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**Financial Crises after  
Financial Liberalization:  
Exceptional Circumstances  
or Structural Weakness?**

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**FINANCIAL CRISES AFTER FINANCIAL LIBERALIZATION:  
EXCEPTIONAL CIRCUMSTANCES OR STRUCTURAL WEAKNESS?**

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**Abstract**

Recent studies have conjectured that there may be a link between financial liberalization and financial instability in emerging economies. Most of these studies, however, do not investigate whether emerging economies are becoming structurally more vulnerable to currency and banking crises. In this paper, we argue that emerging economies are systematically becoming more susceptible to both currency and banking crises after FL. Using data for 27 emerging economies from 1973 to the present, univariate and multivariate analyses indicate that the likelihood of currency crises and banking crises increase after FL. In particular, liberalization allows more liquidity to enter an emerging economy, which finds its way into productive and speculative projects. What is common to both types of crises is a significant increase in speculative financing, thereby increasing the chance for borrower default. Thus, the outflow of international capital becomes more likely, and we find that the chance of either type of crisis grows faster in response to changes in short-term loans after FL than before. Similarly, the reactions to overvalued currencies are at least similar in terms of increasing probabilities of crises in the case of banking crises, or greater in the case of currency crises after FL as compared to before FL. Further, our results show that after FL the chance of a currency crisis declines over time, while the chance of a banking crisis increases.

JEL Codes: F02; F36; F43

Keywords: *Emerging economies; Financial liberalization; financial instability; currency crises; banking crises*

## I. Introduction

Financial turmoil seems to occur more frequently in emerging economies in recent years. In particular, the Asian crisis hit shortly after the shock waves from the Mexican peso crisis in 1995 had subsided. Also, in a survey of banking sector problems, the IMF found that two thirds of its member countries have experienced banking sector problems between 1980 and 1996 (Lindgren, Garcia, and Saal, 1996). In almost all cases, we have witnessed not only the destabilization of the local banking system, but also the failure of the existing currency regime.

Financial systems play a central economic role, with their failure leading to serious repercussions. Stable currencies facilitate cross-border movements of trade and capital, while stable banking sectors help to channel savings to investors. Crises, then, adversely affect international trade and capital flows, domestic credit, and output. These effects also don't seem to be isolated to the economies in question. Through international linkages, crises in one economy are likely to spread to others, be they industrialized or less industrialized. Financial problems have often resulted in severe output contractions, which can lead to worsened trade balances of major trading partners and doubts over the repayment of international loans.

The literature reflects the significance of understanding financial instabilities, while it seems to largely ignore one aspect, namely the impact of greater financial openness itself on financial stability. In almost all studies, crises are seen to be triggered by what is perceived as an outside change. The notion that financial liberalization (FL) *in itself* could be a cause for greater fragility is only lately receiving some attention, and then only in a rather ad hoc fashion (Demirgüç-Kunt and Detragiache, 1998). However, building on the insights of Hyman Minsky (1981; 1986) it can be argued that emerging economies become more vulnerable to both currency and banking crises after FL. In this view, greater internal and external deregulation result in more instabilities as greater liquidity is used increasingly for unsustainable, speculative expansions. This is not to say that structural weaknesses may not raise the likelihood of crises, but that they are unlikely to disappear in the wake of more deregulation. On the contrary, already existing structural weaknesses are likely to become even more severe in a more deregulated environment.

Employing the framework developed by Minsky to explore currency and banking crises offers considerable advantages over other approaches to the twin crises. While alternative approaches ascribe the occurrence of twin crises often to common macro causes, they fail to explore both the connection between financial market operations and deteriorating macro

economic fundamentals, and the link between weaknesses in the foreign exchange markets and the banking sector. By providing not only a consistent argument that links macro economic fundamentals and financial market operations, but also supporting empirical evidence for the growing vulnerability to currency and banking crises after FL, I hope to further our understanding of the mechanics of financial crises, and the appropriate policies to combat these instabilities.

The rest of the paper is organized as follows. In section II, I present an argument which connects FL to a greater likelihood of currency and banking crises. The theoretical argument serves then as the basis for univariate and regression analysis in section III. Finally, some concluding remarks follow in section IV.

## **II. Financial Liberalization and Financial Crises**

To avoid unnecessary confusion, I use the term currency and banking crises as commonly defined in the literature. There, currency crisis are characterized by diminishing foreign exchange reserves and rising short-term interest rates either by themselves or in combination with a devaluation (Eichengreen, Rose and Wyplosz, 1995; Sachs, Tornell and Velasco, 1995; Goldfajn and Valdés, 1997; Kaminsky, Lizondo and Reinhart, 1998). Currency crises are distinct from speculative attacks where a devaluation can be avoided. Bank crises, on the other hand, are characterized by deposit or credit contractions in the wake of a bank run. An indication of a looming bank crisis may be a deterioration of bank balance sheets, which often precedes a bank run. However, a deterioration in the quality of bank balance sheets does not necessarily have to lead to bank runs. In other words, increasing bad loan ratios are indicators for growing bank sector instabilities, while bank failures are considered crises (Lindgren, Garcia, and Saal, 1996).

How do currency and banking crises become more likely after financial liberalization (FL)? FL is generally understood as the elimination of financial regulations in the domestic financial markets, such as credit ceilings, lending requirements, or entry restrictions to reduce excess demand for credit (McKinnon, 1973; Shaw, 1973; Fry, 1995). Additionally, FL often comprises external liberalization. That is, FL includes full or partial capital account opening, leading to the potential of more short-term capital mobility and more foreign direct investment flows. Through the elimination of internal and external government regulations, FL is supposed to make financial markets more efficient, and thereby increasing the available amount of loanable funds for business investments. For instance, banks should find it easier to attract deposits after the elimination of interest rate ceilings and with greater access to international capital markets. Similarly, banks

should be more willing to supply loans as interest rate restrictions are eliminated, and as domestic financial market competition increases. Consequently, financial stability should increase with FL as financial intermediaries supposedly become more efficient.

Lately, a critique of FL as financial market policy has been developed based on Minsky's (1981, 1986) "financial instability hypothesis" (Gabel, 1993). In particular, the initial economic improvements often observed after the introduction of FL are fuelling and are driven by overly optimistic expectations, and hence are not sustainable in the long run. In other words, additional liquidity may not go to the most productive uses, but it may find its way into speculative projects, thereby generating, on the one hand, short-term gains, but also, on the other hand, destabilizing conditions for both the domestic currency as well as the domestic banking sector.

It is important to realize that financial deregulation may lead to short-term economic gains, and hence may fuel optimistic expectations, which ultimately produce the conditions that destabilize the liberalizing economy's currency and its banking sector. As domestic financial markets become more liberalized, credit may be expanded to sectors that were previously credit constrained, mainly because rising real interest rates promise more profits. This greater liquidity might increase business investment. With higher real rates and with expanding real and financial sectors, more funds are then attracted from overseas. More capital inflows, though, may lead to a real currency appreciation, hence attracting even more capital.

