative abnormal returns for Brazilian firms following the imposition of capital controls on foreign portfolio inflows in 2008–2009 consistent with an increase in the cost of capital. Second, controls on debt flows are associated with less negative returns, suggesting that the market views equity and debt flows as different. Third, the data suggest that large firms are less affected by the controls. This finding is consistent with Edison and Warnock's (2004) conclusion that U.S. portfolios are tilted toward large firms.

Fourth, we find that exporting firms are less adversely affected by controls. The larger

[6] Some previous noteworthy examples include the Unremunerated Reserve Requirements in Chile (1990s), Colombia (1990s, 2007), and Thailand (2006). Arguably, these historical examples do not compare to the level of active experimentation in the recent Brazilian experience.

[7] The value of gross domestic product (GDP) that is spanned by the stock market in Brazil averaged more than 40% between 2007 and 2012 (stocks traded, total value % GDP, WDI, World Bank), and the market capitalization of listed firms more than 65% (market capitalization of listed companies % GDP, WDI, World Bank).

[8] If there are fixed costs associated with exporting, liquidity constraints at the firm level will also come into play. An appreciation of the domestic currency, despite potential negative effects on the competitiveness of exporters, may not have a large impact on aggregate exports (see Chaney 2013).

exporting firms in particular are somewhat shielded. The evidence suggests that exporting firms may have access to foreign currency proceeds and are therefore not affected by the capital controls to the same extent as non-exporting firms or smaller exporters.[9] Alternatively, if the capital controls are associated with currency depreciation, these firms may experience an increase in profits as their competitiveness improves.

We also consider external finance dependence at the firm and sector level and find that firms that are more dependent on external finance are more adversely affected by the imposition of capital controls. Finally, real investment at the firm level falls significantly in the aftermath of the controls.

The paper is related to a theoretical literature on boom-bust cycles in foreign capital inflows where foreign capital controls are designed to mitigate the externalities generated by a buildup in foreign debt during capital inflow booms, which in turn lead to costly deleveraging if there is a sudden stop in these flows (Calvo and Reinhart 2000, Tornell and Westermann 2005). In this literature, the case for controls on foreign capital is therefore the same as for the macro-prudential regulation of the financial sector. Their objective is to design regulatory measures that make agents internalize their contributions to systemic risk and curb the destabilizing impact of foreign capital inflow booms and busts.

Note that the theoretical models analyzing capital controls rely on foreign debt to generate excessive leverage buildups in the financial system during capital inflow booms (see Benigno et al. 2011 for a survey). There is a general consensus that the distinction between debt and equity is an extremely important one when discussing the benefits of capital account openness (Henry 2007). Since debt does not embody the risk-sharing aspects of international equity flows, excessive reliance on external debt (especially foreign-currency-denominated bank loans that generate currency mismatches on balance sheets) can cause financial distress, as we have seen in many an emerging-market crisis (Tornell and Westermann 2005, Benmelech and

[9] In related evidence, Desai, Foley, and Forbes (2008) find that U.S. multinational affiliates are better able to circumvent financial constraints and increase sales, assets, and investment significantly more than local firms in the aftermath of currency crises and massive currency depreciations. The evidence in our paper suggests that compared to purely domestic firms that serve local markets, exporting firms may be better able to overcome the financial constraints imposed by capital controls.

Dvir 2013). It is also important to observe that in contrast to the sharp reversal in debt flows during recent emerging-market crises, net portfolio equity inflows remained more stable (IMF [WEO] 2003).

With data that differentiates between capital controls on different categories of assets, Klein (2012) finds that with a few exceptions, there is little evidence of the efficacy of capital controls on the growth of financial variables, the real exchange rate, or GDP growth casting doubts about assumptions behind recent calls for a greater use of episodic controls on capital inflows. Similarly, Fernandez, Rebucci, and Uribe (2013) find that capital controls in the period 2005-2011 have not been implemented as a prudential tool as prescribed by a growing recent theoretical macro literature.

A few papers have studied the macro effects of capital controls in Brazil. Goldfajn and Minella (2005) provide several stylized facts regarding the evolution of capital flows and controls in Brazil and conclude that capital account liberalization and the floating exchange regime have led to a more resilient economy. Using macro data, Carvalho and Garcia (2008) show evidence that the controls were bypassed during the first years following the end of hyperinflation in 1994, when a combination of a controlled exchange rate with extremely high interest rates attracted much carry trade. More recently, Chamon and Garcia (2013) find that "the controls were effective in the sense of creating distortions in the pricing of financial assets, i.e., making the domestic assets more expensive." Therefore, controls were effective in partially segmenting the Brazilian financial market from the international market. However, the controls do not seem to have deterred the appreciation of the *real* when capital inflows were strong.

Forbes, Fratzscher, Kostka, and Straub (2012) use changes in Brazil's tax on capital inflows from 2006 to 2011 to test for direct portfolio effects and externalities from capital controls on investor portfolios. Based on investor interviews, the evidence suggests that an increase in Brazil's tax on foreign investment in bonds causes investors to significantly decrease their portfolio allocations to Brazil in both bonds and equities. Investors simultaneously decrease allocations to countries viewed as more likely to use capital controls. Much of the effect of capital controls on portfolio flows appears to occur through signaling—i.e., changes in investor expectations about future policies—rather than the direct cost of the controls.

The paper proceeds as follows. Section 2 reviews the macroeconomic conditions in Brazil in the 2000s and provides information about the recent use of capital controls measures. Section 3 provides a brief theoretical motivation and Section 4 presents the empirical methodology and summary statistics. Section 5 presents the results and additional tests to ensure the robustness of our findings. Section 6 concludes.

2. Background: Brazil in the 2000s and the Recent Use of Capital Controls

Except for a brief recession during the last two quarters of 2008, caused by the global financial crisis, the Brazilian economy expanded throughout the 2000s due to a commodity exports and consumer boom. The impact of the financial crisis was short lived, and Brazil's economy swiftly returned to growth by the second quarter of 2009. The commodity boom, paired with increased inflows of foreign capital, placed upward pressure on the Brazilian currency, the real.[10] In 2008, the real appreciated by 50% to 1.6 R$/US$ from a low of 3.1 R$/US$ in 2004.[11]

In an attempt to prevent an excessive inflow of foreign capital, stabilize the exchange rate, and reduce the upward trend in inflation, Brazil's government adopted a system of capital controls on inflows from abroad.[12] In March 2008, the government established the *Imposto Sobre Operações Financeiras* (IOF), a financial transaction tax of 1.5% placed on incoming foreign fixed-income investments, as a means of quelling the flow of capital into the economy.

Note that the IOF is a tax that can be levied on a range of financial operations including foreign credit, foreign exchange, securities, and so on.[13] Also, it is a tax over which the executive branch has very broad powers regarding triggering events and applicable rates.[14] According to the Brazilian Constitution, most taxes may only be increased by means of a law approved by the

[10] The International Institute of Finance estimated that foreign capital inflows increased from US$11.2bn in 2006 to US$79.5bn in the following year. Brazil emerged as the biggest recipient of foreign capital in Latin America.
[11] Banco Central Do Brasil, accessed November 29, 2012.
[12] Capital controls are defined as any policy that is designed to reduce or redirect transactions into the capital account of a given nation. Capital controls are divided into administrative or direct controls, such as required approvals for transactions, and market-based or indirect controls, such as taxes. Such controls can be placed inflows or outflows of capital.
[13] The IOF tax was created to replace the CPMF (Contribuição Provisória sobre Movimentação Financeira) abolished in 2008. The CPMF was a tax on bank transactions. It ranged from in 0.25% in 2008 to 0.38% in 2008 when it was abolished.
[14] See www.receita.fazenda.gov.br/aliquotas/impcresegcamb.htm.

National Congress and usually take effect after ninety days. However, the IOF is an exception. The tax can be easily changed overnight at the discretion of the Finance Ministry through policy decree that becomes effective immediately from its enactment date. Using data from investor interviews, Forbes, Fratzscher, Kostka, and Straub (2012) also document that controls were not anticipated by investors.

