ABSTRACT

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In the first paper, I use industry-level data to investigate the impact of exchange rate arrangements on the productive structure of the economy. The identification strategy has similarities with the methodology followed in the literature on heterogeneous effects of financial development. A *de facto* exchange rate regime classification is used to sort pegs and floats. My findings suggest that industries that have higher working capital needs grow faster under exchange rate stability. A fixed exchange rate regime could lower currency or country risk, leading to greater availability of funds and a reduction in the cost of financing. Since loans are often denominated in foreign currency or indexed to the exchange rate in developing countries, firms with higher working capital needs would prefer exchange rate stability, which may lower interest rates in foreign currency and provide easier access to credit.

The second paper investigates the behavior of output across large devaluations and depreciations. First, I define a currency crisis as an episode in which the nominal exchange rate increases by 15%. Then I proceed to classify them into devaluations and depreciations using Reinhart and Rogoff (2004) exchange rate classification. Once these episodes are sorted out, I analyze the behavior of output across them.

As in previous studies, I find that the majority of the currency crisis episodes have been contractionary for 1970-2007. When I separate currency crisis episodes between devaluations and depreciations, I find that the former have been associated with larger output losses for middle income economies.

These findings are consistent with the fact that middle income countries are often subject to currency mismatches. As a result, they may opt for an exchange rate regime that exhibits relatively more stability. This is well documented in Calvo and Reinhart (2002), a behavior they termed “fear of floating”. However, in the case of a currency crisis, the negative impact on output growth is likely to be larger for countries that have adopted a fixed exchange rate regime. This result is also supported by the larger magnitude of the estimated output losses when we use a higher threshold to define currency crisis episodes.

# ESSAYS ON INTERNATIONAL FINANCE

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# Dedication

A mis viejos, por todo. Los quiero un montón.

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# Chapter 1

## Overview

The analysis presented in the next two chapters investigates the relationship between exchange rate arrangements and the behavior of output. The first essay explores the impact of exchange rate regimes on economic performance across industries. The second essay, on the other hand, examines the role played by exchange rate regimes on the behavior of output around currency crisis episodes. Economic theory does not provide a clear cut relationship between nominal exchange rate arrangements and economic performance. A nominal exchange rate regime could potentially affect growth and volatility through several mechanisms: through international trade, by lowering currency risk, by insulating the economy from monetary or real shocks, and by providing insurance against currency fluctuations in the presence of currency mismatches.

The second chapter of my dissertation aims to shed light on the impact of exchange rate arrangements on the productive structure of the economy. My analysis will differ in several respects from previous studies. First, I use industry-level data rather than country-level data. The main advantage of this approach is that it allows for heterogeneous effects across industries that could be masked in the aggregate. For a given country, a fixed exchange rate regime could exert a positive effect on growth or volatility in some industries, while having a negative effect in some others. In order to investigate the impact of exchange rate arrangements on the productive structure of the economy, I adopt an identification strategy that has similarities with the

methodology followed in the literature on heterogeneous effects of financial development.

Second, I use a *de facto* exchange rate regime classification constructed by Reinhart and Rogoff (2004) to determine if a country has adopted peg or a float. The rationale is straightforward. Unlike the official classification given by the central bank's intended regime, this classification keeps track of the actual behavior of the exchange rate. *De jure* classifications reflect the declared intentions of countries, and they generally do not accurately characterize the actual behavior of central banks.

I conjecture that industries which have higher liquidity needs are bound to experience higher growth rates and lower volatility under fixed exchange rate arrangements than under more flexible regimes. My findings suggest that these industries grow faster under exchange rate stability. However, I find little empirical support to the hypothesis that the exchange rate arrangement is important in reducing output volatility in industries with higher working capital needs.

One plausible explanation of these findings could be that a fixed exchange rate regime reduces currency or country risk, which could potentially translate into greater availability of funds through the domestic financial system and a reduction in the cost of financing. Another possible explanation could be given by the degree of liability dollarization in many developing countries. A more stable exchange rate regime would benefit those sectors that have to borrow more, since loans are generally denominated in foreign currency or indexed to the exchange rate. All else equal, firms would prefer more exchange rate stability, which may lower interest rates in foreign currency and provide easier access to credit. Therefore, a peg may help lower

borrowing costs and increase the availability of funds, and hence, having a positive differential impact on industries with higher working capital needs.

The third chapter provides yet another contribution to the existing literature of currency crises. This paper investigates the role played by different exchange rate arrangements in output performance around a currency crisis episode. In other words, I investigate output responses across large devaluations and depreciations. First, I follow a similar approach to Frankel and Rose (1996) and define a currency crisis as an episode in which the nominal exchange rate increases by 15%. Then I proceed to classify them into devaluations and depreciations using the natural exchange rate classification by Reinhart and Rogoff (2004). Once these episodes are sorted out, I analyze the behavior of output across them.

The traditional textbook expenditure-switching effect suggests that large devaluations (depreciations) can be expansionary. A nominal devaluation (depreciation) would translate into a real devaluation (depreciation) in the short-run under wage and price stickiness, stimulating exports and discouraging imports, and increasing employment and output. Therefore, if expenditure-switching is the main acting mechanism, a nominal devaluation (depreciation) is likely to lead to increased production in traded goods, higher net exports, and an improvement of the external position of the country in question.

However, under certain circumstances, depreciations and devaluations can be costly in terms of output. A sharp increase in the exchange rate could have contractionary effects, working through channels such as wealth effects on aggregate demand, higher costs of imported inputs, a rise in the external debt burden from a devaluation

(depreciation) in the presence of liability dollarization, and disruption in credit markets and capital inflows which might limit the possibility of importing capital goods used in production.

As in previous studies, I find that the majority of the currency crisis episodes have been contractionary for the 1970-2007. When I separate currency crisis episodes between devaluations and depreciations, I find that the former have been more contractionary for middle income economies. The distinction is important because middle income countries are in general more open to international credit markets and receive a larger proportion of portfolio capital inflows, making them vulnerable to capital flows reversals and sharp depreciations of their exchange rates (Hutchinson and Noy (2002)).

I interpret these results as follows. Middle income countries are often subject to liability dollarization and currency mismatches. As a result, they may opt for an exchange rate regime that exhibits relatively more stability. This is well documented in Calvo and Reinhart (2002), showing that many developing countries constantly intervene in currency markets to reduce exchange rate variability, a behavior they termed “fear of floating”. However, in case of a sharp increase in the exchange rate – a currency crisis—, the negative impact on output growth is likely to be larger for countries that adopted a fixed exchange rate regime. This result is also supported by the larger magnitude of the estimated output losses when we adopt a higher threshold to define currency crisis episodes.

# Chapter 2

# Exchange Rate Arrangements and Industry Growth: The Role of External Dependence

## *2.1 Introduction*

Economic theory does not provide a clear relationship between nominal exchange rate arrangements and economic performance. In principle, since the exchange rate regime is just another aspect of monetary policy, it should have no effect on long-run growth if money is neutral in the long-run.

Many papers have looked at different mechanisms through which exchange rate arrangements could influence long-run output growth and volatility. A nominal exchange rate regime could potentially affect growth and volatility by promoting international trade, lowering currency risk, insulating the economy from monetary or real shocks, or by simply providing free insurance against domestic currency fluctuations in the presence of currency mismatches in the balance sheets of economic agents. For instance, a fixed exchange rate regime can foster international trade and foreign direct investment by reducing uncertainty and relative price volatility. If lower transaction costs come hand in hand with exchange rate stability, both importers and exporters could benefit from a peg. A relatively stable exchange rate could also increase foreign direct investment (FDI) flows, with all the benefits associated with these flows such as new processes and production technologies, having a positive boost on productivity and long-run growth.

Calvo and Reinhart (2000a) provide an excellent survey on the literature that examines the link between trade and exchange rate volatility. The results are in general mixed. However, when it concerns to emerging markets, empirical evidence seems to lean towards a negative impact of exchange rate variability on trade. The authors advance a few explanations in their paper. First, they note that invoicing patterns are relevant to determine the effects of exchange rate volatility on exports and imports. For emerging economies, prices are quoted in US dollars or some other hard currency in the majority of cases. Second, markets are far from being complete. Both exporters and importers generally do not have full access to tools to hedge against exchange rate risk[1] in emerging market economies. Hence, large fluctuations in the exchange rate could exert a negative effect on trade.

Edwards (1998) examines the trade channel using different indexes of trade policy and finds support for a positive relationship between openness and total factor productivity growth. Endogeneity problems and disagreements about how to measure openness have been the focus of subsequent research (for a discussion, see Rodriguez and Rodrik, 2000). Frankel and Romer (1999) instrument trade using countries' geographic characteristics and find evidence that trade has a significant positive impact on growth. But even if exchange rate stability does foster trade, the empirical evidence that relates trade with growth is mixed at best.

Dornbusch (2001) emphasizes the potential benefit of adopting a peg on currency risk. A fixed exchange rate regime could bring lower currency risk, and therefore,

[1] Wei (1999), however, finds little empirical support for the hypothesis that the availability of hedging tools would reduce the impact of exchange rate volatility on trade.

lower interest rates and reduce the borrowing costs of capital for domestic firms in credit markets. If lower currency risk were to increase the amount of capital inflows and the credit available to domestic firms, firms' time horizons will lengthen, generating a positive effect on investment and growth. Conversely, if agents have doubts about the credibility of the peg, currency risk will increase, resulting in higher borrowing costs and limited access to credit for domestic firms. Shambaugh (2004) examines the relation between monetary policy in the base country and the country adopting a peg. According to his findings, interest rates in countries that adopt a peg seem to follow more closely the interest rates of the base country[2] than in countries that adopt a float. Therefore, adopting a fixed exchange rate regime could potentially translate into a mechanism that provides greater credibility for developing countries with histories of high inflation or poorly managed monetary policy.

The optimal choice of exchange rate regime for an open economy depends on several factors. For instance, under sticky prices, fixed exchange rate regimes provide better insulation for the economy against temporary monetary shocks. Flexible exchange rate regimes, on the other hand, fare better against temporary real shocks. When a real shock takes place, the nominal exchange rate can adjust quickly, simultaneously correcting the real exchange rate. Thus, by allowing for relative price changes and requiring smaller adjustments when a real shock occurs, a flexible exchange regime possesses better insulation properties against these type of shocks in the presence of sticky prices, such as in the Mundell-Fleming model. This conventional wisdom has been questioned by Lahiri, Singh, and Végh (2007), who show that the type of underlying market friction could play an important role in the choice of the exchange

[2] Shambaugh defines the base country as the one to which the currency is pegged.

rate regime. Under credit market frictions, floats provide better insulation properties against monetary shocks, whereas pegs fare better against real shocks.

Several empirical studies find that the short-term response of output to terms-of-trade shocks is smaller in developing countries that adopted flexible exchange rate arrangements. For example, Broda (2004) uses a panel VAR to study the insulation properties of different exchange rate regimes and finds that floats have better insulation properties for terms-of-trade shocks than pegs. Edwards and Levy-Yeyati (2003) also evaluate the effect of terms-of-trade shocks in a panel of 183 countries for the post-Bretton Woods era. They also report that the more rigid the exchange rate regime, the larger the volatility of output in the short-run. Finally, Magud (2005, 2008) suggests that the degree of openness of an economy should not be ignored when choosing an exchange rate regime in the presence of balance sheet effects.

If there is a link between output volatility and output growth, then exchange rate regimes that reduce output volatility could contribute positively to higher long-term growth. Ramey and Ramey (1995) present evidence that output volatility has a negative effect on economic growth.

Currency mismatches and liability dollarization are also relevant variables to consider when choosing an exchange rate arrangement. Currency mismatches are not uncommon in emerging countries. The inability of developing countries to issue debt denominated in domestic currency for developing countries (a phenomenon called "Original Sin" by Eichengreen and Hausman (1999)) may represent one important factor leading to liability dollarization. Firms in emerging markets are subject to balance sheet mismatches, with liabilities mainly denominated in foreign currency,

whereas revenues are in domestic currency, especially for non-tradable sectors. The fact that movements in the exchange rate could exert a large negative impact on the finances of the firms is an important variable to take into account when evaluating the advantages of adopting a given exchange rate arrangement. This is most likely one of the reasons why many emerging markets display "fear of floating" (a phenomenon noted by Calvo and Reinhart (2002), in which countries state they have a flexible exchange rate regime, whereas their behavior resembles more of a peg).

This paper intends to shed light on the impact of nominal exchange rate arrangements on the productive structure of the economy. My analysis will differ in several respects from previous studies. First, I use industry-level data rather than country-level data. The main advantage of this approach is that it allows me to examine whether different exchange rate regimes have heterogeneous effects on industry volatility and growth that are masked in the aggregate. For a given country, a fixed exchange rate regime could exert a positive effect on growth in some industries, while having a negative effect in some others. Industries that are subject to higher liquidity needs, for instance, could benefit from a reduction of borrowing costs or an increase in the availability of funds. If pegs and country risk are negatively correlated, and lower country risk is associated with higher levels of capital inflows and lower cost of capital, then these industries are likely to benefit from a fixed exchange rate regime. On the other hand, central bank policies to defend a peg, such as high interest rates, or fiscal policies that render a peg unsustainable, are likely to increase the country risk and the borrowing costs for domestic firms, primarily affecting those industries with higher liquidity needs.

In order to determine whether a country has a peg or a float, I use the *de facto* exchange rate regime classification constructed by Reinhart and Rogoff (2004). Unlike the official classification given by a country's intended regime, this classification keeps track of the actual behavior of the exchange rate. The distinction between *de jure* and *de facto* behavior is important since economic agents are likely to plan and form expectations according to the actual behavior of the central bank.

The rest of the paper is organized as follows. Section 2.2 reviews two strands of the literature. First, I make a brief account of the literature on exchange rate arrangements and economic performance. Then I review the literature on the heterogeneous effects of financial development, which will serve for my identification purposes. Section 2.3 outlines the empirical approach. Section 2.4 describes the datasets used in this paper, as well as summary statistics. Section 2.5 presents the empirical results. In section 2.6, I perform some robustness checks. Section 2.7 concludes.

### *2.2 Related Literature*

Several studies have investigated the relationship between nominal exchange rate arrangements and economic growth. Ghosh et al. (1996), using a panel of 140 countries for 1960-1990, find that pegs are characterized by higher volatility and lower output per capita growth, but this difference between regimes appears to be quantitatively small and statistically insignificant.

Levy-Yeyati and Sturzenegger (2003) also examine the link between output growth and exchange rate regimes using data from 183 countries over the post-Bretton Woods era (1974-2000). The novelty of their analysis is that they use a *de facto*

classification of exchange rate regimes (instead of using a *de jure* classification based on the regime reported by the governments). In order to construct this classification, they employ cluster analysis to group countries, based on the behavior of three variables related to the nominal exchange rate: the nominal exchange rate volatility, the volatility of exchange rate changes and the volatility of international reserves. Levy-Yeyati and Sturzenegger find that growth rates under flexible exchange rate regimes are significantly higher than under fixed exchange rate regimes for non-industrial economies, whereas this link seems to be of less relevance for industrial economies.

Aghion et al. (2006), on the other hand, examine the relationship between growth and exchange rate regimes conditioning on the country's level of financial development. Their findings suggest that countries with less developed financial systems benefit from a more stable exchange rate, while countries that are more financially developed fare better under a flexible exchange rate regime.

This paper takes a different approach. Instead of relying on country-level data, I use industry-level manufacturing sector data to investigate the impact of nominal exchange rate arrangements on output volatility and growth. The identification approach is similar to the one first introduced by Rajan and Zingales (1998) in their seminal work. These authors investigate whether industries that require relatively more external funds to finance investment (rather than internal funds) grow faster in countries that have more developed financial markets. In order to do that, the authors construct an index of dependence of external funds using data from the United States. This approach depends upon two key assumptions. First, they assume that there is a

technological reason that determines which industries are more dependent on external funds. Second, they assume these technological differences across industries are similar across countries.

Several studies have used this methodological approach. For example, Braun and Larraín (2005) investigate the role of financial frictions in the amplification of short-run fluctuations. The authors argue that credit tightening is likely to exert a greater negative effect in industries that rely primarily on external funds, whereas industries that finance investment and working capital using internal funds are less likely to be exposed to bad credit conditions. They find that industries that have higher liquidity needs are hit harder during downturns. In addition, the differential impact of recessions seems to be larger in countries that are subject to more pronounced credit frictions.

Raddatz (2006) uses a similar approach to explore the relationship between financial development and output volatility. Using industry-level variation of the data, he investigates how the provision of liquidity to firms could potentially affect output volatility. He finds that financial development leads to a relatively greater reduction in the volatility of sectors that are more dependent on external financing, suggesting the existence of a link from financial development to volatility. The following section presents a brief description of the identification strategy.

### *2.3 Empirical Approach*

The identification strategy I adopt in this section has similarities with the methodology followed in the literature on heterogeneous effects of financial

development. This paper explores the following hypotheses. I conjecture that industries which have a higher reliance on external funds are bound to experience higher growth rates and lower volatility under fixed exchange rate arrangements than under flexible exchange rate arrangements. Following Rajan and Zingales, I will assume for identification purposes that industries' liquidity needs are given technologically and are relatively constant across countries.

I estimate the following benchmark empirical specifications:

$$(1) \quad Growth_{i,k,t} = \alpha_0 + \alpha_1 \times Fixed\ ER_{i,t} + \alpha_2 \times Other\ ER_{i,t} + \alpha_3 \times Fixed\ ER_{i,t} \times Liquidity\ Needs_k + \alpha_4 \times Other\ ER_{i,t} \times Liquidity\ Needs_k + FE_{i,t} + FE_{i,k} + \eta_{i,t,k}$$

$$(2) \quad Volatility_{i,k,t} = \beta_0 + \beta_1 \times Fixed\ ER_{i,t} + \beta_2 \times Other\ ER_{i,t} + \beta_3 \times Fixed\ ER_{i,t} \times Liquidity\ Needs_k + \beta_4 \times Other\ ER_{i,t} \times Liquidity\ Needs_k + FE_{i,t} + FE_{i,k} + \varepsilon_{i,t,k}$$

where the dependent variable is either the growth rate of real gross industry output or the volatility of the growth rate of gross industry output (computed over 5-year non-overlapping periods) and $i$, $t$, and $k$ indicate country, period, and industry respectively.

$Fixed\ ER_{i,t}$ is a dummy that takes a value of 1 if the regime is classified as a peg or a crawling peg by Reinhart and Rogoff's classification, and 0 otherwise. $Other\ ER_{i,t}$ is a

dummy that takes a value of 1 if the regime was classified as freely falling or as a dual exchange rate regime in Reinhart and Rogoff's classification, and 0 otherwise.

If a country adopts a fixed exchange regime in the majority of years over a five-year period, that country-period observation is classified as a fixed exchange regime. Similarly, a regime is classified as relatively flexible if it is coded as a float or a managed floating regime for the majority of years over a five-year period. However, if any country-year observation during a five-year period falls into the freely falling category, that country-period observation is automatically classified in the freely falling and no parallel market data category, or in other words, the *Other* $ER_{i,t}$ dummy takes a value of one. The freely falling category is treated differently than flexible regimes due to the adverse effect that high inflation has on growth and volatility. The excluded variable is the dummy for relatively flexible regimes (floats and managed floats).

*Liquidity Needs*$_k$ is a measure of liquidity needs that is assumed to be industry-specific. I use both Rajan and Zingales' External Finance Needs and Raddatz's Cash Conversion Cycle to characterize a firm's need for external financing as opposed to internal financing (Section 2.4.3 provides a description of these two measures). I am interested in the coefficients on the interactions between the different exchange rate arrangements and these measures of liquidity needs. I include country-industry and period-industry fixed effects in all regressions.

I expect to find that industries that have higher liquidity needs exhibit higher growth and lower volatility under a peg, so that $\alpha_3>0$ in the growth regression while $\beta_3<0$ in the volatility regression. A consistent story with these hypotheses could be that pegs

may be associated with lower country risk, which may lower borrowing costs and lead to greater availability of funds for domestic firms.

## *2.4 Data and Descriptive Statistics*

### 2.4.1 Data Sources

I use data from different sources. Industry data was obtained from the UNIDO Indstat-3 (2005) dataset. This dataset provides yearly observations for 28 isic-3 manufacturing industries for a large number of countries for the period 1963-2003. This is an unbalanced panel, and countries in the UNIDO database are skewed towards high-income and middle-income countries, since more disaggregated data is generally not available for many low or lower middle income countries.

