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Characterizing the Business Cycles of Emerging Economies  
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## **CHARACTERIZING THE BUSINESS CYCLES OF EMERGING ECONOMIES**

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# Characterizing the Business Cycles of Emerging Economies<sup>\*</sup>

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## **Abstract**

*We document the properties of business cycles using the dating algorithm by Harding and Pagan (2002) on a quarterly database for 58 countries —21 industrial countries and 37 emerging market economies (EMEs)— from 1970q1 to 2007q4. We find that: (a) recessions are deeper, steeper and costlier among EMEs (especially, in East Asia and Latin America) and that recoveries are swifter and stronger. (b) Recessions have become less costly during the globalization period (1990-2007) than before (1970-89) for industrial countries and EMEs. (c) The main characteristics of downturns are amplified when associated to crisis episodes. (d) The time path of macroeconomic indicators around peaks in real GDP is more volatile in downturns associated with crisis compared to other downturns. (e) Financial cycles (credit and asset prices) tend to precede real output cycles. (f) Credit and stock prices are strongly pro-cyclical while real exchange rates, capital flows and terms of trade tend to be a-cyclical. Finally, an exploratory analysis on the conditional correlates of the cost of recessions shows that: (i) adverse terms of trade shocks raise the cost of recessions in countries with a more open trade regime and deeper financial markets. (ii) Recessions tend to be deeper if they coincide with a sudden stop, but the effect is smaller in countries with deeper domestic credit markets. (iii) Floating exchange rate regimes appear to act as shock absorbers.*

**Key Words:** Business cycles, peaks and troughs, emerging markets

**JEL Codes:** E32, F41

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## 1. Introduction

Emerging market economies (EMEs) have been largely characterized by their macroeconomic volatility. Fluctuations in output, exchange rate and current account balances are typically more frequent, sharper and abrupt than among industrial economies. Historically, the culprit of the greater volatility in EMEs' business cycles has been posited on country specific factors such as the excessive dependence on a few (and volatile) sectors, a narrow tax base, fragile financial system, weak institutions and poor economic policies. More recently, the focus has been gradually shifted towards the external (exogenous) environment faced by EMEs —say, real shocks (e.g. shocks to commodity prices and to the country's external demand), financial shocks (sudden stops due to changes in global liquidity conditions) and natural disasters (Calderon and Levy-Yeyati, 2009). Moreover EMEs are more subject to banking, currency and external debt crisis, which are sometimes related (The World Bank, 2007).

Recent examples of these crisis episodes are the Tequila and East Asian Crisis, and the massive depreciation of the Brazilian and Russian currencies, the subprime crisis in the US, the Greek sovereign debt crisis, which have increased the interest in disentangling the sources of economic crisis episodes. Despite the large output fluctuations in EMEs, the study of business cycles has been mainly conducted for developed economies. Some exceptions are Hoffmaister et al. (1998), Agénor, McDermott and Prasad (2000), Herrera, Perry and Quintero (2000), Neumeyer and Perri (2005), Raddatz (2005), Aiolfi, Catao and Timmermann (2005) Aguiar and Gopinath (2007, 2008), and Cerra and Saxena (2008). They provide answers to different questions that characterized differences in business cycles between EMEs and developed economies. Empirically, one of the limitations in most of these papers is that they either use annual data or limit themselves to a small group of countries.

A recent strand of the literature has recently tried to explain the excess volatility of output fluctuations in emerging markets relative to industrial economies. Aguiar and Gopinath (2007) argue that a DSGE model with shocks to trend growth can match the stylized facts of business cycles in EMEs. Neumeyer and Perri (2005) and Uribe and Yue (2006), on the other hand, show that a DSGE model with interest rate shocks and a financial imperfection will replicate the moments found in the data for EMEs. However, these models fall short of providing a deeper understanding of the mechanism through which: (a) the shock to trend growth occurs, and (b) changes in fundamentals may affect country risk.

A full explanation of the causes of business cycles in EMEs goes beyond the scope of the present paper. Our goal is rather modest. We attempt to describe the main features of the business cycles of emerging market economies vis-à-vis industrial countries as captured by the duration, amplitude, slope and the cost of downturns and upturns in real economic activity. To accomplish this task we use a comprehensive quarterly dataset of 58 countries (21 industrial economies and 37 emerging market economies) from 1970q1 to 2007q4. One of our main contribution is to use a common methodology for dating turning points for a large sample of countries using **quarterly** data. This analysis would allow us to estimate comparable statistics of the duration of recessions and recoveries, the depth and cost of recessions, as well as the speed of recoveries.

The higher exposure and vulnerability of emerging markets to adverse external shocks motivates us to further classify contractionary episodes by their intensity and their coincidence to crisis episodes. In short, we report the main features of recessions and their subsequent recoveries after: (a) severe recessions, as identified by the bottom quartile of all peak-to-trough episodes in our world sample, (b) recessions associated to banking crisis, (c) recessions related to currency crisis, and (d) contractions correlated to economic crisis.<sup>1</sup>

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<sup>1</sup> We define economic crisis, in general, as the occurrence of at least one of these types of crisis: banking crisis, currency crisis, and sovereign default and restructuring on external as well as domestic debt.

Next we zoom in the correlates of real output cycles. We perform this task along the following dimensions: first, we explore the dynamics of macroeconomic variables around recessionary periods using event study analysis. We report the trajectory on a four-year window centered on peaks in real GDP associated to (banking and currency) crisis as compared to those with no crisis for the following real and financial indicators: private consumption, investment, domestic credit to the private sector, stock prices and real exchange rates. Second, we examine the synchronization of real output with the cycle of the real and financial indicators mentioned above using concordance indices (Harding and Pagan, 2002a). These indices capture cyclical properties of these indicators by calculating the fraction of time spent in an expansion or contraction with real output. Third, we conduct an exploratory analysis on the conditional correlates of recessions. We regress the cost of recessions with shocks and structural characteristics of the country that tend to either amplify or mitigate these shocks.

In sum, we assess whether business cycles are alike across groups of countries. Are there systematic differences in the main features of business cycles (duration, amplitude and cost) of industrial countries vis-à-vis emerging markets? Are business cycles alike within emerging markets? Are the main features of recessions and recoveries different when a crisis occurs? Do crises matter for the dynamics of macroeconomic indicators around recessionary periods? Do financial cycles precede output cycles? How is the cost of recessions affected by external shocks and the corresponding amplifying mechanisms?

The paper is divided in 5 sections. In Section 2 we briefly describe the methodology proposed by Harding and Pagan (2002a) to characterize the business cycle. Following the traditional approach outlined by Burns and Mitchell (1946), we identify turning points in an aggregate series —specifically, output level. Once identified the turning points, several characteristics of the cycle are defined —e.g. duration of the phases, output loss or gains in each phase, among others. Then, we discuss the results of applying this methodology to our sample of 61 countries using quarterly data for the period 1970q1-2007q4. The

advantage of using this methodology is two-fold: (a) the identification of cycles neither relies nor depends on any trend-cycle decomposition technique, and (b) it develops an algorithm that provides a statistical foundation to the process of identification of turning points developed by Burns and Mitchell (1946). In Section 3 we further characterize recessions (as well as their subsequent recoveries) by the intensity of the peak-to-trough phase of the cycle and by its coincidence with crisis episodes. Here we consider episodes of banking crisis, currency crisis, and sovereign default of external and domestic debt. Section 4 examines the correlates of downturns in economic activity using event-study analysis, synchronization of cycles and regression analysis. Finally, Section 5 concludes.

## **2. Characterization of business cycles**

This section outlines the methodology used to characterize business cycles for a sample of industrial countries and emerging market economies. There is no unique approach to measure the features and intensity of business cycles in the literature. On the one hand, the seminal work by Hamilton (1989) dates peaks and troughs by modeling the shift in the growth rate of GDP using Markov-switching (MS) methods. On the other hand, Harding and Pagan (2002a) propose a non-parametric approach, which is used in this paper, to identify cyclical turning points in quarterly series —*i.e.* the so-called BBQ algorithm. The two approaches have advantages and disadvantages as discussed in Harding and Pagan (2002b,c), Hamilton (2002), Chauvet and Hamilton (2005) and Chauvet and Piger (2008).

However, there is no consensus on the optimal method to detect turning points in a series. Chauvet and Piger (2008) argue that the MS approach outperforms the BBQ algorithm when predicting peaks and troughs in real time. Nevertheless, if the main purpose of the exercise is to document the historical chronology of turning points, both methodologies can provide the same results. In fact, Chauvet and Piger (2008) find that MS and BBQ approaches can accurately identify the NBER business cycle chronology of US economic activity.



In contrast, Harding and Pagan (2000b,c) argue that the BBQ algorithm provides a simple and transparent way to detect the turning points for a time series and it is not sensitive to changes in the parameterization of the data generating process (DGP) of real GDP. Hamilton (2002), on the other hand, argues that both methods are *philosophically different*. The goal of the econometrician, according to Hamilton, is to make inference on an unobserved phenomenon called recession based on the DGP of different indicators of real economic activity. Harding and Pagan (2002c) consider this argument questionable since both methods perform the same task but in a different way.

In summary, we recognize that: (a) business cycles are characterized by more than just the turning points in real GDP, and (b) there are different dating methodologies. But our purpose in this paper is rather modest. First, we want to identify turning points for a large sample of developed and developing countries using historical data. It goes beyond the scope of this paper to either predict peaks and troughs in real time or undertake dating method comparisons. Second, we want to characterize the main features of business cycles in terms of duration, amplitude, slope and cumulative variation of economic downturns and upturns across countries and over time. Third, we analyze the degree of coincidence between the cycle of real GDP and other (real and financial) variables as suggested in the literature. Fourth, we want to compare all these features across group of countries and over time to search for specific patterns. Given these goals we will follow Harding and Pagan (2002a) approach in order to describe the main features of business cycles.

## **2.1 Methodological issues**

The classical cycle approach, dominant in NBER studies of business cycles, focuses on changes in the level of real GDP. Alternatively, research on business cycles has focused on the identification of “*growth cycles*” as deviations from long run trends, with the latter being obtained by using some specific de-trending technique —say, a deterministic trend

model, the Hodrick-Prescott filter, and the band-pass filter, among others. One limitation of the *growth cycle* methodology is that it tends to over-estimate the frequency of turning points and under-estimate their amplitude when compared to classical cycles (Morsink, Helbling and Tokarick, 2002). In addition, the dating of turning points using growth cycles rather than classical ones is sensitive to the inclusion of new data.

From the seminal work of Burns and Mitchell (1946), the *classical approach* defines business cycles as sequences of expansions and contractions in the *levels* of either total output or employment. Specifically, this approach detects turning points in an aggregate series —typically, the (log) level of real GDP. Harding and Pagan (2002a) extend the Bry and Boschan (1971) algorithm to identify cyclical turning points in quarterly series —*i.e.* the *BBQ* algorithm. In fact, the *BBQ* algorithm requires that:

- (1) Complete cycles should run from peak to peak and have two phases, contraction (peak to trough) and expansion (trough to peak), and peaks and troughs must alternate, and
- (2) The minimum duration of a complete cycle is of at least five (5) quarters and that each phase of the cycle must last at least 2 quarters.

Local maximum and minimum values of real output (typically expressed in natural logs) can be determined by looking at the differences of our measure of real GDP. We denote  $y_{it}$  as the (log level of) quarterly real GDP of country  $i$  in time  $t$ . Hence, Harding and Pagan define the local optima as follows:

- (a) A cyclical **peak** in the level of real output of country  $i$  occurs at time  $t$  if:

$$(1 - L^2)y_{it} > 0, (1 - L)y_{it} > 0 \text{ and } (1 - L)y_{i,t+1} < 0, (1 - L^2)y_{i,t+2} < 0$$

- (b) A cyclical **trough** takes place in country  $i$  at time  $t$  if:

$$(1 - L^2)y_{it} < 0, (1 - L)y_{it} < 0 \text{ and } (1 - L)y_{i,t+1} > 0, (1 - L^2)y_{i,t+2} > 0$$

and  $L$  is the lag operator, where  $L^k x_t = x_{t-k}$ . The algorithm described above ensures that  $y_{it}$  is a local optimum relative to 2 quarters on either side of  $y_{it}$ .<sup>2</sup> This notion of local optimum, in addition to the compliance of the censoring rule (minimum duration of cycle and phases), defines a complete cycle.

Using the *BBQ* algorithm, we identify peaks and troughs in the quarterly series of real GDP for **61** countries over the period **1970-2007**. Our sample consists of 21 industrial countries and 40 emerging market countries. Within the latter group, we gathered information for 13 Latin American countries, 8 East Asian countries, 10 countries in Eastern Europe and 6 other emerging market economies.<sup>3</sup> We should point out that the *BBQ* algorithm was unable to find turning points in the real GDP data for China, El Salvador, and Slovenia. The steady and sharp growth in Chinese real GDP for the last 25 years prevents us from finding these turning points in the data. Short time series for real GDP are the culprit for El Salvador and Slovenia.

After computing the turning points in real output, we characterize the main features of expansions (from trough to subsequent peak) and contractions (from peak to trough) in real economic activity in terms of duration, amplitude, slope and cumulative variation. In addition, we consider more informative, from a cyclical standpoint, to characterize real output upturns. Following Claessens et al. (2010) we define upturns or recoveries as the early stages of the expansion phase, when real GDP reaches the level of the previous peak coming from a trough. We compute the following features of output fluctuations:

- (1) *Duration of the cycle*. It is computed as the number of quarters from peak to trough during contraction episodes and from trough to the next peak in the expansion phase. In addition, the duration of the recovery (upturn) is the number of quarter that takes the real GDP to rebound from the trough to its previous peak.

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<sup>2</sup> An even simpler *sequence* rule is available from the idea that a turning point in a graph at time  $t$  requires that the derivative change sign at  $t$ . Thus, treating  $\Delta y_t$  as a measure of the derivative of  $y_t$  with respect to  $t$ , leads to the use of the sequence  $\{\Delta y_t > 0, \Delta y_{t+1} < 0\}$  as signaling a peak. The problem with the latter is that it would conflict with the requirement that a phase must be at least 2 quarters in length.

<sup>3</sup> The full sample of countries is presented in Appendix I.

