

Financial Liberalization, Economic Performance and Macroeconomic Stability in Brazil: an assessment of the recent period

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Abstract: This paper aims at analyzing the relationship between capital account liberalization, economic performance and macroeconomic stability in Brazil. For this purpose, besides a revision in the literature, the paper develops an empirical study on the effects of financial liberalization in Brazil on a set of macroeconomic variables using two models: one with a *de jure* index of financial liberalization, and another with a *de facto* index of financial integration. In the first model, the study intends to evaluate the proposal that the full convertibility of capital account in Brazil would result in the reduction of country-risk and, consequently, of the domestic interest rate. In the second one, it aims at assessing the hypothesis that financial liberalization has positive effect on economic growth and macroeconomic stability vis-à-vis the hypothesis of the critics of financial liberalization that support that it generates unstable effects on developing economies.

Key-words: financial liberalization; economic growth; Brazilian economy

Resumo: Este artigo objetiva avaliar a relação entre liberalização da conta capital, performance econômica e estabilidade macroeconômica no Brasil. Para tanto, além de uma revisão da literatura, o artigo realiza uma avaliação empírica dos efeitos da liberalização financeira no Brasil sobre um conjunto de variáveis macroeconômicas com o uso da metodologia VAR, utilizando, para tanto, dois modelos: um com um índice de jure de liberalização financeira (ILF), e outro com um índice de facto de integração financeira (IIF). Procura-se no primeiro caso avaliar a hipótese de que a liberalização financeira resulta em redução no risco-país e, conseqüentemente, na taxa de juros doméstica; no segundo caso, avalia-se a hipótese de que a liberalização financeira tem impacto positivo sobre crescimento econômico e a estabilidade macroeconômica vis-à-vis a hipótese dos críticos da liberalização financeira de que esta gera efeitos instabilizadores em países em desenvolvimento.

Palavras-chave: liberalização financeira; crescimento econômico; economia brasileira

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Área 5 - Crescimento, desenvolvimento econômico e instituições

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1. Introduction

Following the various currency crises that occurred in the 1990s and early years of this decade, a number of studies examined the effects of capital account liberalization on economic growth and macroeconomic stability¹. These studies have generally found no robust results regarding the relationship among these variables. Accordingly, the supposed benefits of financial liberalization, which some have regarded as analogous to the process of trade liberalization, have often been called into question.

In Brazil the process of capital account liberalization has been ongoing since the late 1980s, but as yet few empirical studies have evaluated the relationship between financial liberalization and economic growth in Brazil. Empirical studies have often used *de jure* indices (capital control regulations), rather than indices of financial integration (which measure the degree of integration in capital flows). The academic debate has centered on the proposal for full capital account convertibility, originally advanced by P ersio Arida (2003a and 2003b), which drew a series of criticisms.

This paper will offer an empirical evaluation of the relationship among financial liberalization, economic performance and macroeconomic stability in Brazil. To that end, Section 2 considers the international and Brazilian literature (theoretical and empirical ones) on the subject. Section 3 sums up the legislation on capital control in Brazil. Section 4 examines the (*de jure* and *de facto*) indices of financial integration used in the literature and those used in this study. Section 5 evaluates the effects of financial liberalization in Brazil on a set of macroeconomic variables, using VAR methodology. For that purpose it applies two models: one with a *de jure* index of financial liberalization (IFL) and the other with a *de facto* index of financial integration (IFI). The intention is to evaluate, in the first case, Arida's hypothesis that financial liberalization results in a reduction of country risk and thus in the domestic interest rate; and, in the second, the hypothesis from the international literature that financial liberalization has a positive impact on economic growth and macroeconomic stability, in addition to a disciplining effect on economic policy (as against the hypothesis of critics of financial liberalization that it has a destabilizing effect on developing countries). Section 6 concludes the paper.

2. Literature on financial liberalization, economic performance and macroeconomic stability

2.1. International literature

2.1.1. Arguments in favor of financial liberalization

The economists that defend the benefits of capital account liberalization subscribe the theory of efficient markets, in which "prices are a collective outcome of actions of a multitude of individual economic agents whose behavior is assumed to be based on utility maximization and rational expectations" and "this price formation is thought to lead to efficient prices in these markets" (Singh, 2004: 7). Indeed, according to efficient markets theory economic agents have rational expectations and are supposed to make the better use of the available data in their forecasting of the future prices of assets. In other words, the relevant information about the economic fundamentals does exist and are available to the markets participants.

In particular, the optimal efficiency of capital global allocation results from the Hecksher-Ohlin theorem, according to which the return rate of production factor of each country depends on the relative supply of the production factors; furthermore, countries with capital shortage have the marginal investment return higher than the return rate of the

¹ Macroeconomic stability is understood here in a broad sense; not solely as price stability, but also as the economy's displaying less product volatility and being less liable to currency crises and speculative currency attacks.

developed countries that have capital abundance. The free capital fluxes, under efficient markets, allow the search for marginal income in developing economies that reduces the capital shortage in these countries. Therefore, capital account liberalization is an inevitable step on the path of development, which cannot be avoid and should be embraced as free capital movements facilitate an efficient global allocation of savings and help channel resources into their most productive uses, thus increasing economic growth and welfare (Fischer,1998: 2). External savings in the form of capital flows can complement domestic savings, that results in the increase of the investment rate and consequently of the economic growth.

According to Prasad et al (2003) the potential benefits of financial liberalization for emerging countries can be divided in two channels: direct and indirect. *Direct channels* include augmentation of domestic savings, reduction in the cost of capital due to better global allocation of risk, reduction of consumption volatility, transfer of technological and managerial know-how, and stimulation of domestic financial sector development. *Indirect channels* include promotion of specialization, commitment to better economic policies, and signaling the practice of more friendly policies.

Augmentation of domestic savings is related to the notion that capital flows from capital-rich countries to the capital-poor countries due to a comparatively higher marginal productivity capital in the former ones. Therefore, North-South capital flows can benefit both groups as “they allow for increase investment in capital-poor countries while they provide a higher return on capital than is available in capital-rich countries” (Prasad et al, 2003: 23). Another direct channel is the reduction in the cost of capital due to better global allocation of risk. Cross-border capital mobility is supposed to support the diversification of the portfolio of the wealth owners. First, increased risk sharing opportunities between foreign and domestic investors might help to diversify risks, what stimulate firms to take on more total investment; second, domestic stock market becomes more liquid as capital flows increase, reducing the equity risk premium, thereby lowering the cost of raising capital for investment (Prasad et al, 2003: 25). Financial integration in theory can help developing countries to reduce consumption volatility over time. Global financial diversification allows a country to offload some of its income risk in world markets, smoothing the effects of temporary fluctuations in income growth on consumption growth (Lewis, 1999). Furthermore, capital flows may be used for consumption during a fall in the domestic income, at least temporarily, so that foreign saving substitutes domestic ones. Financial liberalization might also encourage transfer of technology and managerial know-how due to the attraction of FDI inflows that generate technology spillovers and stimulate better management practices. Such spillovers can raise aggregate productivity in the economy, and doing so, boost economic growth. The forth direct channel is that increased foreign banks presence in domestic banking sector stimulates the development of domestic financial sector due to three main factors: first, foreign banks presence exerts a pressure for an improvement in the financial regulatory and supervisory framework of domestic financial markets as they are originally well regulated in their parents’ countries; second, due to their international connection, foreign banks participation facilitate access to international financial markets; third, they might introduce new financial services and instruments, increasing banking competition, and also foster technological improvements in domestic banks.

Concerning the *indirect channels* one of the potential benefits of financial integration is related to promotion of specialization based on the comparative advantage considerations as it could play a useful role by helping countries to engage in international risk sharing. It is supposed that better risk association is associated with higher specialization². Another indirect

² Kose et al (2006: 10-11) point out that financial integration can stimulate first diversification and later specialization: “In principle, financial integration allows capital-poor countries to diversify away from their narrow production bases that are often agricultural or natural resource-dependent. At a more advanced stage of development, however, trade and financial integration could simultaneously allow for enhanced specialization based on comparative advantage considerations. This could make countries more vulnerable to industry-specific shocks”.

channel that has been frequently stressed in the literature is that financial liberalization results in market discipline that shall stimulate more consistent macroeconomic policy (understood as sound fiscal and monetary policies, guarantee of rights propriety etc.) as market force (rational foreign investors) can penalize bad policies. In other words, financial flows impose discipline on macroeconomic policies, leading to more 'stable' policies: "market forces can exert a disciplining influence on macroeconomic policies. Normally, when the market's judgment is right, this discipline is valuable, rewarding good policies and penalizing bad" (Fischer, 1998: 3). In particular, a sound policy framework – that can include the adoption of a de facto independency of central bank, the implementation of a inflation targeting regime, and/or the adoption a flexible exchange rate regime – promotes growth by keeping inflation, the budget deficit small, and the current account sustainable, all those factors contributing to create a environment for a sustainable and balanced economic growth. Finally, the removal of restrictions on capital outflows can lead to an increase in capital flows as "country's willingness to undertake financial integration could be interpreted as a signal that it is going to practice more friendly policies towards foreign investment in the future" (Prasad et al, 2003: 26).