For trade data on exports and imports, I use the UN COMTRADE database. Data on country variables was obtained from different sources, mainly from the World Development Indicators database of the World Bank. Finally, liquidity needs and other industry-specific measures were borrowed from Rajan and Zingales (1998), Braun and Larraín (2005) and Raddatz (2006).

Table 2.1 summarizes the average real gross output growth and the real gross output volatility by industry for the post Bretton-Woods period (1974-2003). The average growth rate is computed for each country-industry pair, and then averaged across countries. Output volatility is the average volatility of real gross output for each industry in the manufacturing sector for 1974-2003. Industry volatility is the standard deviation of the growth rate of real gross output over 5-year periods. The non-

overlapping periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003.

In terms of real gross output growth, Table 2.1 shows that Footwear (except rubber or plastic), Textiles, and Miscellaneous Petroleum and Coal Products have been among the slowest growing industries for the period in consideration. On the other hand, Plastic Products, Professional and Scientific Equipment, and Machinery (except industrial) have been among the fastest growing industries in the manufacturing sector.

In terms of real gross output volatility, Food Products, Textiles, and Other Non-Metallic Mineral Products show very low volatility relative to other industries in the manufacturing sector. Miscellaneous Petroleum and Coal Products, Pottery, China and Earthenware, and Professional and Scientific Equipment are among the most volatile industries for the period in consideration.

To study the impact of the exchange rate regime on industry growth and volatility, I use a *de facto* exchange rate regime classification that keeps track of actual behavior, rather than the official or *de jure* regime that represents declared behavior. It is not uncommon for governments to announce a float when the actual behavior of the central bank resembles more closely a peg. Conversely, a peg could resemble a float if the government constantly devalues its currency. The distinction is important since economic agents are likely to plan and form expectations according to the actual behavior of the central bank.[3] I provide a brief description of some of the most

[3] Because this paper focuses more on differences at the industry level, I do not investigate the potential role of deviations from *de jure* regimes. Since I use five-year averages, there is no straightforward way to construct a variable that shows deviations from announced behavior. Alesina and Wagner (2006),

commonly used classifications below.

### 2.4.2 Choosing among *de Facto* Exchange Rate Classifications

In many cases Central Banks' actual behavior differs greatly from the announced regime. For instance, many countries that claim to be running a float resort to frequent intervention in exchange rate markets (a behavior that is closer to a peg than a float). On the other hand, some countries with pegs resort to frequent devaluations of their currency, which causes the exchange rate to resemble a float rather than a peg. The bottom line is that the announced regime does not always relate closely to the actual regime.

Until recently, most empirical work was based on the legal or *de jure* exchange rate regime announced by national governments and compiled in the IMF's Annual Report on Exchange Rate Arrangements and Exchange Restrictions. This classification is mainly based on countries' self-declarations. *De jure* classifications reflect the declared intentions of countries, and they generally do not accurately characterize the actual behavior of central banks. Deviations from the central bank's preannounced exchange rate arrangement are likely to have a detrimental impact on the credibility of domestic monetary policy, increasing uncertainty in currency markets and risk premia charged on liabilities issued in domestic currencies.

Several variables can be taken into account when constructing a *de facto* exchange rate classification. Intervention data such as interest rates and international reserves, parallel market data, and the time period elapsed without changes in the nominal

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for example, explore the determinants of reneging on announced exchange rate arrangements using annual observations.

exchange rate are among several variables used to determine whether exchange rate stability is arising from the absence of shocks or from the central bank's actions to actively manage the exchange rate.

Calvo and Reinhart (2000a), for example, study the behavior of floaters using information on the volatility of the exchange rate, reserves, and interest rates for declared floating economies relative to the world's major economies that can float relatively freely. They show that many countries that claim to have a float in place keep constantly intervening to reduce exchange rate variability. Calvo and Reinhart named this behavior "fear of floating".

In order to adjust for these differences, I use a *de facto* classification of the exchange rate regime rather than a *de jure* classification reported by countries. Several attempts have been carried out to provide a more realistic taxonomy. Levy-Yeyati and Sturzenegger (2003, 2005), Reinhart and Rogoff (2004), and Shambaugh (2004) are some of the most prominent efforts in this direction.

Early attempts, such as Ghosh et al. (1997), extend the IMF classification into a more informative taxonomy. For example, under their classification, countries that realign their pegs more than once a year are not classified as such.

In an effort to construct a better taxonomy of exchange rate arrangements, Levy-Yeyati and Sturzenegger (2003) use both policy and outcome variables to construct a *de facto* classification to distinguish between actual and announced behavior. Country-year observations are sorted applying cluster analysis techniques and data on the volatility of international reserves, the volatility of the exchange rate, and the volatility of changes in the exchange rate. Their classification spans the period 1974-

2004. Observations that show high volatility in the exchange rate variables and little volatility in international reserves are grouped as floats. Conversely, observations that display low volatility in exchange rates but high volatility in international reserves are grouped as pegs. Crawling pegs and dirty floats are characterized by some degree of volatility in all these variables.

A few problems are associated with their methodology. First, country-year data points that exhibit little variability in all the variables are grouped in the inconclusive category by Levy-Yeyati and Sturzenegger's method. The authors resort to additional information in an effort to classify these observations in an uncontroversial way (for instance, currency boards are uncontroversial pegs). The second problem arises from the fact that for some country-year data points, some of the variables used to construct the classification are not available. Third, the ratio of international reserves to M2 may become unstable not because of reserve volatility but due to M2 instability. Finally, they do not account for the potential role of interest rate policy, the presence of capital controls and dual exchange rates, and the differential effects of sterilized and unsterilized intervention.

Shambaugh (2004) constructs another *de facto* classification that utilizes only one variable –the volatility of the exchange rate— to group country-year observations into pegs and non-pegs. He classifies a regime as a peg if the exchange rate remained within a 2 percent band against the base currency for a sufficient length of time (given by twelve months). The twelve-month time window is selected to distinguish cases in which the exchange rate has not changed due to tranquil times from cases in which the government has used active policy to sustain the exchange rate regime.

Further, to account for one-time realignments, countries that stay within the band for eleven out of twelve months are grouped as pegs.

In this chapter, I will follow the natural classification of exchange rate arrangements constructed by Reinhart and Rogoff (2004). They use data on parallel exchange rates and detailed historical chronologies of exchange rate regimes that track capital controls and currency reforms to create a *de facto* classification. The advantage of using parallel market exchange rates rather than official rates is twofold. Parallel exchange rates provide a better indication of the direction of monetary policy, with the parallel market premium generally signaling the direction of future changes in the official exchange rate. Moreover, in countries where parallel markets are important, many economic transactions are carried out using the parallel exchange rate rather than the official one.

Another advantage of using Reinhart and Rogoff's classification is that they include a separate category for countries with episodes where the annual inflation rate is at least 40 percent. This "freely falling" category also includes the first six months of cases in which there was an exchange rate crisis with a transition from a peg to a float. The main reason for including this category is to differentiate flexible regimes that exhibit low inflation from those that experience high inflation, given the lack of monetary control and the distortions associated with the latter.

In order to group countries into different categories, Reinhart and Rogoff use their historical chronologies to establish whether dual, multiple or parallel markets exist. If there is only a unified exchange rate regime, they check whether there is an official pre-announced regime and they proceed to verify the stated system. If no

announcement is in place or if the regime fails verification, and the annual inflation rate does not exceed 40 percent, then they classify the regime by looking at the behavior of the exchange rate using a five-year moving window.

Using Reinhart and Rogoff's classification, I group pegs and crawling pegs into the fixed exchange rate regime category, since the exchange rate is subject to very narrow bands, whereas managed floats and floats are placed in the flexible exchange rate category. Table 2.2 presents the average growth rate and volatility of real gross output by exchange rate arrangement. Regimes that are classified as freely falling or regimes for which parallel data is missing are grouped together in the "Other ER" category. For a given country and five-year period, the prevailing nominal exchange rate is classified as a fixed exchange rate if the country has run a peg or a crawling peg more than 50 percent of the time during that period. Conversely, it is classified as a flexible exchange rate regime if the country has had either a float or a managed float for the majority of the years. Finally, if one year of the five-year period falls in the freely falling category, the country-period observation is classified in the "Other ER" category. Five-year periods are non-overlapping periods. Results do not change much if I require that the majority of the years fall in the freely falling category.

For the period 1974-2003, growth and volatility are higher in the sample of developing and middle income countries than for the sample that includes all countries. This difference is explained by the lower growth and volatility that characterizes the sample of industrial economies (not shown in the tables presented here). Table 2.2 suggests that fixed exchange rate regimes are associated with higher gross output growth than flexible exchange rate regimes. The means tests indicate

that this difference is statistically significant at conventional levels and amounts to about one percentage point for developing and middle income countries.

While fixed exchange rate regimes also seem to be linked to higher output volatility, these differences are only statistically significant at conventional levels for the whole sample. For developing and middle income countries, Table 2.2 suggests that volatility levels across exchange rate regimes are about the same.

The "Other exchange rate regime" category (freely falling and no parallel market data observations) –not reported in Table 2.2— are not uncommon in practice and are generally associated with lower growth and higher volatility compared to both fixed and flexible exchange rate regimes.

### 2.4.3 Measuring Liquidity Needs

In order to shed light on the effects of exchange rate regimes on the productive structure of the economy, I follow the literature on heterogeneous effects of financial development and I classify industries in the manufacturing sector using measures that describe these industries' needs for external liquidity to finance investment and working capital.

Table 2.3 introduces two measures of liquidity needs that have been widely used in the literature that studies the heterogeneous effects of financial development. First, I use the external finance dependence index developed by Rajan and Zingales (1998). This measure is defined as capital expenditures net of cash flows from operations divided by capital expenditures and it is computed using data for publicly listed U.S. firms. Industries such as Tobacco, Pottery, China, Earthenware, Leather Products, and Footwear (except rubber or plastic) are ranked in the lower end of the external finance

dependence index. On the other hand, firms in industries such as Plastic Products, Professional and Scientific Equipment, and Electric Machinery require a significant amount of external funds to finance capital expenditures.

Two assumptions are required in order to apply the approach used by Rajan and Zingales (1998) to our data. First, the demand for external funds in a given sector must be determined technologically. If this is the case, one can assume that the U.S. is the most developed financial market and that large U.S. corporations face a very elastic supply of funds, and estimate the liquidity needs for each industry. Second, we need that these differences across industries should also hold for other countries. More precisely, we need industry rankings to be preserved across countries.

Rajan and Zingales show that their measure of external finance dependence is robust to using Canadian data. Raddatz (2006) constructs similar measures using data from non-US firms from the Worldscope database and finds that the resulting liquidity needs indices are positively correlated with the index built using U.S. data[4].

This measure of industry liquidity needs has been used in several studies. Braun and Larraín (2005) look at the effects of financial development on cyclical fluctuations of different industries using the UNIDO database for the 1963-1999 period. They find that industries with higher dependence on external finance are more adversely affected during recessions and that the more important the frictions in financial

[4] One caveat that might invalidate this approach is the possibility of factor intensity reversals. This scenario is more likely to happen in non-industrial countries, where differences in factor prices could lead to changes in the choice of factor usage intensity and therefore put this identification strategy in jeopardy.

markets, the larger the effect on cyclical volatility in highly dependent industries relative to less dependent industries. In another study, Raddatz (2006) examines the relationship between industry output volatility and the interaction of liquidity needs with measures of financial development. His findings suggest that financial development plays an important role in reducing the volatility of firms in sectors that require higher liquidity needs.

Raddatz constructs an alternative measure of industry liquidity needs. The Cash Conversion Cycle is defined as the average age of inventories plus the average age of accounts receivable minus the average age of accounts payable (365*inventories/cost of goods sold + 365*accounts receivable/sales - 365*accounts payable/cost of goods sold). Although this measure is related to industries' needs for external funding, it primarily attempts to measure the working capital and liquidity needs of a firm. The assumptions underlying the validity of this index are similar to those underlying Rajan and Zingales' index of external dependence.

According to the Cash Conversion Cycle measure, industries such as Petroleum Refineries, Food Products, and Beverages have low liquidity needs, whereas other industries such as Machinery, Professional and Scientific Equipment, and Leather Products have high liquidity needs. The correlation between these two measures is 0.1298. The correlation is low, but positive as expected. The external finance dependence index is more related to long-term investment needs, whereas the cash conversion cycle index is linked to firms' working capital needs.

Tables 2.4, 2.5, 2.6, and 2.7 compare output growth and volatility for industries with different liquidity needs across exchange rate regimes. I use the median across

industries of Rajan and Zingales' index to define industries that have high and low external finance needs (Tables 2.4 and 2.5). Tests for equality of means suggest that the exchange rate regime does have little impact on either growth or volatility in industries with high and low external finance needs. Similarly, volatility is higher for industries that have high external finance needs under fixed exchange rate regimes, result that holds only for the entire sample. This difference is negligible for the subsamples of developing and middle income countries.

Using the Cash Conversion Cycle as the measure of liquidity needs, Tables 2.6 and 2.7 suggest that growth in industries with high cash conversion cycles is higher under pegs than under floats. Means tests indicate that this difference in growth across exchange rate regimes is statistically significant at conventional levels and is larger for developing and middle income countries than for the whole sample. On the other hand, real gross output growth is very similar across exchange rate arrangements for industries with low cash conversion cycles.

In terms of volatility, Table 2.7 suggests that both industries that have high and low cash conversion cycles display higher volatility under a fixed exchange rate regime relative to a flexible regime for the sample that includes all countries. However, the choice of exchange rate arrangement seems to have no differential effect on output volatility across industries with high and low liquidity needs for both developing and middle income countries.

I will exploit this differential impact on real gross output growth across industries when these are sorted using the Cash Conversion Cycle liquidity needs measure. In the next section, I will further explore the preliminary results from Table 2.6, which

supports the hypothesis that industries with higher liquidity needs are likely to exhibit relatively faster growth under a fixed exchange rate regime.

*2.5 Empirical Results*

Tables 2.8 and 2.9 present the basic results for industries' liquidity needs. The dependent variable in Table 2.8 is the average growth rate of real gross output over a 5-year period for industries in the manufacturing sector. FIX is an indicator variable that takes a value of one if a fixed exchange regime was in place in the majority of the years during the five-year period. OTHER takes a value of one if any one year of the period falls into the freely falling category of Reinhart and Rogoff's classification.[5] The excluded category is the flexible exchange regime category. Rajan and Zingales' External Finance Dependence index (Ext. Fin.) and Raddatz's Cash Conversion Cycle index (CCC) are industry specific measures of liquidity needs. Period-industry and country-industry fixed effects are included in all regressions.

Columns (1) through (4) in Table 2.8 present the results for the entire sample. Columns (5) through (8) show the results for developing countries, whereas the remaining columns are for middle income countries. Columns (5) and (8) suggest that fixed exchange rate regimes are associated with higher growth for developing and middle income countries. As expected, the coefficient on OTHER is negative in all

[5] Results also hold if OTHER is defined as a dummy that takes a value of one if the majority of the years in consideration fall into either the freely falling or no parallel market data category in Reinhart and Rogoff's coarse index.

regressions and also statistically significant in several of them, indicating that observations in the freely falling category are generally associated with negative output growth.

Regressions in columns (2) through (4) for the whole sample include interaction terms between measures of liquidity needs and nominal exchange rate arrangements. The interaction between external finance dependence and FIX is statistically insignificant in all regressions. This result also holds when I divide the sample into developing and middles income countries. On the other hand, the interaction between the cash conversion cycle and FIX is statistically significant and positive in column (11), suggesting that output growth is higher for industries with high liquidity needs under fixed exchange rate regimes in middle income countries. While the coefficients of the interaction terms between the FIX dummy and the liquidity needs measures have the correct sign, they are not precisely estimated. Finally, the interaction effect between CCC and OTHER is negative but statistically insignificant in all specifications.

Regression results for industry volatility are shown in Table 2.9. The dependent variable is the standard deviation of the growth rate of gross real output computed over 5-year periods for industries in the manufacturing sector. First, the freely falling category is associated with higher output volatility in all regressions. Second, the coefficient on FIX is negative and statistically significant at conventional levels in just one regression (column (9) for middle income countries). Finally, the interaction effects between FIX and both liquidity needs measures are statistically insignificant.

In the next set of regressions, I include openness of an industry as a regressor. Several studies (see, for example, Magud (2005, 2008) on the insulation properties of different exchange rate regimes) have emphasized the role that the degree of openness of an economy could have when choosing an exchange rate regime, especially in the presence of balance sheet effects.

Currency mismatches are not uncommon in developing and middle income countries, and therefore, controlling for the degree of openness is important. Using industry-level data from the manufacturing sector, I construct a measure of openness which is defined as the sum of exports and imports over gross output for each industry. Similar measures have been previously used in De Gregorio et al. (1994), Betts and Kehoe (2001), and Bems (2008) using annual data. Openness is averaged over 5-year periods and is country-industry-period specific.

In many developing countries, firms are only able to borrow in foreign currency (Eichengreen and Hausman (1999)) and many suffer from liability dollarization. Industries in the manufacturing sector are likely to be affected in different degrees by this phenomenon. For instance, revenues for relatively open industries are in dollars (traded goods), and therefore, exchange rate arrangements should have a lesser impact on output growth. On the other hand, less open industries could benefit from exchange rate stability, experiencing higher growth and less volatility. Firms in such industries are likely to struggle to pay their dollar-denominated debts if the domestic currency experiences a large depreciation. Therefore, firms in relatively less open industries could experience more difficulty borrowing funds or find it more expensive to obtain a loan, affecting firms' output growth and volatility due to the cost of funds

or the lack of access to credit. Therefore, industries that are relatively less open are the ones that are likely to suffer currency mismatches. Also, industries that have higher liquidity needs will likely face more difficulties if debts are denominated in foreign currency.

Table 2.10 presents the regression results including the openness variable as an additional regressor. Once we control for the degree of openness, we find that the coefficient on the interaction of FIX with the Cash Conversion Cycle is positive and statistically significant in all regressions, suggesting that industries with higher liquidity needs (as depicted by the CCC measure) grow faster under a fixed exchange rate system. [6]

Table 2.11 presents the regression results for output volatility for developing and middle income countries. Columns (1) through (12) show that freely falling regimes are associated with higher levels of volatility. The coefficients on FIX, on the other hand, are statistically insignificant, suggesting that the choice between fixed and flexible exchange rate arrangements does not affect output volatility in the manufacturing sector for developing and middle income countries. The interaction terms between liquidity needs and FIX are also statistically insignificant at conventional levels.

However, the coefficient on the openness variable is positive and statistically significant in all regressions. Moreover, the coefficients on the interaction term

[6] In a set of regressions not presented here, we also included the triple interaction terms between the degree of openness, the liquidity needs measures and the exchange rate arrangement. The coefficient on the triple interaction terms are not precisely estimated in the data set and are statistically insignificant.

between the fixed exchange rate arrangement dummies and openness are also negative and statistically significant, but about half the size in magnitude of the coefficient of the openness variable. This finding suggests that output volatility increases as the degree of openness increases under a fixed exchange rate regime.

To summarize, this section explored the question of whether a given exchange rate arrangement has heterogeneous effects on industry growth and industry volatility that do not show up using aggregate data. This may not be surprising since a given exchange rate regime might affect an industry differently depending on industry characteristics such as liquidity needs and openness. The evidence presented here suggests that sectors with high liquidity needs, measured by Raddatz's Cash Conversion Cycle, experience higher output growth under a fixed exchange rate system. This result is consistent with the preliminary findings in Table 2.6. However, I find little empirical support for the hypothesis that the choice between a fixed and flexible exchange rate regime is relevant for output volatility: industries with higher liquidity needs do not seem to exhibit lower output volatility under a peg. These findings are in line with the descriptive statistics presented earlier in the paper.

## *2.6 Robustness Checks*

In this section I perform several robustness checks. First, I construct a currency crisis index *à la* Frankel and Rose (1996) using annual nominal exchange rate data from the International Financial Statistics database of the International Monetary Fund. The authors define a currency crisis as "a large change of the nominal exchange rate that

is also a substantial increase in the rate of change of nominal depreciation." They use two criteria: a) a depreciation of the local currency of at least 25%, and b) the change in the exchange rate should exceed the previous year's change by at least 10%.

I include this currency crisis indicator in the regressions, because despite the fact that Reinhart and Rogoff's classification controls for episodes of high inflation and currency crises, it is possible that some currency crisis episodes are classified as pegs or floats, thus affecting the results found in the previous section. If large currency depreciations represent episodes of economic turmoil and output contraction, then these episodes could potentially affect our results if most crises have been catalogued as floats by the *de facto* index. If that were the case, then crisis episodes, and not the exchange rate regime, would be the culprit for some of the differences across alternative regimes. I report only the regression results for output growth in Table 2.12.