- (2) The *amplitude of the cycle* is calculated as the maximum drop of GDP from peak (trough) to trough (peak) during episodes of contraction (expansion). For instance, the amplitude of the contraction,  $A_C$ , measures the change in the real GDP from a peak ( $y_0$ ) to the next trough ( $y_k$ ), that is,  $A_C = y_k - y_0$ . The amplitude of upturns is measured as the 4-quarter change in real GDP following a trough —as suggested by Sichel (1994) and Claessens et al. (2010).
- (3) The *slope* of each phase is computed as the ratio of the amplitude of the peak-to-trough (trough-to-peak) phase of the cycle to its duration. The slope of the upturn is the amplitude from trough to the previous peak divided by its duration.
- (4) We estimate *cumulative variation of the cycle* as the area of the triangle conformed by the duration and amplitude. It reflects the idea of foregone output from peak to troughs during contractions and the output gains during expansion episodes. For the peak-to-trough phase of the cycle, the *cumulative output loss*  $L_C$  (*i.e.* an approximate measure of the overall cost of a cyclical contraction), with duration of  $k$  quarters, is defined as:

$$L_C = \sum_{j=1}^k (y_j - y_0) - \frac{A_c}{2}$$

## 2.2 Characterizing classical cycles

We now proceed to estimate the duration, amplitude, slope and cumulative variation of the business cycle for our sample of 58 countries (21 industrial countries and 37 emerging market economies) during the period 1970q1-2007q4. Not only we describe the main features of output cycles for emerging market economies vis-à-vis industrial countries but also we highlight the differences across countries within emerging markets.

Table 1 presents the descriptive statistics of the main characteristics of recessions and recoveries (as well as expansions) for the samples of industrial countries and developing

countries. We should note that our discussion will focus on recessions (or economic downturns) and recoveries (economic upturns). Although we report the main features on expansions, we refrain from discussing the stylized facts on this stage of the cycle due to the fact that we are unable to identify whether its main properties are mainly cyclical factors or more permanent shocks (such as, shifts in preferences or technological shocks).

**Fact 1: Recessions and recoveries for industrial countries and emerging market economies are not alike.**

Table 1 reports that although the duration of economic downturns is similar for emerging markets and industrial countries (with averages of 3.6 and 3.8 quarters, respectively), we confirm the fact that emerging market economies experience deeper recessions. The median contractionary period for emerging markets is larger and more abrupt –as signaled by the larger amplitude and slope of real output fluctuations. As expected, recessions are costlier among emerging markets with a median cumulative loss of 9 percent (compared to approximately 4 percent for industrial economies). Interestingly, we find that the dispersion of the amplitude, slope and the cost of recessions is wider within the group of emerging market economies than among industrial countries. For instance, the cumulative loss for emerging market economies go for a range between -45.7 to -0.5 percent, while that of industrial economies the range is between -22.8 and -1.7 percent.

Recoveries (or real upturns), on the other hand, are slightly shorter among industrial countries, with an average duration of 3.5 quarters as opposed to the 3.8 quarters for emerging market economies. On the other hand, the amplitude and slope of the median downturns for emerging market economies doubles that of industrial countries. Again, the dispersion of the amplitude and slope of business cycles is greater among emerging market economies than among industrial countries.

In sum, although the duration of recessions and recoveries are roughly similar across country groups, contractions in emerging markets are larger (more ample) and wilder (higher slope) than industrial countries. In what follows, we will further examine the main characteristics within the group of emerging market economies by classifying our sample of countries by geographical region.

**Fact 2: The duration of contractions is almost similar across country groups, with recessions becoming shorter on average for emerging markets during the globalization period.**

On average, contractions for the 37 emerging market economies in our sample last 3.6 quarters (approximately 11 months), which is roughly similar to that of industrial countries (3.8 quarters). However, we should point out that while the duration of recessions has remained almost invariant over time for industrial countries, it has declined during the globalization period for emerging markets –that is, it declined from 4.3 to 3.5 quarters

Within emerging markets groups, the average duration of downturns varies from 3.2 quarters in Eastern Europe to 4.1 quarters in East Asia. Moreover, duration of peak-to-trough phases of the cycle declined during the globalization period for all emerging market groups. On the other hand, contractionary episodes among East Asia have a larger degree of variability (1.7 quarters) than that of Latin American countries (0.8 quarters). In East Asia, Thailand displays the longest contraction duration (8 quarters) while downturns in Taiwan, South Korea, and Hong Kong last only 3 quarters. Finally, in Latin America, Uruguay had the longest average contractions in the region (5.5 quarters), followed by Venezuela and Argentina (4.6 and 4.5 quarters, respectively). On the other hand, Brazil exhibits the shortest contractionary phases in the region (2.8 quarters).

**Fact 3: The duration of recoveries is roughly similar across country groups, but it has increased for industrial and emerging markets during the globalization period.**

Table 2 shows that, on average, recoveries in emerging markets are as long as those in industrial countries (3.8 and 3.5 quarters, respectively). In addition, the duration of recoveries has significantly increased during the globalization period for both industrial countries (from 3.3 to 4.5 quarters) and emerging market economies (3.4 to 4.3 quarters) —thus, it takes more time to reach the previous peak after coming from the trough.

Within the group of emerging markets, upturns are shorter in duration in Eastern Europe and Latin America (3.4 and 3.5 quarters) than those in East Asia (4.9 quarters). In addition, recoveries in East Asia show a larger degree of variability than those in Latin America. On the other hand, upturns have become longer across emerging market groups during the globalization period (1990-2007) as compared to 1970-1989 (pre-globalization period). For instance, the duration of recoveries in Latin America increased from 3.2 to 3.9 quarters whereas those in East Asia shot up from 4.3 to 6 quarters.

**Fact 4: As measured by their amplitude, economic downturns are deeper in emerging market than in industrial countries while recoveries are stronger. During the globalization period, the median amplitude of peak-to-trough phases of the cycle has barely declined whereas the strength of recoveries has become weaker for industrial countries**

Phases of contraction in economic activity among emerging market economies (EMEs) are deeper relative to that of industrial economies. The median amplitude of peak-to-trough (P-T) cycles is larger in EMEs than in industrial countries (5.2 and 2.2 percent, respectively). On the other hand, the depth of downturns has remained almost invariant for both groups of countries. It declined from 2.2 to 2.1 percent for industrial countries, and from 5 to 4.8 percent for EMEs. Finally, we observe that the degree of variability of downturns in EMEs is larger than that of industrial countries.

Among emerging markets, recessions are deeper in East Asia (5.6 percent) than in Latin America and Eastern Europe (5.2 and 4.6 percent). Furthermore, the amplitude of economic downturns declined significantly in Latin America during the globalization period (to 4.6 from 8.5 percent) while it increase in East Asia (from 4.8 to 5.8 percent). On the other hand, the dispersion of the depth of recessions across countries is larger in East Asia (3.9 percent) than in Latin America (3.3 percent). While the amplitude of downturns varies from 3.8 to 16.1 quarters (Taiwan and Thailand, respectively), it fluctuates between 1.5 percent (Costa Rica) and 11.3 percent (Peru).

As recessions are deeper, recoveries are stronger in emerging markets than in industrial economies. In fact, the amplitude of recoveries in the former group more than doubles that of the latter group (7 and 3.4 percent, respectively). Interestingly, the strength of upturns has remained almost invariant for emerging markets during the globalization period while it has declined significantly for industrial countries (from 3.9 to 2.4 percent). We should also point out that, although recoveries in EMEs are stronger, they display a larger extent of cross-country variability than in industrial countries.

Among emerging markets, East Asia shows more dynamic recoveries than any other region, with median amplitude of 9.5 percent –which is substantially higher than the 5.9 percent in LAC and 6.6 percent in Eastern Europe. In addition, the strength of recoveries has declined in East Asia (from 12.7 to 7.3 percent) as well as for Latin America (from 5.8 to 4.7 percent). Finally, the strength of upturns shows a larger extent of dispersion in East Asia than in Latin America (3 and 1.9 percent, respectively). The amplitude of upturns in East Asia fluctuates between 4.1 and 11.7 percent (Philippines and the Republic of Korea, respectively), and it varies from 4 to 9.1 percent in Latin America (Paraguay and Costa Rica, respectively).

**Fact 5: The pace of recessions and recoveries, as measured by the slope of downturns and upturns, is faster for emerging markets than for industrial countries. During the**



**globalization period, recessions became more turbulent among emerging markets while the ensuing recoveries were slower.**

The pace of downturns in EMEs is almost three times as fast as that of industrial economies (-1.6 percent compared to -0.6 percent) while upturns are twice as fast (3 and 1.6 percent for EMEs and industrial countries, respectively). This implies that EMEs reached the trough of their recessions and come out faster from them at a faster pace than industrial countries. During the globalization period, the pace of recessions became slightly faster whereas that of recoveries slowed down among emerging markets. For industrial countries, the pace of recessions remained almost invariant while that of recoveries almost halved.

Among emerging markets, we observe that the pace of recessions is roughly similar across groups –that is, 1.7 percent per quarter for East Asia and 1.6 percent for Latin America and Eastern Europe. On the other hand, recoveries take place at a faster pace in East Asia (3.6 percent per quarter) than in Eastern Europe (3.1 percent) and Latin America (2.3 percent). In general, all emerging market groups recover at a faster pace than industrial countries and, among them, Latin America is the region that recovers at the slowest pace. Across EMEs, Taiwan (9 percent), Hong Kong (7.1 percent) and Chile (6.5 percent) exhibit the largest slope in the upturn, while Japan (5.7) and New Zealand (4.4 percent) are the best performers among industrial economies.

**Fact 6: As measured by the cumulative output loss in the peak-to-trough phase of the cycle, recessions are costlier in emerging market economies than in industrial countries. Also, the cost of recessions came down during the globalization period for both industrial countries and emerging markets.**

The median cumulative output loss for EMEs over the period 1970-2007 is 9 percent as opposed to a much lower cost for industrial countries (3.9 percent). This implies that

recessions are costlier in EMEs than in industrial countries. However, it should be noted that the cost of recessions has declined during the globalization period for both groups thanks to shorter and smaller downturns. For instance the median output loss for emerging markets went down from 11.3 percent in the pre-globalization period to 7.9 percent in the globalization period.

We observe that across groups of EMEs, recessions are costlier in East Asia (13.7 percent) than in Latin America (10.5 percent) and Eastern Europe (6.7 percent). While recessions became less costly in Latin America during the globalization period (down from 14.3 to 7.4 percent), the cost of recessions went up in East Asia (from 8.9 to 12.1 percent). The higher cost of downturns in Latin America for the pre-globalization period is attributed by the heightened turbulence experienced during the 1980s –i.e. the lost decade for the region. On the other hand, the 1997-98 Asian crisis explains the increase in the cost of recessions for the region. Finally, there is a wider degree of variability in the cost of recessions across emerging market economies. In Latin America, Uruguay, Peru, Venezuela and Chile display the largest output losses (between 19 and 27 percent) while Costa Rica shows the smallest output loss (around 1 percent). In Asia, Thailand experienced, by far, the largest output loss, 46 percent, compare to the median of the region, 6.9 percent.

### **3. Crisis and Business Cycles**

In Section 2 we showed that economic downturns can be deeper, costlier and steeper for emerging markets than for industrial countries. Among emerging markets, recessions were costlier in Latin America in the 1980s and East Asia in the 1990s. These periods coincided with turbulence and economic crisis for both regions. In general, the intensity and violence of output contractions is typically associated to crisis episodes related to overvalued currencies, bank runs, or balance of payments problems. These sharp fluctuations associated to crisis episodes are likely to occur in emerging markets than in

developed economies (Tornell and Westermann, 2002; Claessens et al. 2010; Calderon and Servén, 2011).

The literature distinguishes other aspects that characterize output fluctuations in emerging market economies (vis-à-vis developed countries): (a) consumption is more volatile than output –typically, with a ratio greater than one (and larger than that of developed countries), (b) net exports are strongly counter-cyclical, and (c) real interest rates are highly volatile, counter-cyclical and lead the cycle. The explanation of these features have been treated in a long list of works pioneered by Mendoza (1991) and Backus, Kehoe and Kydland (1992), and followed by the works of Kydland and Zarazaga (2002), Neumeyer and Perri (2005), Uribe and Yue (2006), Aguiar and Gopinath (2007, 2008), Boz, Daude and Durdu (2008), Chang and Fernández (2009), and Comin et al. (2009)

The empirical literature is very extensive for developed economies –*e.g.* see Crucini, Kose and Otrok (2008), Centoni, Cubadda and Hecq (2007) and the references therein. The main explanations for business cycles in this literature are productivity shocks. For samples that involve both emerging and developed economies Kose, Otrok and Whiteman (2003), analyze the importance of domestic and external factors as causes of cycles. They found that less developed economies are more likely to experience country specific business cycles. From a longer time perspective, Alfio, Catao and Timmerman (2008) construct a long index of business cycle for Argentina, Brazil Chile and Mexico. They show how external variables has driven the cycles during inward and outward oriented periods lived by these countries. In terms of depth of recessions and recoveries Cerra and Saxena (2008) build a large sample of countries to document the cost of recessions (*i.e.* large output losses) associated with financial and political crisis. These events may drive the results presented in the previous section, since many emerging economies experienced these disruptive episodes more often. Closely related to this fact, the high pro-cyclicality of capital flows for emerging markets heightens the vulnerability of real output to sudden stops in capital inflows (Calvo, 1998; Mendoza, 2006). In the event of adverse external

shocks, the pro-cyclicality of access to capital markets and an environment with domestic financial frictions tends to amplify the cycle (Caballero, 2002).

This section distinguishes real output upturns and downturns by intensity (whether they were severe or not) and whether they were associated to crisis episodes. It also evaluates the main characteristics of the cycles in real GDP associated with crisis episodes vis-à-vis recessions without crisis (which we will call *regular* recessions).

*Characterizing output cycles by intensity.* We further analyze the features of recessions based on the extent of the real output decline. We define recessions as *severe* if the peak-to-trough decline in output falls within the bottom quartile of the sample distribution of all output drops across countries. Furthermore, we consider *extremely severe recessions* as those where the amplitude of the peak-to-trough phase of cycle is larger than 10 percent.

Table 3 documents the average duration and the median amplitude, slope and cumulative loss of economic downturns according to the intensity or severity of the output drop. We consider severe and extremely severe recessions vis-à-vis regular recessions, and recoveries (real output upturns) following these severe/extremely severe downturns. The table reports the average duration and the median of amplitude, slope and cumulative loss for different samples of countries.

By construction, the amplitude of downturns is larger for severe and extremely severe recessions than for other recessions. The median amplitude for severe recessions is 10.2 percent whereas that of other contractions is 2 percent. Compared to other recessions, severe output drops last longer (4.6 vs. 3.4 quarters) and are more violent (with a slope of 2.6 vs. 0.6 percent). Hence, severe recessions are costlier –in fact, the cumulative output loss for a (median) severe recession is approximately 20 percent compared to a 2.7 percent cumulative output loss for other recessions. When looking at the recovery phase

following these recessions, we observe that real output upturns following a severe recession last longer (5.6 vs. 2.9 quarters) and are larger (7.6 percent vs. 4.2 percent) than upturns following other recessions. However, as proxied by their slope, recoveries after severe recessions are similar to recoveries from regular recessions (1.7 vs. 1.9 percent). We can argue that emerging markets tend to have more violent output contractions due to the higher incidence of sharp external shocks (Calderon and Levy-Yeyati, 2009) and higher unconditional probability of crisis (Calderon and Serven, 2011).