For all the reasons that have been stressed above, in theory financial liberalization shall improve the capital allocation efficiency and as a result the economic growth. As the argument goes, financial integration, combined with good macroeconomic policies and good domestic governance, appears to be conducive to growth.

2.1.2. The criticism theoretical approach

The theoretical criticism on the favorable arguments to financial integration has been done mainly by Keynesian economists – new Keynesians (Rodrik, 1998; Stiglitz, 2000), and post-Keynesians (Eatwell and Taylor, 2000; Davidson, 2002).

Stiglitz and Rodrik criticizes the conventional argument of optimal efficiency of capital global allocation according to which free capital movements facilitate an efficient global allocation of savings and help channel resources into their most productive uses, thus increasing economic growth. The criticism is related to existence of asymmetric information in financial markets that hinder that financial liberalization either domestic or international results in an increase of welfare. Asymmetric information generates information cost and hinders the efficient allocation of financial resources. In other words, "market failures arising from asymmetric information, incompleteness of contingent markets, and bounded rationality (not to mention *irrationality*) are endemic to financial markets" (Rodrik, 1998: 57). In this connection, capital flows are characterized by panics and manias (Bhagwati, 1998, p.8), so that "efficient-markets paradigm is fundamentally misleading when applied to capital flows" (Einchengreen, 2004: 49).

Stiglitz states that the case for free capital mobility is not the same as the case for free trade as financial markets are different from goods and services markets, due the existence of imperfect information. Markets for information are fundamentally different from 'ordinary' markets:

The central function of capital and financial markets is information-gathering – in particular, assessing which projects and firms are most likely to yield the highest returns, and monitoring to ensure that the funds are used in the appropriated way. Moreover, markets for information are fundamentally different from 'ordinary' markets. For instance, whenever information is imperfect, markets are essentially never constrained Pareto efficient – in marked contrast to standard results for competitive markets with perfect information" (Stiglitz, 2000: 1079).

Stiglitz (2000) also criticizes the argument that international financial integration generates greater macroeconomic stability, due to both risk diversification and market discipline that stimulate the adoption of 'sound' macroeconomic policies. He argues that capital flows are procyclical and exacerbates both economic booms and recessions:

(...) capital market liberalization is systematically associated with greater instability, and for good reason: capital flows are markedly procyclical, exacerbating economic fluctuations, when they do not actually cause them (...) In addition, capital market liberalization exposes countries to vicissitudes associated with changes in economic circumstances outside the country: a sudden change in lenders' perceptions concerning 'emerging market risk' can lead to huge capital outflows, undermining the viability of the entire financial system" (Stiglitz, 2000: 1080).

Finally, Stiglitz (2003), in another work, stresses that international financial integration does not stimulate aggregate investment and economic growth, as financial liberalization, in one hand, can facilitate capital flight that results in adverse effects on economic growth, and, on the other hand, it can also result in the presence of higher risk of instability (for instance large changes in exchange rates) that can discourage investment decisions.

Post Keynesian economists do not accept the hypothesis of market efficiency to explain the behavior of financial markets (Glickman, 1994; Davidson, 2002: Chapter 11). In an uncertain world, in which fundamentals do not provide a reliable guide to the future, as the informational basis related to human decision about the wealth accumulation is incomplete, the future forecasting about the price of financial assets are always subject to disappointments. Post Keynesians reject the belief that some observed economic phenomena are the outcome of any stochastic process, because for some occurrences, agents do not possess adequate information to construct future probabilities. The intrinsic value of a given asset, related to the values derived from discount rate related to the expected returns of assets, do not exist, as the discount rate varies according to the risk evaluation that can suddenly change in response to the facts, and, for this reason, cannot be known. In other words, intrinsic value or fundamentals of the assets prices is not calculable in an environment under Knight-Keynes uncertainty (Glickman, 1994). Therefore, short-term speculative practices and not long-run fundamentals determine the financial assets prices. Furthermore, valuations of financial market prices based on forecasting market psychology can, at times, create speculative whirlpools.

Speculation, an activity of anticipation of market psychology, has had under a global financial market a disruptive impact not only on domestic markets but also over whole countries, resulting in a sort of big and global financial casino. Financial instability and speculative attacks on domestic currency cannot be seen as anomalies, but on the contrary they are expected, and possible outcomes that emerge from the operation of global financial markets in a non-ergodic system where there is no safeguarding framework act as an overall market maker. In other words, a specific institutional design of a financial market determines its potential as an environment where speculation can flourish (Alves Jr et al, 1999-2000).

Post Keynesian economists support that financial liberalization and the rise of new financial instruments, as derivatives, increased the possibility of speculative operations in global financial markets: "in today's global economy any news event that fund managers even suspect that others will interpret as a whiff of currency weakness can quickly become a conflagration spread along the information highway. This results in lemming-like behavior that can be self-reinforcing and self-justifying" (Davidson (1997: 671-672). In contrast with closed financial markets of yesterday, capital flows can have disruptive action on countries, damaging the autonomy of domestic macroeconomic policies, and even generate speculative attacks on domestic currencies.

According to this theoretical approach, exchange rate, under the conditions of capital mobility, is increasingly determined by portfolio decisions of international investors, more related to a short-run view. Capital flows has been frequently a predominant force in foreign exchange markets, mainly in the case of emerging economies with thin financial markets, so that exchange rate behavior has been far too volatile for their only determinants to have been fundamental in origin (Harvey, 2003). Portfolio decisions are dependent from the changes in the market sentiment, that is investors' portfolio expectations. Such expectations are modeled using a combination of Post Keynesian conventional tools – such as the convention that

economic agents consider the average opinion of the market when they make their own expectations – and other factors of psychological nature.

We conclude that for both two Keynesian approaches – New and Post Keynesian³ – the process of capital account liberalization, in spite of some benefits of the financial integration, has an unstable effect on developing economies, as they become more prone to cyclical reversals, what results in doubtful effects on economic growth. This calls for the need of some governmental regulation and/or intervention in financial markets.

2.1.3. Empirical studies

A lot of empirical works, most of them using panel data and measuring the international financial integration with the use of different *de jure* and *de facto* indexes, seek to evaluate the relationship between capital account liberalization, on one hand, and economic growth, financial crises and/or macroeconomic volatility, on the other hand. Clearly these variables are inter-connected in the sense that financial crises and macroeconomic volatility have negative impact on economic growth.

A number of surveys conclude that empirical evidences in general do not present a robust relationship between financial liberalization and economic growth (Prasad et al, 2003; Einchengreen, 2004, Ch 3). Prasad et al (2003) surveys 14 studies on this subject done in 1992-2002 and report that only three studies found positive effects of financial integration on growth, while four did find any effect and seven papers found mixed effects. So, they resume the empirical findings of the literature as follows: “a systematic examination of the evidence suggests that it is difficult to establish a robust causal relationship between the degree of financial integration and output growth performance” (Idem: 6). Prasad et al (2003) show evidences that although volatility of output growth declined during 1990s in comparison to the three earlier decades, while volatility of consumption growth relative to that of income growth increased for developing countries in the 1990s, that is precisely that period of the increase in financial globalization. Indeed, this finding is in line with Kose et al (2003), that also found an increase of consumption volatility during the 1990s in developing countries that had high capital fluxes.

In a very known work, Rodrik (1998) investigated the relationship between financial liberalization and some macroeconomic variables in 1977-1989 in almost 100 countries and concluded that “the data provide no evidence that countries without capital controls have grown faster, invested more, or experimented lower inflation. Capital controls are essentially uncorrelated with long-term economic performance once we control for other determinants” (p. 61). Quinn (1997) in a pioneer paper - where he introduces an *de jure* index to measure the degree of financial openness (or the intensity of capital controls) with the use of scale ranging from 0 to 8 with data from IMF AREAER’ report⁴ for a big sample of 64 countries in 1890-1999 period – was one of the first to find robust positive effect between financial liberalization and per capita income. However, as Edison et al (2002) stressed, Quinn’s findings were dominated for what happened in the OECD countries.