The key to understanding the link between FL and a greater likelihood of currency and banking crises is that rather than a stable equilibrium, changes in economic fundamentals may merely produce periods of tranquility (Minsky, 1986). Two aspects are of particular importance here: a continued appreciation helps to attract capital, and deregulated financial markets, in particular capital markets, may promise short-term gains. Both a continued overvaluation and the diversion of liquidity into asset markets can generate speculative financing, thereby destabilizing currencies and banks. Particularly, an overvalued exchange rate hurts the real sector through a deterioration in the terms of trade. Also, additional liquidity invested in short-term speculative assets diverts funds from business investment finance, especially since capital markets early during FL may promise high growth rates. In other words, the financial sector continues to grow due to real exchange rate and asset market gains, thereby creating the conditions for a real economic slow down. This growing likelihood of a disparity between the financial and the real sector reflects the increasing speculative nature of finance in liberalized economies often observed (Gabel, 1998; Kaminsky and Reinhart, 1996; Lindgren, Garcia and Saal, 1996; Sheng, 1996; Benink and

Llewellyn, 1994b; Balino and Sundararajan, 1991).

More speculative financing, though, raises the likelihood of borrower default, and hence the default risk for lenders and the chance of a currency devaluation of the already overvalued currency. Default risk increases due to a number of factors inherent in FL. First, it may rise simply because the financial sectors expands at the same time as the real sector already slows down. Second, default risk may also rise due to increased foreign currency borrowing in the wake of an appreciating currency. An appreciating currency provides an incentive to borrowers to take out foreign currency denominated loans, thereby raising the chance of borrower default in the case of a currency devaluation. Finally, monetary authorities may be tempted to tighten their stance on money to stabilize their overvalued exchange rate, thereby inducing a real slow down, and making loan repayment harder for domestic borrowers.

With a rise in default risk, though, the likelihood of the withdrawal of short-term funds increases, too. If short-term funds, which have been used to fund long-term projects, are withdrawn, a credit crunch ensues, and lenders are forced to recall outstanding loans, thereby depressing investments. Importantly, short-term funds can and will be withdrawn at short notice if investors anticipate economic difficulties. Ironically, large scale capital inflows may have helped to generate an overvaluation, and fuelled a speculative financing boom, which may now make a devaluation, increasing borrower default, and therefore capital outflows more likely.

An overvaluation which has helped to attract capital inflows by raising optimistic expectations about an economy's future performance, may at the same time foster an economic slowdown (Kaminsky and Reinhart, 1996; Eichengreen, Rose, and Wyplosz, 1995; Krugman, 1995b). It is important to note that the likelihood of a currency devaluation grows, the longer an overvaluation persists. In particular, an overvalued currency is one of the main contributing factors for a growing disparity of the real and the financial sector. A continuously overvalued currency raises the price of exports, and therefore adds to the slow down of the real sector, while at the same time enticing domestic investors to borrow more heavily in foreign currencies. Considering, however, that a continued overvaluation has adverse real consequences, capital outflows become more likely. To avoid massive capital outflows monetary authorities may try to sustain an overvaluation by spending official reserves or by tightening money. As reserves are eventually depleted or the real sector slows down, a devaluation may be unavoidable, giving international investors an incentive to withdraw their funds, and making foreign currency loans more difficult to repay, thereby creating a credit crunch, and furthering an economic slowdown.

Besides a real economic decline, a lower interest rate differential due to rising interest rates abroad may also result in net capital outflows<sup>1</sup>. However, capital outflows grow only if domestic money is not tightened, which puts monetary authorities in a bind. If domestic rates are not increased, a large scale capital outflow may create a credit crunch. However, if domestic rates are raised, the real sector may slow down regardless as demand is dampened.

Adding to the greater chance of crises as a result of speculative financing based on large capital inflows, which are, in turn, driven by short-term financial market gains, is the fact, that government finances are simultaneously becoming strained. The need to support either domestic banks or domestic currencies comes in the wake of already deteriorating economic fundamentals, in particular a slowing down real sector. Hence, currency and banking crises may raise the demand on government budgets, when revenues are decreasing and expenditures are rising.

While I have mainly focussed on destabilizing macro trends, such as speculative credit expansions, or currency overvaluations, it should be noted, that the fate of the domestic banking sector is inherently linked to these macro trends due to the central role banks play in any economy, but particularly in emerging economies. That is, internal and external deregulation exposes domestic banks to increasing default, maturity, exchange rate and interest rate risks, and hence makes banking crises more likely. Thus, currency and banking crises alike are reflections of the greater vulnerability of emerging economies to financial turmoil after the introduction of FL.

Obviously, financial liberalization does not have to lead inevitably to crises. It does, however, raise the likelihood of crises, which can be diminished by government policies. So far, I have argued that FL as financial market policy is destabilizing rather than stabilizing, with one possible exception, though. FL includes an opportunity for more international financial competition from multinational bank (MNB) entry, which may reduce the risks banks incur. It is likely that banks reduce their risk exposure once they find themselves in competition with MNBs. In other words, if a bank's net worth is above its safety threshold for prudent lending, more international competition may lead a bank to reduce its credit, such that it can lower its loan and risk exposure. The reduction in domestic bank credit is greater if MNBs engage in "cherry

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<sup>1</sup> In empirical studies on financial crises, rising interest rates abroad appear to have a significantly negative impact on the stability of an emerging financial system (Kaminsky and Reinhart, 1996; Eichengreen, Rose and Wyplosz, 1995).

picking" leaving only borrowers of lesser quality. Obviously, the more a bank reduces its credit the less it is exposed to any of the above described risks, and the less likely it is to engage in speculative financing, thereby also lowering the chance of currency crises.

While proponents of the standard FL framework would argue that internal and external liberalization should increase the efficiency, and thereby the stability of the local financial system, the argument laid out here leads to the opposite conclusion. Greater financial market openness should increase the likelihood of financial crises after FL since the deregulated environment allows for a dynamic environment which fosters speculative finance built upon overly optimistic expectations. It is important to note that these overly optimistic expectations are borne out of initially improving economic fundamentals, and that these improvements lay the foundation for future instabilities. In other words, if liberalizing economies do not improve their regulatory structure before liberalization, crises after FL should be the rule rather than the exception.

### **III. Empirical Tests**

I turn now to testing empirically whether there is evidence for a growing vulnerability to currency and banking crises in emerging economies after FL. To do so, I develop first testable hypotheses with regards to both the determinants of banking and of crises before and after FL. Then, I provide univariate and multivariate tests for these hypotheses, again separately for banking and currency crises. While my analysis begins with banking crises, and continues with currency crises, there is no clear indication that either ordering is superior to the other.