By October of 2008, as the wide-reaching effects of the international financial crisis were becoming clear, foreign direct investment in Brazil nearly halved from US$45.1 billion in 2008 to US$25.9 billion in 2009.[15] In an effort to stem the outflow of investment, the government eliminated the IOF. However, Brazil recovered quickly from the economic downturn, and during the first nine months of 2009, approximately US$20 billion of foreign investments entered the Brazilian equities market.[16] With the resumption of massive capital inflows, capital controls were imposed again as early as February of 2009. On October 20, 2009, Brazilian authorities expanded the IOF tax to a 2% rate on fixed income, in addition to portfolio and equity investments. The IOF did not apply to inflows of direct investment.

Since its re-introduction in October of 2009, the IOF has become a means for the Brazilian government to control the influx of foreign capital, and the tax has repeatedly been both raised and expanded to include other forms of investments (see Table 1 for a detailed list). By late 2010, the real continued to appreciate, emerging as one of the strongest performing currencies in the world. On October 5, 2010, the IOF on fixed-income instruments was raised to 4%; less than two weeks later the tax was raised to 6%.

In early 2011, the exchange rate remained at R$1.6 against the U.S. dollar, and the blame for Brazil's currency appreciation was targeted on incoming foreign capital originating in developed markets. The government decided to raise the IOF to 6% on foreign loans with a minimum maturity of up to 360 days in March 2011. By early April, the IOF was extended to loans with a maturity of up to two years. The increase in tax rate represented a shift away from a dependency on high interest rates to combat the growing levels of inflation in Brazil.

[15] Economist Intelligence Unit, EIU Country Data, accessed September 2012.
[16] "Brazil Increases Tax on Foreign Exchange Transactions Related to Foreign Investments in the Financial and Capital Markets," Memorandum, Simpson Thatcher & Bartlet LLP, October 22, 2009.

The decision to place capital controls on incoming foreign investments was not unanimously supported. Edemir Pinto, chief executive of the Brazilian Stock Exchange, called on the government to remove some of the existing capital controls on the grounds that the IOF was damaging the equity market. Over half of the money raised by Brazilian companies from IPOs originated from foreign investors, and Pinto claimed the tax on financial transactions was choking foreign inflows of capital. In early December 2011, the 2% IOF tax on equities was removed.

In an attempt to depreciate the value of the real, the Central Bank also began aggressively cutting its overnight rate (Selic). Over a ten-month period, the Selic rate was cut eight consecutive times, from 12.5% in late August 2011 to 8% in July 2012. In the first week of June 2013, Brazil removed the tax on foreign investments in local debt and the 1% tax charged currency derivatives.[17,18] One July 1st, the government further eliminated reserve requirements on short dollar positions held by local banks.[19] The next section provides a brief discussion on the theoretical motivation for the empirical analysis that follows.

3. Theoretical Underpinnings

The focus of this paper is on the imposition of capital controls. Theory predicts that the direction of the change in expected returns in response to the imposition of capital controls will be firm specific. Expected returns will rise for firms whose exposure to systematic risk increases and fall for those whose exposure decreases following capital controls announcements. The change in expected returns will be reflected in stock prices. For example, a rise in a firm's expected return will cause a decrease in its stock price.

As an analogous thought experiment, consider the liberalization of stock markets as countries went from financial autarky to financial openness in the late 1980s and early 1990s in many emerging markets, including Brazil. Here the expected return changes could be

[17] http://www.bloomberg.com/news/2013-06-13/brazil-dismantles-capital-control-as-real-drops-to-four-year-low.html.
[18] http://www.reuters.com/article/2013/06/05/brazil-tax-iof-idUSL1N0EG23E20130605.
[19] http://www.bloomberg.com/news/2013-06-25/brazil-eliminates-reserve-requirement-on-bets-against-the-dollar.html.

decomposed into two components—a change in the risk-free rate and a change in the firm-specific risk premium. Moving from financial autarky to openness constitutes a change in the relevant benchmark for the firm-specific expected return.

To see this, notice that the benchmark for the risk-free rate changes from the country-specific risk-free rate in autarky to the world risk-free rate. If the risk-free rate under autarky is greater than the world risk-free rate (not an unreasonable hypothesis given that emerging markets are capital scarce in comparison to advanced countries), then we expect the risk-free rate to fall as countries liberalize their stock markets and experience inflows of foreign capital.

Similarly, if the benchmark for measuring a firm's exposure to systematic risk changes from the domestic market to the world market, we expect that the firm-specific risk premium will fall if a firm's returns are more correlated with the domestic market than with the world market. Here a firm's exposure to systematic risk that determines the risk premium term in the firm's expected return depends on the covariance of the firm's cash flows with the domestic relative to the world market. The higher the systematic risk, the greater the expected return or cost of capital for a given firm. The expected return (or cost of capital) can fall due to the risk-free rate (or average cost of capital) effect and the diversification (or systematic risk) effect as countries move from financial autarky to openness. Concomitantly, if expected future cash flows remain unchanged, stock prices will rise as the expected returns fall.

Indeed, Chari and Henry (2004) show that when countries liberalize their stock markets, firms that become eligible for foreign purchase (investible), experience an average stock price increase of 15.1%. Since the historical covariance of the average investible firm's stock return with the local market is roughly two hundred times larger than its historical covariance with the world market, liberalization reduces the systematic risk associated with holding investible securities. Consistent with this fact, the average effect of the reduction in systematic risk is roughly two-fifths of the total increase in stock prices, and the firm-specific increases are directly proportional to the firm-specific changes in systematic risk.

The imposition of capital controls, in contrast, constitutes a move away from financial openness to financial autarky. As a consequence, the risk-free and the firm-specific systematic risk may rise, and the expected return (or cost of capital) may go up while stock prices fall.

Therefore, negative CARs following capital control policy announcements would suggest that, all else equal, stock prices fall as the market imputes an increase in expected returns or the firm-specific cost of capital.

Following the analysis in Stulz (1999) and Chari and Henry (2004), assume a small country whose equity market is completely integrated into world equity markets.[20] Also assume that all investors in the world are risk averse and care only about the expected return and variance of their investment. In an integrated world capital market, the small country's equity market becomes part of the global equity market and expands the diversification opportunities for foreign investors. Since foreign investors can invest in the country's stock market and domestic investors can invest abroad, the risks associated with domestic production are borne by both foreign and domestic investors.

With completely open capital markets, the relevant source of systematic risk becomes the world market. Therefore, if global investors care only about the expected return and volatility of their portfolio, it follows that the capital asset pricing model (CAPM) will hold for the world market and the risk premium on any risky asset is proportional to its world beta. Let $E[\tilde{R}_i^*]$ be the required rate of return on firm i in the integrated capital market equilibrium. It follows that

$$E[\tilde{R}_i^*] = r_f^* + \beta_{iW}(E[\tilde{R}_W] - r_f^*), \qquad (1)$$

where β_{iW} denotes firm i's beta with the world market, $E[\tilde{R}_W]$ denotes the required rate of return on the world equity market portfolio, and r_f^* denotes the world risk-free rate. Under our assumptions, the aggregate risk premium on the world market portfolio is $\gamma\sigma_W^2$, where σ_W^2 is the variance of the return on the world portfolio and γ is the constant coefficient of relative risk aversion.

Now consider the impact on firm $i's$ required rate of return when the country imposes capital controls effectively segmenting the country's stock market from the rest of the world.

[20] For a detailed analysis of international asset pricing models, see Obstfeld and Rogoff 1996, chapter 5.

Assume also for now that the expected value and variance of the profits from domestic production activities are unaltered by the controls.

After the imposition of controls, market segmentation—albeit varying in degree depending on the range and magnitude of the controls—will reduce the diversification opportunities for foreign investors. Similarly, the effects will be magnified if domestic investors are also circumscribed in their ability to invest abroad. By hampering the ability of foreign investors to access the domestic stock market, the relevant pool of investors will tilt toward domestic investors. It follows that in the now segmented equity market for any individual stock we have

$$E[\tilde{R}_i] = r_f + \beta_{iM}(E[\tilde{R}_M] - r_f), \qquad (2)$$

where $E[\tilde{R}_i]$ is the required rate of return on firm $i's$ stock, r_f is the risk-free rate in the domestic market, β_{iM} is the beta coefficient of firm i with the domestic market portfolio before liberalization, and $E[\tilde{R}_M]$ is the expected return on the domestic market.