There two main explanations for why it is hard to detect a causal and strong effect of financial integration on growth. First explanation is related to the overall macroeconomic costs of financial crises that some developing countries have experienced in the process of financial

³ One of the main differences between the New Keynesian and Post-Keynesian approach is that the former works with rational expectation hypothesis and with general equilibrium models, while the latter works with expectations under non-probabilistic uncertainty and reject the use of general equilibrium models. Another way to understand the difference is that for New Keynesians market fail due the non-existence of perfect information, while for Post Keynesians market is unstable and imperfect even with flexibility.

⁴ The Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) has been published by the IMF since 1950. It is a unique publication based on a database maintained by the IMF that tracks exchange arrangements and foreign exchange systems for all member countries on an annual basis and also provides historical information on these.

integration. Indeed, Kaminsky and Reinhart (1999) domestic financial liberalization when accompanied by capital account liberalization increases the chance of banking crises and/or currency crises. Calvo and Reinhart (2002) document that currency crises in emerging countries, that are often accompanied by sudden stops or reversals of external capital flows, are somehow associated with negative output effects. The second explanation is related to the tendency for exchange rate appreciation caused by strong capital inflows, which may reduce the profitability of exports and thus reduces investment. In particular, overvaluation (where the level of the exchange rate is higher than the level warranted by economic fundamentals) impinges on the growth of exportable industries in developing countries. In this connection, Aguirre and Calderón (2006), using a dynamic panel data techniques for 60 countries over 1965-2003, found that real exchange rates (RERs) in developing countries show a higher degree of misalignment than the ones in industrial countries and that found a negative and significant relationship between growth and RER misalignment; however real exchange rate misalignments hinder growth although the effect is non-linear: growth declines are larger, the larger the size of the misalignments.

According to Prasad et al (2007a), recent analysis of growth episodes suggest that a dynamic manufacturing sector is a key to long-run growth and that reduced reliance on foreign capital, and the avoidance of overvaluation, may help the development of an export-oriented manufacturing sector. The more dynamic manufacturing sectors indeed can contribute towards stimulating exports in goods with greater income elasticity.⁵

Some studies show interesting results that can help to clarify the relationship between capital account liberalization and economic growth. Interestingly, Einchengreen and Legland (2002) suggest that developed countries first developed their domestic financial market, followed by restricted capital account convertibility and after they liberalized their capital account: “the impact of capital account liberalization is more likely to be positive when the domestic financial markets are well developed and regulated and the operation of the international financial system is smooth and stable. It is more likely to be negative when domestic and international financial markets are subject to crises”. So, it is likely that the causality between financial liberalization and economic growth can be reverse: countries that have a robust economic growth can choose to take part of the financial integration, even if it does not contribute directly for a greater economic growth. Kose et al (2006: 26) show evidences that domestic financial development can do the difference for economic growth: “It is not primarily underdevelopment that causes foreign capital to be ineffective in nonindustrial countries; instead what matter seem to be factors related to a specific form of underdevelopment, namely, financial development”. Edwards (2001) evaluated the hypothesis that capital account liberalization over 1973-1988 period had different impact between high-income and low-income countries, using the Quinn measure and more broader measure with the use of a lagged level of capital openness. He found that financial liberalization stimulated economic growth in high-income countries during the 1980s, but reduced economic growth in case of low-income countries.

We can extract two lessons from these findings. First, a fast process of capital account convertibility can jeopardize the development of a developing country’s domestic financial system, due to the greater macroeconomic instability caused for the volatility of capital flows. Second, related to the former one, it seems that developed countries liberalized their capital account only after they reached the stage of mature economies. This calls for the need for a gradual path of financial liberalization in developing countries.

2.2. The empirical literature on financial liberalization in Brazil

⁵ Developing countries, particularly, can face a structural problem in their balance of payments, due to the effect known as the Thirwall’s law (Thirwall, 2002). This law states a link between the rate of economic growth and the income-elasticity of imports and exports of an economy.

Oreiro *et al* (2004) is the first study to examine Arida's full convertibility hypothesis for the Brazilian real. Using a least square regression with monthly figures for the period 1994-2000 and taking as its variables public debt/GDP, country risk variation (JP Morgan) and two indices of capital controls (ICC₁ and ICC₂),⁶ it shows that capital account convertibility, as measured by the index of capital controls of Cardoso & Goldfajn (1998), is statistically irrelevant to country risk premium, thus providing evidence that there is no direct relationship between changes in administrative controls on domestic currency convertibility and variations in country risk premium. Besides the self-regressive variable "risk premium", the only statistically significant variable in the regression exercise was variation in public debt as a proportion of GDP. Oreiro *et al* (2004) also performed two co-integration tests involving country risk premium and the two indices of capital controls (ICC₁ e ICC₂), so as to evaluate the existence (or absence) of a long-term relationship between risk premium and levels of controls on capital inflows and outflows. The results of the co-integration tests reject the hypothesis of co-integration between the variables at the 1% level of significance in the cases of both ICC₁ and ICC₂. The study thus concludes that the results do not support Arida and Bacha's hypothesis that there was a relationship between risk premium and capital controls in the Brazilian economy over the period 1994-2000.

In order to assess the empirical validity of Arida's arguments in favor of full convertibility of the real, Ono *et al* (2005) carried out econometric tests to reflect possible implications of capital account regimes on macroeconomic performance in the period 1990-2001. Using the VAR methodology, they examined the effect of financial liberalization, measured by a index of capital controls (ICC), on the macroeconomic variables base interest (Selic) rate and nominal exchange rate. Their results show that the base interest rate responded negatively to an impulse in the ICC (evidence that an increase in capital controls may reduce short-term interest rate variations) and that the exchange rate did not respond to an ICC shock, contradicting the hypothesis of Arida (2004) that measures restricting capital flows would cause a maladjustment in the exchange rate market and even precipitate a speculative attack. Ono *et al* (2005) also carried out another econometric test with panel data to analyze capital account convertibility and macroeconomic performance. They used the variables GDP per capita, literacy rate, life expectancy, investment rate, government consumption and savings rate for a set of 87 countries. The results are inconclusive as regards the hypothesis that countries with capital account convertibility tend to greater growth, because even when the sample was divided into two groups (OECD member and non-member countries) both groups returned statistically insignificant coefficients. The results of both tests reject the hypothesis advanced by Arida and others that capital controls could act to upset the exchange rate market, increase the interest rate and undermine macroeconomic performance. On the contrary, these results seem to suggest that capital controls can attenuate exchange rate volatility and reduce the interest rate.

Goldfajn & Minella (2005) examined the relationship between capital account liberalization and macroeconomic volatility over a recent period in Brazil. As regards smoothing consumption expenditures and reducing the volatility of GDP growth rate, they show evidence that, according to the behavior of the standard deviation, both variables behaved more stably in the recent period (1992-2003) than in the 1970s and 1980s. They also considered the relationship between capital flows and economic performance from January 1995 to August 2004, using VAR methodology to gauge the impact of capital flow movements on the following set of economic variables: industrial output, current transactions balance, private capital account, terms of trade (measured as a ratio of export prices to import prices), the Emerging Markets Bond Index – Brazil (EMBI+Brasil), real exchange rate and real domestic interest (Selic) rate. The impulse-response function and variance decomposition results show that an increase in country risk generates a positive response in interest rates,

⁶ The first index (ΔICC_1) captures the negative impact of variations in capital outflow restrictions on net capital inflow, while the second (ΔICC_2) reflects the positive impact of capital outflow restrictions on net capital inflow.

exchange rate depreciation, reduction in capital flows and, after a certain lag, a fall in product. Meanwhile, positive shocks to capital flows are not persistent, although they do entail a reduction in interest rates, which in turn seems to cause a depreciation in the exchange rate. Goldfajn and Minella interpret these results as an indication that financial liberalization has led to a reduction in external vulnerability and macroeconomic volatility, possibly on the understanding that a floating exchange rate regime and capital account liberalization combined have a disciplining effect on economic policy, with beneficial effects on economic fundamentals (country risk) and on macroeconomic volatility.