#### **III.1.1 Univariate Analysis for Banking Crises**

From the previous discussion, we can derive a few hypotheses regarding the chance of banking crises before and after FL. In general, financial systems are exposed to greater default, maturity, interest rate and exchange rate risks after internal and external liberalization. Due to a larger possibility for speculative financing, we would expect a growing default risk, and with it increasing financial instability due to the greater exposure to other risks. Because of the larger default risk, the support the government can offer, as well as the stabilizing impact of international financial competition, should decline prior to a crisis.

First, default risk arises from optimistic credit expansions, which are captured by the level

and the growth of production and of real credit<sup>2</sup>. Signs for speculative financing are a widening gap between production and credit, which should appear in the months before a crisis. Further, the responsiveness to speculative financing should be greater after FL. For the same increase in speculative financing, the chance that a banking crisis occurs should grow more after FL.

As a result of a greater default risk maturity, exchange rate, and interest risks should become more likely to materialize. Hence, second, greater maturity risk should result from more short-term capital inflows, measured by the level and growth of short-term debt relative to reserves. Thus, capital inflows relative to official reserves should be larger directly before a crisis, and the response in terms of the chance of a crisis, should again be greater after FL.

Third, the interest rate risk is closely related to short-term capital inflows, where the risk of capital outflows increases with a narrowing interest rate differential. Especially after FL, the interest rate differential should widen immediately before a crisis as a sign of a tighter monetary policy. Also, the reaction in terms of crisis likelihood should be larger after FL than before.

Fourth, the risk that the exchange rate will be devalued depends on the level of overvaluation, measured by the real exchange rate's deviation from its non-crisis period mean. Generally, the overvaluation should be greater prior to a banking crisis, and reactions to an overvaluation should be more pronounced after FL.

Fifth, the impact of international competition, which is expected to be stabilizing, yet declining in the months prior to a crisis as domestic speculative financing grows, is captured by the level and growth of MNB credit relative to total credit.

Finally, possible strains on the government budget are captured by real deposits, real M1, and the ratio of current account balances to reserves, while the support a government can offer is proxied by the growth of official reserves. It is expected that the strains become greater prior to crisis. That is, there should be a monetary expansion, which may cause implicit or explicit insurance problems, e.g. through deposit insurance schemes. Simultaneously, the government's means to stabilize its financial sector weaken prior to crises, which should be reflected in a declining growth rate of official reserves. With liberalization, the reactions to these trends should become more pronounced than before FL.

As my focus is on demonstrating that the economic structure changes immediately before a crisis, and that these changes are different after FL than before, the observations are separated

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<sup>2</sup> See the appendix for a complete list of variables, definitions and sources.

twice. First, observations occur either before or after FL has been introduced. Since all FL policies are often not introduced at once, the elimination of interest rate restrictions is chosen as the beginning of FL (Fry, 1997; Demirgüç-Kunt and Detragiache, 1998). Second, each observation can occur during crisis times or during non-crisis times. Banking crises, however, are hard to identify, mainly because of data limitations. Here, I classify as banking crises bad loan ratios of more than 10%, "bank runs that lead to closure, merging or takeover by the public sector of one or more financial institutions, [or].. if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions" (Kaminsky and Reinhart, 1996:6; Sundararajan and Balino, 1992; Lindgren, Garcia and Saal, 1996; Sheng, 1996). In each case, the variables are measured as the deviation from their mean during non-crisis times, thereby controlling for country and time specific differences in each variable<sup>3</sup>. Put differently, through this manipulation, I am able to elicit systematic differences that are common to all economies. To show the robustness of the results, the deviations are recorded 18 or 24 months prior to a crisis, while the actual crisis and the 18 or 24 months after the crisis are excluded<sup>4</sup>.

The results in table 2 suggest that the two-way split of the data into observations for crisis and non-crisis periods both before and after FL seems to be justified, as the changes appear to be significantly different prior to a crisis for the two sub-periods. In particular, the univariate analysis supports the hypothesis that after FL banking crises are characterized by more optimistic credit expansions. Thus, maturity, interest rate, and exchange rate risk should become more likely to materialize, especially as interest rate and exchange rate risks appear to be greater prior to crises.

As mentioned earlier, we are first looking for signs of growing default risk in the months leading up to a crisis, especially after FL. Here, the level of real credit is larger for the months directly before a crisis, regardless of the subset, while the growth rate of real credit is declining prior to crises before FL, and increasing at the same time after FL. Further, real credit goes to financing an expanding real sector before FL, while it is lent out to a real sector that is slowing down as both the level and the growth rate of industrial production indicate.

With signs of a growth in default risk, we are now turning to the other risks. Maturity risk

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<sup>3</sup> To avoid problems associated with different units, only percentages and indexes are used.

<sup>4</sup> I use a Wilcoxon rank sum test where a positive sign indicates that the mean prior to a crisis as compared to tranquil periods, or the mean after FL as compared to before FL is smaller.

seems to remain unchanged prior to crisis after FL, whereas it appears to grow before FL. Both the level and change in short-term loans to reserves are larger in the months directly before a crisis before FL, while they are statistically the same after FL (see also table 1)<sup>5</sup>. Further, interest rate risk may grow in the months before a crisis after FL, where the real interest rate seems to increase before a crisis, thus making a future interest rate decrease more likely. Also, prior to FL, the interest rate differential is narrowing before a crisis, making capital outflows in fact more likely than with a steady differential as is the case after FL. Finally, the exchange rate risk seems to grow only after FL, where the real exchange rate shows signs of an overvaluation. In fact, prior to FL, there is some indication that the real exchange rate depreciates immediately before a crisis. Thus, the deterioration of the current account balance after FL may be connected to the overvalued exchange rate, while the same deterioration in the current account balance before FL may be determined by other factors. What impact the changes in the three risk categories have on the likelihood of a banking crisis, has to be determined in multivariate analysis further below.

The various risk categories may increase and the likelihood of a crisis may still decline due to some compensating factors, such as government support, or international financial competition. In the months before a crisis, real deposits are greater than during non-crisis times in both subperiods. However, real M1 shrinks immediately before a crisis before FL, while it grows at the same time after FL. Also, the current account balance relative to reserves becomes more negative prior to a crisis (table 1), thereby already limiting the scope of a government's support possibilities. Overall, the strains on the government seem to be greater after FL than before, while changes in official reserves, the main source for financial support here appears to be the same. Further, international financial competition loses its already relatively low importance prior to a crisis after FL, while it grows before FL.