Admittedly, equation (2) represents the extreme case of complete segmentation. Depending on the scope or extensiveness of the controls, the expected return benchmark will range between the complete segmentation and full integration cases. The controls may alternatively be thought of as creating a price wedge in the expected returns or a tax that drives up the expected return relative to the benchmark return under full integration. Indeed, a number of studies about capital controls take this analytical tack.

To recap, if risk-free rates and/or the firm-specific risk premium rise following the imposition of capital controls, the required rate of return for a given firm will go up and its stock price will fall. In mapping the theory to the data, an increase in required rates of return and a fall in stock prices will be reflected in negative CARs in the event windows surrounding capital control announcements.

Note that if the expected value or variance of the domestic production activities are altered as a consequence of the controls, the impact on the stock price will depend on two

effects: the expected cash flow effect and the required rate of return effect. A priori, if some firms benefit from the protectionist variety of capital controls, it is possible that expected cash flows could increase more than the rise in the required rate of return such that stock prices rise and CARs are positive following the imposition of capital controls. For example, exporting firms may benefit from protectionist capital controls if the exchange rate depreciates and expected future cash flows go up.

4. Empirical Methodology and Summary Statistics

We use an event-study methodology to examine investors' reaction to the strengthening or weakening of capital controls.[21] If capital markets are semi-strong form efficient with respect to public information, stock prices will quickly adjust following an announcement, incorporating any expected value changes (Andrade et al. 2001). We analyze several windows (two, three, five, eleven, and twenty-one days) but present results for the two-day windows in our main specifications as this is the most stringent test we can apply to capture the announcement effect of the capital controls with less concern about other confounding news events.

We examine the abnormal stock return around various different windows of time surrounding the announcement of the capital control policy. Stock prices are from Datastream. The market returns used in the benchmark estimations uses the BOVESPA return (the most commonly quoted index in Brazil). We also analyze different broad indices available for different sectors or classes of firms such as the IBRA. Our estimation period is 280 days before and up until 30 days preceding the event date. Cumulative abnormal returns (CARs) sum the abnormal returns over the event window, with abnormal returns estimated using a market model with Scholes-Williams betas that make adjustments for the noise inherent in daily returns data.[22] Given that the some of the events are close in time making their estimation windows overlapping

[21] For more details, see MacKinlay 1997.

[22] In particular, nonsynchronous trading of securities introduces a potentially serious econometric problem of errors in variables to estimate the market model with daily returns data (Scholes and Williams 1977). To address this problem, Scholes-Williams betas provide computationally convenient and consistent estimators for the market model. Using a standardized value of the cumulative abnormal return, we test the null hypothesis that the return is equal to zero.

in time, we also conduct the analysis using the estimation window prior to the Lehman event as the benchmark return in the CAR calculations for all the following events.

Data about firm characteristics are taken from Worldscope. Using all available data, the sample consists of quarterly data from Q1 2006–Q4 2012. These include the (log) of total assets, as a proxy for size and debt to total assets, and short-term debt to total debt as proxies for liquidity.[23] In addition, we construct a number of measures of external finance dependence beginning with the Rajan and Zingales (1998) measure using time-series Brazilian data. We use the consumer price index (CPI) index to deflate the data. The firm-level information is matched to export status and the range of exports using data from the Brazilian Secretary of External Trade (Secretaria de Comercio Exterior, Secex). The export range is in U.S. dollars (FOB) and includes firms exporting less than $1 million, between $1 million and $100 million, and more than $100 million.

4.1 Summary Statistics

Figure 1 depicts the evolution of the BOVESPA index (the most commonly quoted index) corresponding to the different capital control announcements in Table 1. The table includes the date the capital control measure was announced, whether the control affected inflows of debt or equity, the change in the market return on the BOVESPA index in the two-day post-announcement period, and a description of the event.

Table 2 shows summary statistics for Brazil's BOVESPA. The table shows both nominal and real returns on the aggregate BOVESPA index, which showed strong positive returns in the aftermath of the global financial crisis corresponding to the surge in foreign capital inflows. The data are divided into different subperiods that correspond to different rounds of capital control policies. The first period is Q1 2008–Q4 2008. Capital controls were announced and subsequently reduced on October 23, 2008. Q1 2009–Q3 2009 is a time of no new announcements about controls. In the period between Q4 2009 and Q3 2011, new controls were introduced and changed eight times. During this subperiod, nominal and real returns on the

[23] Data availability varies across firms.

Brazilian index averaged 35.4% and 26.1%, respectively and the Real appreciated by about 11%. From Q4 2011 onward, controls on longer-term debt instruments were introduced but then removed for all but a few instruments.

Table 3 presents firm-level summary statistics for the firms in the BOVESPA index. Information includes firm size, PP&E (property, plant, and equipment), investment rates, exporter status, liquidity, and leverage measures. Firm size, operating revenue, and PP&E figures are reported in real terms, i.e., the nominal values are deflated by the CPI. The data show that the average firm size in terms of total assets and in real terms is R$67 million (Panel A). In nominal terms, this roughly translates to US$48 million at an average exchange rate of 1.845 R$/US$ over the sample period. The median firm size for the full sample in nominal terms is approximately US$9 million.

The average leverage ratio (debt/assets) is 33%, while short-term debt on average accounts for about 28% of total debt. About 41% of the firms in the sample are exporters. Panel B reports summary statistics for exporting firms and suggests that exporting firms are on average smaller than non-exporting firms in Panel C. Non-exporting firms include large utilities and financial services firms such as large banks. Hence it is not surprising that the average size of the non-exporting or purely domestic firms is larger than the exporting firms which are primarily in the manufacturing sector. The median exporting firm, however, is almost double the size of the median non-exporting firm, suggesting that a few large firms may be driving the average firm size in the non-exporting subsample. Also, the largest exporting firms (those exporting more than $100 million) are on average larger than the non-exporting firms with average assets of US$66 million in nominal terms. Table 3 also reports summary statistics for PP&E, investment rates, and operating revenues for the full sample, exporting, and non-exporting firms.

5. Results

5.1.1 Abnormal Returns and Firm Characteristics

Table 4 presents evidence of the stock market's response to capital control events using an event-study framework. The basic regression specification is

$$CAR_{it} = Constant + FirmControls_{it} + \varepsilon_{it} \,, \qquad (3)$$

where CAR_{it} is the cumulative abnormal return for firm *i* over the event window *t*. We use a two-day event window as our benchmark specification. The constant term captures the impact of the announcement on average returns, and firm controls include an observable set of firm-specific characteristics such as size, leverage, and so on.

The usual assumption that the error term is random and uncorrelated across firms requires further discussion. Equation (3) is estimated using a panel regression. When aggregating abnormal returns, typical event studies assume that abnormal returns are not correlated across firms. Assuming no correlation across firms means that the covariance between individual firm abnormal returns is zero. Therefore, standard distributional results may be used to calculate the variance of aggregated abnormal returns. The assumption is reasonable if the event dates for individual firms do not overlap in calendar time.

In the case of a capital controls event, however, all Brazilian firms share identical event dates. Therefore, the covariances between individual firm abnormal returns may not be zero, in which case the standard distributional results no longer obtain. We address this problem of clustering in the standard fashion by relaxing the assumption that abnormal returns are not correlated across firms. Specifically, we allow the off-diagonal (covariance) elements in the variance–covariance matrix to be different from zero. In short, the clustering procedure produces standard errors that are appropriately adjusted to reflect the cross-firm correlation of abnormal returns.[24] The estimation procedure also corrects for potential heteroskedasticity across firms.

Measures of two-day CARs using Scholes-Williams betas suggest a significant decline in stock returns surrounding the capital control announcements consistent with an increase in the cost of capital for firms listed on the BOVESPA (Column 1). Quantitatively CARs fall by about -0.43% on average over a two-day window. The effect is statistically significant at the 1% level. Column 2 includes a proxy for firm size in terms of (log) total assets lagged by one quarter.