Van der Lan (2006) evaluated the capital account liberalization process for a period from 1990 to 2005, using two indices: one, a *de jure* index, the index of capital controls (ICC), and another, a *de facto* index, the index of financial integration (IFI). Using VAR methodology he performed an econometric analysis (with quarterly figures for the period 1994-2005) to test the positive causal relationship between financial liberalization and economic growth. The macroeconomic variables used were: Selic interest rate, nominal exchange rate and variations in GDP (at market price). The results did not enable a robust positive relationship to be established between financial liberalization (either *de jure* or *de facto*) and economic growth for the period under consideration. Other important results were: the ICC is not very significant in explaining either interest rate behavior or exchange rate behavior, leading the author to question the beneficial effects of the *de jure* liberalization argued by Arida (reduction in interest rates and in exchange volatility, with beneficial effects on growth). The IFI, meanwhile, generates strong oscillatory effects on interest rate variation (but with no defined trend), and increases in the IFI tend to raise the level of interest rates practiced in the country. The author concludes that increasing capital account liberalization in Brazil has a negative, although limited, net effect.

Note that most studies of Brazil use the index of capital controls developed by Goldfajn & Cardoso (1998). This is partly because many of the studies are designed to evaluate Arida's full convertibility hypothesis for the real. Of the four empirical studies reported here, three offer evidence that financial liberalization did not produce robust results regarding economic growth and/or growth-related variables, and only one shows beneficial results in terms of reduced macroeconomic volatility.

3. Legislation on capital control in Brazil: towards to financial liberalization

Capital flows legislation in Brazil was introduced in the 1960s, according to which foreign capital flows should be registered in order to obtain permission for associated outflows (profits, interests, royalties, and repatriation). Since the end of the 1980s it can be noted an increasing trend towards capital account liberalization in Brazil. Early 1990s foreign direct investment (FDI) was further liberalized as prohibition on FDI into certain sectors was lifted and bureaucratic obstacles were reduced. In 1991 Brazilian government permitted the acquisition by foreign institutional investors of equities of domestic firms. In 1992 BCB allowed a broad liberalization of capital outflows as it permitted that a special non-resident account called CC5 could be operated more freely by foreign financial institutions as a result of acquisition or sale of foreign currencies. This exception created a privileged way to short-term capital flight that was used very often during periods of speculation attacks on domestic currency and represented the introduction of *de facto* convertibility, as in practice residents could deposit in a non-resident bank's account held in a domestic bank, that could convert domestic into foreign currency: residents could transfer resources abroad making these deposits and asking the non-resident financial institution to buy foreign currency to make deposit in an account abroad⁷. In April 1994 Brady Plan converted the external loans into debt securities, helping to overcome the external debt crisis that had contributed somehow to the 'stagflation' environment of Brazil since 1981. In 1994 BCB implemented a financial

⁷ Goldfajn and Minella (2005) report the norms on capital controls in Brazil.

transaction tax⁸ and increased the minimum maturity requirements for capital inflows in order to reduce upward pressure on the exchange rate, to minimize the cost of sterilization and to give some freedom degree for monetary policy.⁹ At the same time, measures aimed to stimulate outflows – including the permission for prepayment of foreign borrowing and import finance – were also adopted.

After the 1999 Brazilian currency crisis and the adoption of a floating exchange regime, economic authorities implemented a lot of norms that resulted in further financial liberalization (mainly related to capital outflows) and greater flexibility in foreign exchange market, including the unification of the exchange rate markets (floating and free ones), the reduction and later elimination of both the minimum average maturity for external loans and the financial transaction tax on capital inflows, the elimination of the restrictions on investments in the securities markets by foreign investors, and the simplification of the procedures related to the capital remittance to other countries¹⁰. In November 1999, Brazil accepted the obligations under Article VIII of the IMF, that precludes the country members from imposing restrictions on the meaning of payments and transfers for current international transactions. In 2005, Brazilian government provided extensive freedom to purchase and sell of foreign currencies in the foreign exchange market, for which was not necessary any BCB's specific permission, and, in 2006, it allowed greater flexibility in the exports operations' exchange rate coverage.

4. Indices of financial liberalization/integration

The process of financial liberalization of national economies can be evaluated in two different ways: integration can be gauged as the result of a set or rules that permit or restrict the free inflow and outflow of financial capital; and integration can be seen as the outcome of the intensity of financial capital inflows and outflows.

In the former case, the indicators used seek to measure the degree of financial openness permitted by the current legislation in a given economy. Such indices are commonly termed *de jure* indices. *De jure* indices thus measure the degree of financial openness by way of a careful analysis of the legislation and any alterations to it. In the latter case, the indicators used seek to evaluate the intensity of capital flows in a given economy. Such indices are commonly called *de facto* indices.

The literature contains various different manners of constructing *de jure* indices. One common manner is to use the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), published by the IMF, which lists the instruments used in each member country. This list of instruments is used to categorize a given country's legislation in a given year as restrictive or liberal, making it possible to construct a binary indicator. Another way of constructing a *de jure* index is the Index of capital controls (ICC) proposed by Cardoso & Goldfajn (1998). Two measures of capital control (ΔCC_1) and (ΔCC_2) are defined as linear combinations of changes in restrictions on capital outflows and inflows, in an endeavor to measure control over capital flows based on alterations in the legislation. A change in the legislation that reduces capital flows is assigned the value +1, while an amendment to in the legislation designed to encourage capital flows receives the value -1. Thus, $\Delta CC_1 = \Delta RI - 0.5 \cdot \Delta RO$ (1) and $\Delta CC_2 = \Delta RI + 0.5 \cdot \Delta RO$ (2), where ΔRI is a measure imposed on capital inflows; and (ii) ΔRO is a measure reflecting variation in the rules on capital outflows.

⁸ The financial transaction tax was from 5% to 9% to Foreign Funds on Securities in October 1994.

⁹ According Ariyoshi et al (2000) these capital controls were not effective in Brazil as capitals inflows increased a great deal and sophistication of financial system enable participants to circumvent most controls.

¹⁰ In March 2005, Central Bank of Brazil authorized individuals and corporates to make transfer of resources abroad through their own bank accounts, a simplification in the norms that meant the end of CC-5 account.

The empirical study by Van der Lan (2006) used this index of capital controls (ICC) with no weighting, but – contrary to the original ICC – decided that if the alteration facilitates capital inflow and/or outflow, it would be assigned a value of +1, i.e. control was reduced. If, on the other hand, the alteration hindered capital inflow and/or outflow, it would be given a value of -1, i.e. controls were increased. In this way, as changes occur to legislation, the value of the ICC becomes more positive if controls on capital flows are reduced and, vice versa. Another way of constructing a *de jure* index, with a view to improving measurement of regulatory liberalization, was set out originally by Quinn (1997), who qualified changes in capital control legislation as -1, -2, -3, -4 or +1, +2, +3, +4, according to whether the change was more or less liberalizing or restrictive, respectively. Quinn’s measure is a qualitative measure, but has been criticized for being subjective. Chinn & Ito (2006), drawing on the AREAER, developed an index of financial integration based on the main components extracted from the disaggregated capital account and from restrictive measures on current account.

De jure indices generally are criticized as measurements of financial integration for not always reflecting the real extent of an economy’s financial integration into world markets. An example is the financial integration of China, which has received high volumes of capital inflows in spite of legislation placing strong restrictions on various kinds of – particularly, resident – capital. In any case, such indices do highlight an important dimension of the international financial integration process, which is to what extent regulatory rulings are liberalizing or restrictive in nature. That criticism brings us to *de facto* indices.