When distinguishing between industrial countries and emerging markets, we find that severe and extremely severe recessions are longer in duration but shorter in amplitude for industrial countries. Typically, severe recessions for industrial countries last longer (6.4 vs. 4.3 quarters) and are shorter in amplitude (8 percent vs. 10.4 percent) than severe recessions for emerging markets. Therefore, industrial countries tend to have less violent cyclical fluctuations during severe recessions than emerging markets –as indicated by their lower slope (1.5 vs. 2.7 percent). On the other hand, recoveries after severe recessions for emerging market economies take more time than industrial countries (7 vs. 5.4 quarters), are smaller in amplitude (4.4 vs. 8.6 percent) and, hence, display a slower recovery pace (1 percent vs. 1.8 percent per quarter).

Zooming in the lens to emerging markets, the median severe recession in East Asia last longer than that in Latin America or Eastern Europe. In addition, severe recessions have a larger output drop in East Asia (12.3 percent when compared to 9.9 percent in Latin America and 7.6 percent in Eastern Europe). This might be attributed to the sharp output drop experienced by East Asia during the 1997-8 crisis. Furthermore, recoveries after severe recessions tend to last longer for the median upturn in East Asia. While it takes 8.6 quarters for real output in East Asia to recover from its trough to the previous peak level, it only takes approximately 5 quarters in Latin America and Eastern Europe. The amplitude of the recovery, as measured by the 4-quarter cumulative output variation after the

trough, is larger for the median peak-to-trough episode in Eastern Europe (11 percent) vis-à-vis those in East Asia (8.7 percent) and Latin America (7.5 percent).

*Recessions associated to crisis episodes.* As we conjectured above, the severity of output contractions might be attributed to the higher likelihood of crisis episodes taking place in emerging market economies when compared to industrial countries. It has been argued in the literature that emerging market economies are not only more prone but also more vulnerable to adverse external shocks. For instance, structural features of these economies such as high liability dollarization and fragile financial systems tend to amplify the deleterious effects of these shocks.

Table 4 reports the duration, amplitude and slope of recessions associated with banking crisis, currency crisis and economic crisis as well as the recovery periods following these downturns. For downturns we also present the cumulative loss of output –which approximates the cost of the recession. *Banking crisis* episodes are identified using the recent database by Laeven and Valencia (2008). They defined systemic banking crises as the situation where: (a) rising non-performing loans exhaust the bank’s capital, (b) asset prices collapse on the heels of run-ups before the crisis, (c) real interest rates are sharply raised, and (d) there is a reversal or slowdown in capital flows. *Currency crisis* on the other hand follow the dating of Reinhart and Rogoff (2009). They use a variant of the Frankel and Rose (1996) approach based on large exchange rate depreciations. They define currency crises as episodes where the annual depreciation exceeds 15 percent. *Sovereign defaults*, as defined in Reinhart and Rogoff, are events where the government is unable to meet principal or interest payments on time –either on the due date or within a specified grace period. Using Reinhart and Rogoff’s dating identification, we distinguish between sovereign defaults on external debt and domestic debt.<sup>4</sup> Finally, this paper also identifies episodes of *economic crisis* as those where at least one of the following types of crisis

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<sup>4</sup> Episodes of sovereign default on external debt include debt rescheduling that it eliminated in terms less favorable than the original liability whereas those of default on domestic debt accounts those events involving the freezing of bank deposits and conversions of those deposits from foreign to local currency (Reinhart and Rogoff, 2009, pp. 11).

takes place: (a) banking crisis, (b) currency crisis, (c) sovereign external debt default, (d) sovereign domestic debt default.

Table 4 reports that recessions associated to crisis events last longer on average than those unrelated to crisis. For instance, the average duration of an output downturn that ends up in a banking crisis is 4.4 quarters whereas that of other recessions is 3.6 quarters. Also, recessions associated to crisis tend to be larger in amplitude, more violent (a steeper slope) and costlier (a larger cumulative loss). The median peak-to-trough episode displays an output drop of 7 percent when associated to a banking crisis (vis-à-vis 2.6 percent for other recessions), it declines at a faster speed (1.8 percent per quarter vs. 0.7 percent for other recessions), and has a greater output cost (with a cumulative loss of 12 percent relative to the 3.5 percent registered by other recessions). Symmetrically, recovery periods after crisis (regardless of the type of crisis) last longer than other upturns –*e.g.* the average duration of recoveries after banking crises is 5.6 quarters while that of other recessions is approximately 3 quarters. The amplitude of the median upturn after any crisis is larger than that of other upturns (6.5 vs. 3.9 percent). In what follows we will focus our discussion on the differences between recessions and recoveries associated banking crisis and currency crisis.

*Banking crisis and recessions.* Recessions associated to banking crisis, on average, tend to last longer in industrial countries than in emerging markets (6.7 and 4 quarters, respectively). However, the downturn in industrial countries is smaller (3.2 percent) than the output drop in emerging markets (7.1 percent). Hence, the drop in real output is more violent among emerging markets –*i.e.* approximately 2 percent per quarter compare to 0.7 percent for industrial countries. Moreover, we are unable to find significant differences between the average duration of peak-to-trough cycles associated to crisis for industrial countries and emerging market economies. However, upturns are larger and steeper for emerging markets.

Among emerging markets, the occurrence of crisis does not seem to matter for the duration of the median recession in Latin America (around 4 quarters). However, recessions tend to be larger and more violent when banking crises occur than otherwise. On the other hand, recoveries after banking crisis in Latin America are longer (more than 5 quarters) than other upturns (approximately 3 quarters) and relatively larger in amplitude (6.4 vs. 4.7 percent), but the recovery is slower.

In East Asia, the average duration of downturns with crisis is 5 quarters (compared to 3.2 quarters for other downturns) and the median amplitude is 14 percent (*i.e.* significantly larger than that of other downturns (3.1 percent)). The cumulative output loss in downturns related to banking crisis is approximately 34 percent whereas the cost of recession is significantly smaller in other recessions (5.8 percent). On average, it takes almost 10 quarters for real output to recover from trough to its previous peak in East Asia when there is a banking crisis (and only 2 quarters, otherwise), and both the amplitude and the slope of the upturns is smaller for upturns that follow a banking crisis. Clearly, fluctuations in real output are sharper in East Asia due to the financial crisis experienced by the region in 1997-8. For instance, the amplitude of the output drop during the East Asian crisis was approximately 20 percent for Indonesia, 16 percent for Thailand, 12 percent for Malaysia and 10 percent for Hong Kong. In sum, among emerging market economies, East Asian countries experienced the most severe recessions when a banking crisis occurred. However, Eastern European countries experienced the largest rebound from a recession with a banking crisis.

*Currency crisis and recessions.* Downturns in economic activity related to currency crisis are only slightly larger than other recessions for both industrial countries (4 vs. 3.7 quarters) and emerging markets (4 vs. 3.5 quarters). In the event of currency crisis, the median amplitude is larger and steeper than otherwise for both industrial and emerging markets. Recoveries after currency crisis are shorter for industrial countries than when there is no crisis, and the converse happens for emerging markets. Upturns in real output



in episodes with currency crisis (vis-à-vis those with no crisis) are larger (in amplitude) and steeper for both industrial and emerging markets.

Within the group of emerging market economies, we interestingly find that the amplitude and the slope of upturns in Latin America is smaller for episodes associated to currency crises than in those with no crisis. In East Asia, upturns that follow a currency crisis last longer than those without crisis (5.9 vs. 1.2 quarters, respectively), but their recovery takes place at a slower pace (1.5 vs. 3 percent per quarter). Again, the rebound from currency crises is stronger and faster for Eastern European countries than for the other two groups of emerging market economies.

#### **4. A deeper look at recessions: Dynamics, synchronicity and determinants**

Section 2 and 3 illustrates the main differences in the business cycle features of emerging market economies vis-à-vis industrial countries. So far the literature has attempted to explain these differences by either introducing a stochastic productivity trend (Aguiar and Gopinath, 2007, 2008) or foreign interest rate shocks along with financial frictions (Neumeyer and Perri, 2005; Uribe and Yue, 2006). However, the theoretical literature still needs to understand: (a) the forces behind the differences in the TFP of emerging market and industrial economies. Are these differences mainly the reflection of policy reversals or frictions? (b) The mechanisms through which shocks to fundamentals may induce fluctuations in country risk spreads.<sup>5</sup>

This section will focus on a more limited issue. We first examine the behavior of macroeconomic and financial indicators around recessions –and, more specifically, around peaks in real GDP associated to crisis episodes and those peaks that are not related to crisis. We focus on patterns in year-on-year growth (or annual variation in the case of

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<sup>5</sup> In other words, it could be a supply shock that deteriorate the economic situation of the country, raising risk premium.

ratios) for a 4-year window (8 quarters before and 8 quarters after the peak in real GDP).<sup>6</sup> Second, we introduce the concordance index to evaluate the degree of synchronization of the business cycle (i.e. fluctuations in real output) and the cycle of macroeconomic indicators. The set of indicators includes components of GDP (private consumption and investment), external factors (terms of trade and capital flows), and financial indicators (credit and asset prices). Finally, we will try to shed light on the factors that drive the depth of recessions by estimating a regression across countries and episodes where each observation represents an episode of contraction (as defined in section 2). The dependent variable is the average output loss, which roughly measures the cost of recessions. Based on the literature previously discussed we include as determinants of the cost of recession proxies for external shocks (foreign interest rate), macroeconomic instability (inflation, flexibility of exchange rate regimes), banking crisis, and other structural characteristics (trade openness, domestic financial development, quality of institutions), among others.

#### **4.1 Dynamics of recessions**

How real, financial and external indicators behave around recessions? To undertake this analysis we run panel data regressions with time effects on a 4-year window centered in the peak of real GDP (that marks the start of the recession in period  $T$ ) and distinguishing between peaks associated to crisis and those peaks that are unrelated to crisis episodes. These regressions are conducted for the sample of industrial countries and emerging market economies, and the coefficient estimates of these regressions are depicted in Figure 1 for the case of banking crisis and Figure 2 for currency crisis episodes.<sup>7</sup> We interpret our coefficient estimates as below or above the average growth outside the 4-year window associated to the crisis episode. For the sake of simplicity, we will call this average growth outside the window of analysis as *trend growth*.

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<sup>6</sup> We carry our event study analysis for year-on-year changes in macroeconomic and financial indicators rather than quarter-to-quarter changes due to the volatility of the latter measure and the fact that quarterly variations can provide a noisy representation of the dynamics.

<sup>7</sup> Note that although the regressions are not reported, they are available from the authors upon request.

*Banking crisis.* Figure 1 shows the evolution of (year-on-year) growth in output, private consumption, real investment, domestic credit to the private sector (in per capita terms and as a percentage to GDP), stock prices (in real terms), and the real exchange rate.

The evolution of growth in real output around a recession for both industrial countries and emerging market economies is as expected. After reaching a peak above trend in period  $T$ , real output goes below in period  $T+1$  and reaches the trough four quarters after period  $T$  for industrial countries and emerging market economies. At the trough ( $T+4$ ), output growth is 4 to 5 percentage points below trend for industrial countries regardless of whether or not the recession is associated to banking crisis. On the other hand, the trough for emerging markets almost 12 percentage points below trend in recessions with crisis (compared to 8 pp below trend for downturns without crisis). We should note that when crisis hits, real output growth tend to converge to trend growth at a faster pace for emerging markets than for industrial countries (see Figure 1.1).

The dynamics of consumption and investment around recessions resembles the behavior of real output. Figure 1.2 and 1.3 depict the behavior of private consumption and investment for industrial countries and emerging market economies around peaks in real GDP. Qualitatively, we observe that the pattern of behavior of private consumption and investment for both group of countries mimics that of real output: (a) the trough in consumption and investment takes place in period  $T+4$ , (b) consumption and investment tend to converge to trend growth at a faster pace for emerging markets than for industrial countries. However, we should point out that the fluctuations in private consumption are smaller than those in output, while investment fluctuations are more volatile than those of output.

We next take a look at the relationship between financial cycles and real output cycles around peaks in real GDP. We want to ascertain whether there is statistical precedence of credit to real output cycles. In this context, we present the evolution of bank credit to the

private sector per capita (Figure 1.4) and as a ratio to GDP (Figure 1.5) for industrial countries and emerging markets around recessions that are related or not to banking crisis. When looking at bank credit per capita, we observe that credit growth is above trend up to period  $T$  ( $T-1$ ) for industrial countries (emerging market economies). We should point out that credit per capita turns around after 2 quarters but still remains below average for industrial countries while it steadily declines after 8 quarters in emerging markets. Finally, we should note that deviations from trend growth in credit per capita are larger among emerging markets than industrial countries.

Figures 1.6 and 1.7 depict the dynamics of real stock prices and real exchange rate around the start of downturn episodes for industrial countries and emerging markets economies. We observe that stock prices goes below trend in period  $T-2$  ( $T-3$ ) for industrial countries (emerging markets). For industrial countries, we observe that the trough in real stock prices takes place in period  $T+2$ , with the trough at more than 20 percentage points below trend in recessions without crisis and almost 40 pp in recessions associated with crisis. Note that while real stock prices is above trend in period  $T+6$  for industrial countries, it takes more time when banking crisis hits. The same qualitative behavior holds for emerging markets (see Figure 1.6). Finally, fluctuations from trend in real exchange rates are more volatile around recessions with crisis than in recessions without crisis. Interestingly, the real exchange rate appreciates significantly in recessions with banking crisis among industrial countries –reaching its peak in period  $T+4$  at 5 pp above the trend growth. On the other hand, emerging markets experience a sharp depreciation of the currency in real terms that reaches its trough in period  $T+5$  at approximately 15 pp below trend growth (see Figure 1.7).

*Currency crisis.* Figure 2 depicts the behavior of macroeconomic variables around peaks in real GDP related to currency crisis episodes as opposed to those with no currency crisis. In a similar fashion to Figure 1, we depict the coefficient estimates of the (year-on-year) variation of real output and other macroeconomic indicators and we interpret these

coefficients as deviations of growth in tranquil times (i.e. outside the 4-year window centered in the beginning of the recession).