[24] Even in the case when the event day is common, if the firms are not from the same industry, as in our case, Brown and Warner (1985) show that use of the market model to derive the abnormal return reduces the inter-correlations virtually to zero and, hence, can be ignored in the analysis.

Controlling for size, the coefficient on the constant term suggests that the CARs fall on average by a quantitatively significant -3.39% at the 1% level, which is an order of magnitude higher than the simple regression in Column 1 that does not control for firm size. This suggests that firm size captures an important dimension of underlying heterogeneity at the firm level. The size variable measured by the lagged value of total firm assets has a positive and significant effect on abnormal returns also at the 5% level. However, the magnitude of the size coefficient (0.00177) is offset by the magnitude of the coefficient on the constant (-0.0339) which measures the decline in average CARs. For the average firm, the magnitude of the size effect is outweighed by the magnitude of the decline in average CARs. The results from the specification in Column 2 therefore suggest that large firms were somewhat shielded from the imposition of capital controls but that the market imputes a significantly negative value to the announcement of the controls.

Including controls for leverage, such as debt to total assets in Column 3 and short-term debt to total debt, does not appear to have a significant effect on the abnormal returns. Columns 3 and 4 corroborate that, on average, CARs are significantly negative at the 1% and 5% levels, respectively, while firm size somewhat mitigates the negative effect on abnormal returns in the immediate aftermath of capital control announcements.[25]

Column 5 and 6 include a variable that takes into account a firm's exporter status. The evidence suggests that the average effect of the capital controls announcement is negative and significant at the 1% level while the coefficient on exporter status is positive and significant in both specifications. The finding is consistent with two explanations.

First, exporting firms may have access to foreign currency proceeds and therefore not be affected by the capital controls to the same extent as purely domestic firms. Second, if the capital controls are designed to reduce foreign capital inflows and as a result prevent the domestic currency from appreciating, exporters could be in an improved competitive position internationally, which drives up their expected cash flows and abnormal returns. The second explanation is consistent with the argument that as a by-product of prudential capital controls

[25] Detailed information on the source of debt financing by firms (from banks, for example) was more limited in our data set. We obtain similar results when controlling by the share of debt from banks.

designed to mitigate the volatility of foreign capital inflows and manage endogenous systemic risk, a depreciated currency may benefit exporting firms in the country imposing the controls. Indeed, Column 6, which includes controls for firm size and exporter status, suggests that large exporting firms are likely to be less negatively affected by the capital controls policy.

Column 7 further explores the impact of the capital controls announcement on exporting firms by size groups. It is interesting to note that while smaller exporters in the <$1 million revenue bin do not experience significant returns, the coefficients on exporting firms in the $1-$100 million revenue bin and the largest revenues, i.e., in the >$100 million in revenues are positive and statistically significant suggesting controlling for firm size, the magnitude of the export revenues also matter. The evidence suggests that large firms with large export revenues are somewhat shielded from the negative effects of capital controls announcements.

5.1.2 Debt Versus Equity Events

The recent Brazilian capital controls distinguish between debt and equity related measures. Table 5 displays regression specifications that separate the results between debt and equity measures.[26] A very similar pattern of results holds with highly significant negative CARs when capital control measures are announced with slightly muted effects when we control for firm size. The overall announcement effect, however, remains negative and statistically significant.

Two patterns are worth noting. First controls on debt flows in Panel A display a less negative announcement effect compared to controls on equity flows in Panel B that appear to have a more negative announcement effect. The decline in average CARs in response to announcements regarding controls on debt ranges from -2.9% to -3.47% over the two-day window in Columns 2–4 and 6–7 (Panel A). The effects are significant at the 5% or 1% levels of significance. Note that consistent with the specifications in Table 4, these regressions control for firm size measured by total assets. The magnitude of the decline in announcement returns in response to controls on equity flows in contrast ranges from a significant -3.64% to -4.31%, which is roughly 25% more negative. Two-sample t-tests with both equal and unequal variances

[26] Table 5 presents results using robust standard errors. Appendix A presents results using two-way clustered errors.

show that the coefficients on debt in Panel A (Column 1) and equity in Panel B (Column 1) are statistically significantly different at the 1% level with t-statistics of 39.13 and 34.76, respectively. The result suggests that the market views controls on debt and equity as distinct and that controls on equity flows are assessed more negatively than controls on debt flows.

The second piece of evidence worth noticing from this table is that for equity related announcements, the short-term debt ratio is negative and significant. The data suggest that for firms with higher levels of short-term debt—controlling for firm size—abnormal returns decline by an additional -1.4%, leading to an overall average decline of -4.8% over the two-day event window (Column 4, Panel B). The result suggests that controls on equity flows more adversely affect firms with higher levels of short-term debt. Moreover, t-tests of means show that the abnormal returns for equity events are significantly lower than for debt events. The evidence is perhaps consistent with the hypothesis that firms with higher levels of short-term debt also are more dependent on external finance in the form of short-term debt or equity and therefore the imposition of controls on equity flows has an even more negative effect on their returns. We examine the hypothesis of credit constraints and external finance dependence in the next subsection.

5.1.3 Credit Constraints and Abnormal Returns

Moving beyond the cost of capital per se, there is another factor to consider in the context of liquidity or credit-constrained firms. Here, the distinction between the differential cost of external and internal finance can also play a role. By affecting the cost of external finance, the imposition of capital controls could affect firms that are more dependent on external finance to fund their investment opportunities. The test then is whether firms (or industries) dependent on external finance are more adversely affected by capital controls as measured by the market's reaction to the policy announcement. Consistent with arguments in Rajan and Zingales (1998), there are two advantages to this simple test: it focuses on the mechanism by which the cost of finance affects a firm's growth prospects, thus providing a stronger test of causality, and it can correct for industry effects.

Moreover, liquidity constraints at the firm level may depend on external finance dependence, firm size, and export status. If production and exporting are associated with fixed costs, liquidity constraints at the firm level become relevant. Firms with easier access to external finance or greater access to low-cost funds may be able to overcome the barriers associated with these fixed costs.

To proxy for a firm's dependence on external finance, we measure the extent of investment expenditures that cannot be financed through internal cash flows generated by the firm using time-series Brazilian data. Accordingly, using the measure in Rajan and Zingales (1998), a firm's dependence on external finance is defined as capital expenditures minus cash flow from operations divided by capital expenditures. Table 6 presents the results.

Column 1 of Table 6 shows the benchmark regression, which includes controls for firm size, exporter status, and external finance dependence. Consistent with the hypothesis that firms that are more dependent on external finance may be affected adversely by capital controls, the coefficient on the external finance dependence variable is negative and significant at the 1% level. Average CARs are negative and significant, but firm size and exporter status—consistent with results in previous tables—have positive and significant coefficients.

Column 2 disaggregates exporting firms by the size of their exporting revenues. External finance dependence continues to have a negative and significant effect on abnormal returns. The evidence also suggests that while the smallest exporters (with revenues less than $1 million) are negatively affected, the larger exporters appear to be somewhat shielded.

Columns 3–6 consider different measures for external finance dependence. Columns 3 and 4 include a dummy variable to distinguish between firms with high and low finance dependence relative to the mean. Columns 5 and 6 restrict the sample to manufacturing firms and classify them according to high and low external finance dependence following the Rajan and Zingales (1998) classification. The result that external finance dependence has a negative and significant effect of abnormal returns is robust to these alternative measures.

Rajan and Zingales (1998) make the case that there is a technological reason why some industries or sectors depend more on external finance than others. They argue that the initial project scale, gestation periods, cash harvest periods, and the need for continuing investment

can differ substantially between industries. To test whether external finance dependence is also industry dependent in the Brazilian context in the aftermath of the controls, we also estimated specifications with sector fixed effects. The coefficient on external finance dependence continues to be negative and statistically significant.

If capital controls increase policy uncertainty while reducing the availability of external finance, investment at the firm level can fall. The next subsection explores the effects of capital controls on firm-level investment.