De facto indices measure financial integration by way of the ratio between capital flows and an indicator of the size of the national economy, generally national product. Kray (1998) and Van der Laan (2006) used the sum of financial inflows and outflows over GDP (in modulus), in an analogy with the indicator of trade integration (exports plus imports over GDP), in order to construct the *de facto* Index of Financial Integration (IFI). Lane & Milesi-Ferretti (2003, 2006) advocate a measure of international financial integration – the IFIGDP – which is the sum of stocks of external assets and liabilities divided by GDP, expressed as

$$IFIGDP_{it} = \frac{(FA_{it} + FL_{it})}{GDP_{it}},$$

where *FA* (*FL*) are the stocks of external assets (liabilities). This

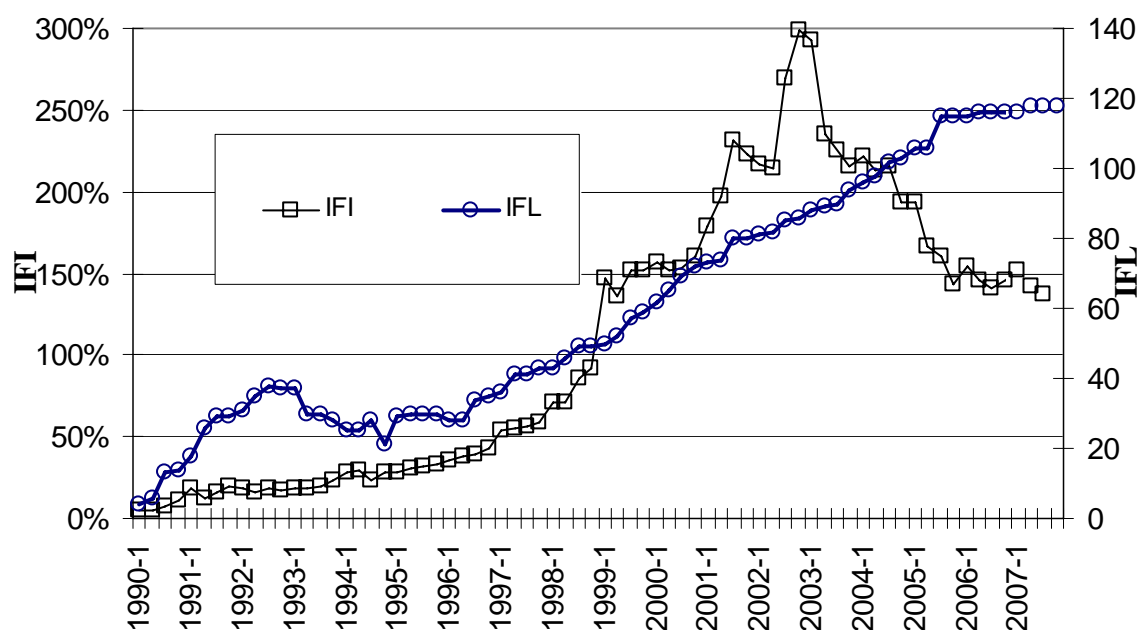
index, therefore, considers assets and liabilities, including both foreigners’ ability to invest in a country and residents’ ability to invest abroad and is thus regarded as more appropriate to gauging the extent of a country’s international financial integration.

This study used the *de jure* index constructed by Van der Lan (2007), as well as his data, which were updated by the authors for the period from the third quarter of 2005 to the fourth quarter of 2007. We renamed the index the Index of Financial Liberalization (IFL) and attributed the value +1 to any alteration in the legislation that facilitates capital inflows and/or outflows and -1 to any alteration that hinders them. In that way, when the indicator is becoming more positive, it is because the legislation has shifted towards financial liberalization. Figure 1 (right-hand axis) shows this index from 1990 to 2007.

The *de facto* index used in this study was the Index of Financial Integration (IFI), following the methodology of the IFIGDP index developed by Lane & Milesi-Ferretti (2003). The index was calculated by totaling the following external assets: direct investment abroad, portfolio investment equity assets, portfolio investment debt assets, derivatives, other investment assets, net errors and omissions, and monetary authority assets; and the following external liabilities: foreign direct investment, portfolio investment equity liabilities, portfolio investment equity liabilities, derivatives, other investment liabilities, use of fund credit and loans, and exceptional financing. All the values were taken from the IMF “International Financial Statistics” report, and the total was divided by GDP. Figure 1 (left-hand axis) shows the variations in this index from 1990 to 2007. As can be seen from the graph, the two indices are apparently correlated until the end of 2002, even though in 1993-1994 there was a brief restrictive interregnum. From 2003 onwards, the process of normative liberalization can be observed to continue, while there is a marked decline in *de facto* financial integration, mainly

as a result of external loan payments in a context of exchange rate appreciation, and of exchange reserve accumulation by the monetary authorities.

Figure 1. IFI and IFL for the Brazilian Economy.



Source: Authors' elaboration with data from IMF (IIF), Van der laan (2007) and Central Bank of Brazil (ILF)

In order to explore the relationship between the *de jure* and *de facto* indices in greater depth, we investigated the empirical relationship between them. The existing evidence indicates that in industrialized countries the empirical relationship between *de jure* and *de facto* measures is stable, with both correlating positively. The same cannot be said of the emerging countries, where the *de facto* index parts company with the *de jure* index from the 1980s onwards; financial integration can be observed to increase, but this is not accompanied by normative liberalization (Kose et al, 2006).

In the case of Brazil, as in Figure 1, the trends in both indices over time suggest that there may be a positive relationship between them, even if it cooled after 2002. It is important to note that the stronger the relationship between the indices, the closer to one (in modulus) elasticity should be.

With a view to evaluating the relationship between the *de jure* and *de facto* indices we used cointegration techniques with the logarithms of the variables in Figure 1¹¹. The Johansen (1995) and Gregory & Hansen (1996) cointegration tests indicate that a long-term relationship does exist between the indices (Table 1). Moreover, the Gregory-Hansen cointegration test has the advantage of suggesting the date of a possible structural break in this relationship. The test did indeed indicate the date of that break as the fourth quarter of 1999 in a constant and trend model¹².

¹¹ In order for cointegration techniques to be used, these variables must not be stationary. The unit root analysis is presented in the following section. Indeed, the ADF and KPSS tests indicate that the two indices are I(1), which makes it possible to use cointegration.

¹² Application of the Gregory-Hansen test in the "fullbreak" model indicated the existence of a break in 2002:4. The test of Johansen *et al* (2000) for analysis with break in 2002:2 (not reported) also indicated the existence of a long-term relationship between the indices. The estimations presented for the model with break in 1999:4 are very close to the estimations of the model with break in 2002:2 (not reported).

Table 1. Cointegration Tests

Test	Null Hypothesis	Model	Statistic	5% Critical Value
Johansen	No Cointegration Relationship	Constant and Trend in Cointegration Vector and 1 lag.*	35.13	25.87
Gregory Hansen	No Cointegration Relationship	Constant and Trend in Cointegration Vector with no lags and break estimated at 1999:4.	-5.91	-4.99

* A similar result is obtained in the model without lags in the Johansen test with structural break.

Cointegration vector estimation indicates that the relationship between the indices can be considered stable. Cointegration vector estimation with constant and trend (T) returns elasticity of 0.22, which can be considered low. When the structural break in 1999, suggested by the Gregory-Hansen test, is modeled with a dummy variable that takes a value of 1 up to 1999:4 (D_{1999}) and 0 from then on, the elasticity obtained is 0.20, which confirms a not very strong relationship between the indices.

5. Evaluating the effects of financial liberalization in Brazil using VAR methodology

As pointed out above, the intention of this study is to examine the impact of financial liberalization in Brazil on macroeconomic variables, so as to test both Arida's hypothesis that financial liberalization results in a reduction of country risk and thus in the domestic interest rate, and also the hypothesis (from the international literature in favor of liberalization) that capital account liberalization has a positive effect on economic growth and a disciplining effect on economic policy. Accordingly, it was decided to use the VAR methodology, with which it is possible to evaluate how the variables used in the analysis depend on each other and their respective shocks. In this case, each variable is expressed as a linear combination of lagged values of itself and of lagged values of all the other variables in the model (Jonhston & Dinard, 1997, p. 288). VAR thus makes it possible to analyze the dynamic impact of random disturbances in the system of variables, yielding analytical tools with which to analyze the dynamic interaction among them.

Thus, the analytical tool used to examine how financial liberalization affects the other variables in the models was the impulse-response function, which shows how variables behave in response to shocks to the standard deviations of the current and future values of the variables in the model, in addition to showing the duration of the shock's effect on the variables.

5.1. Description of the variables used and unit root tests

As already explained, this section will evaluate the effect of capital account liberalization on a set of macroeconomic variables. Two different analyses will be used for that purpose, one for the *de jure* index and another for the *de facto* index. The study data base spans the period from the second quarter of 1994 to the fourth quarter of 2007 (thus subsequent to introduction of the Real Plan) and the frequency is quarterly.