Regression results depicted in Table 2.12 include the currency crisis dummy and the interaction terms between liquidity needs, the currency crisis dummies and the exchange rate regime dummies. As expected, the coefficients on currency crisis and on OTHER are negative and statistically significant in several of the regressions. The coefficients on the interaction between FIX and CCC remain positive, however, these are not precisely estimated in the dataset.

Second, I run similar regressions using real value added rather than real gross output growth. Table 2.13 shows regression results analogous to those presented previously in Table 2.10. Value added and not gross output may prove to be a more appropriate measure to compare industry performance across the manufacturing sector. As

expected, the coefficient on the interaction term between FIX and CCC is statistically significant in all regressions and has the correct sign. Moreover, the differential impact of fixed exchange rate regimes on industries with higher liquidity needs is more precisely estimated using real value added growth rather than real gross output growth as the dependent variable. Results in Table 2.13 confirm our findings using real value added growth.

Finally, since industries that require relatively more external financing (as measured by the CCC index) seem to grow faster under exchange rate stability, I use the Institutional Investor Ratings (IIR) as a proxy for country risk. The idea is that a fixed exchange rate regime, by reducing country risk, could potentially lead to either additional funds being available through the domestic financial system, a reduction in the cost of financing, or both. Therefore, all else equal, industries that have high liquidity needs should benefit relatively more under these circumstances. Columns (1)-(3) and columns (7)-(9) in Table 2.14 show the regression results using real gross output growth, whereas columns (4)-(6) and columns (10)-(12) show the regression results using real value added growth. When Institutional Investor Ratings (IIR) are used as a proxy for country risk, I find that the interaction between IIR and CCC is positive and statistically significant in all regressions using both real gross output and value added growth. The coefficient on the interaction term between the fixed exchange rate regime dummy and CCC in the regressions with real growth output growth as the dependent variable remains positive but loses some precision. On the other hand, when real value added growth is used, the coefficient on the interaction term between the liquidity needs measure and the fixed exchange rate regime dummy

is positive and statistically significant at conventional levels. These findings are consistent with the idea of the potential benefit of a fixed exchange rate regime, which could lower currency risk, and therefore, result in lower interest rates and lower cost of capital for domestic firms in credit markets.

## *2.7 Concluding Remarks*

In this paper, I have examined the effects of nominal exchange rate arrangements on industry-level output growth and volatility. My analysis suggests the following broad conclusions.

First, industries that require relatively more external financing (as opposed to internal financing) than others seem to grow faster under exchange rate stability, although this is true only for developing countries and the Cash Conversion Cycle Index, which is mainly a measure of working capital needs. This result does not hold under Rajan and Zingales' External Finance Dependence Index. One plausible explanation could be that a fixed exchange rate regime reduces currency or country risk, which could potentially translate into more funds being available through the domestic financial system or a reduction in the cost of financing. Therefore, all else equal, industries that have high liquidity needs should benefit relatively more under these circumstances.

Developing countries suffer from liability dollarization. A more stable exchange rate regime would benefit those sectors that have to borrow more to finance investment projects, since loans in that case are mainly conducted in foreign currency or indexed to the exchange rate. A peg may help lower borrowing costs and increase the availability of funds, having a positive differential impact on industries that need to

borrow more. This explanation is supported by the positive sign on the interaction of the Institutional Investors Rating and the Cash Conversion Cycle Index. This channel is likely to benefit industries that require higher working capital needs. Lower currency risk, and therefore, lower interest rates and cost of capital for domestic firms could be among some of the potential benefits of having a peg. Alternatively, industries that have higher liquidity needs are likely to face more difficulties if debts are denominated in foreign currency. All else equal, they would prefer more exchange rate stability, which may lower interest rates and provide easier access to credit. These explanations are consistent with the findings presented in this chapter.

Second, the evidence presented in this paper suggests that fixed exchange rate regimes have little effect on volatility for industries that have relatively higher liquidity needs, and hence, I find little empirical support for the second hypothesis advanced in Section 2.3.

I also find little support to the hypothesis that less open industries are also more likely to benefit from exchange rate stability. This may be the case for countries where liability dollarization is the norm, especially if loans are denominated in foreign currency. If the exchange rate is subject to large fluctuations, firms in these industries might experience difficulties servicing dollar-denominated debts, which they might have been able to repay at the previous exchange rate. Less open industries may therefore find it easier to borrow funds under a fixed exchange regime, potentially increasing their growth and reducing their volatility since they have easier access to credit. Many authors have emphasized the potential for pervasive balance sheet effects in developing countries (Aghion et al. (2004) and Céspedes et al. (2004) to

mention a few). As noted by Eichengreen and Hausmann (1999), emerging markets suffer from the "Original Sin" of being unable to issue debt denominated in domestic currency in international capital markets. I find little empirical support of this channel using this dataset.

These results should be interpreted carefully. The data used in this paper is for the manufacturing sector only. Extending these conclusions to other sectors of the economy should be done with care. Moreover, my results suggest that nominal exchange rate arrangements might have heterogeneous effects on different industries of the economy, depending on the characteristics that each of these industries have. It is not surprising, however, that country-level regressions have found mixed results on the relationship between nominal exchange rate regimes and economic performance.

# -Table 2.1-

| Average growth rate and volatility of real gross output by industry | | | | | | |
|---|---|---|---|---|---|---|
| | *Real gross output growth* | | | *Real gross output volatility* | | |
| Industry | All countries | Developing | Middle income | All countries | Developing | Middle income |
| Food products | 0.0306 | 0.0384 | 0.0385 | 0.1060 | 0.1452 | 0.1417 |
| Beverages | 0.0377 | 0.0422 | 0.0445 | 0.1425 | 0.1800 | 0.1754 |
| Tobacco | 0.0238 | 0.0258 | 0.0309 | 0.1686 | 0.1886 | 0.1898 |
| Textiles | 0.0003 | 0.0058 | 0.0073 | 0.1413 | 0.1620 | 0.1668 |
| Wearing apparel, except footwear | 0.0275 | 0.0618 | 0.0595 | 0.1779 | 0.2456 | 0.2251 |
| Leather products | 0.0109 | 0.0217 | 0.0167 | 0.2033 | 0.2520 | 0.2627 |
| Footwear, except rubber or plastic | -0.0060 | 0.0041 | 0.0051 | 0.1992 | 0.2656 | 0.2546 |
| Wood products, except furniture | 0.0235 | 0.0341 | 0.0360 | 0.2013 | 0.2514 | 0.2323 |
| Furniture, except metal | 0.0378 | 0.0473 | 0.0504 | 0.1920 | 0.2604 | 0.2463 |
| Paper and products | 0.0412 | 0.0519 | 0.0515 | 0.1588 | 0.1948 | 0.2008 |
| Printing and publishing | 0.0499 | 0.0577 | 0.0651 | 0.1575 | 0.2198 | 0.2123 |
| Industrial chemicals | 0.0413 | 0.0375 | 0.0550 | 0.2121 | 0.2593 | 0.2313 |
| Other chemicals | 0.0530 | 0.0534 | 0.0516 | 0.1437 | 0.1789 | 0.1785 |
| Petroleum refineries | 0.0513 | 0.0674 | 0.0571 | 0.2638 | 0.2963 | 0.2928 |
| Misc. petroleum and coal products | 0.0038 | 0.0055 | -0.0022 | 0.3001 | 0.3834 | 0.4215 |
| Rubber products | 0.0164 | 0.0346 | 0.0215 | 0.1961 | 0.2570 | 0.2441 |
| Plastic products | 0.0623 | 0.0802 | 0.0801 | 0.1612 | 0.2081 | 0.1972 |
| Pottery, china, earthenware | 0.0406 | 0.0516 | 0.0617 | 0.2802 | 0.3510 | 0.3532 |
| Glass and products | 0.0380 | 0.0462 | 0.0490 | 0.1863 | 0.2168 | 0.2058 |
| Other non-metallic mineral products | 0.0357 | 0.0466 | 0.0471 | 0.1427 | 0.1743 | 0.1686 |
| Iron and steel | 0.0385 | 0.0677 | 0.0479 | 0.2041 | 0.2460 | 0.2387 |
| Non-ferrous metals | 0.0369 | 0.0558 | 0.0439 | 0.2270 | 0.2953 | 0.3027 |
| Fabricated metal products | 0.0339 | 0.0378 | 0.0384 | 0.1596 | 0.2130 | 0.2090 |
| Machinery, except electrical | 0.0551 | 0.0681 | 0.0604 | 0.2094 | 0.2647 | 0.2647 |
| Machinery, electric | 0.0449 | 0.0509 | 0.0492 | 0.1742 | 0.2142 | 0.2107 |
| Transport equipment | 0.0404 | 0.0459 | 0.0440 | 0.2123 | 0.2887 | 0.2960 |
| Professional & scientific equipment | 0.0606 | 0.0551 | 0.0503 | 0.2420 | 0.3430 | 0.3712 |
| Other manufactured products | 0.0281 | 0.0285 | 0.0394 | 0.2524 | 0.3277 | 0.3276 |

Note: Output growth is the average growth rate across countries of real gross output for each industry in the manufacturing sector for 1974-2003. Industry growth is the average growth rate over 5-year periods. Output volatility is the average volatility across countries of real gross output for each industry in the manufacturing sector for 1974-2003. Industry volatility is the standard deviation of the growth rate of real gross output over 5-year periods. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations.

## -Table 2.2-

**Real output growth and volatility by exchange rate arrangements (5-year averages)**

***Real gross output growth***

| | All countries | | Developing | | Middle income | |
|---|---|---|---|---|---|---|
| RR index | Obs. | Avg. growth | Obs. | Avg. growth | Obs. | Avg. growth |
| Fixed ER Regimes | 4601 | 0.0422 | 2080 | 0.0640 | 1451 | 0.0617 |
| Flexible ER Regimes | 2110 | 0.0379 | 897 | 0.0541 | 778 | 0.0517 |
| Difference FIX - FLEX | | 0.0043 | | 0.0099 | | 0.0100 |
| P-value | | 0.1286 | | 0.0533* | | 0.0910* |

Note: Output growth is the average growth rate of real gross output for each industry in the manufacturing sector over 5-year periods. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Fixed Exchange Rate Regimes include pegs and crawling pegs, and Flexible Exchange Rate Regimes include managed floats and floats. Regimes that are classified as Freely Falling and regimes with no parallel market data are classified as OTHER. I use the classification constructed by Reinhart and Rogoff (2004). *, **, and *** denote significance at 10, 5 and 1 percent respectively for means and medians equality tests.

***Real gross output volatility***

| | All countries | | Developing | | Middle income | |
|---|---|---|---|---|---|---|
| RR index | Obs. | Output vol. | Obs. | Output vol. | Obs. | Output vol. |
| Fixed ER Regimes | 4601 | 0.1735 | 2080 | 0.2162 | 1451 | 0.2288 |
| Flexible ER Regimes | 2110 | 0.1590 | 897 | 0.2160 | 778 | 0.2173 |
| Difference | | 0.0145 | | 0.0002 | | 0.0115 |
| P-value | | 0.0072*** | | 0.9831 | | 0.3299 |

Note: Output volatility is the average volatility of real gross output for each industry in the manufacturing sector for 1974-2003. Industry volatility is the standard deviation of the growth rate of real gross output over 5-year periods. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Fixed Exchange Rate Regimes include pegs and crawling pegs, and Flexible Exchange Rate Regimes include managed floats and floats. Regimes that are classified as Freely Falling and regimes with no parallel market data are classified as OTHER. I use the classification constructed by Reinhart and Rogoff (2004). *, **, and *** denote significance at 10, 5 and 1 percent respectively for means equality tests.

## -Table 2.3-

| Measures of Industry Liquidity Needs | | | |
|---|---|---|---|
| ISIC | Description | External Finance | Cash Conversion Cycle |
| 311 | Food products | 0.137 | 0.495 |
| 313 | Beverages | 0.077 | 0.519 |
| 314 | Tobacco | -0.451 | 1.4 |
| 321 | Textiles | 0.277 | 1.058 |
| 322 | Wearing apparel, except footwear | 0.029 | 1.231 |
| 323 | Leather products | -0.14 | 1.74 |
| 324 | Footwear, except rubber or plastic | -0.078 | 1.328 |
| 331 | Wood products, except furniture | 0.284 | 0.742 |
| 332 | Furniture, except metal | 0.236 | 1.073 |
| 341 | Paper and products | 0.154 | 0.703 |
| 342 | Printing and publishing | 0.204 | 0.781 |
| 351 | Industrial chemicals | 0.236 | 0.914 |
| 352 | Other chemicals | 0.793 | 1.045 |
| 353 | Petroleum refineries | 0.042 | 0.19 |
| 354 | Misc. petroleum and coal products | 0.334 | 0.687 |
| 355 | Rubber products | 0.226 | 0.926 |
| 356 | Plastic products | 1.14 | 0.844 |
| 361 | Pottery, china, earthenware | -0.146 | 1.232 |
| 362 | Glass and products | 0.528 | 0.961 |
| 369 | Other non-metallic mineral products | 0.062 | 1.018 |
| 371 | Iron and steel | 0.087 | 0.897 |
| 372 | Non-ferrous metals | 0.005 | 0.885 |
| 381 | Fabricated metal products | 0.237 | 1.116 |
| 382 | Machinery, except electrical | 0.724 | 1.457 |
| 383 | Machinery, electric | 0.846 | 1.46 |
| 384 | Transport equipment | 0.3 | 0.895 |
| 385 | Professional & scientific equipment | 0.961 | 1.673 |
| 390 | Other manufactured products | 0.47 | 1.416 |
| | | Correlation = 0.1298 | |

## -Table 2.4-

| External Finance Needs and Exchange Rate Arrangements - Output growth | | | | |
|---|---|---|---|---|
| ***All countries*** | | | | |
| | *High External Finance Needs* | | *Low External Finance Needs* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 2335 | 0.0482 | 2266 | 0.0361 |
| FLEX | 1063 | 0.0448 | 1047 | 0.0309 |
| | | | | |
| Difference | | 0.0034 | | 0.0052 |
| P-value | | 0.4069 | | 0.1879 |
| ***Developing countries*** | | | | |
| | *High External Finance Needs* | | *Low External Finance Needs* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 1039 | 0.0679 | 1041 | 0.0602 |
| FLEX | 449 | 0.0585 | 448 | 0.0497 |
| | | | | |
| Difference | | 0.0094 | | 0.0105 |
| P-value | | 0.2185 | | 0.1276 |
| ***Middle income countries*** | | | | |
| | *High External Finance Needs* | | *Low External Finance Needs* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 718 | 0.0677 | 733 | 0.0558 |
| FLEX | 391 | 0.0543 | 387 | 0.0490 |
| | | | | |
| Difference | | 0.0134 | | 0.0068 |
| P-value | | 0.1295 | | 0.3910 |

Note: Output growth is the average growth rate of real gross output for each industry in the manufacturing sector over 5-year periods. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Rajan and Zingales (1998) External Finance Needs is industry-specific. High External Finance Needs industries are industries above the manufacturing sector median according to the Rajan and Zingales measure. Low External Finance Needs industries are industries below the median. Fixed Exchange Rate Regimes include pegs and crawling pegs, and Flexible Exchange Rate Regimes include managed floats and floats. Regimes that are classified as Freely Falling and regimes with no parallel market data are classified as OTHER. I use the classification constructed by Reinhart and Rogoff (2004). *, **, and *** denote significance at 10, 5 and 1 percent respectively for means equality tests.

## -Table 2.5-

| External Finance Needs and Exchange Rate Arrangements - Output volatility | | | | |
|---|---|---|---|---|
| ***All countries*** | | | | |
| | *High External Finance Needs* | | *Low External Finance Needs* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 2335 | 0.1810 | 2266 | 0.1659 |
| FLEX | 1063 | 0.1628 | 1047 | 0.1552 |
| | | | | |
| Difference | | 0.0182 | | 0.0107 |
| P-value | | 0.0261** | | 0.1283 |
| ***Developing countries*** | | | | |
| | *High External Finance Needs* | | *Low External Finance Needs* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 1039 | 0.2294 | 1041 | 0.2031 |
| FLEX | 449 | 0.2261 | 448 | 0.2059 |
| | | | | |
| Difference | | 0.0033 | | -0.0028 |
| P-value | | 0.8301 | | 0.8181 |
| ***Middle income countries*** | | | | |
| | *High External Finance Needs* | | *Low External Finance Needs* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 718 | 0.2425 | 733 | 0.2153 |
| FLEX | 391 | 0.2282 | 387 | 0.2063 |
| | | | | |
| Difference | | 0.0144 | | 0.0090 |
| P-value | | 0.4403 | | 0.5342 |

Note: Output volatility is the average volatility of real gross output for each industry in the manufacturing sector for 1974-2003. Industry volatility is the standard deviation of the growth rate of real gross output over 5-year periods. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Rajan and Zingales (1998) External Finance Needs is industry-specific. High External Finance Needs industries are industries above the manufacturing sector median according to the Rajan and Zingales measure. Low External Finance Needs industries are industries below the median. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Fixed Exchange Rate Regimes include pegs and crawling pegs, and Flexible Exchange Rate Regimes include managed floats and floats. Regimes that are classified as Freely Falling and regimes with no parallel market data are classified as OTHER. I use the classification constructed by Reinhart and Rogoff (2004). *, **, and *** denote significance at 10, 5 and 1 percent respectively for means equality tests.

## -Table 2.6-

| Cash Conversion Cycle and Exchange Rate Arrangements - Ouput growth | | | | |
|---|---|---|---|---|
| ***All countries*** | | | | |
| | *High Cash Conversion Cycle* | | *Low Cash Conversion Cycle* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 2326 | 0.0423 | 2275 | 0.0421 |
| FLEX | 1081 | 0.0354 | 1029 | 0.0406 |
| | | | | |
| Difference | | 0.0070 | | 0.0015 |
| P-value | | 0.0954* | | 0.6906 |
| ***Developing countries*** | | | | |
| | *High Cash Conversion Cycle* | | *Low Cash Conversion Cycle* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 1061 | 0.0662 | 1019 | 0.0617 |
| FLEX | 452 | 0.0463 | 445 | 0.0620 |
| | | | | |
| Difference | | 0.0200 | | -0.0003 |
| P-value | | 0.0073*** | | 0.9665 |
| ***Middle income countries*** | | | | |
| | *High Cash Conversion Cycle* | | *Low Cash Conversion Cycle* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 736 | 0.0650 | 715 | 0.0583 |
| FLEX | 391 | 0.0454 | 387 | 0.0580 |
| | | | | |
| Difference | | 0.0195 | | 0.0004 |
| P-value | | 0.0246** | | 0.9633 |

Note: Output growth is the average growth rate of real gross output for each industry in the manufacturing sector over 5-year periods. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Raddatz (2006) Cash Conversion Cycle (CCC) is industry-specific. High Cash Conversion Cycle industries are industries above the manufacturing sector median according to Raddatz's measure. Low Cash Conversion Cycle industries are industries below the median. Fixed Exchange Rate Regimes include pegs and crawling pegs, and Flexible Exchange Rate Regimes include managed floats and floats. Regimes that are classified as Freely Falling and regimes with no parallel market data are classified as OTHER. I use the classification constructed by Reinhart and Rogoff (2004). *, **, and *** denote significance at 10, 5 and 1 percent respectively for means equality tests.

## -Table 2.7-

| Cash Conversion Cycle and Exchange Rate Arrangements -Output volatility | | | | |
|---|---|---|---|---|
| ***All countries*** | | | | |
| | *High Cash Conversion Cycle* | | *Low Cash Conversion Cycle* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 2326 | 0.1746 | 2275 | 0.1724 |
| FLEX | 1081 | 0.1614 | 1029 | 0.1565 |
| | | | | |
| Difference | | 0.0132 | | 0.0159 |
| P-value | | 0.0948* | | 0.0298** |
| ***Developing countries*** | | | | |
| | *High Cash Conversion Cycle* | | *Low Cash Conversion Cycle* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 1061 | 0.2211 | 1019 | 0.2112 |
| FLEX | 452 | 0.2214 | 445 | 0.2106 |
| | | | | |
| Difference | | -0.0003 | | 0.0006 |
| P-value | | 0.9841 | | 0.9645 |
| ***Middle income countries*** | | | | |
| | *High Cash Conversion Cycle* | | *Low Cash Conversion Cycle* | |
| RR index | Obs | Mean | Obs | Mean |
| FIX | 736 | 0.2329 | 715 | 0.2245 |
| FLEX | 391 | 0.2222 | 387 | 0.2123 |
| | | | | |
| Difference | | 0.0107 | | 0.0122 |
| P-value | | 0.5464 | | 0.4319 |

Note: Output volatility is the average volatility of real gross output for each industry in the manufacturing sector for 1974-2003. Industry volatility is the standard deviation of the growth rate of real gross output over 5-year periods. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Raddatz (2006) Cash Conversion Cycle is industry-specific. High Cash Conversion Cycle (CCC) industries are industries above the manufacturing sector median according to Raddatz's measure. Low Cash Conversion Cycle industries are industries below the median. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. Fixed Exchange Rate Regimes include pegs and crawling pegs, and Flexible Exchange Rate Regimes include managed floats and floats. Regimes that are classified as Freely Falling and regimes with no parallel market data are classified as OTHER. I use the classification constructed by Reinhart and Rogoff (2004). I use the classification constructed by Reinhart and Rogoff (2004). *, **, and *** denote significance at 10, 5 and 1 percent respectively for means equality tests.