Figure 2.1 presents the evolution of real GDP. After peaking at period T for industrial and emerging markets, real output growth begins a steady drop below trend that reaches its trough in period T+4. We should note that the amplitude and cumulative loss in output is not only similar in magnitude for recessions associated to crisis and non-crisis periods for industrial countries but also the output fluctuations are less volatile than for emerging markets. For instance, output growth is 4 to 5 percentage points below trend for industrial countries (regardless the occurrence of a currency crisis) while it is, on average, 12 (8) pp below trend when a currency crisis (does not) take place for emerging market economies.

Figure 2.2 presents the dynamics of private consumption around downturns, and the evolution of this variable resembles that of real output: (i) after peaking around period T, private consumption fall steadily below growth in normal times and reaches its trough in period T+4, (ii) we fail to find significant differences in the behavior of consumption for industrial countries when there is a currency crisis as opposed to when there is no crisis, (iii) private consumption sharply declines around recessions associated with currency crisis –e.g. it is almost 10 (4) percentage points below trend when there is (no) currency crisis, and (iv) deviations from trend growth in consumption are less volatile than those of output for both groups of countries. Figure 2.3, on the other hand, shows the pattern of behavior of (year-on-year growth in) real investment around downturns in economic activity. In contrast to output and consumption, real investment peaks above trend before period T –i.e. it moves below trend growth in period T-2 for industrial and emerging markets. While real investment sharply drops up to period T+1 for industrial countries, it has a larger and more protracted decline (up to period T+4) for emerging markets. Finally, note that while investment is already above trend in period T+8 for industrial countries, it is still below trend growth for emerging markets.

Figure 2.4 and Figure 2.5 depict the behavior around recessions of bank credit to the private sector per capita and as a ratio to GDP, respectively. While credit grows at a faster pace before the downturn –and even more so if the downturn is associated to a currency crisis– it declines below trend growth in period T and reaches its trough in period T+2 for industrial countries and T+4 for emerging markets. While it sharply turns around for industrial countries after currency crisis, it stays 15 to 20 pp below trend for emerging markets. Note that for both groups of countries, growth in real credit per capita stays below trend in the aftermath of economic downturns associated with currency crisis (see Figure 2.4). The behavior of credit to GDP is similar but with more volatility in the aftermath of the economic downturn. This result may be attributed to the dynamic behavior of output. However, we should note that when considering the credit-to-GDP ratio, the drop in credit is not as dramatic as that of credit per capita during crisis times (see Figure 2.5).

Finally, we present the dynamics of asset prices around economic downturns. Real stock prices reached their peak in period T-4 before crisis in industrial countries and then decline steadily up to period T+4 (where they are almost 40 pp below normal times). Afterwards, they steadily increase but continue to grow at a slower pace than normal times in period T+8. For emerging markets, peak in real stock prices growth over trend takes place also in period T-4 and then it declines steadily but at a similar pace than in downturns with no crisis. However, the recovery in real stock prices is sharper in the aftermath of crisis where it grows above trend already in period T+7 (see Figure 2.6). On the other hand, we fail to find a systematic pattern of behavior in the real exchange rate around recessions (with or without currency crisis) for industrial countries. However, we can argue that there is a real appreciation in the currency for emerging markets before downturns (for those associated with or without crisis) and, as expected, a massive real depreciation of the local currency for downturn episodes associated with currency crisis. The maximum depreciation is reached 3 quarters after the downturn, with the real exchange rate at approximately 12 pp below normal times. Finally, real exchange rate in

emerging markets reverts to mean and starts growing above trend in period  $T+8$  (see Figure 2.7).

## 4.2 Synchronization of output and macroeconomic cycles

The extent of synchronization between the cycle of real output and the cycle of macroeconomic indicators (real and financial ones) is examined using the concordance index developed by Harding and Pagan (2002 b). The index of concordance,  $C_{yx}$ , for real output  $y$  and an (real or financial) indicator  $x$  is defined as:

$$C_{yx} = \frac{1}{T} \sum_{t=1}^T [C_t^y C_t^x + (1 - C_t^y)(1 - C_t^x)]$$

where:

$C_t^y = \{0 (1) \text{ if the real output } y \text{ is in a contractionary (expansionary) phase in period } t\}$

$C_t^x = \{0 (1) \text{ if the variable } x \text{ is in a contractionary (expansionary) phase in period } t\}$

In other words,  $C_t^y$  and  $C_t^x$  are binary variables that take the value of one (zero) when the variable is in the trough-to-peak (peak-to-trough) phase of the cycle in period  $t$ . For series with sample size  $T$ ,  $C_{yx}$  measures the fraction of time that real output ( $y$ ) and the macroeconomic indicator  $x$  are in the same phase of their respective cycles. If the concordance index is equal to one (zero), we can argue that the series are perfectly pro-cyclical (counter-cyclical).

Table 5 presents the concordance index between real output and: (a) components of GDP (private consumption and real investment), (b) financial indicators (credit and asset prices), and (c) external factors (terms of trade and capital flows). We compute the coincidence index for full sample of countries (58) and time periods (pre-globalization and globalization periods). We present the different moments of the distribution of cross-country coincidence indices between real output and the different macroeconomic indicators. First, we observe that the cross-country medians and averages for the different concordance indices are roughly similar in magnitude. Second, the concordance index

points out the high pro-cyclicality of private consumption and real investment (with median concordances of at least 0.8). Third, private credit is pro-cyclical as pointed out by the concordance (with a median of 0.77 for total credit) and a low standard deviation (0.11). Note that the concordance between total credit and real output ranges from 0.43 to 0.93. Fourth, asset prices are also pro-cyclical but not as strongly as it is the case for credit. Concordance with real output here varies from 0.43 to 0.91.

Table 6 presents the median across countries of the coincidence among real output, components of GDP, financial indicators and external factors for different samples of countries. As expected, real output is highly synchronized with private consumption as well as private investment for industrial countries and emerging market economies. While the degree of synchronization between output and consumption increases during the globalization for both groups of countries, it only increases for real investment during 1990-2007.

The coincidence between financial indicators (credit and asset prices) and real output provides us with a first approximation to the interaction between financial and real cycles. Real credit to the private sector (total) is pro-cyclical as indicated by the coincidence factor, and it has increased when looking at the globalization period (1990-2007) when compared to 1970-89. This behavior is observed for industrial countries and emerging countries. In general, we observe that the median coincidence is larger for East Asian and Eastern European countries, and they are the lowest for Latin American countries. On the other hand, we observe that the degree of synchronization between output cycles and asset prices (stock prices or exchange rates) is weaker than that of credit (see Table 6).

Finally, we look at the concordance between real output and external factors such as terms of trade and non-FDI inflows (either gross or net flows into the domestic economy). We are unable to find a cyclical pattern of behavior for terms of trade for industrial countries and emerging markets –and the coincidence signals counter-cyclicality for East



Asian countries. Capital flows (expressed as a ratio to GDP) also appear to a-cyclical (with coincidence indices near 0.5). The lack of the systematic relationship between the cycles of real output and that of external factors could be attributed to the fact that the relationship between these two sets of indicators is not contemporaneous, and that it is usually argued that external factors tend to precede real output downturns.

### **4.3 On the severity of the recessions**

This section uses a simple regression analysis to characterize the conditional correlates of economic downturns rather than looking for the causes of recessions. From our identification of peaks and troughs using the BBQ algorithm, we construct a sample of 120 downturns in economic activity and the dependent variable in our regression analysis is the average cost of the recession as measured by the ratio of the cumulative output loss (from peak-to-trough) to its duration (in quarters). Specifically, we regress the cost of recessions on external shocks (say, terms of trade shocks and US interest rates) and structural policies that may amplify or mitigate these shocks (e.g. trade openness, quality of institutions, and exchange rate regime, among others).

Table 7 reports the regression estimates that links the cost of recessions with: (a) *Regional effects* –as proxied by a group of dummy variables that represent different regions such as Latin-American and the Caribbean (LAC), East Asia and the Pacific (EAP) and industrial countries (IND); (b) *Time-effects* captured by dummies for the decades of the 1980s and 1990s so as to examine whether recessions were deeper and more costly in specific decades; and (c) Turbulent events –as proxied by indicators that account for the occurrence of sudden stops and banking crisis in our regression analysis. According to the literature, these types of crises are important in explaining the magnitude of a contraction (Becker and Mauro, 2006).

The evidence reported in Table 7 shows, as reported in section 2, that economic downturns in industrial countries (IND) are significantly less costly than those in LAC and EAP. In the event of turmoil, our regressions find that the average cost of the recession is 1 percent larger in the event of a sudden stop, and approximately 0.5 percent higher if a banking crisis occurs. These results are consistent with the findings in Section 4.1.

Finally, the cost of recessions appears to be not statistically different across decades, except for the LAC region during the “*Lost Decade*” of the 1980s. Our results show that the cost of recessions was higher by 5 percent during the 1980s in the region. We should point out that the median cumulative output loss in LAC is the largest in the pre-globalization period.

It has usually been argued in the literature that business cycles in emerging markets are more volatile due to the country’s vulnerability to large fluctuations in terms of trade, foreign interest rates (Neumeyer and Perri, 2005, Uribe and Yue, 2006), and sharp and sudden changes in capital inflows (Calvo, 1998, Mendoza 2006). Some of these shocks – mostly, exogenous and external to the domestic economy– may be amplified by particular characteristics of the economy such as the extent of openness to international markets of goods and assets, the depth of domestic financial markets (Caballero, 2002, Chang and Fernandez 2009), exchange rate regime (Edwards and Levy-Yeyati 2005) or the degree of specialization of the economy. Inadequate macroeconomic framework and poor quality of institutions can also act as magnifiers of the effects of these exogenous external shocks.

Appendix I reports the definition and sources of the variables involved in our regression analysis. The external shocks are captured by capital flows (say, gross FDI flows and gross equity-related flows), terms of trade, foreign interest rate (weighted average of G-3 real money market rate and the US real interest rate), and (dummies for) sudden stops. Our measures of external shocks are measured as the variation over the last 4 quarters before the peak in real GDP. Structural policies included are: (a) the quality of institutions, as

measured by the index of political risk reported by the International Country Risk Guide (ICRG) at the beginning of the recession (or at the peak of real GDP); (b) trade openness, (c) financial openness, and (d) financial development. Note that the last three variables are expressed at their level in the year previous to the start of the recession. The quality of macroeconomic policies is approximated by the extent of real exchange rate undervaluation and the average inflation on the previous four quarters. Also, we include a binary variables for either floating or fixed exchange rate regimes. The inclusion of these binary variables allows us to investigate whether floating exchange rate regimes isolate better the economies<sup>8</sup>.

Table 8 presents a simple regression analysis between the cost of recessions and different shocks identified in the literature. We also interact this shock with the amplifying factors mentioned earlier. We should first note that the dummy for the LAC region in the 1980s and for industrial economies are neither statistically nor economically significant anymore, as opposed to the results reported in Table 7. This implies that our control variables may explain the differences in the cost of recessions (as measured by output losses) between EMEs and industrial countries.

Regarding the external shocks, as expected, terms of trade play an important role in explaining the magnitude of the recession. Our evidence shows that adverse terms of trade shocks would increase the cost of recessions (in terms of foregone output); however, an open trade regime and deeper domestic financial markets will mitigate the effect of the shock. Surprisingly, countries with a more diversified economic structure will be more affected by a terms of trade shock. The final effect of the terms of trade shock will depend of the combination of these three variables (trade openness, private credit and concentration of economic activity) at the moment that the recession occurs. The effect of U.S. interest rate fluctuations, on the other hand, is not statistically significant, except for *EAP* countries (where the coefficient is positive and significant).

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<sup>8</sup> Edwards and Levy Yeyati (2005) show evidence in favor of flexible exchange rate as shock absorber.

Hence, a positive shock in the U.S. interest rate increases the cost of the recession only for this group of countries. We also included the interaction of changes in the US interest rate with private credit and financial openness and they were not statistically significant.

Output losses are still larger when a sudden stop occurs; however, this effect is mitigated in countries with deeper domestic credit market. We fail to find a significant coefficient estimate for financial openness as explanatory variable or when interacted with financial domestic development. It seems that what really captures the depth of recessions is whether a sudden stop in capital inflows takes place or not.<sup>9</sup>

Indicators of macroeconomic policy stability and external imbalances have the expected signs. Real exchange rate overvaluation is strongly positive. This implies that recessions are more costly when preceded by a substantial real overvaluation and, typically, real overvaluation precedes currency crisis. Hence, we can argue that expected output losses are larger when currency crisis ensues, which is consistent with the findings in section 4.1. On the other hand, inflation has a positive sign although the coefficient is not statistically significant. Finally, we include dummy variables that capture both fixed and floating exchange rate regimes. We find that the cost of the recession (in terms of foregone output) is smaller in countries with more flexible exchange rate arrangements. This result is consistent with the case for flexible rates in Friedman (1953): the output loss in response to adverse real shocks (say, negative terms of trade shocks) is smaller in countries with more flexible exchange rate regimes. Also, note that the interaction with terms of trade was not statistically significant. Finally, we find that, as expected, countries with better quality of institutions typically experience less costly recessions.

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<sup>9</sup> Although not reported, these estimations are available from the authors upon request.

## 5. Summary and conclusions

One of the main contributions of this paper is to establish a set of stylized facts on the main features of business cycles for the largest available sample of emerging market economies using quarterly data.<sup>10</sup> Specifically, we apply the BBQ algorithm developed by Harding and Pagan (2002a) on quarterly series of real GDP over the period 1970q1-2007q4 for a sample of **58** countries, of which **37** are emerging market economies and **21** are industrial economies. We will highlight some of them here.

We confirm the evidence that expansions and contractions in real economic activity in emerging markets are more volatile than those of industrial countries. More specifically, we find that: first, recessions are costlier for emerging market economies (EMEs) —i.e. the median cumulative loss in real output for this group more than doubles that of industrial countries (9 vs. 4 percent). Second, recessions are steeper and recoveries are swifter among emerging markets. The pace of downturns in EMEs is almost three times as fast as that of industrial economies while upturns are twice as fast. Third, the depth, speed and cost of recessions show a larger extent of variability within the group of emerging market economies compared to industrial countries. Fourth, among emerging markets, recessions are deeper in East Asia than in Latin America and Eastern Europe. However, at the same time, East Asian economies experience the fastest recoveries. Fifth, economic downturns have been more severe in the pre globalization period for Latin America, while the converse is true for East Asian and Eastern European economies.<sup>11</sup> Finally, recessions have become less costly during the globalization period for both industrial countries and EMEs. This could be attributed to shorter and smaller downturns.