### **III.1.2 Multivariate Analysis for Banking Crises**

So far, the discussion has relied on univariate analyses, which ignores joint effects of the explanatory variables. For instance, the univariate results indicate more speculative financing after FL, which should increase the vulnerability to international capital mobility. Other factors, though,

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The fact that the ratio of short-term loans to reserves is smaller after FL is obviously not an indication that short-term borrowing is larger before FL as table 1 shows. Financial fragility arises from the use of additional funds for speculative financing, which appears to be greater after FL.

such as short-term debt relative to official reserves indicate a lower chance of crisis after FL. Only by incorporating the risks and countervailing forces simultaneously can we determine if the chance of a crisis has changed after FL. Here, I expand the analysis by using a logistic regression, which has the advantages that it investigates the effects of a variety of variables simultaneously, and that it controls for dynamic changes by including observations for tranquil and pre-crises periods.

For the regression, the dependent variable is a dichotomous variable which takes the value of one during the 18 months prior to a banking crisis, and the value zero otherwise. Similar to the univariate analysis the 18 months after a crisis and the actual crisis period are excluded. Further, in the selection of explanatory variables, I have considered a number of factors. First, we have chosen levels, rather than changes of industrial production, real credit, or short-term debt relative to reserves since their interpretation is more straightforward. Second, due to a high degree of collinearity we have excluded the real interest rate, and retained the interest rate differential, since monetary policy responses are also captured by real M1 and M2. Third, as the inclusion of some variables would unduly limit the number of observations, I have excluded the MNB variables.

To study the impact of a number of factors on the likelihood of banking crises in emerging economies, I first estimate the relevant coefficients for each subset by using a fixed effects logistic regression<sup>6</sup>. A greater vulnerability to banking crises will be demonstrated if the chance of a banking crisis increases more after FL in response to the same economic fundamentals. This appears to be the case as regressions (1) and (2) in table 3 show. For instance, the slowing down of industrial production in the months prior to crisis after FL, also increases the likelihood of a banking crisis significantly. In contrast, the growth in industrial production prior to FL, does not significantly reduce the chance of a banking crisis. Further, an expansion of real credit prior to FL reduces the likelihood of a crisis, whereas it significantly increases the chance of a banking crisis after FL. Thus, the different reactions to real credit may reflect a larger emphasis on speculative financing after FL. As the regression results suggest more speculative financing after FL than before, it may not be surprising to find somewhat stronger reactions to changes in the level of short-term loans relative to reserves after FL. With respect to the other risk categories, namely interest rate and exchange rate risks, there do not appear any significant differences, which means

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Fixed effects merely refers to the assumed correlation structure in the regression. Country fixed effects cannot be used since they would introduce an automatic selection bias as countries with no banking crisis during the sampling period would be eliminated in the estimation procedure.

that during both sub-periods a narrowing real interest rate differential has no impact on the chance of a crisis, and that an overvaluation leads to a significant increase in the chance of a banking crisis. Thus, the greater exposure to various risks after FL, also leads to a greater likelihood of banking crises after FL. Put differently, the possible countervailing forces to the observed increases in default risk and exchange rate risk before a crisis after FL do not appear to compensate for the greater risks. This is also demonstrated by the fact that faster growth in official reserves does not reduce the chance of a banking crisis as it does prior to FL. Also, improvements in the current account balance show the same sign for both periods, suggesting that emerging economies would have to experience greater absolute improvements in the current account balance after FL than before as significantly larger risks have to be compensated. One aspect seems to improve after FL, namely the reactions to financial intermediation as greater real deposits reduce the chance of a crisis after FL, but raise it prior to FL. Hence, this is an indication that increased domestic liquidity improves a banking system's stability rather than destabilizing it.

It may be argued that the multivariate results showing a greater chance for banking crises after FL are dominated by some turbulences during a transitory stage. To account for the impact of time after FL, we first introduce a logged time trend. It is expected that policymakers become more familiar with the deregulated environment and are consequently better able to respond to destabilizing trends the longer an economy has been liberalized. In this case, the logged time trend represents something like a "national learning curve". The results of regression (3) in table 3 show that the prior results are robust, and that the longer an economy has been liberalized the greater the likelihood of a crisis becomes. In other words, policy makers may also become caught up in a "deregulation euphoria", thereby increasing the chance of a banking crisis. The second alternative to control for the effects of time is to introduce fixed effects for each month since FL has been introduced as in regression (4) of table 3. The results indicate the robustness of the previous results, thereby showing again that after controlling for the time that has passed since FL has been introduced emerging economies are still more susceptible to currency crises.

### **III.2.1 Univariate Analysis for Currency Crises**

As the univariate and multivariate results indicate a greater vulnerability to banking crises in emerging economies after FL, mainly because of a greater default risk resulting from overly optimistic credit expansions, the question arises whether we can also observe an increase in the

likelihood of currency crises after FL. In particular, we would expect a growing vulnerability to currency crises to be reflected in a number of trends before and after FL. Using macro data for an array of sources I can employ again the same univariate and multivariate tests to see whether the vulnerability to currency crises increases after FL.

First, measures of speculative financing should be better indicators of crises after FL than before FL. In particular, we should observe both overly optimistic credit expansions and asset market bubbles in the months leading up to a crisis, and more importantly, a greater response to it after FL. As investors can withdraw their funds faster after FL, they can also more easily respond to deteriorating fundamentals and cause a crisis. For overly optimistic credit expansions I include the levels and growth rates of industrial production and real credit, while the growth rate of the stock market index serves as a proxy for asset market bubbles. If speculative financing is indeed increasing, we should observe a divergence between real and financial trends prior to crisis, and an above average build-up in the asset market. Further, a larger increase in the likelihood of a crisis should result after FL given the same changes in production, credit or asset markets.

Second, I would expect the importance of short-term capital flows to increase in determining an economy's vulnerability to crises. To account for the effects of capital mobility I include the level and growth of short-term debt to reserves, the interest rate differential with the US, and exchange rate overvaluation. Short-term debt, the interest rate differential and the overvaluation should be greater immediately before a crisis. Also, the responsiveness to these trends should be greater after FL due to greater capital mobility, which should be reflected in a larger change in the crisis probability in response to the same change in these three variables.

Third, in connection with increased capital inflows, and an overvaluation, I would expect the current account balance to deteriorate. Thus, I include the current account balance relative to reserves here, which is expected to be lower prior to a crisis as compared to tranquil periods. Further, I would expect the chance of a crisis to increase more after FL than before FL given the same decline in the current account balance as capital has become more mobile.

Fourth, in the months leading up to a crisis I would expect to see signs of stabilizing measures by the government. In particular, we should observe monetary tightening, measured by the real interest rate, and the sale of official reserves, accounted for by the growth rate of official reserves. Also, the need for stabilizing measures is reflected in a faster growth of real M1 and M2, before a crisis. Due to the greater openness after FL, and the resulting greater liquidity, these trends may be more pronounced after FL than before. Put differently, the likelihood of a crisis

should increase more after FL given the same change in interest rates, money or reserves.