# -Table 2.8-

**Liquidity needs and output growth**

| | *All countries* | | | | *Developing countries* | | | | *Middle income countries* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| FIX | 0.0081 | 0.0053 | -0.0150 | -0.0161 | 0.0198** | 0.0139 | -0.0266 | -0.0292 | 0.0248*** | 0.0162* | -0.0255 | -0.0296 |
| | (0.0052) | (0.0060) | (0.0170) | (0.0173) | (0.0086) | (0.0097) | (0.0288) | (0.0293) | (0.0085) | (0.0096) | (0.0301) | (0.0306) |
| OTHER | -0.0588*** | -0.0534*** | -0.0174 | -0.0149 | -0.0423*** | -0.0392*** | -0.0238 | -0.0221 | -0.0355*** | -0.0340*** | -0.0100 | -0.0093 |
| | (0.0092) | (0.0109) | (0.0323) | (0.0330) | (0.0114) | (0.0132) | (0.0405) | (0.0414) | (0.0108) | (0.0129) | (0.0453) | (0.0463) |
| FIX x Ext. Fin. | | 0.0103 | | 0.0076 | | 0.0214 | | 0.0166 | | 0.0314 | | 0.0266 |
| | | (0.0120) | | (0.0116) | | (0.0189) | | (0.0180) | | (0.0203) | | (0.0190) |
| OTHER x Ext. Fin. | | -0.0198 | | -0.0159 | | -0.0116 | | -0.0101 | | -0.0059 | | -0.0034 |
| | | (0.0228) | | (0.0224) | | (0.0285) | | (0.0278) | | (0.0305) | | (0.0294) |
| FIX x CCC | | | 0.0224 | 0.0215 | | | 0.0448 | 0.0428 | | | 0.0486* | 0.0454 |
| | | | (0.0164) | (0.0161) | | | (0.0274) | (0.0271) | | | (0.0294) | (0.0289) |
| OTHER x CCC | | | -0.0399 | -0.0382 | | | -0.0181 | -0.0171 | | | -0.0250 | -0.0249 |
| | | | (0.0289) | (0.0284) | | | (0.0367) | (0.0362) | | | (0.0417) | (0.0410) |
| Constant | 0.0601*** | 0.0600*** | 0.0601*** | 0.0601*** | 0.0770*** | 0.0771*** | 0.0772*** | 0.0773*** | 0.0658*** | 0.0660*** | 0.0662*** | 0.0663*** |
| | (0.0058) | (0.0058) | (0.0058) | (0.0058) | (0.0101) | (0.0101) | (0.0101) | (0.0101) | (0.0083) | (0.0083) | (0.0082) | (0.0082) |
| Period x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 7935 | 7935 | 7935 | 7935 | 4117 | 4117 | 4117 | 4117 | 3156 | 3156 | 3156 | 3156 |
| Adj. R sq. | 0.122 | 0.122 | 0.123 | 0.123 | 0.104 | 0.104 | 0.106 | 0.105 | 0.108 | 0.108 | 0.101 | 0.101 |

Note: The dependent variable is the growth rate of real gross output of an industry in a given country and period. Industry growth is the average growth rate of real gross output over 5-year periods. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. External Finance and Cash Conversion Cycle (CCC) are industry-specific. FIX include pegs and crawling pegs, and OTHER include freely falling and regimes with no parallel market data from Reinhart and Rogoff (2004) classification. Columns (1)-(4) show the results for all countries. Columns (5)-(8) show the results for developing countries. Columns (9)-(12) show the results for middle income countries. Heterokesdacity robust standard errors, clustered at the country-industry level are reported in parenthesis. *, **, and *** denote significance at 10, 5 and 1 percent respectively.

# -Table 2.9-

**Liquidity needs and output volatility**

| | *All countries* | | | | *Developing countries* | | | | *Middle income countries* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| FIX | -0.0076 | -0.0013 | -0.0027 | 0.0002 | -0.0166 | -0.0086 | 0.0076 | 0.0115 | -0.0336** | -0.0286 | -0.0006 | 0.0013 |
| | (0.0090) | (0.0121) | (0.0262) | (0.0259) | (0.0149) | (0.0199) | (0.0421) | (0.0416) | (0.0168) | (0.0221) | (0.0486) | (0.0484) |
| OTHER | 0.0940*** | 0.1033*** | 0.1238*** | 0.1283*** | 0.0892*** | 0.1006*** | 0.1257*** | 0.1314*** | 0.0716*** | 0.0814*** | 0.1109** | 0.1155*** |
| | (0.0126) | (0.0167) | (0.0362) | (0.0362) | (0.0153) | (0.0208) | (0.0426) | (0.0428) | (0.0144) | (0.0188) | (0.0436) | (0.0442) |
| FIX x Ext. Fin. | | -0.0225 | | -0.0222 | | -0.0288 | | -0.0263 | | -0.0177 | | -0.0139 |
| | | (0.0260) | | (0.0268) | | (0.0424) | | (0.0437) | | (0.0504) | | (0.0515) |
| OTHER x Ext. Fin. | | -0.0337 | | -0.0309 | | -0.0418 | | -0.0382 | | -0.0359 | | -0.0314 |
| | | (0.0333) | | (0.0337) | | (0.0429) | | (0.0436) | | (0.0443) | | (0.0442) |
| FIX x CCC | | | -0.0048 | -0.0016 | | | -0.0236 | -0.0202 | | | -0.0319 | -0.0300 |
| | | | (0.0266) | (0.0274) | | | (0.0438) | (0.0451) | | | (0.0511) | (0.0522) |
| OTHER x CCC | | | -0.0289 | -0.0249 | | | -0.0355 | -0.0309 | | | -0.0383 | -0.0343 |
| | | | (0.0342) | (0.0348) | | | (0.0426) | (0.0434) | | | (0.0438) | (0.0440) |
| Constant | 0.1808*** | 0.1807*** | 0.1808*** | 0.1807*** | 0.2123*** | 0.2122*** | 0.2124*** | 0.2122*** | 0.2194*** | 0.2193*** | 0.2194*** | 0.2193*** |
| | (0.0092) | (0.0092) | (0.0092) | (0.0092) | (0.0155) | (0.0156) | (0.0155) | (0.0156) | (0.0150) | (0.0150) | (0.0150) | (0.0150) |
| Period x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 7935 | 7935 | 7935 | 7935 | 4117 | 4117 | 4117 | 4117 | 3156 | 3156 | 3156 | 3156 |
| Adj. R sq. | 0.323 | 0.323 | 0.323 | 0.323 | 0.280 | 0.280 | 0.280 | 0.280 | 0.249 | 0.249 | 0.249 | 0.248 |

Note: The dependent variable is the volatility of real gross output for each industry in the manufacturing sector for 1974-2003. Industry volatility is the standard deviation of the growth rate of real gross output over 5-year periods. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. External Finance and Cash Conversion Cycle (CCC) are industry-specific. FIX include pegs and crawling pegs, and OTHER include freely falling and regimes with no parallel market data from Reinhart and Rogoff (2004) classification. Columns (1)-(4) show the results for all countries. Columns (5)-(8) show the results for developing countries. Columns (9)-(12) show the results for middle income countries. Heterokesdacity robust standard errors, clustered at the country-industry level are reported in parenthesis. *, **, and *** denote significance at 10, 5 and 1 percent respectively.

## -Table 2.10-

| Industry openness, liquidity needs and output growth | | | | | | |
|---|---|---|---|---|---|---|
| | *Developing countries* | | | *Middle income countries* | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| FIX | 0.0329*** | -0.0305 | -0.0342 | 0.0347*** | -0.0291 | -0.0345 |
| | (0.0111) | (0.0315) | (0.0322) | (0.0118) | (0.0340) | (0.0346) |
| OTHER | -0.0417*** | -0.0318 | -0.0325 | -0.0597*** | -0.0258 | -0.0265 |
| | (0.0129) | (0.0347) | (0.0351) | (0.0142) | (0.0377) | (0.0382) |
| Openness | 0.0004 | 0.0004 | 0.0005 | 0.0006 | 0.0006 | 0.0007 |
| | (0.0055) | (0.0054) | (0.0054) | (0.0056) | (0.0055) | (0.0054) |
| FIX x Openness | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | -0.0000 |
| | (0.0056) | (0.0054) | (0.0054) | (0.0057) | (0.0056) | (0.0055) |
| OTHER x Openness | -0.0002 | -0.0002 | -0.0003 | 0.0013 | 0.0014 | 0.0012 |
| | (0.0055) | (0.0054) | (0.0054) | (0.0056) | (0.0055) | (0.0054) |
| FIX x Ext. Fin. | 0.0321 | | 0.0248 | 0.0431* | | 0.0360 |
| | (0.0240) | | (0.0230) | (0.0252) | | (0.0238) |
| OTHER x Ext. Fin. | 0.0018 | | 0.0039 | -0.0024 | | 0.0034 |
| | (0.0295) | | (0.0293) | (0.0299) | | (0.0296) |
| FIX x CCC | | 0.0698** | 0.0670** | | 0.0729** | 0.0689** |
| | | (0.0310) | (0.0304) | | (0.0338) | (0.0330) |
| OTHER x CCC | | -0.0092 | -0.0094 | | -0.0340 | -0.0340 |
| | | (0.0332) | (0.0330) | | (0.0369) | (0.0367) |
| Constant | 0.0483*** | 0.0482*** | 0.0480*** | 0.0234** | 0.0234** | 0.0231** |
| | (0.0110) | (0.0109) | (0.0109) | (0.0115) | (0.0116) | (0.0115) |
| Period x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 3393 | 3393 | 3393 | 2579 | 2579 | 2579 |
| Adj. R sq. | 0.381 | 0.383 | 0.383 | 0.187 | 0.192 | 0.192 |

Note: The dependent variable is the growth rate of real gross output of an industry in a given country and period. Industry growth is the average growth rate of real gross output over 5-year periods. Openness is defined as average of the ratio of (exports + imports)/real gross output over 5-year periods and is country-industry-period specific. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. External Finance and Cash Conversion Cycle (CCC) are industry-specific. FIX include pegs and crawling pegs, and OTHER include freely falling and regimes with no parallel market data from Reinhart and Rogoff (2004) classification. Columns (1)-(3) show the results for developing countries. Columns (4)-(6) show the results for middle income countries. Heterokesdacity robust standard errors, clustered at the country-industry level are reported in parenthesis. *, **, and *** denote significance at 10, 5 and 1 percent respectively.

## -Table 2.11-

| Industry tradability, liquidity needs and output volatility | | | | | | |
|---|---|---|---|---|---|---|
| | *Developing countries* | | | *Middle income countries* | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| FIX | -0.0168 | 0.0220 | 0.0227 | -0.0293 | 0.0203 | 0.0206 |
| | (0.0187) | (0.0420) | (0.0423) | (0.0213) | (0.0498) | (0.0503) |
| OTHER | 0.0843*** | 0.1232*** | 0.1191*** | 0.1027*** | 0.1312*** | 0.1320** |
| | (0.0189) | (0.0457) | (0.0461) | (0.0215) | (0.0507) | (0.0513) |
| Openness | 0.0112*** | 0.0110*** | 0.0111*** | 0.0107*** | 0.0106*** | 0.0106*** |
| | (0.0026) | (0.0025) | (0.0025) | (0.0025) | (0.0023) | (0.0024) |
| FIX x Openness | -0.0053** | -0.0051** | -0.0051** | -0.0051** | -0.0049** | -0.0049** |
| | (0.0025) | (0.0023) | (0.0024) | (0.0024) | (0.0022) | (0.0022) |
| OTHER x Openness | -0.0075*** | -0.0073*** | -0.0073*** | -0.0112*** | -0.0110*** | -0.0110*** |
| | (0.0027) | (0.0025) | (0.0026) | (0.0026) | (0.0025) | (0.0025) |
| FIX x Ext. Fin. | -0.0083 | | -0.0040 | -0.0076 | | -0.0021 |
| | (0.0414) | | (0.0420) | (0.0482) | | (0.0486) |
| OTHER x Ext. Fin. | 0.0269 | | 0.0311 | -0.0104 | | -0.0066 |
| | (0.0413) | | (0.0417) | (0.0471) | | (0.0478) |
| FIX x CCC | | -0.0401 | -0.0397 | | -0.0503 | -0.0500 |
| | | (0.0431) | (0.0436) | | (0.0507) | (0.0513) |
| OTHER x CCC | | -0.0309 | -0.0352 | | -0.0307 | -0.0297 |
| | | (0.0442) | (0.0447) | | (0.0494) | (0.0501) |
| Constant | 0.2245*** | 0.2247*** | 0.2247*** | 0.2498*** | 0.2501*** | 0.2501*** |
| | (0.0141) | (0.0141) | (0.0141) | (0.0162) | (0.0163) | (0.0163) |
| Period x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 3393 | 3393 | 3393 | 2579 | 2579 | 2579 |
| Adj. R sq. | 0.582 | 0.582 | 0.582 | 0.429 | 0.430 | 0.429 |

Note: The dependent variable is the volatility of real gross output for each industry in the manufacturing sector for 1974-2003. Industry volatility is the standard deviation of the growth rate of real gross output over 5-year periods. Openness is defined as average of the ratio of (exports + imports)/real gross output over 5-year periods and is country-industry-period specific. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. External Finance and Cash Conversion Cycle (CCC) are industry-specific. FIX include pegs and crawling pegs, and OTHER include freely falling and regimes with no parallel market data from Reinhart and Rogoff (2004) classification. Columns (1)-(3) show the results for developing countries. Columns (4)-(6) show the results for middle income countries. Heterokesdacity robust standard errors, clustered at the country-industry level are reported in parenthesis. *, **, and *** denote significance at 10, 5 and 1 percent respectively.

# -Table 2.12-

**Currency crisis, liquidity needs and output growth**

| | *All countries* | | | | *Developing countries* | | | | *Middle income countries* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| FIX | 0.0052 | 0.0027 | -0.0138 | -0.0147 | 0.0165* | 0.0107 | -0.0261 | -0.0286 | 0.0197** | 0.0106 | -0.0231 | -0.0275 |
| | (0.0054) | (0.0061) | (0.0171) | (0.0174) | (0.0089) | (0.0100) | (0.0293) | (0.0298) | (0.0092) | (0.0102) | (0.0308) | (0.0313) |
| OTHER | -0.0536*** | -0.0490*** | -0.0194 | -0.0171 | -0.0392*** | -0.0362*** | -0.0243 | -0.0226 | -0.0325*** | -0.0309** | -0.0115 | -0.0107 |
| | (0.0093) | (0.0111) | (0.0328) | (0.0336) | (0.0115) | (0.0134) | (0.0407) | (0.0415) | (0.0106) | (0.0127) | (0.0452) | (0.0461) |
| CRISIS | -0.0157*** | -0.0135** | 0.0061 | 0.0069 | -0.0132** | -0.0128 | 0.0025 | 0.0025 | -0.0171** | -0.0184** | 0.0088 | 0.0078 |
| | (0.0052) | (0.0062) | (0.0154) | (0.0157) | (0.0066) | (0.0078) | (0.0191) | (0.0196) | (0.0075) | (0.0091) | (0.0224) | (0.0231) |
| CRISIS x Ext. Fin. | | -0.0081 | | -0.0056 | | -0.0018 | | 0.0001 | | 0.0044 | | 0.0076 |
| | | (0.0151) | | (0.0150) | | (0.0185) | | (0.0184) | | (0.0205) | | (0.0201) |
| CRISIS x CCC | | | -0.0212 | -0.0205 | | | -0.0154 | -0.0154 | | | -0.0253 | -0.0264 |
| | | | (0.0151) | (0.0150) | | | (0.0188) | (0.0186) | | | (0.0224) | (0.0220) |
| FIX x Ext. Fin. | | 0.0090 | | 0.0068 | | 0.0211 | | 0.0167 | | 0.0331 | | 0.0291 |
| | | (0.0126) | | (0.0122) | | (0.0200) | | (0.0190) | | (0.0218) | | (0.0203) |
| OTHER x Ext. Fin. | | -0.0168 | | -0.0139 | | -0.0112 | | -0.0102 | | -0.0065 | | -0.0049 |
| | | (0.0235) | | (0.0231) | | (0.0289) | | (0.0283) | | (0.0296) | | (0.0286) |
| FIX x CCC | | | 0.0184 | 0.0175 | | | 0.0411 | 0.0391 | | | 0.0413 | 0.0378 |
| | | | (0.0167) | (0.0165) | | | (0.0283) | (0.0278) | | | (0.0308) | (0.0300) |
| OTHER x CCC | | | -0.0330 | -0.0315 | | | -0.0145 | -0.0135 | | | -0.0205 | -0.0201 |
| | | | (0.0293) | (0.0289) | | | (0.0366) | (0.0362) | | | (0.0414) | (0.0408) |
| Constant | 0.0645*** | 0.0645*** | 0.0646*** | 0.0646*** | 0.0814*** | 0.0814*** | 0.0816*** | 0.0816*** | 0.0725*** | 0.0726*** | 0.0728*** | 0.0729*** |
| | (0.0060) | (0.0060) | (0.0060) | (0.0060) | (0.0104) | (0.0104) | (0.0103) | (0.0103) | (0.0092) | (0.0091) | (0.0091) | (0.0091) |
| Period x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 7935 | 7935 | 7935 | 7935 | 4117 | 4117 | 4117 | 4117 | 3156 | 3156 | 3156 | 3156 |
| Adj. R sq. | 0.123 | 0.123 | 0.125 | 0.124 | 0.105 | 0.105 | 0.106 | 0.106 | (0.120) | (0.121) | (0.118) | (0.119) |

Note: The dependent variable is the growth rate of real gross output of an industry in a given country and period. Industry growth is the average growth rate of real gross output over 5-year periods. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. Industry-level data is from the UNIDO Indstat-3 2005 database from the United Nations. External Finance and Cash Conversion Cycle (CCC) are industry-specific. FIX include pegs and crawling pegs, and OTHER include freely falling and regimes with no parallel market data from Reinhart and Rogoff (2004) classification. CRISIS is a dummy variable that takes a value of 1 if there a currency crisis has occured in a given country over 5-year time period, 0 otherwise. Time periods are the same as indicated above. Columns (1)-(4) show the results for all countries. Columns (5)-(8) show the results for developing countries. Columns (9)-(12) show the results for middle income countries. Heterokesdacity robust standard errors, clustered at the country-industry level are reported in parenthesis. *, **, and *** denote significance at 10, 5 and 1 percent respectively.