Section 2 presents evidence that recessions were deeper, steeper and costlier in emerging markets. In this context, we further investigate the features of economic downturns as

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<sup>10</sup> Typically, cross-country studies for emerging markets and developing economies use annual data (e.g. Hausmann, Rodriguez, and Wagner, 2006)

<sup>11</sup> We defined 1970-1989 as the Pre-globalization period, and 1990-2007 as the globalization period.

classified by their intensity. We find that severe and extremely severe downturns are shorter and deeper for emerging markets compared to industrial countries. Among emerging markets, East Asia exhibits the deepest recessionary periods while Eastern Europe recovers at the fastest pace from severe recessions. We argue that the severity of recessions in EMEs is linked to their higher incidence and vulnerability to economic crises (banking, currency, and sovereign default on domestic or external debt). Hence, we examine the properties of recessions and recoveries when associated to crisis episodes vis-à-vis those that do not coincide with any crisis. Real downturns associated to crisis tend to be deeper, steeper and costlier. Symmetrically, recoveries following crises (regardless of the type of crisis) last longer than other upturns (4.3 versus 3.4 quarters) and the amplitude of the median upturn after any crisis is larger than that of other upturns (6.5 vs. 3.9 percent).

In the last part of the paper, we explore the dynamics, synchronization and conditional correlates of output cycles. First, we analyze the dynamics of relevant macroeconomic (real and financial) indicators around peaks in real GDP (i.e. beginning of downturns) and distinguishing between regular recessions and those associated to crises. Real consumption and investment closely resemble the dynamics of output, and as the theory would predict consumption (investment) fluctuates less (more) than output for both emerging market and industrial economies. This dynamics around downturns are amplified when either banking or currency crises occur. Peaks in financial variables (banking credit and stock prices) tend to precede peaks in real output. As expected, banking credit (per capita or over GDP) collapses during economic downturns associated to banking or currency crisis. Moreover, credit does not reach its pre-crisis level after 8 quarters. On average, we observe a small real overvaluation before the peak in real output for industrial countries and EMEs. However, there is a massive real depreciation in emerging markets after the beginning of the downturn —especially, when downturns coincide with crises. This is not true for developed economies, where we are unable to find a clear pattern.

Second, we analyze the synchronization of cycles in real output with those of other real and financial variables. Using the coincidence index suggested by Harding and Pagan (2002a), we find high pro-cyclicality of private consumption and real investment (with median concordances of at least 0.8). Regarding the interaction between financial and real cycles, we find that private credit is private credit is pro-cyclical (with a median concordance of 0.77 for total credit). Finally, asset prices are also pro-cyclical but not as strongly as it is the case for credit. Real exchange rate, capital inflows and terms of trade tend to be a-cyclical.

Finally, we conducted an exploratory analysis on the conditional correlates of the cost of recessions. Using a sample of 120 recession episodes, we find that terms of trade shocks would subsequently affect the cost of recessions (as measured by the average annual foregone output). Terms of trade deterioration would raise the average annual rate of output lost during a recession in countries that are open to trade, with deeper domestic financial markets and, surprisingly, in countries a more diversified output structure. On the other hand, U.S. interest rate shocks seem to play a role in recessions taking place in East Asia. Recessions tend to be deeper (and, hence, the output loss larger) in countries experiencing a sudden stop, and the average rate of output foregone is even larger if the country has a shallow domestic financial market. Countries with a stronger institutional framework –say, better investment profile, government stability, higher quality of bureaucracy, democratic accountability, among others– tend to have lower costs associated to recessionary phases.

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## APPENDIX I: Data Description

### I.1 Data on Gross Domestic Product

We gather data GDP data on local currency at constant prices for a sample of selected countries. See Table I.1 for more details.

**Table I.1**  
**Sample of Countries and Sources of Data**

Country	Period	Source
Argentina	1970.Q1-2005.Q1	IMF's International Financial Statistics (IFS) for 1970-79, and Ministerio de Economía y Producción (MECON) for 1980-2005. Webpage: <a href="http://www.mecon.gov.ar/secpro/dir_cn/default1.htm">http://www.mecon.gov.ar/secpro/dir_cn/default1.htm</a>
Australia	1970.Q1-2005.Q1	Australian Bureau of Statistics. Data available from the Reserve Bank of Australia ( <a href="http://www.rba.gov.au/">http://www.rba.gov.au/</a> ).
Brazil	1980.Q1-2005.Q1	Central Bank of Brazil and Instituto Brasileiro de Geografia e Estatística ( <a href="http://www.ibge.gov.br/">http://www.ibge.gov.br/</a> )
Canada	1970.Q1-2005.Q1	IMF's International Financial Statistics (IFS)
Chile	1977.Q1-2005.Q1	Central Bank of Chile, Department of National Accounts
Colombia	1977.Q1-2004.Q4	Departamento Administrativo Nacional de Estadística (DANE, <a href="http://www.dane.gov.co/">www.dane.gov.co/</a> ) for 1994-2004 and Departamento Nacional de Planeación (DNP, <a href="http://www.dnp.gov.co">www.dnp.gov.co</a> ) for 1977-1993
France	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Germany	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Hong Kong	1973.Q1-2005.Q1	Census and Statistics Department de Hong Kong ( <a href="http://www.info.gov.hk/censtatd/eng/hkstat/">http://www.info.gov.hk/censtatd/eng/hkstat/</a> ).
Indonesia	1970.Q1-2005.Q1	Statistics Indonesia, IMF's IFS
Italy	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Japan	1970.Q1-2005.Q1	Economic and Social Research Institute of Japan, IMF's IFS and Bloomberg for 2005
Korea	1970.Q1-2005.Q1	Bank of Korea
Malaysia	1988.Q1-2004.Q4	IMF's International Financial Statistics
Mexico	1980.Q1-2005.Q1	Instituto Nacional de Estadística Geografía e Informática (INEGI, <a href="http://www.inegi.gob.mx/">http://www.inegi.gob.mx/</a> )
New Zealand	1982.Q2-2005.Q1	Statistics New Zealand (SNZ, <a href="http://www.stats.govt.nz/">http://www.stats.govt.nz/</a> )
Peru	1979.Q1-2005.Q1	Central Reserve Bank of Peru ( <a href="http://www.bcrp.gob.pe">www.bcrp.gob.pe</a> )
Portugal	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Singapore	1975.Q1-2005.Q1	Singapore Department of Statistics ( <a href="http://www.singstat.gov.sg/">http://www.singstat.gov.sg/</a> )
Spain	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Sweden	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
Taiwan	1970.Q1-2005.Q1	National Statistics, Republic of China ( <a href="http://eng.stat.gov.tw/">http://eng.stat.gov.tw/</a> ).
Thailand	1993.Q1-2005.Q1	National Economic and Social Information Board ( <a href="http://www.nesdb.go.th/">http://www.nesdb.go.th/</a> ).
United Kingdom	1970.Q1-2005.Q1	IMF's IFS and Bloomberg for 2005
United States	1970.Q1-2005.Q1	Bureau of Economic Analysis ( <a href="http://www.bea.gov">www.bea.gov</a> )
Venezuela	1993.Q1-2005.Q1	Central Bank of Venezuela ( <a href="http://www.bcv.org.ve/">http://www.bcv.org.ve/</a> ).

Control Variables	Period
Gross FDI Inflows	Yearly average variation (last 8 qtr before the episode)
Gross Equity related Inflows	Yearly average variation (last 8 qtr before the episode)
Terms of trade	Yearly average variation (last 8 qtr before the episode)
G3 Real Money Market Rate	Yearly average variation (last 8 qtr before the episode)
US Real Money Market Rate	Yearly average variation (last 8 qtr before the episode)
ICRG The Political Risk Rating	At the beginning of the previous year
Trade Openness	At previous year
Financial Openness (at previous year)	At previous year
Private credit by deposit money banks to GDP	At previous year
REER Sub-valuation	4 qtr before turning point (average of HP filter gap)
Inflation average	Average over previous 4 quarters

**Table 1**  
**Basic features of real output cycles**

*Sample of 58 countries, 1970-2007 (quarterly data)*

Region	Real output contractions (Peak-to-trough phase of the cycle)							Real output expansions (Trough-to-peak phase of the cycle)								
	Number of downturns	Time in Downturn (%)	Downturn			Cumulative Loss	Excess Area	Expansion			Upturns					
			Duration	Amplitude	Slope			Duration	Amplitude	Slope	Number	Time (%)	Duration	Amplitude	Slope	
<b>All Countries</b>																
Average	4.2	14.9%	3.7	-4.4%	-1.3%	-9.6%	-47.8%	20.0	27.9%	1.5%	4.3	10.0%	3.7	5.9%	2.9%	
Median	4.0	13.2%	3.4	-3.7%	-0.9%	-7.3%	-47.8%	16.0	16.6%	1.3%	4.0	8.3%	3.3	5.3%	2.3%	
Std. Deviation	2.3	7.6%	1.2	3.3%	0.9%	8.4%	7.5%	17.1	31.7%	0.7%	2.4	5.8%	2.0	3.0%	2.1%	
Minimum	1.0	4.8%	2.0	-16.1%	-5.0%	-45.7%	-64.9%	3.0	3.9%	0.6%	1.0	0.7%	1.0	1.8%	0.3%	
Maximum	10.0	38.4%	8.0	-0.4%	-0.2%	-0.5%	-31.4%	101.0	190.8%	3.9%	11.0	30.6%	14.0	12.8%	9.1%	
<b>Industrial Countries</b>																
Average	5.2	13.2%	3.8	-2.4%	-0.7%	-6.0%	-46.3%	19.1	18.1%	1.0%	5.2	8.5%	3.5	3.6%	1.9%	
Median	5.0	12.5%	3.7	-2.2%	-0.6%	-3.9%	-47.5%	18.0	15.3%	1.0%	6.0	6.6%	3.3	3.4%	1.6%	
Std. Deviation	1.7	4.9%	0.9	1.3%	0.4%	5.2%	5.4%	9.0	13.0%	0.4%	1.7	4.5%	1.3	1.4%	1.3%	
Minimum	2.0	5.9%	2.5	-6.3%	-2.0%	-22.8%	-56.3%	4.8	6.3%	0.6%	2.0	1.3%	2.0	1.8%	0.6%	
Maximum	9.0	27.0%	6.5	-1.1%	-0.3%	-1.7%	-37.3%	46.0	69.7%	2.3%	9.0	17.8%	6.3	7.3%	4.7%	
<b>Emerging Market Economies</b>																
Average	3.6	16.0%	3.6	-5.6%	-1.6%	-11.7%	-48.6%	20.6	33.9%	1.8%	3.7	11.0%	3.8	7.2%	3.4%	
Median	3.0	13.6%	3.3	-5.2%	-1.6%	-9.0%	-48.3%	14.0	23.7%	1.7%	3.0	10.2%	3.4	7.0%	3.0%	
Std. Deviation	2.5	8.7%	1.3	3.5%	1.0%	9.1%	8.4%	20.7	38.0%	0.7%	2.5	6.5%	2.3	2.9%	2.3%	
Minimum	1.0	4.8%	2.0	-16.1%	-5.0%	-45.7%	-64.9%	3.0	3.9%	0.8%	1.0	0.7%	1.0	1.8%	0.3%	
Maximum	10.0	38.4%	8.0	-0.4%	-0.2%	-0.5%	-31.4%	101.0	190.8%	3.9%	11.0	30.6%	14.0	12.8%	9.1%	

*Recessions (or "downturns") are defined as the period (in quarters) between the peak in real GDP and its subsequent trough. Expansions, on the other hand, cover the period between the trough and the next peak in real output. Real output "upturns" (recovery phase) represent the early stages of the expansion and take place in the period that takes the real GDP to go from the trough to its previous peak level. Time in recession (upturn) is defined as the number of quarters where the economy is in a peak-to-trough (trough-to-previous peak) phase of the cycle as a share of total time length of the series. The amplitude of the downturn is computed as the percentage variation in the real GDP from its peak to its trough while the amplitude of the upturn is computed as the 4-quarter cumulative variation in real output following the trough. The slope of the downturn is the ratio of the amplitude to the duration of the downturn (or peak-to-trough phase) whereas that of the upturn is amplitude from trough to previous peak divided by its duration. The cumulative loss combines information on the duration and amplitude to measure the overall cost of recession.*

**Table 2****Basic features of real output cycles***Sample of 58 countries, 1970-2007 (quarterly data)*

Region	Real output contractions (Peak-to-trough phase of the cycle)					Real output expansions (Trough-to-peak phase of the cycle)						
	Duration	Amplitude	Slope	Cumulative	Excess	Expansion			Upturns			
				Loss	Area	Duration	Amplitude	Slope	Duration	Amplitude	Slope	
<b>All Countries</b>												
1970-2007	3.7	-3.7%	-0.9%	-7.3%	-47.8%	20.0	16.6%	1.3%	3.7	5.3%	2.3%	
1970-1989 ( <i>Pre-globalization</i> )	4.1	-3.3%	-0.9%	-7.2%	-46.9%	22.8	18.1%	1.2%	3.4	4.7%	2.0%	
1990-2007 ( <i>Globalization</i> )	3.7	-3.0%	-1.0%	-6.3%	-48.9%	16.2	17.2%	1.4%	4.4	4.6%	1.7%	
<b>Industrial Countries</b>												
1970-2007	3.8	-2.2%	-0.6%	-3.9%	-47.5%	19.1	15.3%	1.0%	3.5	3.4%	1.6%	
1970-1989 ( <i>Pre-globalization</i> )	3.9	-2.2%	-0.6%	-4.2%	-45.8%	19.3	15.5%	1.0%	3.3	3.9%	1.5%	
1990-2007 ( <i>Globalization</i> )	4.0	-2.1%	-0.5%	-3.0%	-49.2%	22.3	17.2%	0.7%	4.5	2.4%	0.8%	
<b>Emerging Market Economies</b>												
1970-2007	3.6	-5.2%	-1.6%	-9.0%	-48.3%	20.6	23.7%	1.7%	3.8	7.0%	3.0%	
1970-1989 ( <i>Pre-globalization</i> )	4.3	-5.0%	-1.2%	-11.3%	-47.8%	26.4	25.1%	1.8%	3.4	6.8%	2.8%	
1990-2007 ( <i>Globalization</i> )	3.5	-4.8%	-1.6%	-7.9%	-48.6%	13.8	16.8%	1.6%	4.3	6.4%	2.4%	
<b>Latin America</b>												
1970-2007	3.7	-5.2%	-1.6%	-10.5%	-50.8%	16.4	17.7%	1.5%	3.5	5.9%	2.3%	
1970-1989 ( <i>Pre-globalization</i> )	4.0	-8.5%	-2.3%	-14.3%	-51.9%	15.5	16.2%	1.6%	3.2	5.8%	2.2%	
1990-2007 ( <i>Globalization</i> )	3.6	-4.6%	-1.5%	-7.4%	-50.2%	12.7	16.8%	1.5%	3.9	4.7%	1.7%	
<b>East Asia</b>												
1970-2007	4.1	-5.6%	-1.7%	-13.7%	-45.7%	38.6	54.3%	2.0%	4.9	9.5%	3.6%	
1970-1989 ( <i>Pre-globalization</i> )	4.5	-4.8%	-1.0%	-8.9%	-40.1%	46.4	91.2%	2.0%	4.3	12.7%	6.3%	
1990-2007 ( <i>Globalization</i> )	4.1	-5.8%	-1.7%	-12.1%	-49.9%	8.0	12.6%	1.8%	6.0	7.3%	2.4%	
<b>Eastern Europe</b>												
1970-2007	3.2	-4.6%	-1.6%	-6.7%	-47.4%	17.6	24.9%	1.6%	3.4	6.6%	3.1%	
1970-1989 ( <i>Pre-globalization</i> )	5.0	-5.0%	-1.0%	-13.5%	-45.8%	19.0	27.2%	1.4%	3.0	10.6%	3.5%	
1990-2007 ( <i>Globalization</i> )	3.1	-4.6%	-1.6%	-6.7%	-47.4%	17.4	24.1%	1.6%	3.5	6.5%	3.1%	