For analysis of the model with the *de jure* index of financial liberalization (IFL model) the following variables were used: Gross Domestic Product (GDP), Nominal Exchange Rate (EXCH), Country Risk (RISK) and Interest Rate (INTER), in addition to the *de jure* index itself. All the data were drawn from the Ipeadata website, except quarterly country risk, which was supplied directly by the IPEA¹³. The GDP series was constructed with figures for GDP at

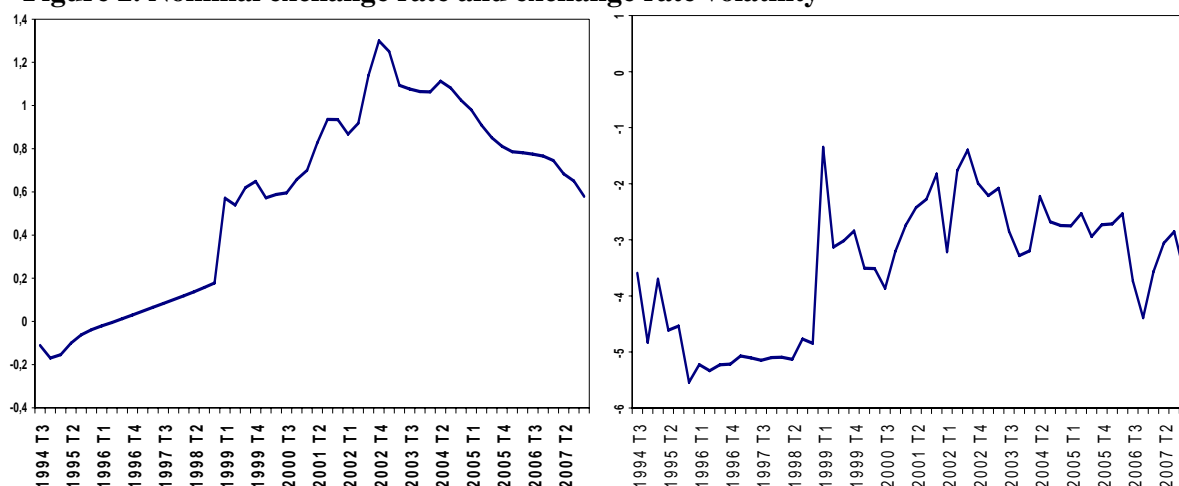
¹³ We thank Eliane de Araújo, of IPEA, for kindly providing the country risk figures. From 1994 to 1997 the country risk data were calculated using the C-Bond (Brazil's main external debt bond) in base points over the

market price (chained index) deseasonalized. For interest rate, the Selic-Over (nominal) rate was used. The exchange rate volatility series was constructed using standard deviations of the daily mean commercial exchange rate.

For the model of the *de facto* index of financial integration (IFI model) the following variables were used: Gross Domestic Product (GDP), Nominal Exchange Rate (EXCH)¹⁴, Rate of Inflation (INFL) – measured by the extensive consumer price index (IPCA) – and the Interest Rate (INTER). As in the *de jure* model, all data were drawn from the Ipeadata website. In order to smooth variations in the series, all variables were transformed into logarithms, except the rates of interest and inflation.

The first step in the VAR methodology is to ascertain whether the variables used in the *de jure* and *de facto* models can be considered stationary. In particular, the exchange rate (EXCH) and exchange volatility (VEXCH) displayed problems of structural breaks or aberrant observations, which could undermine the results obtained by traditional unit root tests. Indeed, Figure 2, showing how these variables' logarithms evolve over time, indicates for both that important changes occurred in January 1999, when the exchange rate regime changed.

Figure 2. Nominal exchange rate and exchange rate volatility



In fact, the ADF and KPSS tests for these variables do not return conclusive results. It was thus decided to use the test of Saikkonen & Lutkepohl (2002), referred to below as SL, which models the structural break explicitly. The results from that test indicated that both exchange rate and exchange volatility have a unit root. The ADF and KPSS tests also gave discrepant results for interest rate, foreign exchange reserves and country risk. In this case, the SL test was also applied to determine the order of integration of the variables¹⁵.

US Treasury bond, the series being obtained from the mean of the daily series. From 1998 onwards the EMBI+ was drawn directly from JP Morgan's website.

¹⁴ As will be seen below, the model was also tested with exchange rate volatility instead of exchange rate level. The exchange rate volatility series was constructed from the quarterly standard deviations of the mean daily commercial exchange rate.

¹⁵ The appendix shows the ADF unit root tests, as well as the results of the KPSS and SL tests. The latter was applied only in the case where the former tests returned discrepant results.

Table 2. Tests of unit root

Variable	ADF	KPSS	SL	Decision
ILF	I (1)	I (1)	***	I (1)
IIF	I (1)	I (1)	***	I (1)
VCAM	I (1)	I (0)	I (1)	I (1)
INF	I (0)	I (0)	***	I (0)
CAM	I (1)	I (0)	I (1)	I (1)
PIB	I (1)	I (1)	***	I (1)
R	I (0)	I (1)	I (0)	I (0)
RI	I (1)	I (0)	I (1)	I (1)
RP	I (1)	I (0)	I (1)	I (1)

5.2. Presentation and selection of the models, ordering of the variables used and analysis of results

5.2.1. Model with Index of Financial Liberalization (IFL)

Formulation of the model with the index of financial liberalization (IFL) was designed to test Arida's hypothesis, according to which the effect of full capital account convertibility would be to reduce country risk and consequently the domestic interest rate. Accordingly, the variables of the VAR model were ordered as follows: DIFL → DRISK → DEXCH → DINTER → DGDP. In addition to these variables, it was also decided to include an exogenous dummy variable in the model because of the shift in exchange rate regime that took place in early 1999, as corroborated by the tests already mentioned above, as well as an "foreign exchange reserves" variable. The former variable was included as a control variable, because over most of the period 1999-2007 it can be treated as an exogenous variable determined by the monetary authority, even though from 1994-1998 – with a semi-fixed exchange rate – it functioned as an economic policy adjustment variable. Specifically in the IFL model, the "foreign exchange reserves" variable affects country risk and exchange rate in parallel and, as the model is dynamic, also comes to affect the other variables. Note that including these control variables improved the fit of the residuals without any significant change in the results given by the impulse-response function, which warrants greater confidence in the results.

In order to select the lags for the model, three criteria were used: Akaike (AIC), Schwarz (BIC) and Hannan-Quinn (HQ). These were complemented by residuals analysis using tests of self-correlation and normality (asymmetry and kurtosis). The VAR model with best fit had one lag, even though the residuals tests cannot be considered satisfactory¹⁶. Table 3 shows these results.

Table 3: Lags Criteria and Residual Tests – IFL Model

Lags	Criteria			Residual Tests		
	AIC	BIC	HQ	Autocorrelation	Skewness	Kurtosis
1	-7.15*	-5.59*	-6.56*	Yes ^φ	Yes	Yes
2	-7.06	-4.52	-6.10	-----	-----	-----
3	-6.95	-3.44	-5.62	-----	-----	-----
4	-6.99	-2.51	-5.30	-----	-----	-----

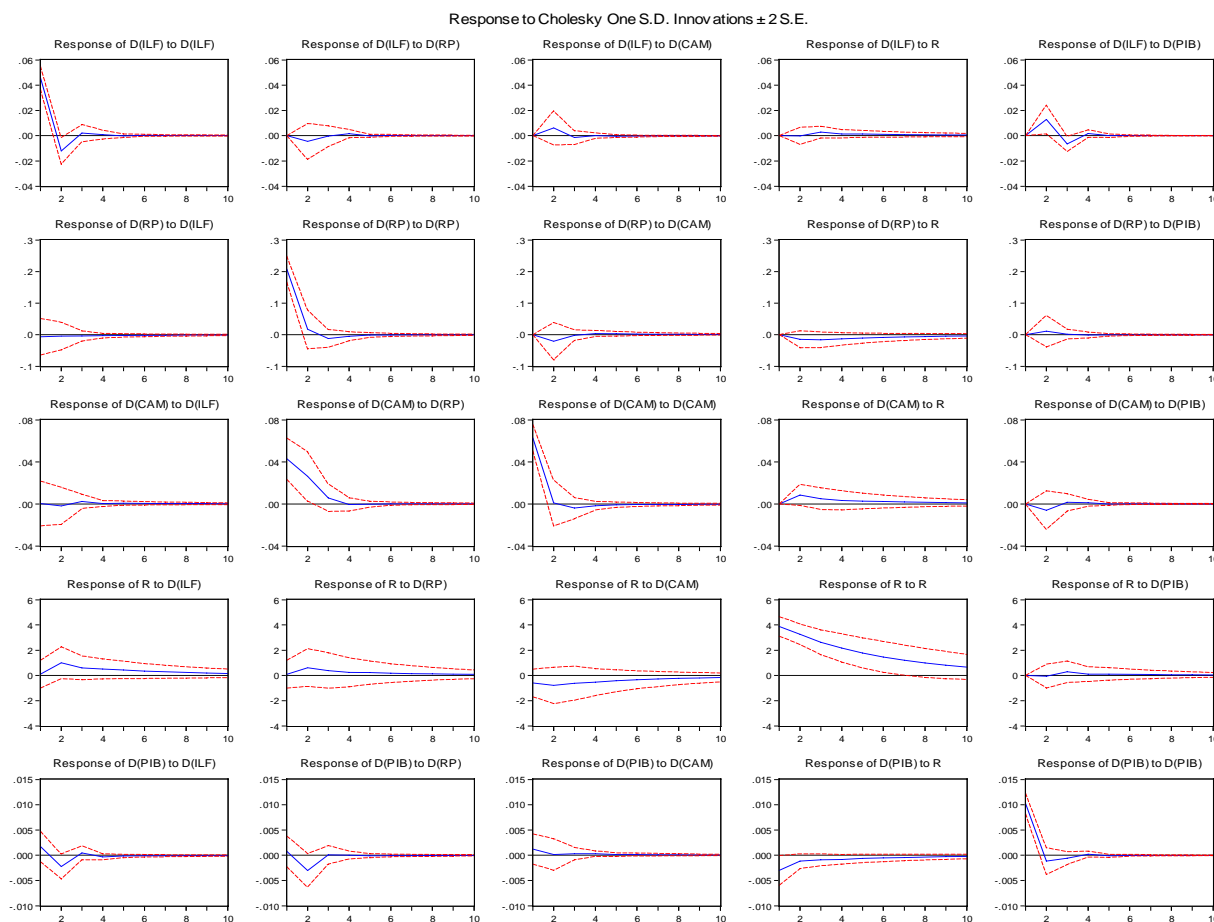
^φ Autocorrelation in the first lag.