## -Table 2.13-

| Industry openness, liquidity needs and value added growth | | | | | | |
|---|---|---|---|---|---|---|
| | *Developing countries* | | | *Middle income countries* | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| FIX | 0.0330** | -0.0531 | -0.0533 | 0.0278* | -0.0695 | -0.0707 |
| | (0.0152) | (0.0412) | (0.0406) | (0.0164) | (0.0450) | (0.0443) |
| OTHER | -0.0491** | -0.0590 | -0.0613 | -0.0738*** | -0.0671 | -0.0720 |
| | (0.0203) | (0.0450) | (0.0455) | (0.0234) | (0.0474) | (0.0476) |
| Openness | -0.0010 | -0.0008 | -0.0007 | -0.0011 | -0.0009 | -0.0009 |
| | (0.0052) | (0.0049) | (0.0049) | (0.0053) | (0.0050) | (0.0050) |
| FIX x Openness | 0.0014 | 0.0011 | 0.0011 | 0.0016 | 0.0014 | 0.0014 |
| | (0.0052) | (0.0049) | (0.0049) | (0.0054) | (0.0050) | (0.0050) |
| OTHER x Openness | -0.0042 | -0.0037 | -0.0039 | -0.0041 | -0.0033 | -0.0036 |
| | (0.0054) | (0.0051) | (0.0051) | (0.0056) | (0.0053) | (0.0053) |
| FIX x Ext. Fin. | 0.0112 | | 0.0012 | 0.0204 | | 0.0094 |
| | (0.0279) | | (0.0287) | (0.0303) | | (0.0310) |
| OTHER x Ext. Fin. | 0.0173 | | 0.0154 | 0.0356 | | 0.0347 |
| | (0.0384) | | (0.0390) | (0.0447) | | (0.0461) |
| FIX x CCC | | 0.0869** | 0.0867** | | 0.1002** | 0.0988** |
| | | (0.0408) | (0.0419) | | (0.0450) | (0.0463) |
| OTHER x CCC | | 0.0137 | 0.0121 | | 0.0019 | -0.0020 |
| | | (0.0426) | (0.0432) | | (0.0464) | (0.0474) |
| Constant | 0.0842*** | 0.0807*** | 0.0815*** | 0.0510*** | 0.0503*** | 0.0503*** |
| | (0.0168) | (0.0164) | (0.0167) | (0.0122) | (0.0121) | (0.0121) |
| Period x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 3675 | 3675 | 3675 | 2791 | 2791 | 2791 |
| Adj. R sq. | 0.185 | 0.189 | 0.188 | 0.049 | 0.056 | 0.055 |

Note: The dependent variable is the growth rate of real value added of an industry in a given country and period. Industry growth is the average growth rate of real value added over 5-year periods. Openness is defined as average of the ratio of (exports + imports)/real gross output over 5-year periods and is country-industry-period specific. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. External Finance and Cash Conversion Cycle (CCC) are industry-specific. FIX include pegs and crawling pegs, and OTHER include freely falling and regimes with no parallel market data from Reinhart and Rogoff (2004) classification. Columns (1)-(3) show the results for developing countries. Columns (4)-(6) show the results for middle income countries. Heterokesdacity robust standard errors, clustered at the country-industry level are reported in parenthesis. *, **, and *** denote significance at 10, 5 and 1 percent respectively.

# -Table 2.14-

| Institutional Investor Rating, liquidity needs and output/value added growth | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Developing countries* | | | | | | *Middle income countries* | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| FIX | 0.0102 | -0.0293 | -0.0331 | 0.0082 | -0.0788* | -0.0805** | 0.0087 | -0.0281 | -0.0323 | 0.0079 | -0.0857* | -0.0871* |
| | (0.0102) | (0.0293) | (0.0298) | (0.0151) | (0.0407) | (0.0399) | (0.0115) | (0.0335) | (0.0338) | (0.0170) | (0.0455) | (0.0445) |
| OTHER | -0.0574*** | -0.0688** | -0.0692** | -0.0578*** | -0.0985** | -0.1020** | -0.0643*** | -0.0739** | -0.0770** | -0.0709*** | -0.0989** | -0.1073** |
| | (0.0123) | (0.0344) | (0.0350) | (0.0192) | (0.0422) | (0.0425) | (0.0138) | (0.0370) | (0.0377) | (0.0209) | (0.0443) | (0.0448) |
| IIR | 0.0012 | -0.0018 | -0.0017 | 0.0020** | -0.0014 | -0.0012 | 0.0011 | -0.0025 | -0.0027 | 0.0019** | -0.0013 | -0.0014 |
| | (0.0009) | (0.0018) | (0.0018) | (0.0008) | (0.0017) | (0.0017) | (0.0008) | (0.0019) | (0.0019) | (0.0008) | (0.0017) | (0.0017) |
| IIR x Ext. Fin | 0.0000 | | -0.0005 | -0.0007 | | -0.0012 | 0.0025 | | 0.0018 | 0.0005 | | 0.0001 |
| | (0.0017) | | (0.0017) | (0.0017) | | (0.0017) | (0.0020) | | (0.0018) | (0.0016) | | (0.0016) |
| IIR x CCC | | 0.0029* | 0.0029* | | 0.0031** | 0.0033** | | 0.0042** | 0.0040** | | 0.0033** | 0.0033** |
| | | (0.0017) | (0.0017) | | (0.0016) | (0.0016) | | (0.0019) | (0.0018) | | (0.0016) | (0.0016) |
| FIX x Ext. Fin. | 0.0309 | | 0.0266 | 0.0256 | | 0.0147 | 0.0289 | | 0.0258 | 0.0240 | | 0.0130 |
| | (0.0222) | | (0.0211) | (0.0280) | | (0.0295) | (0.0247) | | (0.0234) | (0.0313) | | (0.0331) |
| OTHER x Ext. Fin. | 0.0062 | | 0.0048 | 0.0307 | | 0.0243 | 0.0242 | | 0.0220 | 0.0601 | | 0.0538 |
| | (0.0281) | | (0.0272) | (0.0395) | | (0.0399) | (0.0322) | | (0.0306) | (0.0440) | | (0.0442) |
| FIX x CCC | | 0.0461 | 0.0427 | | 0.0907** | 0.0887** | | 0.0428 | 0.0399 | | 0.0969** | 0.0947** |
| | | (0.0300) | (0.0295) | | (0.0408) | (0.0424) | | (0.0345) | (0.0338) | | (0.0461) | (0.0480) |
| OTHER x CCC | | 0.0124 | 0.0114 | | 0.0472 | 0.0444 | | 0.0159 | 0.0127 | | 0.0424 | 0.0369 |
| | | (0.0327) | (0.0322) | | (0.0412) | (0.0420) | | (0.0364) | (0.0356) | | (0.0443) | (0.0449) |
| Constant | 0.0436 | 0.0453* | 0.0452* | 0.0235 | 0.0189 | 0.0246 | 0.0209 | 0.0220 | 0.0302 | -0.0021 | 0.0154 | 0.0142 |
| | (0.0267) | (0.0265) | (0.0266) | (0.0213) | (0.0222) | (0.0213) | (0.0258) | (0.0249) | (0.0248) | (0.0210) | (0.0194) | (0.0196) |
| Period x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country x Ind. FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 3043 | 3043 | 3043 | 3485 | 3485 | 3485 | 2379 | 2379 | 2379 | 2706 | 2706 | 2706 |
| Adj. R sq. | 0.177 | 0.181 | 0.180 | 0.110 | 0.116 | 0.116 | 0.052 | 0.058 | 0.057 | 0.05 | 0.052 | 0.056 |

Note: The dependent variable is the growth rate of real gross output (value added) of an industry in a given country and period. Industry growth is the average growth rate of real gross output (value added) over 5-year periods. IIR is the Institutional Investor Rating averaged over 5-year periods and is country-industry-period specific. The periods are 1974-1978, 1979-1983, 1984-1988, 1989-1993, 1994-1998, and 1999-2003. External Finance and Cash Conversion Cycle (CCC) are industry-specific. FIX include pegs and crawling pegs, and OTHER include freely falling and regimes with no parallel market data from Reinhart and Rogoff (2004) classification. Columns (1)-(6) show the results for developing countries. Columns (7)-(12) show the results for middle income countries. In columns (1)-(3) and (7)-(9), the dependent variable in the real gross output growth. In columns (4)-(6) and (10)-(11) the dependent variable is the real value added growth. Heterokesdacity robust standard errors, clustered at the country-industry level are reported in parenthesis. *, **, and *** denote significance at 10, 5 and 1 percent respectively.

# Chapter 3

# Currency Devaluations and Currency Depreciations: Are They Any Different?

## *3.1 Introduction*

Currency crises have been recurrent phenomena in developing countries. Many of these crises were confined just to the borders of the originating country, such was the case when Argentina abandoned its currency board and defaulted on its sovereign debt in 2002. In other cases, crises spilled over to other countries. This was the case during the Tequila Peso Crisis of 1994-1995 and the Asian Crisis of 1997. The devaluation of the Baht in 1997 was not only bound to the Thai economy, but also had economic consequences for other countries in the region. Many of them also experienced collapses in their currencies and significant output contractions.

Around the Tequila and the East Asian Crises, a large empirical literature emerged focusing on underlying factors behind currency crisis episodes and ways to better predict their occurrence. Eichengreen, Rose, and Wyplosz (1995) and Frankel and Rose (1996), for instance, examine the behavior of macroeconomic and institutional variables around the time of a currency crisis to establish which of these factors may be useful to predict the occurrence of these events. Other studies, such as Kaminsky, Lizondo, and Reinhart (1998), develop a set of early warning indicators for currency crises.

Most of these empirical studies rely on theoretical models of currency crisis to narrow down the selection of potential explanatory variables that could help predict the occurrence of a crisis. Early theoretical models such as Krugman (1979) and Flood and Garber (1984) have identified deteriorating economic fundamentals as the main culprit of currency crisis episodes. In Krugman's model, the government's persistent fiscal deficit is financed by the central bank, which gradually drains its international reserves until a perfect foresight speculative attack to the fixed exchange regime rate takes place. Other studies, such as Obstfeld (1994, 1996), explore the possibility of trade-offs among alternative government objectives and the decision of whether to abandon or defend the fixed exchange rate regime. Later models emphasized the possibility of multiple equilibria, self-fulfilling expectations, and potential contagion effects (Eichengreen, Rose and Wyplosz (1995), MacKinnon and Pill (1997)). Berg and Patillo (1999) analyze the out-of-sample performance and the ability to predict the vicinity of a crisis of several of these empirical models, finding mixed results.

This chapter provides yet another contribution to the existing literature of currency crises[7]. This paper investigates the role played by different exchange rate arrangements in output performance around a currency crisis episode. In other words, I explore whether output responses differ across large devaluations and depreciations. First, I define a currency crisis episode using a similar methodology as in Frankel and Rose (1996). More specifically, a currency crisis takes place when the nominal exchange rate experiences a 15% increase. Then I proceed to classify crisis episodes into devaluations and depreciations using the natural exchange rate classification by

[7] See, for example, Edwards (1986), Morley (1992), or Gupta et al. (2007).

Reinhart and Rogoff (2004). Once these episodes are sorted out, I analyze the behavior of output across them.

The paper is organized as follows. Section 3.2 presents a brief review of the literature. Section 3.3 discusses data sources, the construction of both depreciation and devaluation indicators, descriptive statistics, and the methodology. Regression results are reported in section 3.4. Section 3.5 performs several robustness checks. Section 3.6 concludes.

### *3.2 Related Literature*

The traditional textbook expenditure-switching effect suggests that large devaluations (depreciations) can be expansionary. A nominal devaluation (depreciation) would translate into a real devaluation (depreciation) in the short-run under wage and price stickiness, stimulating exports and discouraging imports, and increasing employment and output. Therefore, if expenditure-switching is the main acting mechanism, a nominal devaluation (depreciation) is likely to lead to increased production in traded goods, higher net exports, and an improvement of the external position of the country in question.

However, under certain circumstances, depreciations and devaluations can be costly in terms of output. A sharp increase in the exchange rate could have contractionary effects, working through channels such as wealth effects on aggregate demand, higher costs of imported inputs, a rise in the external debt burden from a devaluation (depreciation) in the presence of liability dollarization, and disruption in credit

markets and capital inflows which might limit the possibility of importing capital goods used in production.

Lizondo and Montiel (1989) present a general framework to explore a variety of channels through which a nominal depreciation or devaluation could affect real economic activity. On the demand side, a real devaluation (depreciation) is likely to affect the real economy though the following: i) by changes in the relative price of traded goods and the demand for non-traded goods due to substitution effects, ii) by generating real income effects, which will depend on the trade balance at the time of the devaluation (depreciation), iii) by changing the income distribution of the economy, either from sectors that have a high propensity to spend to sectors with lower propensity to spend on non-traded goods, from the private to the public sector through changes in the real tax burden, and across owners of different type of assets as it causes changes in the real value of existing wealth, and vi) by altering investment decisions in the non-traded sectors if a substantial share of investment is composed of imported capital goods.

On the supply side, a devaluation (depreciation) is likely to work through various channels: i) through its effect on the production cost of domestically produced goods expressed in domestic currency, and hence on the supply of those goods ii) through its effect on the price of imported inputs, especially in non-traded sectors –the output effect will depend on the elasticity of substitution between labor and imported inputs, iii) through post-devaluation (depreciation) increases in nominal wages, which could lead to output contraction in non-traded sectors, and iv) through increases in the

financing costs for working capital following a devaluation (depreciation) episode and its negative effect on economic activity in non-traded sectors.

Early studies that focused on the output effects of currency crises such as Cooper (1971) and Krueger (1979) find that devaluations were associated with output contractions, although these effects were relatively small. Morley (1992) analyzes the effects of devaluations during stabilization programs in 28 developing countries for the period beginning in 1974. He finds that a ten percentage point increase in the real exchange rate was associated with a one percentage point decline in the rate of capacity utilization two years following the devaluation. A comparison of the devaluation episodes across the Cooper and Morley studies suggests that later episodes were on average more contractionary than earlier ones. According to Morley (1992), these differences are explained by the fact that in the 1960s devaluations were undertaken in the context of trade liberalization and government efforts to correct distortions in the foreign trade sector (reduction of tariffs and elimination of multiple exchange rates), whereas devaluations after 1974 were generally associated with balance of payments crises.

Edwards (1986) also evaluates the contractionary devaluation hypothesis using data on 12 developing countries for 1965-1980. He finds that devaluations have been associated on average with declines in aggregate real output during the first year, but this effect is reversed in the second year, suggesting that devaluations have no effects on the medium-run.

More recent studies find that currency crises are generally associated with output losses. For example, Hutchitson and Noy (2002) analyze the output costs of currency

and balance of payments crises in emerging markets using data for the period 1975-1997 that includes 32 emerging market economies and 78 crisis episodes. They find that these episodes are associated with a cumulative output drop of 5 to 8 percent over a two-year period, even after controlling for country-specific factors, and external and policy variables. Finally, Gupta et al. (2007) also examine the behavior of output during currency crises for the period 1970-2000 in 91 developing countries spanning 195 crisis episodes. They find that even though the majority of the currency crises have been contractionary, 40 percent of crises have had an expansionary effect on output. They also report that countries that were less open to trade, that had large capital inflows, and that had more open capital accounts were more likely to suffer a contraction in economy activity.

### *3.3 Data and Methodology*

In order to study the response in output across large devaluations and depreciations, first it is necessary to construct an indicator of currency crises. Previous studies have either used an index of exchange rate pressure or just tracked changes in the nominal exchange rate to identify crisis episodes.

The former method identifies currency crises as occurring when the index of exchange rate pressure exceeds a given threshold. This index is computed using changes in the exchange rate, changes in international reserves, and in some cases, changes in the interest rate (see for example, Eichengreen et al. (1995), Goldstein, Kaminsky, and Reinhart (2000), Hutchinson and Noy (2002), or Kaminsky, Lizondo,

and Reinhart (1998)). The rationale behind the inclusion of interest rates or reserve losses in the construction of the index is that a speculative attack on the currency might force the monetary authority to defend the currency by using its international reserves or through hikes in domestic interest rates. One problem that could arise with this type of index is that in some cases international reserves data is not readily available. An additional concern is that in some occasions changes in interest rates do not convey relevant information due to government controls on the financial system.

The latter method defines currency crisis episodes as occurring when the nominal exchange rate crosses a given threshold. Edwards (1986) and Morley (1992), for example, define a devaluation episode when the exchange rate increases by 15 percent. In Frankel and Rose (1996), a currency crisis requires two conditions: i) a depreciation of the currency of at least 25 percent, and ii) at least a 10 percent increase in the rate of depreciation. In this paper, a currency crisis is said to occur when the exchange rate (expressed as domestic currency per unit of reference or base currency) experiences an increase of at least 15 percent during the course of a year.[8,9] I adopt this lower threshold because Frankel and Rose's threshold may prove to be too high and as a result it will fail to capture depreciations and devaluations episodes in periods of low inflation[10]. My results, however, also hold using Frankel and Rose's

[8] This is computed with respect to the reference or base currency for a given country.

[9] A comparison between the currency crisis episodes identified here and the ones identified in other studies using the index of exchange rate pressure are positively correlated and show a significant degree of overlap.

[10] I would like to thank Prof. Carmen Reinhart for this suggestion.

higher threshold. In this case, understandably so, the number of episodes is reduced significantly from 240 to 131 given the higher threshold imposed.

The next step is to sort these episodes into devaluations and depreciations. I use the *de facto* exchange rate classification given by Reinhart and Rogoff (2004, RR hereafter) and the detailed country chronologies provided in their paper to determine whether or not a currency crisis was associated with a peg or semi-peg regime.[11] Thus, a devaluation episode is defined as a currency crisis in which the country was running a peg or semi-peg regime prior to the crisis according to RR classification. Similarly, a large depreciation is defined as a crisis episode in which the country was running a float or semi-float exchange rate regime.

Country-level data such as real output, financial and external variables were obtained from different sources, mainly from the International Financial Statistics (IFS) of the International Monetary Fund and the World Development Indicators (WDI) of the World Bank. In Table 3.B, I list the years and countries that have experienced a currency crisis episode, classifying them into devaluation and depreciation episodes according to RR. For the period 1970-2007, I identify 240 currency crises, with 138 of them occurring under a peg or semi-peg system. 58 of those large depreciations and devaluations were recorded in industrial countries, whereas 182 of them took place in developing countries.

[11] I exclude crisis episodes that were preceded by periods of high inflation. These episodes are classified as freely falling under the RR exchange rate classification. I relax this restriction in Section 3.5 below.

Table 3.1 presents descriptive statistics on currency crisis, devaluation, and depreciation episodes and the average change in output growth. The change in output growth is defined as the difference between the average real output growth for the two years preceding currency crisis episode and the average real output growth for the concurrent and posterior year of the crisis episode. Similar measures have been used in other studies (see, for example, Gupta et al. (2007)). The idea behind this approach is to compare "turbulent" periods to "tranquil" ones. Taking the average of two pre-crisis years and two post-crisis years helps avoid potential problems related to the timing of the currency crisis episode, which in some cases might have occurred late in the year. For the same reasons, I also include in next section's regression analysis an additional dummy variable to measure the output effect in the year following each crisis episode.

Out of these 240 episodes, about fifty-four percent of them were associated with negative output performances. The average growth effect across all currency crisis episodes is -1%. While depreciations seem to lead to slightly larger output losses than devaluations, the difference is small and statistically insignificant. For industrial countries, the average change in growth across currency crisis episodes is negligible (-0.015%). While depreciation episodes appear to be slightly more contractionary than devaluations, they are associated on average with very mild output losses (-0.4%).

Currency crisis episodes have been associated with much larger output losses for the sample of developing countries. Economic activity fell in fifty-five percent of these episodes and the average decline in output growth around currency crises was 1.2%.

A quick comparison across devaluation and depreciation episodes in this sub-sample suggests that the proportion of episodes linked with negative changes in growth is about the same. As shown in Table 3.1, the average change in growth is very similar across these episodes. A simple means test indicates that changes in growth are not statistically different across devaluations and depreciations.

Finally, I disaggregate the sample into middle income countries[12] and developing non-middle income countries (hereafter, non-middle income countries). This distinction is interesting because middle income countries are in general more open to international credit markets than low income countries and also receive a larger proportion of portfolio inflows (Hutchinson and Noy (2002)). This makes them more vulnerable to capital flow reversals, sudden stops and sharp devaluations (depreciations) of their nominal exchange rate. Aghion et al. (2006) argue that economies at the intermediate stage of financial development comprise the more interesting group as the liberalization of the capital account is more likely to put macroeconomic stability in jeopardy.

For middle income countries, currency crises have been associated with significantly larger output losses (the change in output growth is about -1.8%). The proportion of episodes with negative changes in growth is about the same as in developing countries (roughly fifty-eight percent). Moreover, output contractions during devaluation episodes are on average more costly (the average change in growth is -2.5%), with approximately fifty-nine percent of all such episodes associated with a

[12] To classify a country as a middle income country, I use the World Bank's classification. The list of countries included in each category is provided in the appendix at the end of the chapter.

decline in output growth. On the other hand, the slowdown in growth during depreciation episodes has been smaller on average (close to -1.1%). For non-middle income countries, the change in growth is around -0.4% across crisis episodes, with devaluations being mildly expansionary (average change in growth of about 0.5% and fifty-six percent of the episodes being associated with increases in growth) and depreciations being contractionary (average decline in growth of about 1.6%, with only thirty-nine percent of such episodes associated with increases in growth).