5.2 Capital Controls and Firm Investment

An advantage of firm-level data is that detailed balance sheet and incorporation information allow us to analyze the role of firm characteristics to explain the impact of the capital controls and to identify the transmission mechanisms of policy shocks more directly onto real variables. Theory suggests that there ought to be significant cross-sectional variation in the stock price and real investment declines by firm type (see Chari and Henry 2004 and 2008). For example, the adverse effects on stock prices and investment may be stronger for small firms that are more dependent on external finance. The effects on investment may also be particularly adverse for exporting firms that are more dependent on external finance with a decline in the number of products and markets they serve following the imposition of capital controls. [27]

Next we examine the cross-sectional variation in the stock price and real investment declines by firm type to see if the observed patterns are consistent with the reduction in investment observed in this period (see Figure 2). We examine the impact on investment one year following the announcement of a capital control by event and find that investment falls for the BOVESPA firms for different announcements. Table 7 presents evidence about the difference between investment rates before and after the imposition of controls by firm characteristics. We consider two cases. The first coincides with the announcement of the first controls in 2008, and the second case is in 2009 after the global financial crisis had hit. The table

[27] A vast literature on the importance of liquidity constraints includes Stiglitz and Weiss 1981. Fazzari, Hubbard, and Peterson (1988) study the importance of financing constraints for investment, among others, and Holmstrom and Tirole (1997) work on the role of the lending channel.

looks at the before-and-after investment picture for two- and three-year windows around 2008 and 2009.

For the sample as a whole, investment remains relatively unchanged in the two- and three-year windows around the 2008 date in Panel A. While investment drops in magnitude following the 2009 date, the difference is not statistically significant (Panel B). Controlling for size, we see a dramatic fall in investment for firms that lie below the mean firm size, and the difference is statistically significant in both panels. The simple summary statistic suggests that while large firms were relatively unaffected, small firms experienced a significant fall in their investment rates. In fact, in the two-year period following 2009, small firm investment dropped to an average of 1.74% relative to an average rate of 8.89% in the two-year prior period. The difference is statistically significant.

Similarly, non-exporting firms appear to have borne the brunt of the impact, with investment contracting to -1% average rate in the two years after 2009 compared to an average of 7.94% in the two years before. Exporting firms, on the other hand, saw a statistically significant rise in their investment rates. Lastly, firms with an above-median score for external finance dependence saw a decline in their investment rate, while firms that were less dependent on external finance experienced increased investment. In sum, the data suggest that there is substantial heterogeneity in the firm-level investment response in the aftermath of capital controls. Small, non-exporting, and external-finance-dependent firms saw significant drops in their real investment rates in the two- to three-year window following the imposition of controls.

While we cannot definitively attribute causality, it is illustrative to examine broad patterns in terms of the effects on real investment and the real economy. We caution that these results unlike the analysis of announcement effects measured by the CARs in tightly specified event windows that are precisely identified, when examining investment data over a two-three year window other factors could be driving the real investment patterns. Nevertheless the collapse in investment is noteworthy especially if the motivation for the controls was to boost the competitiveness of domestic firms by counteracting the real appreciation of the exchange rate.

5.3 Robustness Checks and Additional Tests

We conduct a number of tests to ensure the robustness of our results. The firm and stock market regressions are estimated for different windows and different methodologies for computing returns (raw returns, CAPM) obtaining similar patterns (Table 8) and for firms listed on the alternative IBRA stock exchange (Table 8). Note that the correlations between the betas such as Scholes-Williams, standard CAPM, and so on are very high. We also use two-way clustered standard errors (firm and event) in Appendix Tables A and B. The results remain robust.

To examine whether the source of external financing matters, we control for the share of debt from banks (Column 1, Table 9). The coefficient on the variable measuring the share of debt by banks was negative and significant.[28] Column 2 in Table 9 reports the results for operating revenue as a proxy for size. The result is robust, and the coefficient on operating revenues is negative and significant.

The specification in Column 3 of Table 9 tests whether outliers matter by dropping the event with the most negative abnormal returns on October 22, 2008, which also coincided with the global financial crisis. The constant remains negative and significant, and the pattern of coefficients is similar for total assets, exporter status, and external finance dependence. The results are also not driven by the IPO of OGX Petróleo e Gás Participações S.A. or this firm in particular (not reported).

In Column 4, we run a specification with an invariant estimation window prior to the controls that were implemented in October 2009 following which a series of controls were put into place on a wide range of instruments. Average CARs are -3.56% and significant at the 1% level. We looked at easing and tightening events separately in Columns 5 and 6 of Table 9 and found that easing events that merely reduce the extent of capital controls without completely removing them result in significantly negative abnormal returns. The evidence is consistent with the notion that policy predictability and legal certainty matter with regard foreign investment. Frequent changes in the rules entail policy uncertainty and policy reversibility, which in turn

[28] The coverage of this variable was sparser in Worldscope.

undermine investor confidence. Further, the negative returns are consistent with increased administrative costs for firms and investors.

We also looked at a sample of firms that are subsidiaries of multinational companies either Brazilian owned (headquarters in Brazil) or foreign owned (headquarters abroad), obtaining a similar pattern of results (Column 7). We also examined a subsample of firms that issue on the New York Stock Exchange (ADRs) in Column 8 and another subsample of firms that issued bonds abroad during the period of study in Column 9. The data are from Bloomberg and company reports. The pattern of results is robust in these alternative specifications.

6. Conclusion

This paper examines the effects of capital controls on firm-level stock returns and real investment using data from Brazil. Theory suggests that the imposition of capital controls can drive up the cost of capital and curb investment. In particular, capital controls can increase uncertainty while reducing the availability of external finance.

Our event-study methodology uses stock prices and firm-level data from the time surrounding the announcements of various capital control measures. In 2008–2009, there is a significant decline in CARs for Brazilian firms following the imposition of capital controls on equity flows, consistent with an increase in the cost of capital. Controls on debt flows, however, are associated with less negative returns, suggesting that the market views controls on equity and debt flows differently.

The data also suggest that large firms and exporting firms are less affected by the controls. The largest exporting firms in particular, with receipts of more than $100 million, are somewhat shielded from the controls. However, in terms of magnitude, the evidence suggests that the decline in average returns swamps the advantages that firm size and export status offer. Moreover, firms that are external finance dependent are more adversely affected by the imposition of capital controls.

The rationale for capital controls policy measures range from macro-prudential efforts to reduce the volatility of foreign capital inflows to a protectionist stance on maintaining the

competitiveness of the external sector. However, the evidence in this paper suggests that capital controls can increase market uncertainty and reduce the availability of external finance, which in turn can lower investment at the firm level. Moreover, the findings in the paper have implications for macro-finance models that focus on aggregate variables to examine the optimality of macro-prudential regulation and abstract from heterogeneity at the firm level. In particular, the evidence in this paper suggests that capital controls disproportionately affect small, non-exporting firms, especially those more dependent on external finance.

A challenge for tackling the long-standing question of the benefits and costs of open international capital markets is the tension between generalizable empirical studies based on cross-country data and the availability of precisely identifiable policy shocks. Our paper has the advantage that we can cleanly identify the implemented capital controls by type and magnitude for Brazil. The paper also considers a set of measurable outcome variables–namely CARs and real investment. Future research could shed light on the channels through which these effects might operate. For example, we could gain a better insight into whether the documented effects of capital controls on the cost of capital have implications for actual capital-raising or are simply about the liquidity or depth of capital markets that foreign investors can improve. We take a step in furthering our understanding of the effects of capital controls on the real economy. Future research could bring us yet nearer.