Finally, the presence of MNBs after FL should lower the risk of currency crises as it induces banks to engage in less speculative financing<sup>7</sup>. Here, the ratio of MNB credit relative to total credit and its change measure the competitive impact of MNBs, which is expected to decline when overall credit increases in the months leading up to a crisis, and after FL<sup>8</sup>.

Since I am interested in showing that the economy changes just before a crisis, and that the economic environment is different after FL than before, the data is separated twice. First, I divide the data into observations that occur before and after FL has been introduced. Since all FL policies are often not introduced at once, the elimination of interest rate restrictions is chosen as the beginning of FL (Fry, 1997; Demirgüç-Kunt and Detragiache, 1998). Second, I classify each observation whether it occurs during crisis times or during non-crisis times within each subset. To determine which months are crisis months, I use a currency crisis index which is constructed as weighted average of changes in the nominal exchange rate (relative to the US dollar), and of changes in official reserves (Eichengreen, Wyplosz and Rose, 1995, 1994a, 1994b; Kaminsky and Reinhart, 1996). The weights of each component are chosen such that the conditional volatilities are the same. A crisis is then defined as a deviation of the index of more than three standard deviations from its mean. The 18 (or 24) months prior to a crisis are considered pre-crisis periods.

What do the results (table 4) tell us about macro trends in emerging economies prior to currency crises? The results suggest that the two way differentiation in the data is again justified. In both subsets, most variables show clear differences between tranquil periods and the pre-crisis months indicating that economic environment destabilizes in the 1-2 years prior to a crisis. Further, most variables are different in the pre-crisis months before and after FL. Hence, our results support the argument that emerging economies' structure changes with FL.

The individual results tend to support some of our above hypotheses. Most importantly, I find evidence for more speculative financing after FL, which may have serious repercussions, especially since it could mean a larger chance of borrower default. Aside from a greater chance of borrower default, the results are mixed with respect to the consequences of external liberalization, especially when it comes to current account balance, exchange rate overvaluation,

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Even though MNBs operate in more regulated economies, their operations are often restricted in such a way that they do not directly compete with domestic banks.

<sup>8</sup> This assumes that MNBs do not engage in speculative financing as domestic banks do.

interest rate differential and international financial competition.

First, crises are characterized by speculative financing, especially after FL. Real credit increases more prior to a crisis than in tranquil periods and more after FL than before, while industrial production declines to the same degree before and after FL just before a crisis. The divergence between the real and the financial sector becomes even more pronounced when we look at the growth rates of production and real credit (see also table 1). Prior to FL, industrial production grows at the same rate as before, while real credit growth declines. In contrast, industrial production growth slows after FL, whereas real credit growth remains the same<sup>9</sup>. Further, there is not much initial support for asset bubbles before a crisis as stock market growth is higher during non-crisis times. As stock market growth, however, seems to reach its peak about one year before a crisis, as Kaminsky and Reinhart (1996) already found, it is possible that the end of an asset market bubble precedes a crisis. Considering that the decline in asset market growth is larger after FL, it is likely that the previous asset market bubble is also greater after FL, which would speak for more speculation in a deregulated environment.

Second, the univariate results with respect to international capital mobility are mixed. For instance, emerging economies experience real exchange rate overvaluations and subsequent current account balance declines leading up to a crisis, particularly before FL, while the real interest rate differential declines faster during pre-crisis months, particularly after FL. This may increase the chance of a crisis, especially if short-term debt increases just before a crisis. Before and after FL, short-term loans relative to reserves are greater prior to crisis, especially before FL, leaving emerging economies generally more exposed to capital mobility, but less so after FL. Interestingly, though, the 12-month change in short-term loans relative to reserves falls below its non-crisis period average before FL. In fact, the change in short-term debt becomes negative prior to crisis before FL, while it turns positive after FL (table 1). Thus, there is an indication for a general reduction in short-term debt after FL, except in the months prior to a crisis, whereas there seems to be a larger build-up of short-term debt that is being reduced prior to crises before FL. Thus, the results may not necessarily indicate a greater exposure to short-term capital mobility, but an increasing one after FL, in contrast to an decreasing one before FL.

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<sup>9</sup>

That this seems to contradict some of the summary statistics in table 2, which depends on the standard deviation of the estimates. Hence, the non-parametric Wilcoxon ranksum is a better indicator than simply “eyeballing” the various period averages, particularly with smaller samples.

Fourth, the governments appear to try to stabilize their currencies through the sale of official reserves, while a monetary expansion continues in the months prior to a crisis. The growth rate of official reserves falls below its non-crisis average, especially after FL. Real M1 and M2, though, seem to be undisturbed by this as they increase above their non-crisis levels prior to crises, possibly aided by a declining real interest rate.

Finally, MNBs seem to increase their lending more than domestic banks prior to crisis. The MNB credit market share rises above its non-crisis averages in the months leading up to a crisis, particularly after FL. Considering that real credit is growing faster in the months before a crisis, the results indicate that MNBs are aiding a lending boom, rather than stabilizing the domestic financial system. How large, however, the overall impact of MNBs is, remains questionable since their credit market share seems to be below 1%.

### **III.1.2 Multivariate Analysis for Currency Crisis**

So far, the discussion has relied on univariate analyses, thereby again ignoring possible joint effects. For instance, the univariate results indicate more speculative financing after FL, which should increase the vulnerability to international capital mobility. Other factors, though, such as the real exchange rate or the current account balance, indicate a lower chance of crisis after FL. The various factors are included in a logistic regression where the dependent variable takes the value of one during the 18 months prior to a currency crisis, and the value zero otherwise. Similar to the univariate analysis the 18 months after a crisis and the actual crisis period are excluded.

In the selection of the explanatory variables, we have considered the same factors as for banking crises. Hence, industrial production, real credit, and short-term debt relative to reserves along with the interest rate differential, real M1 and M2, the current account balance relative to reserves, the growth of official reserves, and the real exchange rate are included.

To see which factors determine the chance of a currency crisis before and after FL, I estimate fixed effects logistic models for both subsets. Regressions (1) and (2) in table 5 show that the determinants of currency crisis vary between the two sub-periods, as the statistical comparison indicates. In particular, the parameter estimates for industrial production are negative, and smaller after FL than before. Put differently, industrial production has to increase more after FL to achieve the same reduction in the likelihood of a crisis as before FL. Second, the estimates for real credit are positive, and slightly more so after FL than before, indicating that a credit expansion

leads to a greater increase in the chance of a banking crisis after FL. Next, short-term loans have a greater destabilizing effect and improvements of the current account balance have a smaller stabilizing impact after FL. Similarly, faster reserve accumulations have a smaller stabilizing effect after FL than before. However, overvalued exchange rates have a stronger destabilizing effect after FL than before. Finally, the money variables appear to have opposite effects before and after FL. While an expansion of M1 is stabilizing before FL, it seems to be destabilizing after FL. An increase in M2, though, seems to destabilize a currency before FL, and stabilize it after FL.