Figure 3.1 shows the frequency distribution of the change in output growth across different episodes. Panels 1.a to 1.c present the impact on output growth of currency crises, devaluations, and depreciations episodes for developing countries respectively. The frequency distributions suggest that there is not much discrepancy between large depreciations and large devaluations in terms of their impact on growth. The impact of currency crisis episodes for middle income countries is depicted in Panels 2.a to 2.c. While the impact of currency crisis and depreciation episodes on output growth seem to be more evenly distributed, the panels also suggest that devaluation episodes are more likely to be associated with weaker output performances than depreciation episodes. Finally, panels 3.a to 3.c show that this regularity is somehow reversed for non-middle income countries. Depreciation episodes appear to be more contractionary than devaluation episodes for non-middle income countries. We explore these facts in more detail in the next section.

*3.4 Regression Results*

I use regression analysis to complement the univariate event analysis presented in the previous section. Before and after event analysis, such as in Eichengreen et al. (1995) or Aziz, Caramazza and Salgado (2000), cannot discern whether the impact of the crisis on output growth is the result of the depreciation or devaluation itself, or is instead the consequence of some other concurrent change. First, I present the regression results of real output growth on indicator variables of currency crisis, devaluation, and depreciation episodes (Table 3.2). All regressions include country and year fixed effects.

The upper panel of Table 3.2 presents the regression results for currency crisis episodes. On average, these episodes appear to have been contractionary for the sample as a whole, especially for developing countries and in particular for middle income economies. On the other hand, output losses associated with currency crises are at most mild and statistically insignificant for industrial and non-middle income countries.

Once I disaggregate between devaluations and depreciations (lower panel of Table 3.2), the output effect continues to be negligible for industrial countries and statistically insignificant at conventional levels. Devaluations, on the other hand, seem to be associated with larger output losses than depreciations for middle income countries, with an average combined decline in the real output growth rate of about 5 percent in the year of the event and the year after. This pattern is reversed for non-middle income countries, with devaluations associated with mild expansions –effect that is statistically insignificant though—and depreciations being contractionary.

In the next set of regressions, I include several control variables –external, fiscal, and macroeconomic variables—that have been used in other empirical studies of currency crisis episodes or that play an important explanatory role in existing theoretical models of currency crisis. Early literature on currency crises such as Krugman (1979) and Flood and Garber (1984)) stressed the role played by economic fundamentals as determinants of currency crisis episodes. These models typically explained crises as a result of inconsistencies in domestic policies, such as a persistent money-financed fiscal deficit and a commitment to a pegged exchange rate. The deterioration in economic fundamentals could be an indication of a potential crisis. Large fiscal deficits, high rates of monetary growth, high inflation, an overvalued real exchange rate, large current account deficits or sharp losses of international reserves can be a reflection of weak economic fundamentals. Other studies, such as Rodrik and Velasco (1999), note that difficulties in rolling over short-term debt could lead to currency and debt crises. Therefore, the ratio of short-term debt to foreign reserves is also included as a regressor.

The dependent variable is the growth rate of real output. I include in all specifications foreign variables (real US interest rates and average growth in industrial countries), monetary and fiscal policy variables (the change in M2 and government consumption growth), external sector variables (currency overvaluation, export growth, changes in the terms of trade, and openness), and other potentially relevant domestic variables (loss in foreign reserves, reserves measured in terms of months of imports, the ratio of short-term debt to reserves and the ratio of the current account to GDP) as

regressors.[13] Since the focus of this study is to evaluate the output effects of currency crisis episodes, I use yearly data for my analysis and I do exclude long-term determinants of growth. Many of these variables have been used in other empirical studies, particularly in the literature that studies the output effects of currency crises (Eichengreen et al. (1995), Aziz et al. (2000), Hutchinson and Noy (2002), Gupta et al. (2007)) and the literature that predicts the occurrence of currency crises (Frankel and Rose (1996), Kaminsky, Lizondo, and Reinhart (1998), Milessi-Ferreti and Razin (1998), Berg and Patillo (1999)). Results are shown in the tables below.

Table 3.3 presents regression results for currency crisis episodes. All regressions include country fixed effects. Columns (1) and (2) show regression results for developing countries, columns (3) and (4) show the results for middle income countries, and columns (5) and (6) present the results for non-middle income countries.

The coefficients on the real interest rate in the US and the weighted average growth in G7-countries are statistically significant with the correct sign for developing countries and for middle income economies. While the sign of the coefficient on the real interest rate in the US remain negative for non-middle income economies, it is statistically insignificant at conventional levels. External sector variables such as export growth, the change in the terms of trade, the openness of the economy to trade, and the overvaluation of the currency all have the right sign and in most cases are statistically significant in the regressions.

For developing countries, the coefficients for currency crisis episodes are negative and statistically significant at the 1% level, suggesting that currency crises are

[13] Table 3.A includes a brief description of the main variables as well as the data sources.

associated on impact with output losses. Output growth falls by 1.3% during currency crisis episodes (Column (1)). The decline in output is more pronounced when the year following the currency crisis is included. The combined decline in output growth between the year of the crisis and the posterior year amounts to 2.5%. As shown in columns (3) and (4), this result is mainly driven by the subsample of middle income countries, with output growth falling by as much as 4.2%. For non-middle income countries, the drop in output following a crisis is around 0.5% during the first year, and is statistically insignificant. Column (6) also suggests that currency crisis episodes are slightly expansionary after one year, but the coefficient is statistically insignificant. The difference in magnitude of output losses across middle income and non-middle income countries is consistent with previous findings. Gupta et al. (2007) explore the relationship between output growth and currency crises for developing countries for the period 1970-2000 and they find that output contractions during currency crisis episodes are larger in magnitude for more developed economies relative to less developed ones.

We estimate the same specification as in Table 3.3, but this time separating currency crisis episodes between depreciations and devaluations. Columns (1) and (2) in Table 3.4 show that depreciations and devaluations are associated with declines in output for developing and middle income countries. The coefficients on the depreciation and devaluation dummies are statistically significant at conventional levels. Depreciation episodes seem to have only a contemporaneous effect, whereas devaluations reduce output growth in both the year of the event and the year after. Columns (3) and (4) suggest that middle income countries are driving these results. The output effects of

both devaluations and depreciations are larger in magnitude in this group of countries (-2.3% in year one and -3.2% in year 2 for devaluations against -1.7% and -0.8% for depreciations, but this last coefficient is statistically insignificant). A Wald test indicates that devaluations are associated with a larger decline in output than depreciations (during the year of the crisis and the year following the crisis), and this difference is statistically significant at conventional levels (p-value of 0.055). The output effect of devaluation and depreciation episodes is not precisely estimated in columns (5) and (6) for non-middle income economies. The coefficients are smaller in magnitude and statistically insignificant.

Tables 3.5 and 3.6 control for the effects of banking crises using an indicator variable borrowed from Reinhart and Rogoff (2008). Systemic banking sector problems are generally associated with a credit crunch and contraction in economic activity. Output losses following banking crises can be amplified due to information asymmetries and credit market imperfections (see Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) for theoretical models of the credit channel). If banking crisis episodes are concentrated around devaluation (depreciation) episodes, then the findings in Tables 3.3 and 3.4 may be just a reflection of output losses associated with banking sector problems and constrained credit conditions for domestic firms rather than the impact attributable to devaluations or depreciations. Kaminsky and Reinhart (1999) point that twin crisis episodes (joint currency and banking crisis) are far more severe and costly in terms of output than currency crisis episodes occurring in isolation, and hence, the need to control for banking sector problems.

As expected, the coefficients on the banking crisis indicators are statistically significant for both middle income and non-middle income countries, with the output effects for former showing with one period lag, while the effects for the latter appearing contemporaneously. A Wald test for the null hypothesis that the coefficients on devaluation and depreciation episodes are of the same magnitude (both for the year of the event and the following year) is rejected at conventional significance levels (p-value of 0.08). Even with the inclusion of the banking crisis dummies, devaluation episodes seem to lead to more severe contractions. Overall, results including banking crises are similar to those obtained in Tables 3.3 and 3.4. Regression results in Table 3.6 are in line with previous findings. The combined decline in output growth for devaluation episodes is about 5.1% (column (4)) for middle income countries. On the other hand, depreciations only exert a contemporaneous effect on output growth (-1.6%).

### *3.5 Robustness Checks*

I perform several robustness checks using different definitions of currency crises. In the previous sections, I defined a currency crisis episode as a 15% increase in the nominal exchange rate, but I excluded all those episodes classified as "freely falling" in the RR classification. These episodes that fall into the "freely falling" crisis episodes consist of episodes that were preceded by high inflation (above 40% annual inflation). The main reason for excluding them in the previous section was to differentiate flexible regimes that exhibit low inflation from those that were

characterized by high inflation and poor macroeconomic and monetary management. Regression results presented in the middle panel of Table 3.7 include all these episodes. A quick comparison with the upper panel –which shows the benchmark specification corresponding to Table 3.6—suggests that results are in line with previous findings.

Second, I use the Frankel and Rose (1996) definition of a currency crisis. They define a currency crisis as "a large change of the nominal exchange rate that is also a substantial increase in the rate of change of nominal depreciation." They use the following criteria: a) a depreciation of the local currency of at least 25%, and b) the change in the exchange rate should exceed the previous year's change by at least 10%. Results are shown in the bottom panel of Table 3.7. As expected, the coefficients are larger in magnitude relative to the benchmark specification, and statistically significant at the 1% level and with the expected sign for the sample of middle income countries. Larger currency collapses are likely to be linked to heightened uncertainty and economic turmoil. If firms in middle income countries are subject to liability dollarization, a larger depreciation of the local currency (from 15% to 25%) is likely to cause far more severe balance sheet effects, non-performing loans and an increased number of bankruptcies.

Finally, columns (5) through (8) in Table 3.7 report the regression results using an alternative country classification. Here, I distinguish between emerging and non-emerging countries using the EMBI Global (JP Morgan). With this classification, the coefficients on the depreciation episodes dummies are not precisely estimated in the benchmark specification and the one that includes the freely falling episodes. The

coefficients on the devaluation episodes dummies are larger in magnitude compared to the benchmark classification of developing countries (middle income and non-middle income countries) and are statistically significant at conventional levels with the expected sign. These results are consistent with my previous findings.

### *3.6 Concluding Remarks*

In this paper, I compare the output effects of large devaluations and depreciations. First, I define currency crises using a standard definition found in the literature. Second, I classify these currency crises into devaluations and depreciations. Then, I compare the output effects across episodes. For developing economies, the majority of the currency crisis episodes have been contractionary for the 1970-2007. These results are consistent with previous studies (Gupta et al. (2007)). These findings are mainly driven by the subsample of middle income countries. The distinction is important because middle income and emerging economies are more open to international credit markets and receive a larger proportion of portfolio capital inflows, making them vulnerable to capital flows reversals and sharp depreciations of their exchange rates.

When I disaggregate between devaluation and depreciation episodes, devaluations have been on average more contractionary than depreciations for middle income and emerging market economies, with a combined decline in output growth of 5.5% (and 5.1% after controlling for banking crises). Depreciations, on the other hand, appear to have been associated with milder output contractions (a decline of about 1.6

percentage points in output growth) during the initial year of the currency crisis episode. The effect of the following year is statistically insignificant at conventional levels.

I interpret these results as follows. Middle income countries are in general subject to liability dollarization and currency mismatches. As a result, they may opt for an exchange rate regime that exhibits relatively more stability. However, in the case of a collapse in the exchange rate, the output effect is likely to be larger. This result is also supported by the fact that the magnitude of the coefficients are much larger when I use Frankel and Rose (1996) definition of currency crisis episodes, which utilizes a higher threshold to identify these type of events.

## -Table 3.1-

**Economic performance after a currency crisis**

Average post-crisis growth - Average pre-crisis growth

| | Currency crisis | Devaluations | Depreciations |
|---|---|---|---|
| **All countries** | | | |
| Average change in growth | -0.0097 | -0.0085 | -0.0113 |
| Obs. | 240 | 138 | 102 |
| Episodes with positive growth | 111 | 71 | 40 |
| Episodes with negative growth | 129 | 67 | 62 |
| **Industrial countries** | | | |
| Average change in growth | -0.0015 | -0.0003 | -0.0041 |
| Obs. | 58 | 41 | 17 |
| Episodes with positive growth | 30 | 25 | 5 |
| Episodes with negative growth | 28 | 16 | 12 |
| **Developing countries** | | | |
| Average change in growth | -0.0123 | -0.0120 | -0.0128 |
| Obs. | 182 | 97 | 85 |
| Episodes with positive growth | 81 | 46 | 35 |
| Episodes with negative growth | 101 | 51 | 50 |
| **Middle income countries** | | | |
| Average change in growth | -0.0183 | -0.0253 | -0.0110 |
| Obs. | 106 | 54 | 52 |
| Episodes with positive growth | 44 | 22 | 22 |
| Episodes with negative growth | 62 | 32 | 30 |
| **Non-middle income countries** | | | |
| Average change in growth | -0.0040 | 0.0048 | -0.0156 |
| Obs. | 76 | 43 | 33 |
| Episodes with positive growth | 37 | 24 | 13 |
| Episodes with negative growth | 39 | 19 | 20 |

Note: Average growth is the difference between the average real output growth of the two years prior to the currency crisis and the average real output growth of the year of the crisis and the following year

# -Table 3.2-

| ***Currency crises, devaluations, depreciations, and growth*** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | All countries | | Industrial | | Developing | | Middle income | | Non-middle income | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | | | | | *Currency crises* | | | | | |
| Currency Crisis | -0.0128*** | -0.0122*** | -0.0037 | -0.0033 | -0.0135*** | -0.0131*** | -0.0159*** | -0.0148*** | -0.0101 | -0.0094 |
| | (0.0033) | (0.0032) | (0.0040) | (0.0039) | (0.0043) | (0.0041) | (0.0058) | (0.0053) | (0.0062) | (0.0064) |
| Currency Crisis (-1) | | -0.0112*** | | -0.0028 | | -0.0135*** | | -0.0241*** | | 0.0016 |
| | | (0.0032) | | (0.0038) | | (0.0041) | | (0.0057) | | (0.0049) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 3611 | 3521 | 929 | 921 | 2682 | 2600 | 1572 | 1522 | 1110 | 1078 |
| adj. R-sq | 0.152 | 0.156 | 0.363 | 0.368 | 0.141 | 0.143 | 0.162 | 0.171 | 0.104 | 0.102 |
| | | | | | *Sorting currency crises into devaluations and depreciations* | | | | | |
| Devaluation | -0.0101** | -0.0110** | -0.0044 | -0.0035 | -0.0095 | -0.0113* | -0.0189** | -0.0216** | 0.0030 | 0.0047 |
| | (0.0043) | (0.0043) | (0.0055) | (0.0053) | (0.0058) | (0.0059) | (0.0085) | (0.0085) | (0.0068) | (0.0070) |
| Devaluation (-1) | | -0.0097** | | -0.0014 | | -0.0121** | | -0.0277*** | | 0.0086 |
| | | (0.0042) | | (0.0045) | | (0.0056) | | (0.0083) | | (0.0054) |
| Depreciation | -0.0164*** | -0.0140*** | -0.0023 | -0.0029 | -0.0179*** | -0.0153*** | -0.0128* | -0.0073 | -0.0270*** | -0.0277*** |
| | (0.0051) | (0.0044) | (0.0040) | (0.0040) | (0.0061) | (0.0053) | (0.0076) | (0.0055) | (0.0101) | (0.0106) |
| Depreciation (-1) | | -0.0132*** | | -0.0057 | | -0.0151*** | | -0.0202*** | | -0.0076 |
| | | (0.0049) | | (0.0066) | | (0.0057) | | (0.0075) | | (0.0084) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 3611 | 3521 | 929 | 921 | 2682 | 2600 | 1572 | 1522 | 1110 | 1078 |
| adj. R-sq | 0.152 | 0.156 | 0.362 | 0.367 | 0.141 | 0.143 | 0.161 | 0.172 | 0.109 | 0.108 |

Note: The dependent variable is the annual growth in real GDP for 1970-2007. Columns (1)-(2) show the results for all countries. Columns (3)-(4) show the results for high income countries. Columns (5)-(6) show the resuls for developing countries. Columns (7)-(8) show the results for middle income countries. Columns (9)-(10) show the results for non-middle income countries. Heterokesdacity robust standard errors are reported in parentheses. *, **, and *** denote significance at 10, 5, and 1 percent respectively.

## -Table 3.3-

| ***Currency crises and growth*** | | | | | | |
|---|---|---|---|---|---|---|
| | Developing | | Middle income | | Non-middle income | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Real US interest | -0.1676*** | -0.1649*** | -0.1902*** | -0.1817*** | -0.0699 | -0.0622 |
| | (0.0572) | (0.0577) | (0.0664) | (0.0651) | (0.1003) | (0.1007) |
| G7 growth | 0.3798*** | 0.3986*** | 0.3818*** | 0.3914*** | 0.3732** | 0.3949** |
| | (0.1071) | (0.1080) | (0.1337) | (0.1344) | (0.1720) | (0.1720) |
| Δ Terms-of-Trade | 0.0824*** | 0.0817*** | 0.1095*** | 0.1084*** | 0.0550*** | 0.0576*** |
| | (0.0095) | (0.0096) | (0.0125) | (0.0126) | (0.0135) | (0.0135) |
| Openness (-1) | 0.0105** | 0.0076 | 0.0138** | 0.0119* | 0.0080 | 0.0046 |
| | (0.0052) | (0.0053) | (0.0067) | (0.0067) | (0.0076) | (0.0081) |
| Export growth (-1) | 0.0369*** | 0.0359*** | 0.0253 | 0.0250 | 0.0291** | 0.0321** |
| | (0.0110) | (0.0115) | (0.0157) | (0.0164) | (0.0146) | (0.0151) |
| Overvaluation (-1) | -0.0085* | -0.0067 | -0.0200*** | -0.0177*** | 0.0090 | 0.0098 |
| | (0.0045) | (0.0048) | (0.0058) | (0.0063) | (0.0065) | (0.0067) |
| Res. as month of M | -0.0005 | -0.0010 | -0.0005 | -0.0009 | -0.0013 | -0.0015 |
| | (0.0008) | (0.0008) | (0.0009) | (0.0010) | (0.0014) | (0.0014) |
| ST Debt to Res. | 0.0000 | 0.0001 | -0.0001 | -0.0001 | -0.0000 | 0.0001 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| CA to GDP (-1) | 0.0568* | 0.0568* | 0.1214*** | 0.1106** | 0.0047 | 0.0176 |
| | (0.0314) | (0.0323) | (0.0434) | (0.0452) | (0.0413) | (0.0414) |
| Reserves loss | 0.0021 | 0.0032 | 0.0016 | 0.0027 | 0.0020 | 0.0023 |
| | (0.0026) | (0.0026) | (0.0037) | (0.0037) | (0.0037) | (0.0037) |
| M2 growth (-1) | -0.0031 | 0.0022 | 0.0289*** | 0.0333*** | -0.0074** | -0.0038** |
| | (0.0038) | (0.0035) | (0.0084) | (0.0092) | (0.0036) | (0.0016) |
| Gov. cons. gth (-1) | 0.0099 | 0.0096 | 0.0072 | 0.0066 | 0.0169 | 0.0220 |
| | (0.0066) | (0.0066) | (0.0047) | (0.0044) | (0.0163) | (0.0170) |
| Currency crisis | -0.0125*** | -0.0138*** | -0.0178*** | -0.0206*** | -0.0053 | -0.0034 |
| | (0.0042) | (0.0043) | (0.0051) | (0.0051) | (0.0070) | (0.0071) |
| Currency crisis (-1) | | -0.0109** | | -0.0212*** | | 0.0085 |
| | | (0.0051) | | (0.0071) | | (0.0059) |
| Constant | 0.0241 | 0.0288* | 0.0184 | 0.0232 | -0.0025 | -0.0027 |
| | (0.0153) | (0.0159) | (0.0156) | (0.0167) | (0.0195) | (0.0198) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 1438 | 1400 | 895 | 874 | 543 | 526 |
| adj. R-sq | 0.238 | 0.248 | 0.336 | 0.354 | 0.133 | 0.146 |

Note: The dependent variable is the annual growth in the real GDP in the period 1970-2007. Columns (1)-(2) show the resuls for developing countries. Columns (3)-(4) show the results for middle income countries. Columns (5)-(6) show the results for non-middle income countries. Heterokesdacity robust standard errors are reported in parentheses. *, **, and *** denote significance at 10, 5, and 1 percent respectively.