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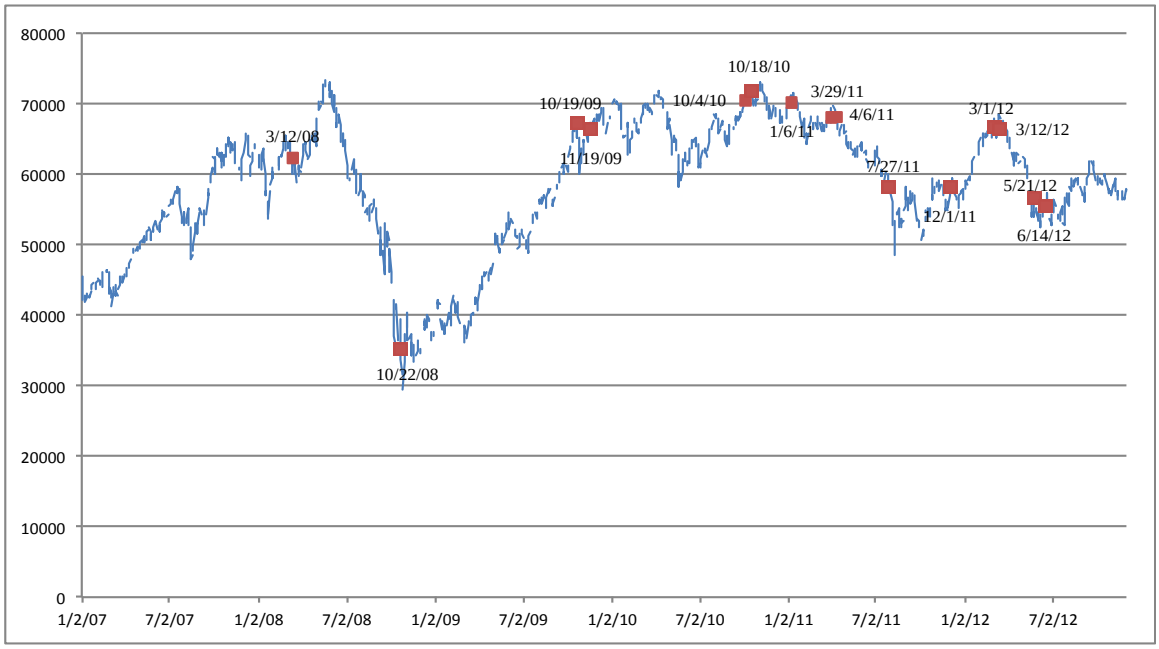
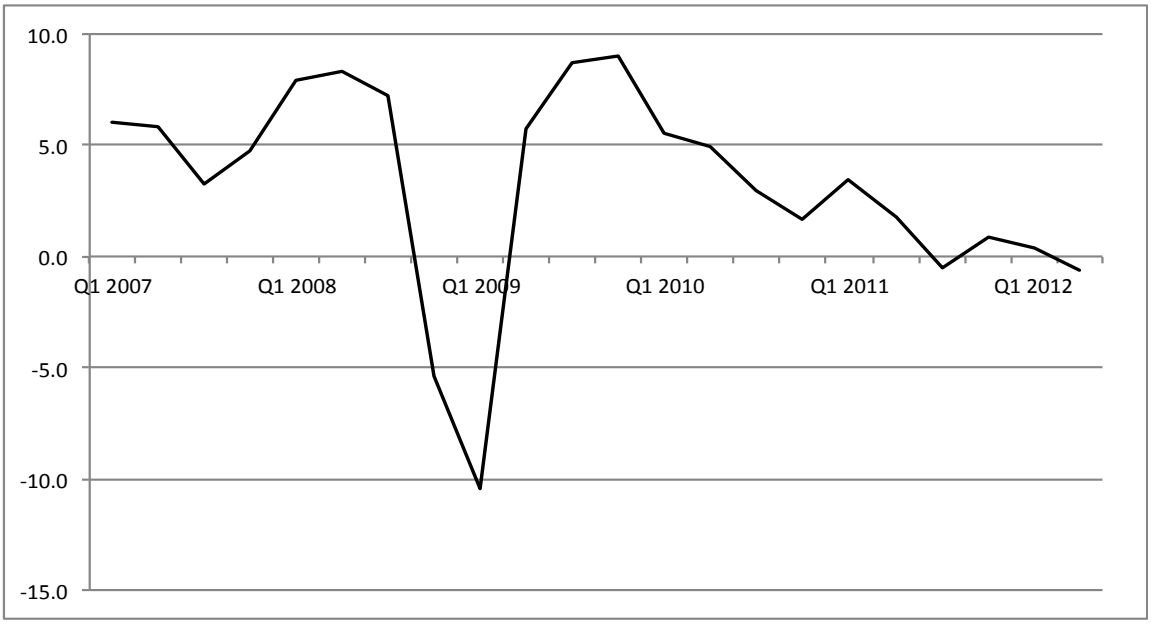
Figure 1: Bovespa Index and Capital Controls



Source: Datastream

Figure 2: Gross Fixed Capital Formation, Seasonally Adjusted (Quarterly Percent Change)



Source: OECD

Table 1. Capital Controls in Brazil: 2008-2012

Date	Change in Bovespa (%) 2 days after	Debt Event	Equity Event	Event	Effective Date
3/12/2008	-0.30%	1	0	IOF tax=1.5% on fixed income investments made by non-residents	3/17/2008
10/22/2008	-10.23%	1	0	IOF tax=0% on fixed income investments	10/23/20008
10/19/2009	-2.61%	1	1	IOF tax=2% introduced on equities and fixed income securities	10/20/2009
11/18/2009	0.44%	0	1	Tax=1.5% on American Depositary Receipts (ADRs) converted into local stocks	11/19/2009
10/4/2010	0.22%	1	0	IOF tax=4% on fixed income bonds and derivatives; 2% for equities	10/5/2010
10/18/2010	-1.86%	1	0	IOF tax=6% on fixed income bonds and derivatives; 2% for equities	10/19/2010
3/28/2011	1.20%	1	0	IOF tax=6% on overseas loans and bonds with maturities up to 1 year	3/29/2011
4/6/2011	-0.46%	1	0	IOF tax to overseas bonds and bonds with maturities up to 2 years	4/7/2001
7/26/2011	-1.06%	0	1	Tax of 1% on foreign exchange derivatives; legislation allow tax to be increased up to 25	7/27/2011
12/1/2011	1.32%	0	1	IOF tax=0% on variable income instruments traded on the exchange and certain debentu	12/2/2011
2/29/2012	2.99%	1	0	IOF tax to cover overseas loans and bonds with maturities up to 3 years	3/1/2012
3/9/2012	2.53%	1	0	IOF tax to cover overseas loans and bonds with maturities up to 5 years	3/12/2012
5/21/2012	-3.48%	1	0	IOF tax=1.5% for individual borrowers (from 2.5%)	5/22/2012
6/13/2012	0.82%	1	0	IOF tax to overseas loans and bonds with maturities up to 2 years	6/14/2012
12/4/2012	0.16%	1	0	IOF tax to overseas loans and bonds with maturities up to 1 year	12/5/2012

Source: Adapted from Brittany A. Baumann and Kevin P. Gallagher, "Navigating Capital Flows in Brazil and Chile," Initiative for Policy Dialogue Working Paper Series, Columbia University, June 2012. Note: IOF (*Imposto Sobre Operações Financeiras) is a tax placed on financial transactions* .

Table 2. Bovespa Index Returns

Notes: Bovespa: Nominal & Real Index deflated by Consumer Price Index, Percent Returns.

	Nominal Returns	Real Returns
Q1 2008-Q4 2008	-12.2	-15.7
Q1 2009-Q3 2009	-12.5	-16.2
Q4 2009-Q3 2011	35.4	26.1
Q4 2011	-13.8	-19.3
Q1 2012	14.0	12.3
Q2 2012-Q4 2012	-9.7	-11.9

Table 3. Summary Statistics (Reais, R$)

Notes: Financial figures are from Q4 2007 which is the last quarter prior to announcement regarding the introduction of capital controls on 3/12/2008. Nominal variables at the firm-level are divided by the Consumer Price Index (x 100). The sample period is Q4-2007-Q4-2012. Total Assets and Property, Plant & Equipment are in real terms deflated by the CPI. Investment is the percentage change in real property, plant & equipment(PP&E). External Finance Dependence is measured as (CE-CF)/CE which is the difference between capital expenditures and cash flows divided by cash flows as in Rajan and Zingales (1998). The average USD/Reais exchange rate from 2008-2012 was 1.845 R$/US$.Sources: Datastream for firm-level data and Secex for export data.