We report the average duration of real output downturns, upturns and expansions. The statistics for amplitude, slope and cumulative loss (only for medians) refer to sample median across episodes. Averages for those statistics are not reported but are available from the authors upon request. The duration of real output contractions ("downturns") is the number of quarters between peak and trough while that of expansions is the number of quarters from trough to peak. Real output "upturns", on the other hand, are defined as the early stage of the expansion (recovery phase) that takes place during the period where output rebounds from the trough to its previous peak. The amplitude of the downturn is the distance between the peak in real output and its subsequent trough while that of expansions is the distance between the trough and the next peak in real output. Moreover, the amplitude of the upturn is computed as the 4-quarter cumulative variation in real output following the trough. The slope of the downturn (expansion) is the ratio of the amplitude of the peak-to-trough (trough-to-peak) phase of the cycle to its duration. Cumulative loss combines information of the duration and amplitude of the peak-to-trough phase of the cycle to measure the overall cost of the recession.

**Table 3****Basic features of real output cycles: By Intensity of Downturns***Sample of 58 countries, 1970-2007 (quarterly data)*

Region	Real output contractions (Peak-to-trough phase of the cycle)				Recoveries (Trough-to-previous peak)			
	Duration	Amplitude	Slope	Cumulative Loss	Region	Duration	Amplitude	Slope
<b>ALL Countries</b>					<b>ALL Countries</b>			
Severe recessions 1/	4.6	-10.2%	-2.6%	-20.2%	After severe recessions 1/	5.6	7.6%	1.7%
Extremely severe recessions 2/	4.7	-13.4%	-3.6%	-23.4%	After extremely severe recessions	7.0	9.6%	1.7%
Other recessions	3.4	-2.0%	-0.6%	-2.7%	After Other recessions	2.9	4.2%	1.9%
<b>Industrial Countries</b>					<b>Industrial Countries</b>			
Severe recessions 1/	6.4	-8.0%	-1.5%	-23.2%	Severe recessions 1/	7.0	4.4%	1.0%
Extremely severe recessions 2/	7.0	-12.0%	-2.3%	-33.2%	Extremely severe recessions 2/	10.0	4.7%	0.7%
Other recessions	3.5	-1.7%	-0.5%	-2.3%	Other recessions	3.1	2.8%	1.1%
<b>Emerging Market Economies</b>					<b>Emerging Market Economies</b>			
Severe recessions 1/	4.3	-10.4%	-2.7%	-18.0%	Severe recessions 1/	5.4	8.6%	1.8%
Extremely severe recessions 2/	4.4	-13.6%	-3.8%	-22.4%	Extremely severe recessions 2/	6.6	11.0%	2.2%
Other recessions	3.3	-2.5%	-0.8%	-3.0%	Other recessions	2.6	5.7%	2.7%
<b>Latin America (LAC)</b>					<b>Latin America (LAC)</b>			
Severe recessions 1/	4.6	-9.9%	-2.6%	-20.2%	Severe recessions 1/	4.7	7.5%	1.6%
Extremely severe recessions 2/	4.7	-14.5%	-3.7%	-24.6%	Extremely severe recessions 2/	5.8	11.0%	1.7%
Other recessions	3.0	-2.1%	-0.7%	-2.7%	Other recessions	2.6	4.6%	2.0%
<b>East Asia</b>					<b>East Asia</b>			
Severe recessions 1/	5.0	-12.3%	-2.9%	-32.1%	Severe recessions 1/	8.6	8.7%	1.5%
Extremely severe recessions 2/	5.4	-16.1%	-3.9%	-45.7%	Extremely severe recessions 2/	10.4	8.4%	0.6%
Other recessions	3.1	-2.7%	-0.9%	-3.2%	Other recessions	2.3	6.7%	3.3%
<b>Eastern Europe</b>					<b>Eastern Europe</b>			
Severe recessions 1/	3.1	-7.6%	-2.8%	-11.2%	Severe recessions 1/	4.7	11.0%	2.7%
Extremely severe recessions 2/	3.0	-11.0%	-3.5%	-13.3%	Extremely severe recessions 2/	4.3	11.2%	2.7%
Other recessions	3.3	-2.5%	-0.8%	-4.7%	Other recessions	2.6	6.8%	3.6%

See footnote on Table 2 for the definition of duration, amplitude and slope for output downturns and upturns. 1/ Severe recessions are defined as those episodes in the bottom quartile of the amplitude of peak-to-trough (P-T) episodes in our sample. 2/ Extremely severe recessions are those P-T episodes with amplitude higher than 10 percent.



Table 4

## Basic features of real output cycles: By Crisis

Sample of 58 countries, 1970-2007 (quarterly data)

RECESSIONS / DOWNTURNS	Banking Crisis 1/				Currency Crisis 2/				Economic Crisis 3/			
	Duration	Amplitude	Slope	Cumulative Loss	Duration	Amplitude	Slope	Cumulative Loss	Duration	Amplitude	Slope	Cumulative Loss
<b>ALL Countries</b>												
Recessions without crisis	3.6	-2.6%	-0.7%	-3.5%	3.6	-2.6%	-0.7%	-3.5%	3.4	-2.1%	-0.7%	-3.0%
Recessions associated with crisis	4.4	-7.0%	-1.8%	-11.9%	4.0	-6.4%	-1.6%	-12.0%	4.3	-5.9%	-1.6%	-10.7%
<b>Industrial Countries</b>												
Recessions without crisis	3.6	-1.9%	-0.5%	-2.8%	3.7	-1.9%	-0.5%	-2.7%	3.6	-1.8%	-0.5%	-2.7%
Recessions associated with crisis	6.7	-3.2%	-0.7%	-9.3%	4.0	-3.8%	-1.2%	-5.4%	5.6	-3.2%	-0.8%	-5.4%
<b>Emerging Market Economies</b>												
Recessions without crisis	3.5	-4.0%	-1.0%	-6.7%	3.5	-4.4%	-1.2%	-6.6%	3.3	-2.9%	-1.0%	-4.7%
Recessions associated with crisis	4.0	-7.1%	-2.0%	-11.9%	4.0	-7.1%	-1.7%	-12.4%	4.1	-6.3%	-1.8%	-11.5%
<b>Latin America (LAC)</b>												
Recessions without crisis	3.8	-4.7%	-1.1%	-7.6%	3.8	-5.4%	-1.4%	-7.8%	3.7	-4.0%	-0.9%	-6.5%
Recessions associated with crisis	3.9	-7.0%	-1.8%	-10.0%	3.8	-7.3%	-1.8%	-12.0%	3.9	-6.7%	-1.8%	-10.7%
<b>East Asia</b>												
Recessions without crisis	3.2	-3.1%	-0.9%	-5.8%	3.2	-3.6%	-1.0%	-6.4%	3.2	-3.6%	-1.0%	-6.4%
Recessions associated with crisis	5.0	-14.0%	-2.5%	-33.7%	4.4	-8.7%	-2.0%	-16.7%	4.4	-8.7%	-2.0%	-16.7%
<b>Eastern Europe</b>												
Recessions without crisis	2.7	-2.5%	-0.8%	-2.1%	3.0	-3.6%	-1.4%	-4.7%	2.4	-1.7%	-0.8%	-2.1%
Recessions associated with crisis	3.8	-7.1%	-2.4%	-11.9%	3.8	-10.5%	-2.8%	-13.3%	3.7	-7.1%	-2.4%	-11.9%
<b>RECOVERIES / UPTURNS</b>												
	Banking Crisis 1/			Currency Crisis 2/			Economic Crisis 3/					
	Duration	Amplitude	Slope	Duration	Amplitude	Slope	Duration	Amplitude	Slope			
<b>ALL Countries</b>												
Recoveries not associated with crisis	3.1	4.3%	2.0%	3.3	4.3%	1.8%	3.1	3.9%	1.9%			
Recoveries after crisis	5.6	6.5%	1.4%	4.8	7.1%	2.5%	4.7	6.5%	1.8%			
<b>Industrial Countries</b>												
Recoveries not associated with crisis	3.3	2.9%	1.2%	2.8	2.8%	1.1%	3.4	2.8%	1.2%			
Recoveries after crisis	5.5	2.9%	0.4%	1.8	4.3%	2.7%	4.5	4.2%	0.5%			
<b>Emerging Market Economies</b>												
Recoveries not associated with crisis	2.9	6.4%	2.8%	2.4	6.3%	2.4%	2.6	6.4%	2.9%			
Recoveries after crisis	5.7	6.9%	1.4%	4.0	7.5%	2.5%	4.7	6.9%	2.0%			
<b>Latin America (LAC)</b>												
Recoveries not associated with crisis	2.8	4.7%	2.3%	2.2	5.8%	2.0%	2.4	4.6%	2.3%			
Recoveries after crisis	5.3	6.4%	1.4%	3.5	5.2%	1.7%	4.5	6.1%	1.7%			
<b>East Asia</b>												
Recoveries not associated with crisis	2.3	8.4%	3.3%	1.2	6.7%	3.1%	2.3	6.7%	3.1%			
Recoveries after crisis	9.7	7.5%	0.8%	5.9	8.7%	1.5%	7.1	8.7%	1.5%			
<b>Eastern Europe</b>												
Recoveries not associated with crisis	2.7	6.8%	3.6%	1.9	6.1%	3.2%	2.3	6.0%	4.5%			
Recoveries after crisis	4.2	10.5%	2.7%	0.8	10.6%	2.8%	4.2	10.6%	2.7%			

The statistics for amplitude, slope, and cumulative loss for downturns and upturns refer to sample median across countries. Averages are presented for the duration. Duration for contractions or "downturns" is the number of quarters between peak and trough. Real output "upturns" are defined as the expansion (recovery phase) that takes place during the period where output rebounds from the trough to its previous peak. The amplitude of downturns calculated as the distance between the real output at its peak and its subsequent trough. On the other hand, the amplitude of the upturn is computed as the one-year cumulative variation in real output following the trough. The slope of the downturn is the ratio of the amplitude of the peak-to-trough phase of the cycle to its duration. The slope of upturns is the amplitude from trough to the previous peak divided by its duration. Cumulative loss uses information on the duration and amplitude to measure the overall cost of the recession. 1/ Recessions associated with crisis are defined as those where the crisis (banking, currency or economic) takes place at the same time or within the 4-6 quarter window before the start of the contractionary period. Banking crisis are identified as in Laeven and Valencia (2008). 2/ Currency crisis episodes are taken from Reinhart & Rogoff (2008). 3/ Economic crisis is defined as those episodes where at least one of the following events takes place: sovereign domestic default and restructuring, sovereign external debt default and restructuring, banking crisis, and currency crisis.

**Table 5**  
**Synchronization of Output Cycles with External and Financial Variables**

*Sample of 58 countries, 1970-2007 (quarterly data)*

Region	Coincidence with real GDP									
	Private	Real	Terms of	Non-FDI Inflows		Real private credit			Asset prices	
	Consumption	Investment	Trade	Gross	Net	Total	Per capita	% GDP	Stocks	REER
<b>ALL Countries</b>										
<b>1970-2007</b>										
Average	0.8545	0.7711	0.4997	0.5350	0.5287	0.7611	0.6535	0.7289	0.6566	0.5851
Median	0.8821	0.7963	0.5000	0.5484	0.5333	0.7680	0.6250	0.7368	0.6579	0.5731
Std. Deviation	0.1145	0.1201	0.0959	0.0870	0.1230	0.1060	0.1104	0.1009	0.0932	0.0820
Minimum	0.4167	0.4792	0.3289	0.3269	0.2833	0.4250	0.4821	0.4250	0.4464	0.4605
Maximum	0.9808	0.9808	0.6833	0.7143	0.8182	0.9333	0.9231	0.9333	0.9079	0.8500
<b>1970-1989 (Pre-Globalization)</b>										
Average	0.7820	0.7268	0.4947	0.5280	0.4970	0.7312	0.6155	0.6949	0.6584	0.5430
Median	0.8625	0.7875	0.4875	0.5192	0.4792	0.7438	0.5854	0.6750	0.6875	0.5250
Std. Deviation	0.2268	0.2204	0.1061	0.1561	0.1356	0.1419	0.1422	0.1405	0.1824	0.1046
Minimum	0.0909	0.0909	0.3000	0.2750	0.2500	0.2500	0.3208	0.2500	0.2500	0.2885
Maximum	0.9667	0.9500	0.7500	0.9500	0.7875	0.9500	0.9000	0.9125	0.9250	0.7625
<b>1990-2007 (Globalization)</b>										
Average	0.8648	0.7762	0.4960	0.5390	0.5353	0.7677	0.6628	0.7400	0.6606	0.5969
Median	0.8889	0.8056	0.5222	0.5556	0.5333	0.7847	0.6667	0.7500	0.6528	0.5972
Std. Deviation	0.1197	0.1176	0.1275	0.0879	0.1352	0.1228	0.1360	0.1163	0.0953	0.0952
Minimum	0.4167	0.4792	0.1806	0.3269	0.2833	0.4444	0.4028	0.4444	0.4464	0.3611
Maximum	0.9861	0.9808	0.6833	0.7222	0.8182	0.9362	0.9231	0.9444	0.8889	0.8500