## -Table 3.4-

| ***Devaluations, depreciations and growth*** | | | | | | |
|---|---|---|---|---|---|---|
| | Developing | | Middle income | | Non-middle income | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Real US interest | -0.1678*** | -0.1607*** | -0.1900*** | -0.1783*** | -0.0744 | -0.0676 |
| | (0.0572) | (0.0575) | (0.0665) | (0.0647) | (0.1002) | (0.1012) |
| G7 growth | 0.3807*** | 0.4000*** | 0.3772*** | 0.3824*** | 0.3623** | 0.3831** |
| | (0.1072) | (0.1082) | (0.1331) | (0.1336) | (0.1727) | (0.1732) |
| Δ Terms-of-Trade | 0.0823*** | 0.0812*** | 0.1096*** | 0.1073*** | 0.0544*** | 0.0571*** |
| | (0.0094) | (0.0096) | (0.0125) | (0.0127) | (0.0133) | (0.0133) |
| Openness (-1) | 0.0105** | 0.0083 | 0.0142** | 0.0137** | 0.0093 | 0.0059 |
| | (0.0052) | (0.0052) | (0.0067) | (0.0065) | (0.0077) | (0.0082) |
| Export growth (-1) | 0.0370*** | 0.0365*** | 0.0254 | 0.0261 | 0.0299** | 0.0330** |
| | (0.0110) | (0.0114) | (0.0157) | (0.0160) | (0.0147) | (0.0152) |
| Overvaluation (-1) | -0.0084* | -0.0067 | -0.0202*** | -0.0179*** | 0.0093 | 0.0102 |
| | (0.0045) | (0.0048) | (0.0058) | (0.0063) | (0.0065) | (0.0067) |
| Res. as month of M | -0.0005 | -0.0010 | -0.0005 | -0.0009 | -0.0012 | -0.0015 |
| | (0.0008) | (0.0008) | (0.0009) | (0.0010) | (0.0014) | (0.0014) |
| ST Debt to Res. | 0.0000 | 0.0001 | -0.0001 | -0.0001 | -0.0000 | 0.0001 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| CA to GDP (-1) | 0.0571* | 0.0565* | 0.1206*** | 0.1061** | 0.0068 | 0.0194 |
| | (0.0314) | (0.0324) | (0.0434) | (0.0459) | (0.0413) | (0.0415) |
| Reserves loss | 0.0020 | 0.0032 | 0.0017 | 0.0029 | 0.0017 | 0.0019 |
| | (0.0026) | (0.0026) | (0.0037) | (0.0037) | (0.0037) | (0.0038) |
| M2 growth (-1) | -0.0031 | 0.0025 | 0.0287*** | 0.0341*** | -0.0074** | -0.0039** |
| | (0.0038) | (0.0036) | (0.0084) | (0.0092) | (0.0036) | (0.0016) |
| Gov. cons. gth (-1) | 0.0099 | 0.0093 | 0.0072 | 0.0065 | 0.0181 | 0.0235 |
| | (0.0067) | (0.0065) | (0.0047) | (0.0043) | (0.0164) | (0.0172) |
| Devaluation | -0.0111* | -0.0127** | -0.0207*** | -0.0234*** | 0.0011 | 0.0029 |
| | (0.0059) | (0.0060) | (0.0074) | (0.0074) | (0.0087) | (0.0087) |
| Devaluation (-1) | | -0.0160** | | -0.0316*** | | 0.0090 |
| | | (0.0074) | | (0.0110) | | (0.0065) |
| Depreciation | -0.0144*** | -0.0153*** | -0.0142** | -0.0166*** | -0.0159 | -0.0136 |
| | (0.0055) | (0.0055) | (0.0061) | (0.0061) | (0.0109) | (0.0111) |
| Depreciation (-1) | | -0.0038 | | -0.0084 | | 0.0078 |
| | | (0.0059) | | (0.0070) | | (0.0106) |
| Constant | 0.0242 | 0.0276* | 0.0179 | 0.0200 | 0.0004 | 0.0002 |
| | (0.0152) | (0.0153) | (0.0158) | (0.0159) | (0.0200) | (0.0204) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 1438 | 1400 | 895 | 874 | 543 | 526 |
| adj. R-sq | 0.238 | 0.249 | 0.336 | 0.358 | 0.134 | 0.145 |

Note: The dependent variable is the annual growth in the real GDP in the period 1970-2007. Columns (1)-(2) show the resuls for developing countries. Columns (3)-(4) show the results for middle-income countries. Columns (5)-(6) show the results for non-middle income countries. Heterokesdacity robust standard errors are reported in parentheses. *, **, and *** denote significance at 10, 5, and 1 percent respectively.

## -Table 3.5-

| *Currency crises, banking crises, and growth* | | | | | | |
|---|---|---|---|---|---|---|
| | Developing | | Middle income | | Non-middle income | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Real US interest | -0.1545*** | -0.1530*** | -0.1785*** | -0.1724*** | -0.0597 | -0.0515 |
| | (0.0568) | (0.0574) | (0.0659) | (0.0650) | (0.1004) | (0.1005) |
| G7 growth | 0.3698*** | 0.3902*** | 0.3640*** | 0.3758*** | 0.3860** | 0.4114** |
| | (0.1060) | (0.1067) | (0.1328) | (0.1332) | (0.1691) | (0.1693) |
| Δ Terms-of-Trade | 0.0830*** | 0.0824*** | 0.1102*** | 0.1088*** | 0.0551*** | 0.0583*** |
| | (0.0094) | (0.0095) | (0.0124) | (0.0125) | (0.0135) | (0.0135) |
| Openness (-1) | 0.0097* | 0.0070 | 0.0133** | 0.0116* | 0.0070 | 0.0034 |
| | (0.0050) | (0.0051) | (0.0065) | (0.0065) | (0.0076) | (0.0080) |
| Export growth (-1) | 0.0350*** | 0.0339*** | 0.0236 | 0.0237 | 0.0274* | 0.0284* |
| | (0.0109) | (0.0113) | (0.0156) | (0.0163) | (0.0144) | (0.0146) |
| Overvaluation (-1) | -0.0084* | -0.0070 | -0.0199*** | -0.0179*** | 0.0090 | 0.0097 |
| | (0.0045) | (0.0048) | (0.0058) | (0.0063) | (0.0064) | (0.0066) |
| Res. as month of M | -0.0006 | -0.0011 | -0.0006 | -0.0011 | -0.0012 | -0.0014 |
| | (0.0008) | (0.0008) | (0.0010) | (0.0010) | (0.0014) | (0.0014) |
| ST Debt to Res. | 0.0000 | 0.0001 | -0.0001 | -0.0001 | -0.0000 | 0.0001 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0002) | (0.0001) | (0.0001) |
| CA to GDP (-1) | 0.0530* | 0.0530 | 0.1160*** | 0.1059** | 0.0036 | 0.0167 |
| | (0.0318) | (0.0327) | (0.0440) | (0.0460) | (0.0411) | (0.0411) |
| Reserves loss | 0.0021 | 0.0031 | 0.0016 | 0.0026 | 0.0021 | 0.0024 |
| | (0.0025) | (0.0026) | (0.0036) | (0.0037) | (0.0037) | (0.0037) |
| M2 growth (-1) | -0.0034 | 0.0019 | 0.0269*** | 0.0323*** | -0.0074** | -0.0038** |
| | (0.0037) | (0.0034) | (0.0084) | (0.0088) | (0.0036) | (0.0016) |
| Gov. cons. gth (-1) | 0.0093 | 0.0092 | 0.0067 | 0.0062 | 0.0170 | 0.0226 |
| | (0.0063) | (0.0064) | (0.0043) | (0.0041) | (0.0162) | (0.0169) |
| Banking crisis | -0.0122** | -0.0134** | -0.0072 | -0.0067 | -0.0243* | -0.0268* |
| | (0.0059) | (0.0061) | (0.0064) | (0.0066) | (0.0141) | (0.0144) |
| Banking crisis (-1) | -0.0217*** | -0.0227*** | -0.0194*** | -0.0202*** | -0.0194 | -0.0209 |
| | (0.0080) | (0.0082) | (0.0071) | (0.0070) | (0.0258) | (0.0257) |
| Currency crisis | -0.0115*** | -0.0126*** | -0.0167*** | -0.0193*** | -0.0050 | -0.0031 |
| | (0.0043) | (0.0043) | (0.0051) | (0.0051) | (0.0073) | (0.0074) |
| Currency crisis (-1) | | -0.0094* | | -0.0194*** | | 0.0081 |
| | | (0.0050) | | (0.0069) | | (0.0060) |
| Constant | 0.0252* | 0.0294* | 0.0199 | 0.0239 | 0.0008 | 0.0007 |
| | (0.0152) | (0.0157) | (0.0155) | (0.0165) | (0.0185) | (0.0187) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 1438 | 1400 | 895 | 874 | 543 | 526 |
| adj. R-sq | 0.248 | 0.259 | 0.345 | 0.363 | 0.141 | 0.155 |

Note: The dependent variable is the annual growth in the real GDP in the period 1970-2007. Columns (1)-(2) show the resuls for developing countries. Columns (3)-(4) show the results for middle-income countries. Columns (5)-(6) show the results for non-middle income countries. Heterokesdacity robust standard errors are reported in parentheses. *, **, and *** denote significance at 10, 5, and 1 percent respectively.

## -Table 3.6-

| *Devaluations, depreciations, banking crises, and growth* | | | | | | |
|---|---|---|---|---|---|---|
| | Developing | | Middle income | | Non-middle income | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Real US interest | -0.1548*** | -0.1497*** | -0.1785*** | -0.1696*** | -0.0646 | -0.0593 |
| | (0.0568) | (0.0572) | (0.0659) | (0.0645) | (0.1002) | (0.1007) |
| G7 growth | 0.3711*** | 0.3920*** | 0.3605*** | 0.3691*** | 0.3741** | 0.3971** |
| | (0.1061) | (0.1069) | (0.1323) | (0.1325) | (0.1696) | (0.1701) |
| Δ Terms-of-Trade | 0.0829*** | 0.0820*** | 0.1102*** | 0.1078*** | 0.0544*** | 0.0578*** |
| | (0.0094) | (0.0095) | (0.0125) | (0.0126) | (0.0132) | (0.0133) |
| Openness (-1) | 0.0096* | 0.0075 | 0.0135** | 0.0132** | 0.0084 | 0.0047 |
| | (0.0050) | (0.0050) | (0.0066) | (0.0063) | (0.0078) | (0.0082) |
| Export growth (-1) | 0.0351*** | 0.0344*** | 0.0237 | 0.0247 | 0.0282* | 0.0291** |
| | (0.0109) | (0.0112) | (0.0156) | (0.0159) | (0.0145) | (0.0148) |
| Overvaluation (-1) | -0.0083* | -0.0069 | -0.0200*** | -0.0180*** | 0.0093 | 0.0100 |
| | (0.0045) | (0.0048) | (0.0058) | (0.0063) | (0.0064) | (0.0066) |
| Res. as month of M | -0.0006 | -0.0011 | -0.0006 | -0.0010 | -0.0012 | -0.0014 |
| | (0.0008) | (0.0008) | (0.0010) | (0.0010) | (0.0014) | (0.0014) |
| ST Debt to Res. | 0.0000 | 0.0001 | -0.0001 | -0.0001 | -0.0000 | 0.0001 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0002) | (0.0001) | (0.0001) |
| CA to GDP (-1) | 0.0534* | 0.0529 | 0.1154*** | 0.1022** | 0.0060 | 0.0184 |
| | (0.0318) | (0.0328) | (0.0440) | (0.0466) | (0.0411) | (0.0411) |
| Reserves loss | 0.0020 | 0.0031 | 0.0016 | 0.0027 | 0.0017 | 0.0018 |
| | (0.0026) | (0.0026) | (0.0037) | (0.0037) | (0.0038) | (0.0038) |
| M2 growth (-1) | -0.0034 | 0.0022 | 0.0267*** | 0.0331*** | -0.0074** | -0.0040*** |
| | (0.0037) | (0.0034) | (0.0083) | (0.0088) | (0.0036) | (0.0015) |
| Gov. cons. gth (-1) | 0.0093 | 0.0090 | 0.0066 | 0.0061 | 0.0184 | 0.0247 |
| | (0.0064) | (0.0063) | (0.0043) | (0.0040) | (0.0163) | (0.0171) |
| Banking crisis | -0.0123** | -0.0133** | -0.0071 | -0.0060 | -0.0254* | -0.0280* |
| | (0.0060) | (0.0061) | (0.0064) | (0.0065) | (0.0140) | (0.0145) |
| Banking crisis (-1) | -0.0218*** | -0.0224*** | -0.0193*** | -0.0195*** | -0.0198 | -0.0215 |
| | (0.0080) | (0.0081) | (0.0072) | (0.0068) | (0.0256) | (0.0256) |
| Devaluation | -0.0095 | -0.0106* | -0.0190** | -0.0215*** | 0.0023 | 0.0043 |
| | (0.0061) | (0.0061) | (0.0075) | (0.0074) | (0.0091) | (0.0093) |
| Devaluation (-1) | | -0.0137* | | -0.0291*** | | 0.0096 |
| | | (0.0072) | | (0.0107) | | (0.0068) |
| Depreciation | -0.0143*** | -0.0150*** | -0.0138** | -0.0161*** | -0.0171 | -0.0149 |
| | (0.0054) | (0.0055) | (0.0061) | (0.0060) | (0.0109) | (0.0110) |
| Depreciation (-1) | | -0.0035 | | -0.0075 | | 0.0059 |
| | | (0.0059) | | (0.0070) | | (0.0106) |
| Constant | 0.0254* | 0.0285* | 0.0195 | 0.0210 | 0.0041 | 0.0047 |
| | (0.0150) | (0.0151) | (0.0156) | (0.0157) | (0.0189) | (0.0190) |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 1438 | 1400 | 895 | 874 | 543 | 526 |
| adj. R-sq | 0.248 | 0.260 | 0.344 | 0.366 | 0.143 | 0.156 |

Note: The dependent variable is the annual growth in the real GDP in the period 1970-2007. Columns (1)-(2) show the resuls for developing countries. Columns (3)-(4) show the results for middle income countries. Columns (5)-(6) show the results for non-middle income countries. Heterokesdacity robust standard errors are reported in parentheses. *, **, and *** denote significance at 10, 5, and 1 percent respectively.

## -Table 3.7-

| ***Devaluations, depreciations, banking crises, and growth*** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Middle income | | Non-middle income | | Emerging | | Non-emerging | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *Benchmark* | | | | | | | | |
| Devaluation | -0.0190** | -0.0215*** | 0.0023 | 0.0043 | -0.0184** | -0.0214** | -0.0028 | -0.0015 |
| | (0.0075) | (0.0074) | (0.0091) | (0.0093) | (0.0092) | (0.0091) | (0.0078) | (0.0079) |
| Devaluation (-1) | | -0.0291*** | | 0.0096 | | -0.0386*** | | 0.0068 |
| | | (0.0107) | | (0.0068) | | (0.0130) | | (0.0056) |
| Depreciation | -0.0138** | -0.0161*** | -0.0171 | -0.0149 | -0.0077 | -0.0101 | -0.0241*** | -0.0224** |
| | (0.0061) | (0.0060) | (0.0109) | (0.0110) | (0.0062) | (0.0061) | (0.0090) | (0.0091) |
| Depreciation (-1) | | -0.0075 | | 0.0059 | | -0.0103 | | 0.0058 |
| | | (0.0070) | | (0.0106) | | (0.0079) | | (0.0088) |
| *Including regimes classified as freely falling in RR* | | | | | | | | |
| Devaluation | -0.0169** | -0.0195*** | 0.0021 | 0.0040 | -0.0180* | -0.0210** | -0.0031 | -0.0018 |
| | (0.0074) | (0.0074) | (0.0092) | (0.0093) | (0.0093) | (0.0092) | (0.0078) | (0.0078) |
| Devaluation (-1) | | -0.0296*** | | 0.0096 | | -0.0374*** | | 0.0081 |
| | | (0.0108) | | (0.0067) | | (0.0128) | | (0.0054) |
| Depreciation | -0.0126** | -0.0141** | -0.0171** | -0.0150* | -0.0074 | -0.0096 | -0.0223*** | -0.0208*** |
| | (0.0057) | (0.0058) | (0.0080) | (0.0081) | (0.0068) | (0.0069) | (0.0062) | (0.0063) |
| Depreciation (-1) | | -0.0004 | | 0.0072 | | -0.0019 | | 0.0064 |
| | | (0.0054) | | (0.0081) | | (0.0067) | | (0.0063) |
| *Using Frankel and Rose (1996) definition of currency crises* | | | | | | | | |
| Devaluation | -0.0397*** | -0.0426*** | -0.0033 | -0.0010 | -0.0411*** | -0.0434*** | -0.0103 | -0.0080 |
| | (0.0100) | (0.0098) | (0.0133) | (0.0135) | (0.0114) | (0.0111) | (0.0117) | (0.0119) |
| Devaluation (-1) | | -0.0421*** | | 0.0160* | | -0.0490*** | | 0.0151* |
| | | (0.0147) | | (0.0094) | | (0.0165) | | (0.0080) |
| Depreciation | -0.0276*** | -0.0279*** | -0.0107 | -0.0106 | -0.0284*** | -0.0282*** | -0.0199* | -0.0190* |
| | (0.0085) | (0.0084) | (0.0103) | (0.0104) | (0.0087) | (0.0085) | (0.0103) | (0.0103) |
| Depreciation (-1) | | -0.0017 | | -0.0001 | | -0.0057 | | 0.0062 |
| | | (0.0097) | | (0.0188) | | (0.0114) | | (0.0143) |

Note: The dependent variable is the annual growth in the real GDP in the period 1970-2007. Columns (1)-(2) show the resuls for middle incomes countries. Columns (3)-(4) show the results for non-middle income countries. Columns (5)-(6) show the results for emerging economies. Columns (7)-(8) show the results for non-emerging economies. Heterokesdacity robust standard errors are reported in parentheses. *, **, and *** denote significance at 10, 5, and 1 percent respectively. In Frankel and Rose (1996), a currency crisis requires two conditions: 1) a depreciation of the currency of at least 25 percent, and 2) at least a 10 percent increase in the rate of depreciation. Emerging countries are classified using the EMBI Global (J.P. Morgan).