While the multivariate results largely confirm the univariate findings, the question remains as to whether emerging economies become more susceptible to currency crises after FL than before. The results show that speculative financing has a stronger destabilizing effect after FL than before, as does an overvalued currency or short-term international loans. The potentially stabilizing impact of improving current account balances or faster growing official reserves are weaker after FL than before. Finally, real M1 increases have a larger destabilizing impact after FL, whereas positive real M2 changes have a smaller stabilizing effect after FL than before. In other words, given the same set of economic fundamentals the chance of a banking crisis grows after FL. Thus, the results not only show a structural difference after FL, they also suggest that this new structure in liberalized emerging economies is systematically more unstable than emerging economies before FL.

Given that the vulnerability to currency crisis grows after liberalization, we are still facing the possibility that the multivariate results presented here capture some turbulences in the early stages of FL, rather than underlying structural weaknesses. To control for this potential timing effect, we have again first added a logged time trend to the regression (table 5), which represents again a “national learning curve”. As regression (1) indicates, the time trend has the expected negative sign, indicating that the chance of a crisis does in fact decline the longer ago FL has been introduced. Regression (1) also shows that the results remain largely unchanged as compared to the results without a time trend, indicating that the relative importance of the economic variables does not shrink, but rather that stabilizing factors with respect to currency crises are improving. Alternatively, we include time fixed effects, i.e. dummies for each month that has passed since the introduction of FL, which allows us to control for time specific changes after FL. The results are reported in regression (2), with the main results by and large the same as compared to the results without controlling for time effects. The inclusion of time effects in the regression changes only the effect of industrial production notably as the estimated parameter becomes positive. Put

differently, increases in industrial production raise the chance of a currency crisis, which may reflect tendencies of overinvestment in the face of increasing liquidity.

#### **IV. Concluding Remarks and Policy Implications**

In this paper, we have argued that the vulnerability of emerging economies to currency and banking crises increases after financial opening. This argument is supported by univariate and multivariate tests for both banking and currency crises. Hence, this paper provides insights into the structural weaknesses that become more prevalent after FL, and that should be countered with adequate policies.

Our results indicate that the vulnerability to both types of crises increases after internal and external liberalization. In particular, external liberalization allows more liquidity to enter an emerging economy, which, put somewhat simplified, can then, thanks to internal liberalization, find its way into productive and speculative projects. What is common to both types of crises is a significant increase in the divergence between real and financial trends, which is taken as an indication for growing trend of more speculative financing. As production and credit drift apart prior to crises, the chance of a crisis increases faster after FL than before. With a larger chance of borrower default in emerging economies, the outflow of international capital becomes more likely, and it seems hence not surprising to find that the chance of either type of crisis grows faster in response to changes in short-term loans after FL than before. Similarly, the reactions to overvalued currencies are at least similar in terms of increasing probabilities of crises in the case of banking crises, or greater in the case of currency crises after FL. Interestingly, the chance of currency crisis declines over time after FL, even though the reactions to economic fundamentals remain similar, which suggests that other stabilizing institutions, such as more transparency, may be improving. In contrast, the chance of a banking crisis seems to increase with time, which may indicate a growing optimism on the part of regulators.

Does our research then suggest that greater financial openness should not be pursued as a policy goals in emerging markets? Clearly, this study shows that financing is not necessarily going where it is supposed to go in a less regulated environment, thus opening the possibility for crises. This implies a few conclusions. First, any economy which wants to liberalize its financial system should evaluate its need to liberalize very carefully. In particular, the rationale for FL is based on the assertion that a developing economy is mired in excess demand for credit. If such excess demand is not apparent, or if excess supply exists instead, other arguments in favor of

liberalization have to be even more compelling. Second, if a decision is cast in favor of liberalization the necessary institutions to stabilize the banks and currencies should be in place before opening one's borders. In other words, since greater vulnerability does not seem to be a string of exceptional cases, but rather a structural phenomenon, such institution building seems a necessary precondition rather than an acceptable afterthought to financial liberalization.

Appendix: A. Tables

TABLE 1: SUMMARY STATISTICS FOR BANKING AND CURRENCY CRISES

Variable	Before FL					After FL				
	Overall	Banking Crisis		Currency Crisis		Overall	Banking Crisis		Currency Crisis	
		Tranquil Periods	Pre-Crisis Periods	Tranquil Periods	Pre-Crisis Periods		Tranquil Periods	Pre-Crisis Periods	Tranquil Periods	Pre-Crisis Periods
Industrial Production	83.510	83.653	87.769	86.148	83.017	109.473	109.353	108.369	108.727	116.585
Industrial Production Growth	3.849	4.015	2.027	4.346	5.246	5.646	6.373	5.346	6.760	2.635
Real Credit	93.876	95.015	84.542	81.910	106.585	123.75	115.454	152.002	119.595	164.440
Real Credit Growth	6.620	6.627	9.067	6.800	8.255	7.115	6.594	11.582	6.726	12.659
(Short-term Loans/ Reserves)	7.442	7.615	5.302	4.512	15.784	1.867	1.931	1.846	1.495	3.031
$\Delta$ (Short-term Loans/ Reserves)	15.509	16.126	100.080	109.710	-89.633	-21.012	-16.529	-49.515	-11.232	6.302
(Current Acct./ Reserves)	-0.240	-0.240	-0.275	-0.209	-0.401	-0.077	-0.079	-0.100	-0.059	-0.163
Growth of Reserves	23.986	24.227	18.157	25.952	6.000	29.363	27.668	32.627	28.786	10.149
Real Interest Rate	-30.991	-36.302	-0.844	-30.048	-6.566	46558.35	62339.4	-0.096	66177.35	-0.664
Real Interest Rate Differential	-32.775	-37.971	-3.613	-31.549	-9.049	46556.06	62366.31	-2.058	66175.22	-3.193
Real M1	106.933	109.517	82.416	94.981	121.288	116.102	112.920	134.336	115.526	136.435
Real Deposits	67.622	67.712	70.560	N/A	N/A	143.968	140.573	151.141	N/A	N/A
Real M2		N/A	N/A	74.740	91.721		N/A	N/A	133.567	149.300
Real Exchange Rate	0.337	0.015	0.269	0.122	-4.968	-0.636	0.000	-5.921	0.053	1.786
(MNB Credit/Total Credit)	0.599	0.655	0.037	0.694	0.510	0.496	0.513	0.493	0.503	0.499
$\Delta$ (MNB Credit/Total Credit)	-0.018	-0.020	0.021	-0.004	-0.096	0.041	0.059	0.252	0.035	0.052