	Observations	Mean	Std. Dev	Median
		Panel A: All Firms		
Total Assets (Millions of R$)	862	66.8	142.1	12.7
Debt/Assets (%)	855	32.575	14.946	31.240
Short-term Debt/Debt (%)	851	28.5	22.8	21.6
External Finance Dependence	980	-65.855	899.734	-10.081
PP&E (Millions of R$)	886	16.0	43.8	3.7
Investment	854	0.053	0.507	0.017
Operating Revenues (Millions of R$)	888	0.8	2.2	0.2
Exporter Dummy	1000	0.410	0.492	0.000
		Panel B: Exporting Firms		
Total Assets (Millions of R$)	370	57.0	106.9	19.1
External Finance Dependence	410	-0.9542	2.634	-0.432
PP&E (Millions of R$)	370	30.3	63.0	7.1
Operating Revenues (Millions of R$)	370	1.3	3.0	0.2
		Panel C: Non-Exporting Firms		
Total Assets (Millions of R$)	492	74.1	163.4	9.6
External Finance Dependence	570	-112.5382	1177.969	-2.3682
PP&E (Millions of R$)	492	5.3	10.7	2.2
Operating Revenues (Millions of R$)	518	0.5	1.3	0.2

Table 4. Post Capital Control Announcement Returns are Significantly Negative

Notes: The sample includes all events and the firms on the Bovespa exchange. Cumulative Abnormal Returns are measured over a two-day window using Scholes-Williams betas. Log Total Assets, Debt to Assets and Short Term Debt to Total Debt all correspond to one year lagged values and are from Worldscope. Export data are matched from Secex. Clustered standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1, ‡ p<0.15.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				All Events			
Constant	-0.00428***	-0.0339***	-0.0347***	-0.0300**	-0.00613***	-0.0348***	-0.0354***
	(0.00119)	(0.01230)	(0.01290)	(0.01370)	(0.00134)	(0.01190)	(0.01120)
Log Total Assets		0.00177**	0.00168**	0.00159*		0.00169**	0.00173**
		(0.00072)	(0.00075)	(0.00081)		(0.00071)	(0.00067)
Debt/Assets			0.0000758				
			(0.00007)				
Short-term Debt/Debt				-0.00413			
				(0.00513)			
Exporter					0.00452*	0.00508**	
					(0.00246)	(0.00239)	
Export < $1 mil							-0.0057
							(0.00434)
Export $1 mil -$100 mil							0.00823*
							(0.00450)
Export > $100 mil							0.00532**
							(0.00220)
Observations	1,000	941	931	854	1,000	941	941
R-squared	0.000	0.006	0.006	0.005	0.004	0.0103	0.0152

Table 5. The Market Reaction is Different For Controls on Debt Vs. Equity.

Notes: Panel A reports results for capital controls on debt-related flows and Panel B on equity-related flows. The sample includes all events and the firms on the Bovespa exchange. Cumulative Abnormal Returns are measured over a two-day window using Scholes-Williams betas. Log Total Assets, Debt to Assets and Short Term Debt to Total Debt all correspond to one year lagged values and are from Worldscope. Export data are matched from Secex. Clustered standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1, ‡ p<0.15.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Scholes-Williams			
				Panel A: Debt Events			
Constant	-0.00368***	-0.0328**	-0.0330**	-0.0290*	-0.00608***	-0.0340**	-0.0347***
	(0.00138)	(0.0141)	(0.0149)	(0.0157)	(0.00162)	(0.0138)	(0.0130)
Log Total Assets		0.00174**	0.00162*	0.00152+		0.00165**	0.00169**
(lag 1y)		(0.000822)	(0.000856)	(0.000918)		(0.000818)	(0.000773)
Debt/Assets			6.85e-05				
(lag 1y)			(7.93e-05)				
Short-term Debt/Debt				-0.00199			
(lag 1y)				(0.00599)			
Exporter					0.00584**	0.00634**	
					(0.00280)	(0.00274)	
Export < $1 mil							-0.00689
							(0.00581)
Export $1 mil -$100 m							0.0101**
							(0.00495)
Export > $100 mil							0.00668***
							(0.00245)
Observations	797	776	768	692	797	776	776
R-squared	0.000	0.005	0.005	0.004	0.005	0.011	0.00178
				Panel B: Equity Events			
Constant	-0.00781***	-0.0387**	-0.0428**	-0.0364**	-0.00987***	-0.0401**	-0.0431**
	(0.00187)	(0.0174)	(0.0171)	(0.0173)	(0.00249)	(0.0161)	(0.0168)
Log Total Assets		0.00185*	0.00192*	0.00199*		0.00175*	0.00193**
(lag 1y)		(0.00103)	(0.00103)	(0.00104)		(0.000926)	(0.000962)
Debt/Assets			9.19e-05				
(lag 1y)			(0.000122)				
Short-term Debt/Debt				-0.0138			
(lag 1y)				(0.00991)			
Exporter					0.00503	0.00707*	
					(0.00370)	(0.00369)	
Export < $1 mil							0.00619+
							(0.00420)
Export $1 mil -$100 m							0.00916*
							(0.00476)
Export > $100 mil							0.00584
							(0.00485)
Observations							
R-squared	0.000	0.012	0.015	0.025	0.007	0.027	0.028

Table 6. External Finance-Dependent Firms are More Negatively Impacted by Capital Controls

Notes: Cumulative Abnormal returns using Scholes-Williams betas. Log Total Assets corresponds to lagged values (to the closest year) taken from Worldscope. External Finance Dependence is measured as (CE-CF)/CE which is the difference between capital expenditures and cash flows divided by cash flows as in Rajan and Zingales (1998). Sources: Datastream and Secex. Export data are matched from Secex. Clustered standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1, ‡ p<0.15.

	(1)	(2)	(3)	(4)	(5)	(6)
	All Events					
Constant	-0.0335***	-0.0346***	-0.0229*	-0.0234*	-0.0261	-0.0337+
	(0.0119)	(0.0111)	(0.0134)	(0.0128)	(0.0220)	(0.0212)
Log Total Assets	0.00162**	0.00168**	0.00127*	0.00129*	0.00185	0.00234*
(lag 1y)	(0.0007)	(0.0006)	(0.0007)	(0.0007)	(0.0013)	(0.0013)
ExtFinDep	-7.96e-07***	-7.97e-07***				
(lag 1y)	(1.59e-07)	(1.59e-07)				
ExtFinDep>mean			-0.00681**	-0.00662**		
(dummy variable)			(0.0026)	(0.0026)		
High Ext. Fin. (Manuf)					-0.00571+	-0.00586*
(dummy variable)					(0.0033)	(0.0034)
Exporter	0.00535**		0.00724**		-0.00274	
	(0.0024)		(0.00279)		(0.0027)	
Export < $1 mil		-0.00570		-0.00397		-0.00764+
		(0.0043)		(0.0046)		(0.0046)
Export $1 mil -$100 mil		0.00895*		0.0102**		-0.000891
		(0.0046)		(0.0047)		(0.0053)
Export > $100 mil		0.00537**		0.00759***		-0.00469
		(0.0022)		(0.0026)		(0.0047)
Observations	926	926	921	921	457	457
R-squared	0.0106	0.0116	0.014	0.019	0.009	0.011
Standard Errors	Two-Way Clustering	Two-Way Clustering	Two-Way Clustering	Two-Way Clustering	Two-Way Clustering	Two-Way Clustering

Table 7: The Firm-Level Investment Response in the Aftermath of Capital Controls

Notes: Investment is the percent change in Property, Plant & Equipment. External Finance Dependence is measured as (CE-CF)/CE which is the difference between capital expenditures and cash flows divided by cash flows as in Rajan and Zingales (1998). Note that ExtFinDep>median refers to firms that are more external finance dependent. *** p<0.01, ** p<0.05, * p<0.1, † p<0.15.