## -Table 3.A-

| Variable | Definition | Source |
|---|---|---|
| ***Real GDP growth*** | Annual real GDP growth | World Development Indicators (2009) |
| ***G7 growth*** | Annual real GDP growth of G7 countries, GDP weigthed average | World Development Indicators (2009) |
| ***Real US interest rate*** | Real US Federal Funds rate | International Financial Statistics (2009) |
| ***Terms-of-trade*** | Exports as capacity of imports in constant local currency units | World Development Indicators (2009) |
| ***Openness*** | Ratio of exports plus imports to GDP | World Development Indicators (2009) |
| ***Export growth*** | Growth of real exports | World Development Indicators (2009) |
| ***Overvaluation*** | Deviation from the average bilateral exchange rate over the period | International Financial Statistics (2009) |
| ***Reserves in months of imports*** | Total reserves in months of imports | World Development Indicators (2009) |
| ***CA to GDP*** | Current account balance to GDP | World Development Indicators (2009) |
| ***Reserves loss*** | Change in international reserves | World Development Indicators (2009) |
| ***Short-term debt to reserves*** | Short-term debt to total reserves | World Development Indicators (2009) |
| ***M2 growth*** | Real money and quasi money growth | World Development Indicators (2009) |
| ***General government consumption growth*** | Real general government final consumption expenditure growth | World Development Indicators (2009) |
| ***Banking crisis*** | Dummy variable for banking crisis episodes | Reihart and Rogoff (2008) |
| ***Currency crisis*** | Dummy variable for currency crisis episodes, defined as an annual increase in the nominal exchange rate (expressed as domestic currency per unit of base currency) of at least 15 percent, excluding episodes classified as freely falling and those that lacked parallel exchange rate data | International Financial Statistics (IFS) and Ilzetzki, Reinhart and Rogoff (2008) |
| ***Depreciation*** | Dummy variable for depreciation episodes, defined as a crisis episodes in which the country was running a float/semi-float. | International Financial Statistics (IFS) and Ilzetzki, Reinhart and Rogoff (2008) |
| ***Devaluation*** | Dummy variable for devaluation episodes, defined as a crisis episodes in which the country was running a pegged/semi-pegged. | International Financial Statistics (IFS) and Ilzetzki, Reinhart and Rogoff (2008) |

# -Table 3.B-

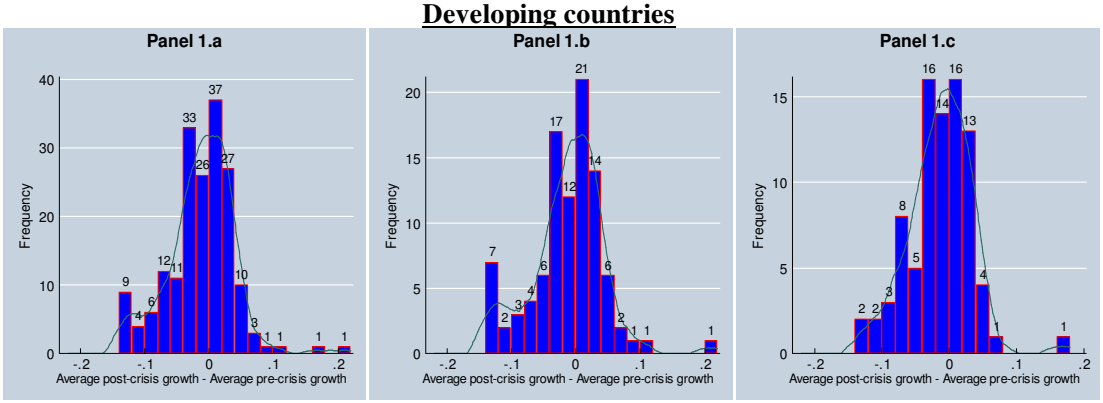
| Country | Year | Depreciation[1] | Devaluation[2] | Currency crisis[3] |
|---|---|---|---|---|
| ***High income countries*** | | | | |
| Australia | 1976 | 1 | 0 | 1 |
| Australia | 1982 | 1 | 0 | 1 |
| Australia | 1997 | 1 | 1 | 0 |
| Austria | 2005 | 1 | 0 | 1 |
| Belgium | 1982 | 1 | 0 | 1 |
| Belgium | 2005 | 1 | 0 | 1 |
| Brunei | 1997 | 1 | 0 | 1 |
| Cyprus | 1976 | 1 | 0 | 1 |
| Cyprus | 1986 | 1 | 0 | 1 |
| Finland | 1977 | 1 | 0 | 1 |
| Finland | 1982 | 1 | 0 | 1 |
| Finland | 1992 | 1 | 0 | 1 |
| Finland | 2005 | 1 | 0 | 1 |
| France | 1976 | 1 | 0 | 1 |
| France | 2005 | 1 | 0 | 1 |
| Germany | 1981 | 1 | 1 | 0 |
| Germany | 1997 | 1 | 1 | 0 |
| Germany | 2005 | 1 | 0 | 1 |
| Greece | 1975 | 1 | 0 | 1 |
| Greece | 1980 | 1 | 0 | 1 |
| Greece | 1985 | 1 | 1 | 0 |
| Greece | 2005 | 1 | 0 | 1 |
| Hong Kong, China | 1983 | 1 | 0 | 1 |
| Iceland | 1986 | 1 | 1 | 0 |
| Iceland | 2001 | 1 | 0 | 1 |
| Iceland | 2006 | 1 | 1 | 0 |
| Ireland | 2005 | 1 | 0 | 1 |
| Israel | 1971 | 1 | 0 | 1 |
| Israel | 1989 | 1 | 0 | 1 |
| Israel | 1998 | 1 | 1 | 0 |
| Italy | 1976 | 1 | 0 | 1 |
| Italy | 1992 | 1 | 0 | 1 |
| Italy | 2005 | 1 | 0 | 1 |
| Japan | 1979 | 1 | 1 | 0 |
| Luxembourg | 1982 | 1 | 0 | 1 |
| Luxembourg | 2005 | 1 | 0 | 1 |
| Malta | 1992 | 1 | 1 | 0 |
| Netherlands | 2005 | 1 | 0 | 1 |
| New Zealand | 1975 | 1 | 0 | 1 |
| New Zealand | 1984 | 1 | 0 | 1 |
| New Zealand | 1988 | 1 | 1 | 0 |
| Norway | 1982 | 1 | 1 | 0 |
| Norway | 1986 | 1 | 1 | 0 |
| Norway | 2003 | 1 | 1 | 0 |
| Portugal | 1976 | 1 | 1 | 0 |
| Portugal | 1982 | 1 | 0 | 1 |
| Portugal | 1986 | 1 | 0 | 1 |
| Portugal | 2005 | 1 | 0 | 1 |
| Singapore | 1997 | 1 | 1 | 0 |
| Spain | 1976 | 1 | 0 | 1 |
| Spain | 1982 | 1 | 0 | 1 |
| Spain | 1993 | 1 | 0 | 1 |
| Spain | 2005 | 1 | 0 | 1 |
| Sweden | 1977 | 1 | 0 | 1 |
| Sweden | 1982 | 1 | 0 | 1 |
| Sweden | 1992 | 1 | 0 | 1 |
| Trinidad and Tobago | 1993 | 1 | 0 | 1 |
| United Kingdom | 1975 | 1 | 1 | 0 |
| United Kingdom | 1981 | 1 | 1 | 0 |
| United Kingdom | 1992 | 1 | 0 | 1 |
| ***Developing non-middle income countries*** | | | | |
| Benin | 1994 | 1 | 0 | 1 |
| Burkina Faso | 1994 | 1 | 0 | 1 |
| Burundi | 1983 | 1 | 0 | 1 |
| Burundi | 1988 | 1 | 1 | 0 |
| Burundi | 1992 | 1 | 1 | 0 |
| Burundi | 1996 | 1 | 1 | 0 |
| Burundi | 2000 | 1 | 1 | 0 |
| ***Developing non-middle income countries (cont.)*** | | | | |
| Central African Republic | 1994 | 1 | 0 | 1 |
| Chad | 1994 | 1 | 0 | 1 |
| Congo, Dem. Rep. | 2000 | 1 | 1 | 0 |
| Congo, Dem. Rep. | 2004 | 1 | 1 | 0 |
| *Cote d'Ivoire** | 1994 | 1 | 0 | 1 |
| Ethiopia | 1992 | 1 | 0 | 1 |
| Gambia, The | 1991 | 1 | 1 | 0 |
| Gambia, The | 2000 | 1 | 0 | 1 |
| Ghana | 1992 | 1 | 1 | 0 |
| Ghana | 2000 | 1 | 1 | 0 |
| Guinea | 1991 | 1 | 0 | 1 |
| Guinea | 1999 | 1 | 0 | 1 |
| Guinea | 2004 | 1 | 1 | 0 |
| Guinea-Bissau | 1983 | 1 | 0 | 1 |
| Guinea-Bissau | 1987 | 1 | 0 | 1 |
| Guinea-Bissau | 1991 | 1 | 0 | 1 |
| Haiti | 1991 | 1 | 1 | 0 |
| Haiti | 2000 | 1 | 1 | 0 |
| Haiti | 2005 | 1 | 1 | 0 |
| India | 1984 | 1 | 0 | 1 |
| India | 1988 | 1 | 0 | 1 |
| India | 1993 | 1 | 0 | 1 |
| Kenya | 1981 | 1 | 0 | 1 |
| Kenya | 1985 | 1 | 0 | 1 |
| Kenya | 1990 | 1 | 1 | 0 |
| Kenya | 1995 | 1 | 1 | 0 |
| Kenya | 1999 | 1 | 0 | 1 |
| Lao PDR | 1987 | 1 | 1 | 0 |
| Lao PDR | 1995 | 1 | 0 | 1 |
| Madagascar | 1984 | 1 | 0 | 1 |
| Madagascar | 1991 | 1 | 1 | 0 |
| Madagascar | 2002 | 1 | 1 | 0 |
| Malawi | 1982 | 1 | 1 | 0 |
| Malawi | 1986 | 1 | 1 | 0 |
| Malawi | 1992 | 1 | 1 | 0 |
| Malawi | 1997 | 1 | 0 | 1 |
| Malawi | 2002 | 1 | 1 | 0 |
| Mali | 1994 | 1 | 0 | 1 |
| Mauritania | 1984 | 1 | 0 | 1 |
| Mauritania | 1992 | 1 | 1 | 0 |
| Mauritania | 1997 | 1 | 0 | 1 |
| Mongolia | 1991 | 1 | 1 | 0 |
| Mozambique | 1995 | 1 | 0 | 1 |
| Mozambique | 2000 | 1 | 0 | 1 |
| Mozambique | 2005 | 1 | 0 | 1 |
| Myanmar | 1971 | 1 | 0 | 1 |
| Myanmar | 1975 | 1 | 0 | 1 |
| Nepal | 1984 | 1 | 0 | 1 |
| Nepal | 1988 | 1 | 0 | 1 |
| Niger | 1994 | 1 | 0 | 1 |
| *Nigeria** | 1981 | 1 | 1 | 0 |
| *Nigeria** | 1989 | 1 | 1 | 0 |
| *Nigeria** | 1999 | 1 | 1 | 0 |
| Pakistan | 1982 | 1 | 0 | 1 |
| Pakistan | 1993 | 1 | 0 | 1 |
| Papua New Guinea | 1994 | 1 | 0 | 1 |
| Papua New Guinea | 1998 | 1 | 0 | 1 |
| Senegal | 1994 | 1 | 0 | 1 |
| Sudan | 1991 | 1 | 0 | 1 |
| Sudan | 1995 | 1 | 0 | 1 |
| Tanzania | 1991 | 1 | 1 | 0 |
| Tanzania | 1999 | 1 | 0 | 1 |
| Togo | 1994 | 1 | 0 | 1 |
| Uganda | 1989 | 1 | 0 | 1 |
| Uganda | 1998 | 1 | 1 | 0 |
| Zambia | 1985 | 1 | 1 | 0 |
| Zambia | 2006 | 1 | 1 | 0 |
| Zimbabwe | 1982 | 1 | 0 | 1 |
| Zimbabwe | 1988 | 1 | 1 | 0 |
| Zimbabwe | 1997 | 1 | 1 | 0 |

| Country | Year | Depreciation[1] | Devaluation[2] | Currency crisis[3] | Country | Year | Depreciation[1] | Devaluation[2] | Currency crisis[3] |
|---|---|---|---|---|---|---|---|---|---|
| | ***Developing middle income countries*** | | | | | ***Developing middle income countries*** | | | |
| Albania | 1997 | 1 | 1 | 0 | Iran, Islamic Rep. | 1993 | 1 | 1 | 0 |
| *Algeria** | 1988 | 1 | 1 | 0 | Iran, Islamic Rep. | 2000 | 1 | 1 | 0 |
| *Algeria** | 1994 | 1 | 1 | 0 | Jamaica | 1978 | 1 | 0 | 1 |
| *Algeria** | 2002 | 1 | 0 | 1 | Jamaica | 1983 | 1 | 0 | 1 |
| *Argentina** | 1971 | 1 | 0 | 1 | Jamaica | 1989 | 1 | 0 | 1 |
| *Argentina** | 2002 | 1 | 0 | 1 | Jamaica | 2003 | 1 | 0 | 1 |
| Azerbaijan | 1993 | 1 | 1 | 0 | *Jordan** | 1988 | 1 | 0 | 1 |
| Bolivia | 1972 | 1 | 1 | 0 | Kazakhstan | 1999 | 1 | 0 | 1 |
| Bolivia | 1979 | 1 | 1 | 0 | *Korea, Rep.** | 1971 | 1 | 1 | 0 |
| Bolivia | 1989 | 1 | 0 | 1 | *Korea, Rep.** | 1980 | 1 | 0 | 1 |
| *Brazil** | 1974 | 1 | 1 | 0 | *Korea, Rep.** | 1997 | 1 | 0 | 1 |
| *Brazil** | 1999 | 1 | 0 | 1 | Macedonia, FYR | 1997 | 1 | 0 | 1 |
| *Bulgaria** | 1990 | 1 | 1 | 0 | *Malaysia** | 1997 | 1 | 0 | 1 |
| Cameroon | 1994 | 1 | 0 | 1 | Mauritius | 1983 | 1 | 1 | 0 |
| *Chile** | 1971 | 1 | 1 | 0 | Mauritius | 1997 | 1 | 0 | 1 |
| *Chile** | 1982 | 1 | 0 | 1 | *Mexico** | 1976 | 1 | 0 | 1 |
| *Chile** | 1987 | 1 | 1 | 0 | *Mexico** | 1982 | 1 | 0 | 1 |
| *China** | 1984 | 1 | 1 | 0 | *Mexico** | 1994 | 1 | 0 | 1 |
| *China** | 1989 | 1 | 1 | 0 | *Mexico** | 1998 | 1 | 1 | 0 |
| *China** | 1994 | 1 | 0 | 1 | Moldova | 1998 | 1 | 0 | 1 |
| *Colombia** | 1974 | 1 | 1 | 0 | *Morocco** | 1985 | 1 | 0 | 1 |
| *Colombia** | 1980 | 1 | 0 | 1 | Nicaragua | 1979 | 1 | 0 | 1 |
| *Colombia** | 1984 | 1 | 0 | 1 | Nicaragua | 1993 | 1 | 0 | 1 |
| *Colombia** | 1988 | 1 | 1 | 0 | Paraguay | 1984 | 1 | 1 | 0 |
| *Colombia** | 1995 | 1 | 1 | 0 | Paraguay | 1989 | 1 | 1 | 0 |
| *Colombia** | 1999 | 1 | 1 | 0 | Paraguay | 1993 | 1 | 0 | 1 |
| Congo, Rep. | 1994 | 1 | 0 | 1 | Paraguay | 1998 | 1 | 0 | 1 |
| *Costa Rica** | 1974 | 1 | 1 | 0 | Paraguay | 2002 | 1 | 1 | 0 |
| *Costa Rica** | 1981 | 1 | 0 | 1 | *Peru** | 1998 | 1 | 0 | 1 |
| *Costa Rica** | 1987 | 1 | 1 | 0 | *Philippines** | 1970 | 1 | 0 | 1 |
| *Costa Rica** | 1991 | 1 | 1 | 0 | *Philippines** | 1983 | 1 | 1 | 0 |
| *Costa Rica** | 1995 | 1 | 0 | 1 | *Philippines** | 1990 | 1 | 0 | 1 |
| *Croatia** | 1993 | 1 | 1 | 0 | *Philippines** | 1997 | 1 | 0 | 1 |
| *Dominican Republic** | 1985 | 1 | 1 | 0 | *Poland** | 2003 | 1 | 1 | 0 |
| *Dominican Republic** | 2002 | 1 | 0 | 1 | Seychelles | 2007 | 1 | 0 | 1 |
| *Ecuador** | 1970 | 1 | 0 | 1 | *South Africa** | 1975 | 1 | 1 | 0 |
| *Ecuador** | 1982 | 1 | 0 | 1 | *South Africa** | 1981 | 1 | 1 | 0 |
| *Ecuador** | 1986 | 1 | 1 | 0 | *South Africa** | 1985 | 1 | 1 | 0 |
| *Ecuador** | 1995 | 1 | 1 | 0 | *South Africa** | 1996 | 1 | 1 | 0 |
| *Egypt, Arab Rep.** | 1979 | 1 | 1 | 0 | *South Africa** | 2000 | 1 | 1 | 0 |
| *Egypt, Arab Rep.** | 1989 | 1 | 1 | 0 | Sri Lanka | 1977 | 1 | 0 | 1 |
| *Egypt, Arab Rep.** | 2001 | 1 | 0 | 1 | Sri Lanka | 1983 | 1 | 0 | 1 |
| *El Salvador** | 1986 | 1 | 1 | 0 | Sri Lanka | 1989 | 1 | 0 | 1 |
| *El Salvador** | 1990 | 1 | 1 | 0 | Syrian Arab Republic | 1988 | 1 | 1 | 0 |
| Equatorial Guinea | 1994 | 1 | 0 | 1 | *Thailand** | 1984 | 1 | 0 | 1 |
| Gabon | 1994 | 1 | 0 | 1 | *Thailand** | 1997 | 1 | 0 | 1 |
| Guyana | 1981 | 1 | 0 | 1 | *Tunisia** | 1986 | 1 | 0 | 1 |
| Honduras | 1990 | 1 | 1 | 0 | *Turkey** | 1970 | 1 | 1 | 0 |
| Honduras | 1994 | 1 | 1 | 0 | *Turkey** | 1977 | 1 | 1 | 0 |
| *Hungary** | 1985 | 1 | 1 | 0 | *Turkey** | 2000 | 1 | 1 | 0 |
| *Hungary** | 1989 | 1 | 1 | 0 | *Turkey** | 2006 | 1 | 1 | 0 |
| *Hungary** | 1994 | 1 | 1 | 0 | *Uruguay** | 1980 | 1 | 0 | 1 |
| *Hungary** | 1998 | 1 | 0 | 1 | *Uruguay** | 1992 | 1 | 0 | 1 |
| *Indonesia** | 1970 | 1 | 1 | 0 | *Uruguay** | 2001 | 1 | 0 | 1 |
| *Indonesia** | 1978 | 1 | 1 | 0 | *Venezuela, RB** | 1984 | 1 | 1 | 0 |
| *Indonesia** | 1983 | 1 | 0 | 1 | *Venezuela, RB** | 1993 | 1 | 1 | 0 |
| *Indonesia** | 1997 | 1 | 0 | 1 | *Venezuela, RB** | 2002 | 1 | 0 | 1 |

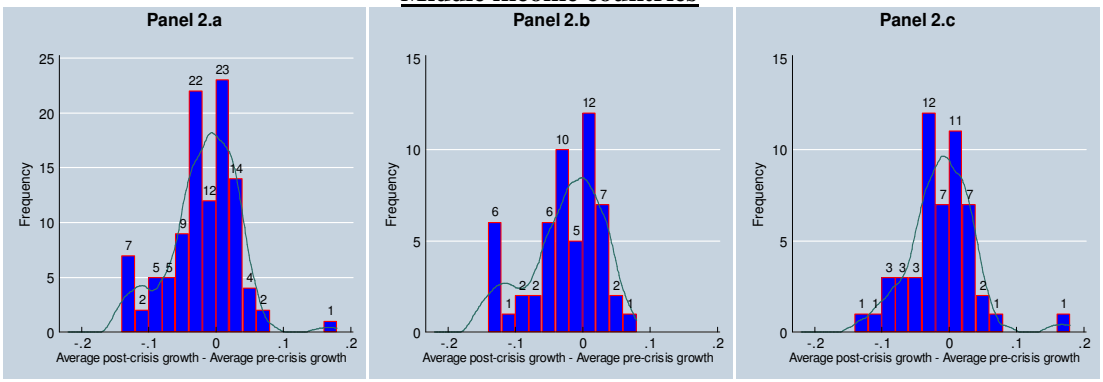
Note: A currency crisis is defined as an annual increase in the exchange rate (expressed as domestic currency per unit of foreign currency) of at least 15 percent. Depreciation and devaluation episodes are crisis episodes in which the country was running a pegged/semi-pegged or a float/semi-float according to the Reinhart and Rogoff classification. Episodes characterized by Reinhart and Rogoff as freely falling and those that lacked parallel exchange rate data have been excluded from this list. The distinction between high income, developing middle income, and developing non-middle income countries is done using the World Bank income classification (2009). The asterick (*) indicates an emerging market using the EMBI Global by J.P. Morgan.

# Figure 3.1

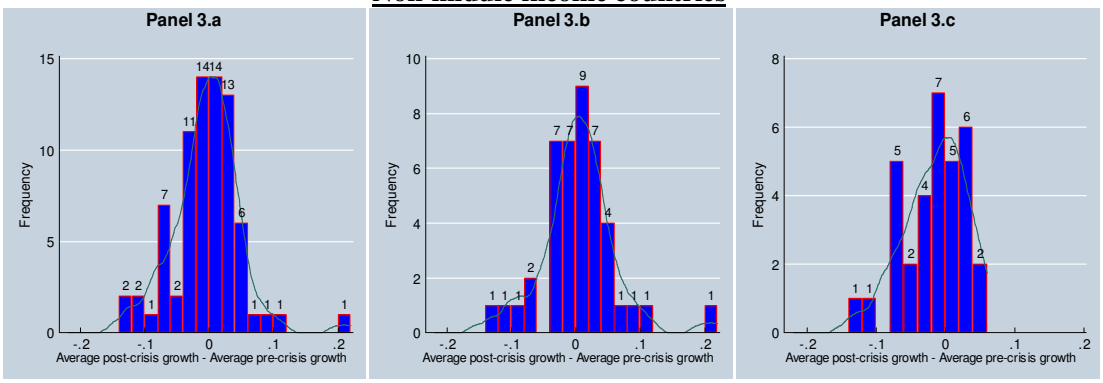
## Developing countries




## Middle income countries




## Non-middle income countries



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