After defining the most suitable model, the results of the impulse-response functions were analyzed, as illustrated in Figure 3. There it can be seen that positive shocks of the IFL variable, represented by the left-hand column in the figure, did not produce statistically

¹⁶ As the residuals are not well behaved, it is important to analyze the standard deviation estimation of the model using simulation methods, such as Monte Carlo. The results are similar to those shown in Figure 3.

significant the effects on the macroeconomic variables. As regards the other columns, the only significant result, besides the effect on the variables themselves, was the positive response by the exchange rate to shocks to country risk, meaning that an increase in country risk generates an exchange devaluation effect. Therefore, these results suggest that Arida's hypothesis is not validated.

Figure 3. Impulse-Response Functions – IFL Model



5.2.2. Model with Index of Financial Integration (IFI)

The model with the index of financial integration (IFI) is intended to test the hypothesis from the international literature that an increase in financial integration will have a positive effect on economic growth and macroeconomic stability in Brazil, in addition to generating disciplining effects on economic policy, as against the hypothesis of critics of financial liberalization that it would produce destabilizing effects on developing countries. Thus the variables of the VAR IFI model were ordered as follows: DIFI \rightarrow DEXCH \rightarrow DINFL \rightarrow DINTER \rightarrow DGDP. In this case, the disciplining effect on economic policy was tested by how the inflation rate responded to positive shocks to the index of financial integration. As in the *de jure* model, two control variables were included (a dummy and foreign exchange reserves) which, as in the previous model, yielded better results. Therefore, the ordering reflects the idea that shocks to the index of financial integration impact, firstly, the exchange rate level, which in turn affects the rate of inflation; the latter impacts the interest rate, due mainly to the reaction function of the Central Bank (via Taylor's rule), lastly generating effects on the GDP growth rate.

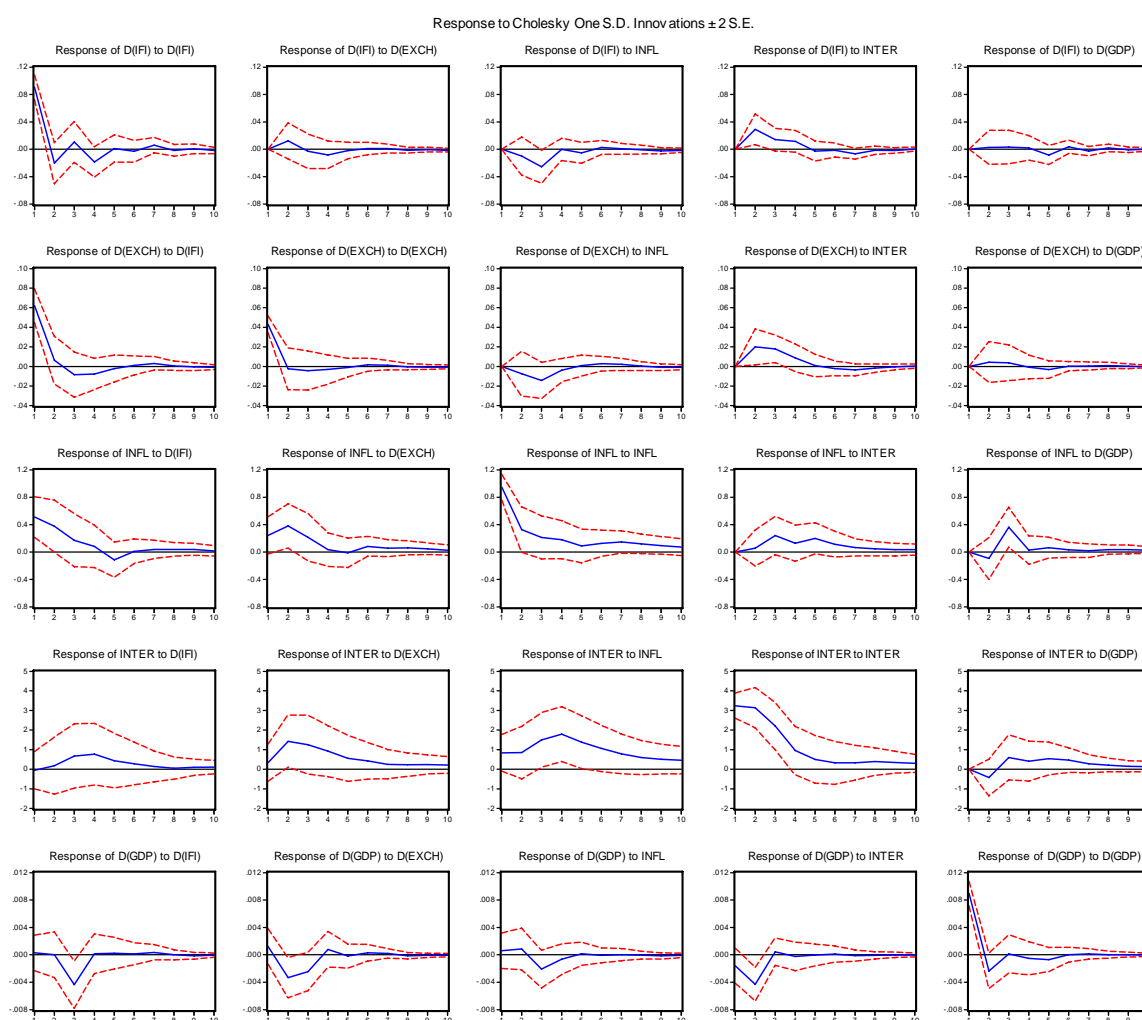
The procedure for choosing the lags in the model was the same as for the *de jure* model. Thus, the model chosen had two lags, because it returned better fit for the residuals. Table 4 summarizes the test results.

Table 4: Lags Criteria and Residual Tests – IFI Model

Lags	Criteria			Residual Tests		
	AIC	BIC	HQ	Autocorrelation	Skewness	Kurtosis
1	-3.17	-1.61*	-2.58*	Yes	Yes	No
2	-3.33*	-0.79	-2.37	No	No	Yes
3	-3.26	0.24	-1.93	-----	-----	-----
4	-3.29	1.18	-1.60	-----	-----	-----

The impulse-response functions are reported in Figure 4. As illustrated in Figure 4, an increase in *de facto* financial integration generates a positive effect on exchange rate (devaluation) and rate of inflation, both shocks dissipating after two quarters. An increase in financial integration causes a decline in GDP, with a three-quarter lag. The interest rate response was not statistically significant. In the other results, responses were as expected, with inflation and interest rates responding positively to an increase in exchange rate, and GDP reacting negatively to an increase in interest rate¹⁷.

Figure 4. Impulse-Response Functions – IFI Model



¹⁷ To test the robustness of the model, we opted to construct two further models, IFI2 and IFI3. In the IFI2 model, the exchange volatility (VEXCH) variable, at first differences, was included in place of the exchange rate. In the IFI3 model, the same order was tested as in the IFI2 model, but we used exchange volatility in level. The results did not show significant changes in the impulse-response functions, indicating a robust model. The impulse-response function of the IFI 2 model is shown in the appendix.