*Concordance indices for real output and the cycle of external variables (capital flows and terms of trade) as well as of financial variables (credit and asset prices) is computed. The index of concordance represents the fraction of time that 2 cycles are in the same phase. We first compute the concordance statistic for each country and next their sample median.*

**Table 6****Synchronization of Output Cycles with External and Financial Variables across Regions***Sample of 58 countries, 1970-2007 (quarterly data)*

Region	Coincidence with real GDP									
	Private Consumption	Real Investment	Terms of Trade	Non-FDI Inflows		Real private credit			Asset prices	
				Gross	Net	Total	Per capita	% GDP	Stocks	REER
<b>Industrial Countries</b>										
1970-2007	0.8796	0.7632	0.4868	0.5366	0.4962	0.7680	0.7418	0.6513	0.6579	0.5395
1970-1989 ( <i>Pre-globalization</i> )	0.8688	0.8028	0.5000	0.5192	0.4792	0.7625	0.7438	0.6750	0.7313	0.5250
1990-2007 ( <i>Globalization</i> )	0.9167	0.7778	0.5139	0.5347	0.4861	0.8056	0.7569	0.7222	0.6528	0.5556
<b>Emerging Market Economies</b>										
1970-2007	0.8846	0.8260	0.5167	0.5518	0.5401	0.7599	0.7361	0.6071	0.6495	0.5972
1970-1989 ( <i>Pre-globalization</i> )	0.8555	0.7750	0.4500	0.5143	0.4732	0.7321	0.6699	0.5783	0.5625	0.5500
1990-2007 ( <i>Globalization</i> )	0.8868	0.8260	0.5294	0.5667	0.5375	0.7847	0.7500	0.6389	0.6567	0.5972
<b>Latin America</b>										
1970-2007	0.8529	0.7778	0.5415	0.5234	0.5579	0.7222	0.7143	0.5713	0.6283	0.5882
1970-1989 ( <i>Pre-globalization</i> )	0.6750	0.6500	0.4500	0.5000	0.4464	0.6250	0.6250	0.5470	0.3750	0.5630
1990-2007 ( <i>Globalization</i> )	0.8529	0.8000	0.5783	0.5139	0.5833	0.7361	0.7292	0.5833	0.6389	0.6042
<b>East Asia</b>										
1970-2007	0.9318	0.8143	0.3676	0.5665	0.5000	0.8571	0.7679	0.6631	0.6696	0.5804
1970-1989 ( <i>Pre-globalization</i> )	0.8951	0.8235	0.4265	0.5143	0.4732	0.8625	0.8208	0.7250	0.6503	0.5250
1990-2007 ( <i>Globalization</i> )	0.9306	0.8056	0.3889	0.5828	0.5000	0.8611	0.7500	0.5903	0.6944	0.5556
<b>Eastern Europe</b>										
1970-2007	0.8846	0.8462	0.5833	0.5750	0.5333	0.8421	0.8421	0.7581	0.6737	0.6833
1970-1989 ( <i>Pre-globalization</i> )	..	..	..	..	..	..	..	..	..	..
1990-2007 ( <i>Globalization</i> )	0.8846	0.8462	0.5694	0.5750	0.5333	0.8421	0.8421	0.7730	0.6737	0.6833

*Concordance indices for real output and the cycle of external variables (capital flows and terms of trade) as well as of financial variables (credit and asset prices) is computed. The index of concordance represents the fraction of time that 2 cycles are in the same phase. We first compute the concordance statistic for each country and then medians across groups of countries.*

**Table 7****Average cost of recessions***Dependent variable: Average output loss 1/*

	[1]	[2]	[3]
Constant	0.0136 ** (0.004)	0.0093 ** (0.003)	0.0127 ** (0.002)
Dummy LAC	0.0014 (0.004)		
Dummy EAP	-0.0030 (0.005)		
Dummy IND	-0.0097 ** (0.004)		-0.0088 ** (0.003)
Suden Stops	0.0100 ** (0.003)	0.0118 ** (0.003)	0.0105 ** (0.003)
Banking Crisis	0.0038 (0.003)	0.0052 * (0.003)	0.0031 (0.003)
Dummy 80s		0.0042 (0.003)	
Dummy 90s		-0.0010 (0.003)	
Dummy LAC*Dummy 80s			0.0054 * (0.003)
Number of episodes	126	126	126
Adjusted R squared	0.224	0.140	0.242
White test ( <i>p-value</i> )	(0.143)	(0.759)	(0.317)

*Standard deviation in parenthesis. \*, \*\* the coefficient is significant at 10% and 5% level, respectively.*

*1/ The average output loss is measured as the cumulative output loss divided by the duration of the peak-to-trough phase of the cycle.*

**Table 8****Average cost of recessions***Dependent variable: Average output loss 1/*

	[1]	[2]	[3]	[4]
Constant	0.0260 ** (0.008)	0.0284 ** (0.007)	0.0287 ** (0.007)	0.0274 ** (0.007)
TOT*Open	-0.1266 ** (0.057)	-0.1197 ** (0.050)	-0.1149 ** (0.051)	-0.1165 ** (0.051)
TOT*private credit	-0.1216 ** (0.053)	-0.1178 ** (0.051)	-0.1116 ** (0.053)	-0.1200 ** (0.053)
TOT*output Herfindhal	0.5714 ** (0.265)	0.5521 ** (0.236)	0.5547 ** (0.231)	0.5907 ** (0.229)
Interest US*Dummy IND	-0.0076 (0.049)			
Interest US*Dummy EAP	0.2594 ** (0.091)	0.2711 ** (0.093)	0.2715 ** (0.093)	0.2947 ** (0.090)
Interest US*Dummy LAC	-0.0049 (0.080)			
Domestic currency overvaluation	0.0269 * (0.016)	0.0282 * (0.015)	0.0287 * (0.015)	0.0319 ** (0.015)
log (1+inflation rate)	0.0059 (0.004)	0.0060 (0.004)	0.0057 (0.004)	0.0062 * (0.004)
Floating ER	-0.0063 ** (0.002)	-0.0066 ** (0.002)	-0.0068 ** (0.002)	-0.0053 ** (0.002)
Floating ER*TOT	0.0169 (0.024)	0.0177 (0.023)		
Fix ER	-0.0026 (0.003)	-0.0030 (0.003)	-0.0031 (0.003)	
Fix ER*TOT	0.0103 (0.054)	0.0036 (0.053)		
Institutions quality	-0.0190 * (0.011)	-0.0233 ** (0.009)	-0.0235 ** (0.009)	-0.0240 ** (0.009)
Suden Stops	0.0154 ** (0.006)	0.0158 ** (0.006)	0.0156 ** (0.006)	0.0164 ** (0.006)
Suden Stops*Private credit	-0.0099 (0.007)	-0.0103 (0.007)	-0.0100 (0.007)	-0.0118 * (0.007)
Dummy IND	-0.0024 (0.002)			
Dummy LAC*Dummy 80s	-0.0001 (0.004)			
Number of episodes	120	120	120	120
Adjusted R squared	0.379	0.399	0.409	0.407
White test ( <i>p-value</i> )	(0.001)	(0.000)	(0.000)	(0.000)

*Robust standard errors in parenthesis. \*, \*\* the coefficient is significant at 10% and 5% level, respectively.*

*1/ The average output loss is measured as the cumulative output loss divided by the duration of the peak-to-trough phase of the cycle.*

**Table A.1**  
**Basic features of real output cycles: All Countries**

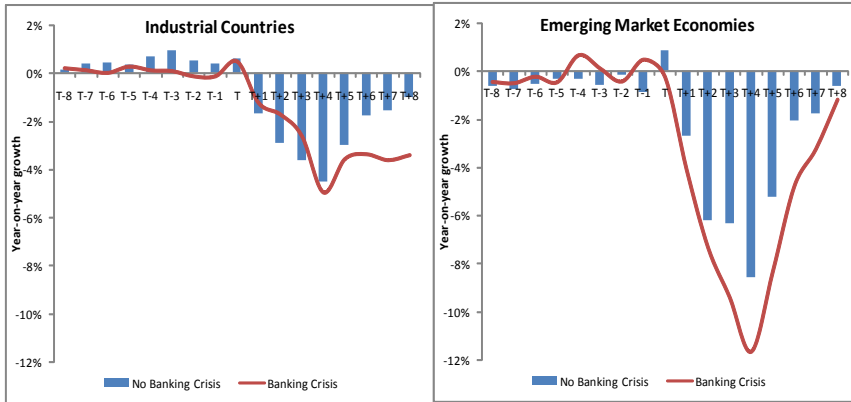
Sample of 61 countries, 1970-2007 (quarterly data)

Country	Real output contractions							Real output expansions								
	Peak-to-trough (P-T) phase of the cycle							Trough-to-peak phase of the cycle								
	Number of Recessions	Time in Recession (%)	P-T Duration	P-T Amplitude	P-T Slope	Cumulative Loss	Excess Area	Expansion				Upturns				
								Number	Duration	Amplitude	Slope	Number	Duration	Amplitude	Slope	
<b>Industrial Countries</b>																
Australia	5	32.2%	3.2	-2.2%	-0.7%	-3.8%	-53.4%	4	15.8	15.9%	1.0%	5	2.0	5.2%	3.6%	
Austria	6	10.5%	2.5	-1.2%	-0.5%	-1.7%	-47.8%	5	18.6	13.7%	0.8%	6	2.2	3.0%	1.9%	
Belgium	6	9.9%	2.8	-1.1%	-0.4%	-1.7%	-47.5%	5	18.4	12.5%	0.7%	6	2.3	2.9%	1.3%	
Canada	3	11.2%	4.0	-2.9%	-0.6%	-6.5%	-49.5%	2	16.0	17.0%	1.3%	3	5.0	3.6%	1.8%	
Switzerland	6	..	4.3	-2.7%	-0.5%	-9.2%	-52.6%	5	17.8	9.9%	0.6%	6	5.3	2.0%	0.8%	
Germany	5	..	4.3	-1.6%	-0.4%	-4.3%	-51.4%	5	19.4	14.8%	0.6%	6	3.0	2.5%	1.0%	
Denmark	6	21.2%	4.3	-1.6%	-0.4%	-3.9%	-42.5%	5	21.4	15.3%	0.7%	6	2.8	3.6%	1.6%	
Spain	4	26.8%	3.0	-1.1%	-0.3%	-2.8%	-39.2%	3	20.7	14.6%	0.6%	4	3.3	2.1%	0.8%	
Finland	5	7.9%	4.6	-4.1%	-0.8%	-22.8%	-37.6%	5	20.0	21.8%	1.1%	6	4.5	2.2%	2.6%	
France	3	17.1%	3.3	-1.5%	-0.5%	-2.8%	-43.0%	2	32.0	22.1%	0.8%	3	4.0	2.5%	0.7%	
United Kingdom	4	9.7%	4.8	-3.7%	-0.8%	-10.3%	-47.9%	3	18.0	15.4%	1.0%	4	5.8	1.8%	0.7%	
Ireland	2	4.8%	3.0	-1.2%	-0.4%	-1.9%	-45.8%	2	46.0	69.7%	1.2%	2	2.0	4.4%	2.2%	
Iceland	7	11.8%	3.3	-2.5%	-0.9%	-4.4%	-48.3%	6	12.7	14.6%	1.1%	7	4.1	3.4%	1.2%	
Italy	8	18.3%	3.1	-1.3%	-0.4%	-2.5%	-44.2%	7	13.9	10.2%	0.7%	8	2.1	3.2%	1.7%	
Japan	6	17.1%	3.7	-2.4%	-0.8%	-5.7%	-37.3%	5	18.0	19.6%	1.2%	6	3.3	5.7%	4.7%	
Netherlands	5	17.1%	4.0	-2.2%	-0.9%	-2.6%	-43.7%	4	4.8	6.3%	1.5%	5	2.4	4.9%	3.7%	
Norway	6	20.5%	2.5	-1.5%	-0.6%	-2.1%	-46.9%	5	8.6	8.5%	1.2%	6	2.2	4.8%	3.7%	
New Zealand	9	11.8%	4.1	-6.3%	-2.0%	-13.2%	-49.0%	9	8.0	13.0%	2.3%	9	3.3	7.3%	4.4%	
Portugal	4	7.9%	4.5	-3.4%	-0.8%	-6.7%	-56.3%	3	32.3	31.7%	1.0%	4	6.3	2.8%	0.6%	
Sweden	4	10.0%	6.5	-2.9%	-0.4%	-12.9%	-38.1%	3	21.0	15.5%	0.8%	4	5.0	2.4%	0.6%	
United States	4	18.4%	3.0	-2.4%	-0.9%	-3.6%	-50.7%	4	17.3	18.1%	1.1%	4	3.3	3.6%	1.3%	
<b>Latin America</b>																
Argentina	10	6.6%	4.5	-9.5%	-2.5%	-22.4%	-50.8%	10	8.0	13.7%	1.7%	11	3.9	5.9%	1.3%	
Bolivia	1	12.5%	3.0	-1.8%	-0.6%	-2.0%	-64.0%	..	..	..	..	1	2.0	4.4%	2.2%	
Brazil	10	18.6%	2.8	-4.3%	-1.4%	-6.0%	-51.7%	9	6.9	9.6%	1.5%	10	2.7	4.7%	1.9%	
Chile	4	20.0%	3.0	-8.7%	-2.4%	-19.7%	-47.3%	3	24.7	49.5%	2.0%	4	5.3	9.0%	6.5%	
Colombia	2	11.5%	3.0	-4.0%	-1.1%	-9.0%	-49.8%	1	62.0	59.8%	1.0%	2	6.0	4.4%	1.3%	
Costa Rica	2	5.9%	4.0	-1.5%	-0.6%	-2.6%	-41.6%	2	19.0	31.4%	1.9%	2	1.0	9.1%	9.1%	
Dominican Republic	5	..	3.8	-8.9%	-2.1%	-11.3%	-64.9%	5	14.4	28.9%	2.4%	5	4.2	6.9%	2.3%	
Ecuador	6	5.9%	3.0	-5.2%	-1.5%	-7.2%	-56.8%	5	16.4	18.8%	1.1%	6	2.8	7.3%	3.0%	
Mexico	5	14.5%	4.2	-5.2%	-1.6%	-10.5%	-48.3%	4	15.0	16.6%	1.1%	5	5.2	4.0%	1.0%	
Peru	7	9.8%	3.4	-11.3%	-3.4%	-23.8%	-47.7%	6	8.5	18.9%	2.8%	7	3.3	8.0%	4.7%	
Paraguay	4	16.4%	3.8	-4.0%	-1.2%	-7.4%	-48.9%	3	6.7	8.8%	1.5%	4	2.0	4.0%	3.2%	
Uruguay	4	6.3%	5.5	-9.9%	-1.7%	-27.4%	-57.4%	4	8.5	12.4%	1.3%	5	4.0	5.8%	1.2%	
Venezuela, RB	8	14.5%	4.6	-9.1%	-1.7%	-19.2%	-54.5%	8	6.3	8.2%	1.2%	8	3.4	8.3%	2.4%	
<b>East Asia</b>																
Hong Kong	8	5.9%	3.3	-5.2%	-2.0%	-9.0%	-47.2%	7	12.7	27.4%	2.3%	8	2.0	11.6%	7.1%	
Singapore	4	27.8%	3.0	-4.2%	-1.3%	-6.9%	-43.7%	3	19.7	42.6%	2.2%	4	3.0	7.4%	2.6%	
Taiwan	2	19.4%	4.5	-3.8%	-0.8%	-7.8%	-49.3%	1	101.0	190.8%	1.9%	2	1.5	10.7%	9.0%	
Indonesia	3	13.8%	3.0	-7.3%	-1.7%	-18.0%	-42.6%	2	29.5	58.3%	2.0%	3	7.0	11.6%	4.9%	
Korea	2	8.9%	4.5	-6.5%	-1.8%	-14.5%	-44.3%	1	67.0	145.6%	2.2%	2	3.0	11.7%	4.5%	
Malaysia	3	13.2%	3.3	-6.0%	-1.8%	-12.9%	-34.6%	2	27.0	54.3%	2.0%	3	4.7	5.3%	1.4%	
Philippines	5	9.9%	3.4	-5.2%	-1.2%	-18.2%	-58.0%	4	13.5	15.6%	1.0%	5	4.4	4.1%	1.7%	
Thailand	1	27.0%	8.0	-16.1%	-2.0%	-45.7%	-64.5%	..	..	..	..	1	14.0	8.4%	0.6%	
<b>Eastern Europe</b>																
Belarus	1	20.7%	2.0	-0.8%	-0.4%	-0.8%	-53.0%	1	23.0	40.3%	1.8%	1	1.0	6.4%	6.4%	
Czech Republic	1	15.7%	7.0	-2.5%	-0.4%	-11.9%	-31.4%	1	12.0	15.1%	1.3%	1	6.0	1.8%	0.3%	
Estonia	2	12.5%	3.0	-4.8%	-1.6%	-6.7%	-47.6%	1	16.0	29.5%	1.8%	2	4.0	8.3%	3.2%	
Croatia	2	11.8%	3.5	-5.6%	-1.7%	-12.5%	-55.2%	3	15.0	25.8%	1.8%	3	3.3	10.0%	3.1%	
Hungary	1	26.8%	2.0	-0.4%	-0.2%	-0.5%	-34.6%	1	44.0	45.2%	1.0%	1	2.0	..	..	
Latvia	2	13.5%	2.0	-5.2%	-2.6%	-5.2%	-47.2%	2	3.0	10.2%	3.4%	3	2.7	8.7%	5.7%	
Poland	1	9.1%	2.0	-1.7%	-0.8%	-1.8%	-44.3%	1	37.0	47.4%	1.3%	1	4.0	1.9%	0.5%	
Russia	2	8.3%	3.5	-8.0%	-2.4%	-12.9%	-51.1%	1	5.0	3.9%	0.8%	2	4.0	6.6%	1.7%	
Slovak Republic	2	17.1%	2.5	-4.3%	-1.6%	-6.6%	-39.0%	1	8.0	11.8%	1.5%	2	3.5	5.5%	3.3%	
Turkey	4	7.1%	4.0	-8.8%	-2.9%	-16.6%	-48.3%	3	13.3	24.0%	1.9%	4	3.8	11.2%	3.0%	
<b>Other Emerging Markets</b>																
Israel	4	19.0%	2.8	-3.4%	-1.3%	-4.2%	-58.1%	3	23.0	31.1%	1.3%	4	3.3	5.5%	3.9%	
Jordan	2	5.9%	2.0	-0.5%	-0.3%	-0.6%	-57.4%	1	4.0	6.5%	1.6%	2	1.0	6.3%	6.3%	
Morocco	3	32.5%	3.3	-12.3%	-5.0%	-23.8%	-38.3%	4	13.5	23.4%	2.6%	4	6.8	12.8%	2.9%	
India	1	10.5%	4.0	-3.0%	-0.8%	-8.0%	-34.0%	..	..	..	..	1	2.0	7.1%	3.6%	
Botswana	4	38.4%	3.3	-5.6%	-2.2%	-7.7%	-45.2%	4	5.0	16.0%	3.9%	4	2.8	11.6%	6.3%	
South Africa	5	20.4%	6.2	-3.3%	-0.6%	-10.6%	-47.3%	4	10.5	10.7%	1.1%	5	4.2	3.9%	1.7%	