	Panel A: Initial Imposition of Controls: 3/12/2008						Panel B. Post Lehman: 10/19/2009					
	3 Years Before	3 Years After	T-test means (p-value)	2 Years Before	2 Years After	T-test means (p-value)	3 Years Before	3 Years After	T-test means (p-value)	2 Years Before	2 Years After	T-test means (p-value)
1. All Firms	4.51%	5.18%	0.656	5.64%	5.29%	0.865	5.43%	2.47%	0.183	5.65%	1.70%	0.174
Standard Deviation	0.317	0.217		0.370	0.228		0.271	0.519		0.228	0.596	
N	631	708		442	496		717	689		490	482	
2. Size												
Log Assets> mean	1.82%	3.65%	0.295	1.88%	4.06%	0.356	1.78%	2.07%	0.8758	2.57%	1.54%	0.564
Standard Deviation	0.316	0.162		0.377	0.167		0.246	0.143		0.143	0.141	
N	505	248		337	207		421	103		251	85	
Log Assets<mean	15.27%	6.00%	0.002	17.70%	6.18%	0.001	10.62%	2.54%	0.0051	8.89%	1.74%	0.059
Standard Deviation	0.299	0.241	**	0.320	0.263	***	0.294	0.559	*	0.288	0.654	*
N	126	460		105	289		296	586		239	397	
3. Export												
Exporting	5.82%	3.98%	0.427	7.81%	3.07%	0.140	4.47%	4.20%	0.8388	2.73%	5.63%	0.067
Standard Deviation	0.344	0.181		0.402	0.196	†	0.185	0.128		0.176	0.148	*
N	275	312		192	214		312	292		215	208	
Non Exporting	3.49%	3.92%	0.833	3.97%	4.07%	0.970	6.17%	1.19%	0.1841	7.94%	-1.00%	0.073
Standard Deviation	0.294	0.241		0.344	0.249		0.321	0.675		0.260	0.779	*
N	356	356		250	252		405	397		275	274	
4. Liquidity												
ExtFinDep>mean	5.06%	3.58%	0.293	6.45%	3.17%	0.082	5.21%	1.70%	0.1423	5.24%	1.09%	0.194
Standard Deviation	0.279	0.183		0.326	0.178	*	0.277	0.529	†	0.229	0.624	
N	556	587		383	409		651	620		440	434	
ExtFinDep<mean	-0.23%	15.02%	0.041	-0.51%	17.76%	0.059	7.09%	1.78%	0.0871	8.82%	3.66%	0.204
Standard Deviation	0.529	0.373	**	0.596	0.425	*	0.203	0.125	*	0.225	0.14199	
N	72	88		56	64		60	60		44	42	
ExtFinDep>median	8.05%	3.98%	0.077	9.57%	4.10%	0.078	4.95%	-0.73%	0.142	3.72%	-1.92%	0.301
Standard Deviation	0.363	0.184	*	0.419	0.196	*	0.194	0.684	†	0.180	0.817	
N	308	348		219	246		356	339		245	237	
ExtFinDep<median	1.13%	6.25%	0.009	1.77%	6.31%	0.090	5.64%	4.19%	0.505	7.19%	4.53%	0.247
Standard Deviation	0.262	0.247	***	0.311	0.260	*	0.335	0.219		0.270	0.222	
N	323	350		223	242		343	332		231	233	

Table 8: Robustness: Capital Controls, Alternative Indices & Event Windows

Notes: Cumulative Abnormal returns using Scholes-Williams betas and CAPM and Raw Returns. Clustered standard errors in parenthesis. ***p<0.01, **p<0.05, *p<0.1, ‡p<0.15.

	BOVESPA			IBRA		
	CAR		RAW	CAR		RAW
	Williams	CAPM		Williams	CAPM	
	Panel A: All Events					
2 day	-0.00428***	-0.00348***	-0.0121***	-0.00574***	-0.00459***	-0.00902***
	(0.00119)	(0.00118)	(0.00118)	(0.000866)	(0.000863)	(0.000936)
2 day (prior)	-0.000726	-0.00218**	0.00396***	-0.000349	-0.00214***	0.00529***
	(0.00103)	(0.000911)	(0.000996)	(0.000785)	(0.000764)	(0.000812)
3 day	-0.00237*	-0.00300**	-0.00270**	-0.00342***	-0.00411***	-0.000785
	(0.00131)	(0.00127)	(0.00127)	(0.000996)	(0.000988)	(0.00104)
Observations	1,000	1,000	1,000	1,867	1,867	1,867
	Panel B: Debt Events					
2 day	-0.00368***	-0.00261*	-0.0123***	-0.00534***	-0.00391***	-0.00930***
	(0.00138)	(0.00136)	(0.00144)	(0.000987)	(0.000979)	(0.00108)
2 day (prior)	-0.000680	-0.00177*	0.00261**	0.000194	-0.00106	0.00446***
	(0.00108)	(0.00102)	(0.00113)	(0.000854)	(0.000846)	(0.000910)
3 day	-0.00132	-0.00154	-0.00299**	-0.00236**	-0.00251**	-0.00108
	(0.00144)	(0.00142)	(0.00148)	(0.00109)	(0.00109)	(0.00116)
Observations	797	797	797	1,484	1,484	1,484
	Panel C: Equity Events					
2 day	-0.00781***	-0.00776***	-0.0134***	-0.00843***	-0.00792***	-0.00991***
	(0.00187)	(0.00185)	(0.00174)	(0.00163)	(0.00163)	(0.00163)
2 day (prior)	-0.00101	-0.00338*	0.00862***	-0.00127	-0.00460***	0.00889***
	(0.00205)	(0.00186)	(0.00180)	(0.00152)	(0.00149)	(0.00143)
3 day	-0.00706***	-0.00841***	-0.00662***	-0.00840***	-0.00987***	-0.00396*
	(0.00258)	(0.00244)	(0.00240)	(0.00204)	(0.00201)	(0.00201)
Observations	268	268	268	502	502	502

Table 9: Robustness Tests and Additional Checks

Notes: The sample includes all events and the firms on the Bovespa exchange. Cumulative Abnormal Returns are measured over a two-day window using Scholes-Williams betas. Log Total Assets and Operating Revenue corresponds to lagged one year values from Worldscope, Bank Debt/Total Debt correspond to one quarter lagged values and are from Worldscope. Export data (dummy variables) are matched from Secex. External Finance Dependence is measured as (CE-CF)/CE which is the difference between capital expenditures and cash flows divided by cash flows as in Rajan and Zingales (1998). MNCs correspond to firms that belong to a multinational firm (either Brazilian or foreign). ADRs corresponds to firms that issue ADRs on the NYSE. Foreign Bond Issuance data are from Bloomberg. Clustered standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1, ‡ p<0.15.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Bank Debt	Operating Revenue	Excluding Lehman Event	Invarient Estimation Window	Tightening Events	Loosening Events	MNCs	ADRs	Foreign Bond Issuance
Constant	-0.0357**	-0.00705***	-0.0329***	-0.0356***	-0.0242***	-0.0577*	-0.0286*	-0.0574***	-0.0672***
	(0.0137)	(0.00121)	(0.0111)	(0.0114)	(0.00896)	(0.0289)	(0.0146)	(0.0176)	(0.0135)
Log Total Assets	0.00184**		0.00168**	0.00182**	0.00117**	0.00281+	0.00137+	0.00285**	0.00330***
(lag 1y)	-0.0008		(0.000684)	-0.0007	(0.000522)	(0.00174)	(0.000834)	(0.00110)	(0.000767)
Exporter	0.0048+	0.00502*	0.00452*	0.0046+	0.00384*	0.00852+	0.00487*	0.00729*	0.00834***
	(0.0029)	(0.0025)	(0.0026)	(0.0027)	(0.0019)	(0.0056)	(0.0027)	(0.0040)	(0.0025)
ExtFinDep	-2.75e-05***	-7.68e-07***	-6.31e-07***	-5.90e-07***	-3.70e-07**	-1.32e-06***	-6.32e-07***	-0.000162	-0.000117***
(lag 1y)	(6.90-E06)	(1.53e-07)	(1.04e-07)	(1.21-07)	(1.51e-07)	(2.48e-07)	(1.46e-07)	(0.000322)	(9.46e-06)
Bank Debt / Total Debt	-3.70e-07**								
	(1.43e-07)								
Operating Revenue		5.91e-10**							
(lag 1y)		(2.32e-10)							
Observations	709	939	817	781	627	299	661	420	286
R-squared	0.011	0.007	0.010	0.012	0.011	0.005	0.007	0.003	0.005