TABLE 2: UNIVARIATE TESTS FOR BANKING CRISES

Variable	Equality of Tranquil and Crises Periods Before FL		Equality of Tranquil and Crises Periods After FL		Equality of Crises Periods Before and After FL	
	18-month	24-month	18-month	24-month	18-month	24-month
Pre-Crisis Period						
Industrial Production	-6.275***	-7.114***	3.197***	3.262***	5.034***	5.505***
Δ Industrial Production	1.022	-0.723	6.089***	5.215***	1.586	3.045***
Δ Stock Market	n.a.	n.a.	0.906	2.750***	n.a.	n.a.
Real Credit	-4.590***	-4.923***	-5.063***	-6.033***	-0.152	-0.742
Δ Real Credit	0.632	1.858*	-2.216**	-2.952***	-2.053**	-3.841***
Δ Short-term Loans/Reserves	-2.118**	-3.673***	-0.412	1.062	1.834*	3.947***
Real Interest Rate	0.754	1.009	-2.466***	-1.404	1.253	3.043***
Real Interest Rate Differential	2.112**	2.198***	-1.459	-0.374	0.812	2.737***
Real M1	2.485***	2.449**	-9.848***	-11.070***	-6.589***	-7.329***
Real Deposits	-5.754***	-6.867***	-3.845***	-4.403***	1.426	1.393
Real Exchange Rate (Deviation from Trend)	-0.623	-3.103***	11.056***	10.923***	4.579***	3.131***
Current Account/Reserves	3.667***	3.478***	8.502***	9.841***	0.468	1.781*
Short-term Loans/Reserves	-4.752***	-4.541***	-1.608	-1.325	4.105***	3.498***
Δ Official Reserves	0.112	0.515	0.243	0.239	-0.664	-1.221
MNB Loans/Total Credit	-4.800***	-4.347***	10.048***	12.350***	9.182***	9.936***
Δ MNB Loans/Total Credit	-1.711*	-3.103***	10.048***	7.212***	3.460***	5.864***

\*= significance at the 5%-level, \*\*= significance at the 2.5%-level; \*\*\*=significance at the 1%-level

TABLE 3: MULTIVARIATE ANALYSIS FOR BANKING CRISES

Variable	Exp. Sign	Before FL	After FL	Parameter Comparison	Trend Variable	Time Fixed Effects
		(1)	(2)		(1)	(3)
Industrial Production	" - "	0.0116 (0.0199)	-0.0125*** (0.0029)	1.198	-0.0161*** (0.0035)	-0.0174*** (0.0042)
Real Credit	" + "	-0.0697*** (0.0184)	0.0172*** (0.0023)	-4.686***	0.0183*** (0.0024)	0.0178*** (0.0030)
(Short-term Loans/Reserves)	" + "	0.0851** (0.0369)	0.1611*** (0.0377)	-1.441*	0.1856*** (0.0404)	0.2280*** (0.0465)
(Current Acct./Reserves)	" - "	-3.155*** (0.7713)	-2.2296*** (0.0377)	-1.198	-2.3064*** (0.6885)	-3.5355*** (0.8907)
Δ Reserves	" - "	-0.0470*** (0.0104)	0.0054 (0.0013)	-4.999***	0.0059*** (0.0013)	0.0062*** (0.0017)
Real Interest Rate Differential	" - "	0.00005 (0.0002)	0.0004 (0.0003)	-0.971	0.0004 (0.0003)	0.0018 (0.0017)
Real M1	" + "	0.0040 (0.0063)	0.0010 (0.0021)	0.452	0.0020 (0.0022)	0.0020 (0.0027)
Real Deposits	" + "	0.0698*** (0.0167)	-0.0088*** (0.0015)	4.688***	-0.0099*** (0.0016)	-0.0123*** (0.0021)
Real Exchange Rate	" - "	-0.0341*** (0.0074)	-0.0254*** (0.0038)	-1.046	-0.0261*** (0.0039)	-0.0135*** (0.0047)
Logged Trend	" - "	N/A	N/A	N/A	0.1886* (0.0975)	N/A
Constant	" +/- "	-6.9145*** (1.6104)	-1.5279*** (0.3002)	-	-2.0369*** (0.4048)	-3.4926*** (1.1860)
No. of Observations		1075	1074	-	1074	709
Time Fixed Effects		No	No	-	No	Yes
Log Likelihood		-56.9113	-496.6996	-	-494.766	-358.823
Chi-Square		145.72	150.23	-	154.09	172.94
Pseudo-R2		0.5615	0.1314	-	0.1347	0.1942

\* = significant at 10%; \*\* = significant at 5%; \*\*\* = significant at 1%

TABLE 4: UNIVARIATE TESTS FOR CURRENCY CRISES

Variable	Equality of Tranquil and Crises Periods Before FL		Equality of Tranquil and Crises Periods Before FL		Equality of Crises Periods Before and After FL	
	18-month	24-month	18-month	24-month	18-month	24-month
Pre-Crisis Period						
Industrial Production	3.061***	3.944***	2.572***	1.495	0.291	-1.572
Δ Industrial Production	0.659	1.929*	5.789***	5.798***	3.466***	2.686***
Real Credit	-10.113***	-11.261***	-8.487***	-7.572***	-2.249**	-1.702*
Δ Real Credit	2.168***	4.141***	-1.219	0.557	-2.132**	-1.962**
Δ Stock Market	3.314***	2.265**	3.780***	4.649***	-1.895*	-0.195
Short-Term Loans/Official Reserves	-12.744***	-13.866***	-10.088***	-4.765***	3.567***	5.093***
Δ Short-term Loans/Official Reserves	-4.689***	-4.331***	-7.252***	-8.819***	-1.263	-4.345***
Real Interest Rate	0.588	1.196	2.949***	3.456***	6.598***	7.329***
Real Interest Rate Differential	2.749***	2.992***	2.748***	3.347***	5.533***	6.469***
Current Account Balance/Reserves	14.468***	15.110***	11.426***	11.231***	-1.950*	-2.259**
Δ Foreign Exchange Reserves	8.767***	7.436***	11.326***	12.541***	0.350	2.957***
Real M1	-9.017***	-10.059***	-7.378***	-7.572***	-0.858	-1.597
Real M2	-6.850***	-8.378***	-3.327***	-7.639***	-0.742	-0.872
Real Exchange Rate (Deviation from Trend)	11.171***	11.696***	6.519***	8.220***	-2.014*	-1.099
MNB Credit/Total Credit	-2.723***	-5.835***	-2.813***	-4.623***	0.530	1.295
Δ MNB Credit/Total Credit	2.052**	-1.648*	-4.143***	-4.651***	-3.550***	-0.840

\*= significance at the 5%-level, \*\*= significance at the 2.5%-level; \*\*\*=significance at the 1%-level