The recent empirical evidence thus shows that the Brazil's increasing financial integration, in addition to having a negative effect on GDP, has generated more destabilizing effects from the macroeconomic standpoint, as evidenced by its impact in raising the rate of inflation and the exchange rate.

6. Conclusion

This paper has examined the relationship among capital account liberalization, economic performance and macroeconomic stability in Brazil. Using the VAR methodology with two models – one *de jure* index and another *de facto* index – it sought to evaluate, firstly, Arida's hypothesis that financial liberalization tends to reduce country risk and domestic interest rate and, secondly, whether – in line with hypotheses from the international literature in favor of financial liberalization – capital account deregulation has had a positive effect on economic growth and macroeconomic stability, with disciplining effects on economic policy.

The results from the IFL model (index of financial liberalization) do not validate Arida's hypothesis that full capital account convertibility would have the effect of reducing country risk and, consequently, domestic interest rate. The results from the impulse-response function show that shocks among the variables were not statistically significant, the only significant result – besides the effects of the variables themselves – was the positive response by exchange rate to country risk shocks.

The results from the IFI (index of financial integration) model offer no evidence that financial liberalization has generated positive effects on a set of macroeconomic variables (inflation and economic growth). On the contrary, the empirical evidence shows that Brazil's increased financial integration, in addition to having an adverse effect on GDP, has generated more destabilizing effects from the macroeconomic standpoint, as evidenced by its impact in raising the rate of inflation and the exchange rate.

In line with the results obtained by other studies in the international and Brazilian literature, the results reported in this paper seem to support the criticisms of financial liberalization that its destabilizing effects predominate over the potential beneficial effects – that, at least, is what the case of Brazil in recent times appears to reveal. Lastly, and interestingly, both the short-term and long-term (co-integration) relationships show there is only a slight dynamic relationship between the two indices used in this study. This finding may explain, at least in part, the (statistically weak) results from the IFL model, given that capital flows in Brazil may respond predominantly to other – external and internal – factors and not just to capital control deregulation. These results suggest that on the subject addressed by this paper there remains a wide spectrum of research to be pursued and explored in greater depth by further academic studies.

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Annex

Figure A.1. Impulse-Response Functions – IFI Model 2

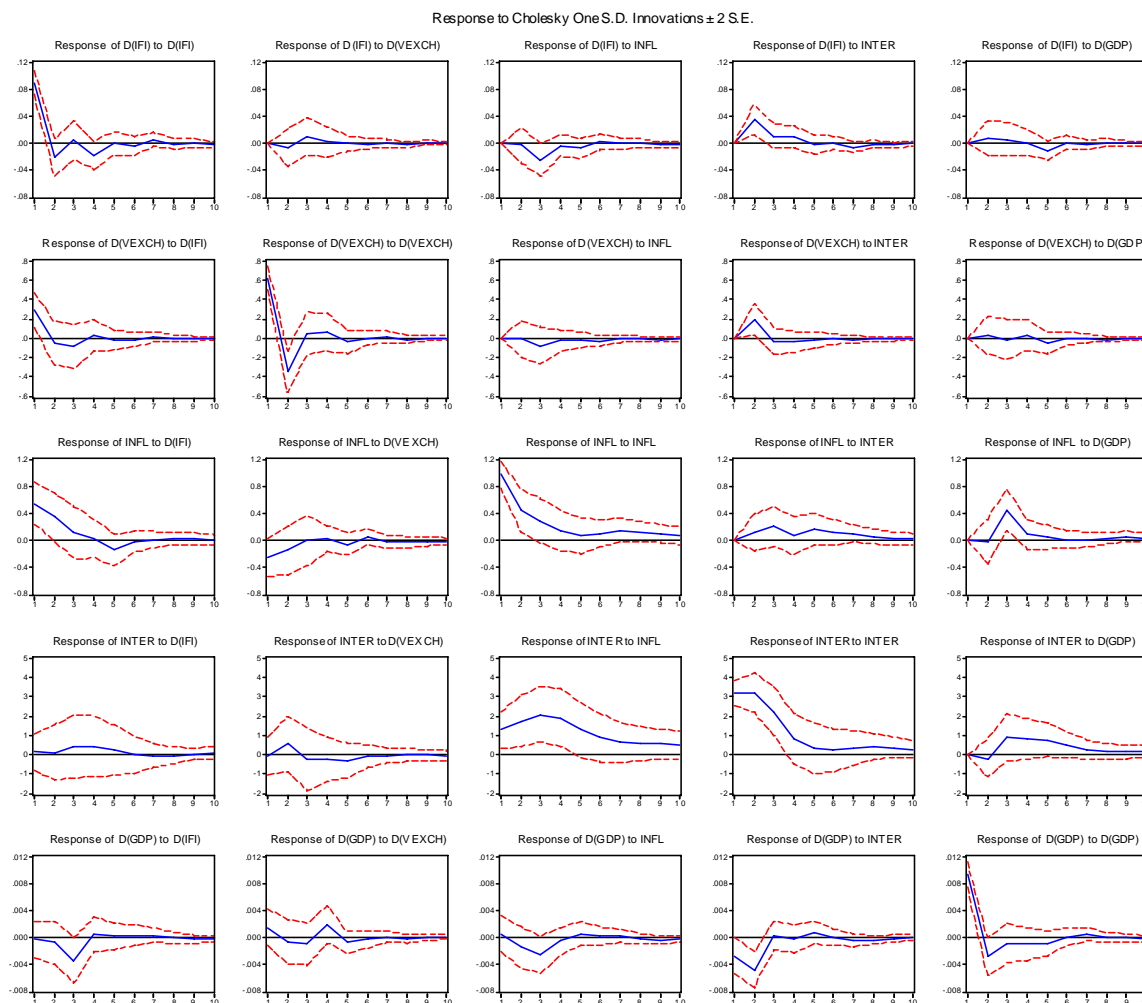


Table A.1: ADF Test

Variable	ADF		Critical value at 5%	P-Value
	Model (<i>lags</i>)	Statistic		
IFL	c + t (1)	-1.3874	-3.5004	0.8530
D(IFL)	c + t (0)	-14.8560	-3.5004	0.0000
IFI	c + t (0)	-0.6189	-3.4986	0.9736
D(IFI)	c + t (4)	-3.6679	-3.5085	0.0346
VEXCH	c (0)	-2.4236	-2.9187	0.1404
D(VEXCH)	c (0)	-10.5311	-2.9199	0.0000
INF	c (0)	-5.0232	-2.9187	0.0001
EXCH	c (0)	-1.5794	-2.9187	0.4858
D(EXCH)	c (0)	-5.6705	-2.9199	0.0000
GDP	c + t (0)	-1.4336	3.4986	0.8391
D(GDP)	c + t (0)	-8.2157	-3.5004	0.0000
INTER	c (2)	-3.3116	-2.9211	0.0089
RES	c (0)	0.9288	-2.9187	0.9952
D(RES)	c (0)	-5.1993	-2.9199	0.0001
RISK	c (0)	-0.7082	-2.9187	0.8355
D(RISK)	c (0)	-5.9659	-2.9199	0.0000

Table A.2: KPSS Test

Variable	Model	Statistic	Critical value at 5%
IFL	c + t	0.2438	0.146
D(IFL)	c	0.2539	0.463
IFI	c + t	0.2383	0.146
D(IFI)	c + t	0.1114	0.1460
VEXCH	c	0.1141	0.1460
INFL	c	0.3759	0.4630
EXCH	c	0.6819	0.4630
D(EXCH)	c	0.5059	0.4630
GDP	c + t	0.2291	0.1460
D(GDP)	c	0.2815	0.4630
INTER	c	0.6861	0.4630
RES	c	0.3270	0.4630
RISK	c	0.3616	0.4630

Table A.3: SL Test

Variable	Break	Model (<i>lags</i>)	Statistic	Critical value at 5%
EXCH	1999:1 (dummy shift)	c (2)	-1.2674	-2.88
VEXCH	1999:1 (dummy shift)	c (0)	-1.9546	-2.88
INTER	1997:4 (dummy shift)	c (2)	-6.9343	-2.88
RES	2000:2 (dummy shift)	c (1)	0.3043	-2.88
RISK	2002:3 (dummy shift)	c (0)	-0.2525	-2.88