TABLE 5: MULTIVARIATE ANALYSIS FOR CURRENCY CRISES

Variable	Exp. Sign	Before FL	After FL	Parameter Comparison	Trend Variable	Time Fixed Effects
		(1)	(2)		(1)	(2)
Industrial Production	" - "	-0.0098* (0.0050)	0.0030 (0.0030)	-2.195***	0.0080** (0.0033)	0.0097*** (0.0037)
Real Credit	" + "	0.0079*** (0.0026)	0.0129*** (0.0019)	-1.553*	0.0110*** (0.0020)	0.0077*** (0.0022)
(Short-term Loans/Reserves)	" + "	0.1048*** (0.0398)	0.2177*** (0.0485)	-1.800**	0.1681*** (0.0495)	0.2317*** (0.0592)
(Current Acct. /Reserves)	" - "	-3.2289*** (0.6501)	-0.5823 (0.7193)	-2.730***	-0.5425 (0.7297)	-0.5403 (0.8474)
Δ Reserves	" - "	-0.0187*** (0.0029)	-0.0107*** (0.0025)	-2.090**	-0.0107*** (0.0025)	-0.0104*** (0.0027)
Real Interest Rate Differential	" - "	9.71e-07 (0.0001)	0.0001 (0.0002)	-0.443	0.0001 (0.0002)	0.0002 (0.0003)
Real M1	" - "	0.0258 (0.0048)	0.0053** (0.0026)	3.755***	0.0021 (0.0027)	-0.0001 (0.0031)
Real M2	" - "	-0.0288*** (0.0069)	-0.0101*** (0.0025)	-2.550***	-0.0064** (0.0027)	0.0001 (0.0033)
Real Exchange Rate	" - "	0.0032 (0.0040)	-0.0165*** (0.0036)	3.661***	-0.0155*** (0.0037)	-0.1064*** (0.0042)
Logged Trend		N/A	N/A	-	-0.3521*** (0.1041)	N/A
Constant	" +/- "	-2.0046*** (0.3385)	-3.0672*** (0.3306)	-	-2.0286*** (0.4369)	-3.0676*** (0.9298)
No. of Observations		899	1155	-	1155	832
Time Fixed Effects		No	No	-	No	Yes
Log Likelihood		-384.351	-472.983	-	-467.316	-386.018
Chi-Square		255.88	161.24	-	172.57	176.64
Pseudo-R2		0.2497	0.1456	-	0.1559	0.1862

\* = significant at 10%; \*\* = significant at 5%; \*\*\*= significant at 1%

TABLE 6: VARIABLE DEFINITIONS AND SOURCES<sup>10</sup>

Variable Name	Definition	Source
Industrial Production	Industrial production index with base=1990 (where available; where not available the industrial production index has been replaced - in order of priority - by manufacturing production index, mining production index, crude petroleum production index, and gold output index)	IMF
$\Delta$ Industrial Production	12-month change in industrial production index (in percent)	IMF
$\Delta$ Stock Market	12-month change in stock market index (in percent)	Datastream
Real Interest Rate	Real (CPI adjusted) domestic interest rate (where available discount rates have been used; where not available the following interest rates have been used - in order of priority: federal funds rate, treasury bill rate, long- term government bond rate)(in percent)	IMF
Interest Rate Differential	Difference between real (CPI adjusted) domestic interest rate and respective US rate(in percent)	IMF
Real M1	Index of CPI adjusted M1 with base=1990	IMF
Real M2	Index of CPI adjusted M2 with base=1990	IMF
Real Deposits	Index of CPI adjusted deposits with base=1990	IMF
Real Credit	Index of CPI adjusted credit with base=1990	IMF
$\Delta$ Real Credit	12-month change of CPI-inflation adjusted domestic credit (based on monetary survey) (in percent)	IMF
Real Exchange Rate (Deviation from Trend)	Monthly difference of official exchange rate index (base=1990) adjusted for price level differences between an emerging economy and the US and its average during tranquil (non-crises) periods. (in percent)	IMF
$\Delta$ Change in Official Reserves	12-month change of official foreign exchange reserves (in percent)	IMF
Current Account/ Reserves	Current account balance relative to official reserves (in percent)	IMF
Short-term Loans/ Reserves	Short-term outstanding debt relative to official reserves (in percent)	IMF; WB
$\Delta$ Short-term Loans/ Official Reserves	12-month change in total short-term outstanding debt relative to official reserves (in percent)	IMF; WB
MNB Lending/ Total Credit	The ratio of loans by multinational banks relative to total domestic credit (in percent)	BIS; IMF

<sup>10</sup> GDP figures, balance of payments data and international debt positions are interpolated where appropriate.

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Variable Name	Definition	Source
$\Delta$ MNB Lending/ Total Credit	12-month change in the ratio of loans by multinational banks relative to total domestic credit (in percent)	BIS; IMF
Debt/GDP	Ratio of total outstanding external debt to GDP	IMF; WB
$\Delta$ US \$ Value of Portfolio Investment in Equity	12-month change of the US \$ value of portfolio investment in equity (in percent)	IMF
$\Delta$ US \$ Value of Portfolio Investment in Debt	12-month change of the US \$ value of portfolio investment in debt securities (in percent)	IMF
$\Delta$ Unemployment Rate	12-month change in the official unemployment rate (in percent)	IMF
$\Delta$ Employment	12-month change in the officially reported employment level (in percent)	IMF

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Sources: IMF, *International Financial Statistics*; World Bank, *World Debt Tables*; BIS, *International Banking and Financial Market Developments*; DataStream.

TABLE 7: OVERVIEW OF COUNTRIES, FINANCIAL LIBERALIZATION,  
AND BANKING CRISES

Country	Financial Liberalization	Banking Crisis
Argentina	1977	03/1980; 05/1985; 1989; 12/1994
Bolivia	1985	10/1987
Brazil	1975	11/1985; 07/1994
Chile	1980	09/1981
Colombia	1980	07/1982
Mexico	1989	09/1982; 09/1992; 09/1994
Paraguay	1990	1995
Uruguay	1976	03/1981
Venezuela	1981 [1984-01/1989: Interest Rate Controls Reimposed]; 1989	10/1993
Indonesia	1983	1992
Korea	1984-1988 [1988-1991: Interest Rate Controls Reimposed]; 1991	11/1997
Malaysia	1980	07/1985
Phillippines	1981	01/1981
Thailand	1989	03/1979; 10/1983; 05/1997
Israel	1990	1985
Jordan	1988	08/1989
Kenya	1991	1993
Tanzania	1993	1988
Turkey	1980; [12/83-06/87: Interest Rate Controls Reimposed]; 1987	10/1983; 01/1991; 03/1994
Egypt	1991	
Zambia	1992	01/1995
Guatemala	1989	
Guyana	1991	1993
Honduras	1990	
El Salvador	1991	1989
Peru	1980 [interest rate control reimposed 1984-1990] 1990	04/1989

Sources: Demirgüç-Kunt and Detragiache, 1997, 1998; Kaminsky and Reinhart, 1996; Lindgren, Garcia and Saal, 1996

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