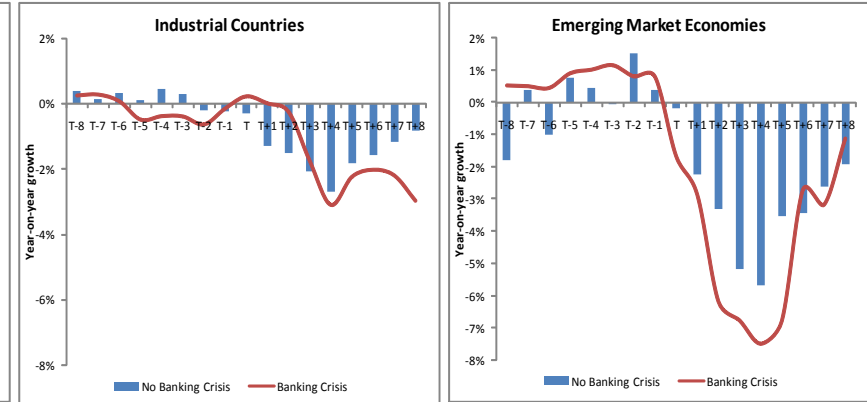
The definitions of the basic features associated to the classical business cycles (duration, amplitude, slope, among others) are outlined in the document and the footnote in Tables 1 and 2. The BBQ algorithm used to select turning points (Harding and Pagan, 2002) was unable to find any turning points in the data for the People's Republic of China, El Salvador and Slovenia.

**Figure 1**  
**Recession and Banking Crisis: Event Analysis**

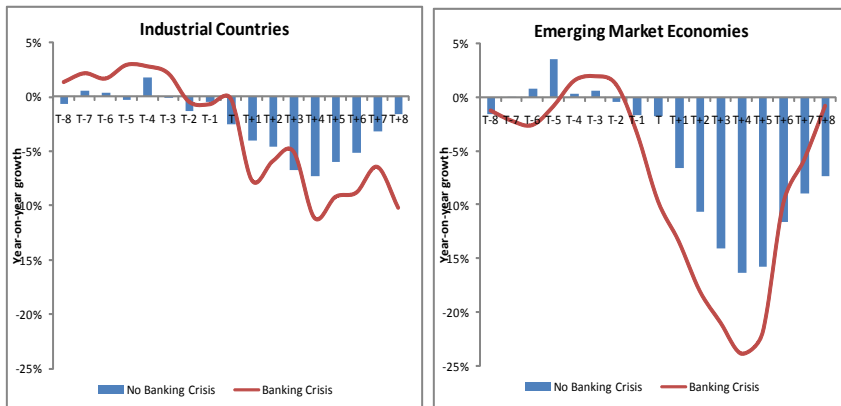
**1.1 Real GDP**



**1.2 Real Private Consumption**

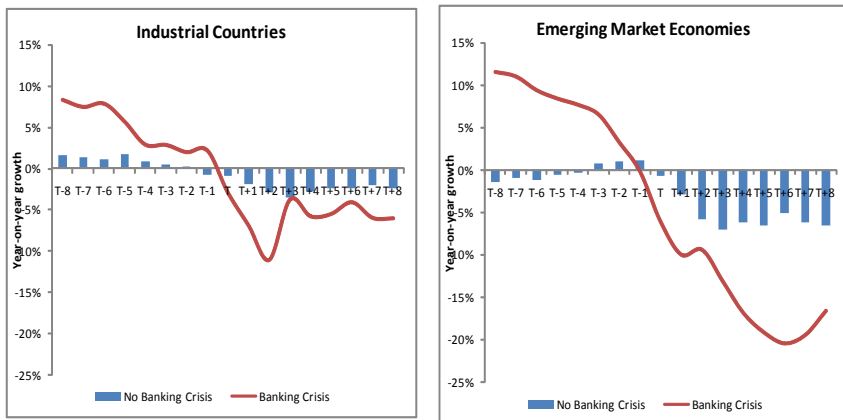


**1.3 Real Investment**

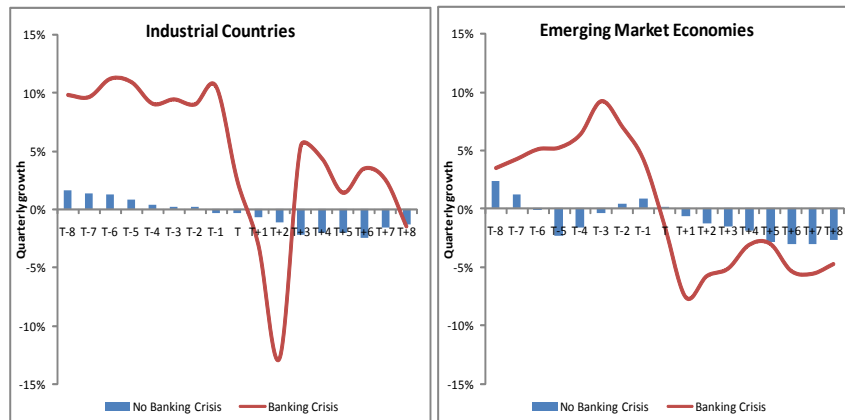


**Figure 1**  
**Recession and Banking Crisis: Event Analysis**

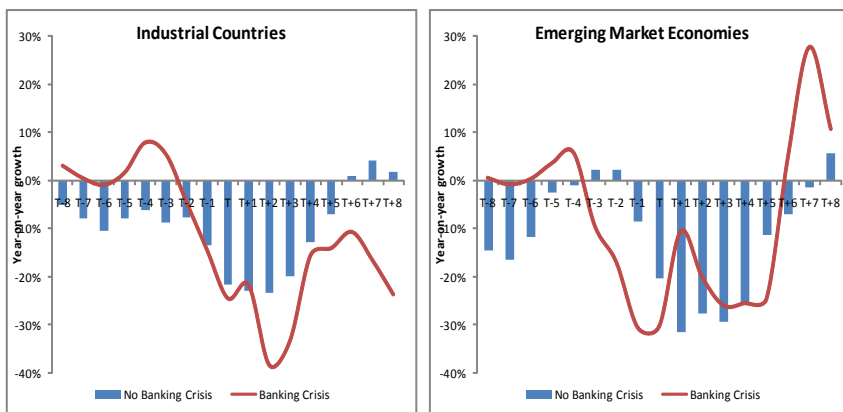
**1.4 Bank credit to the private sector (constant prices, per capita)**



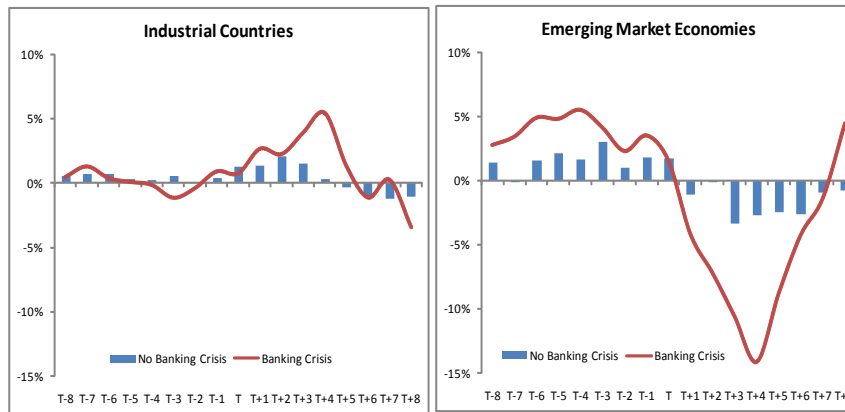
**1.5 Bank credit to the private sector (ratio to GDP)**



**1.6 Stock prices (in real terms)**



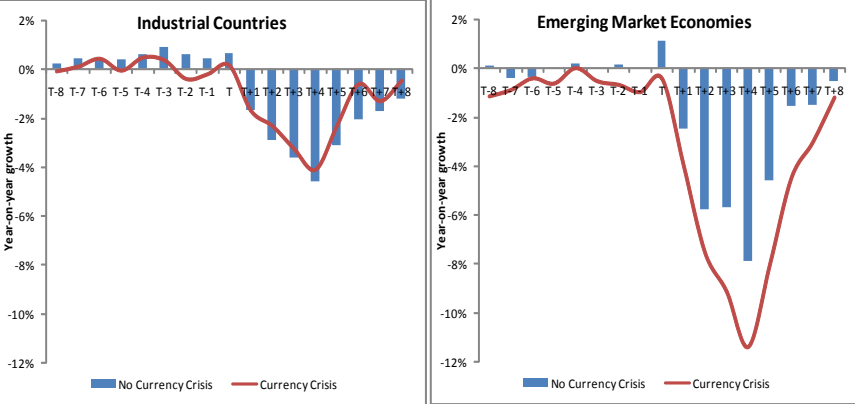
**1.7 Real effective exchange rate**



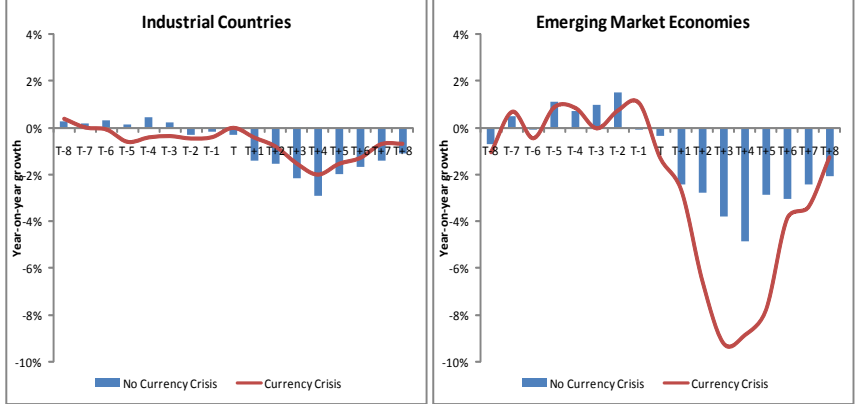


**Figure 2**  
**Recession and Currency Crisis: Event Analysis**

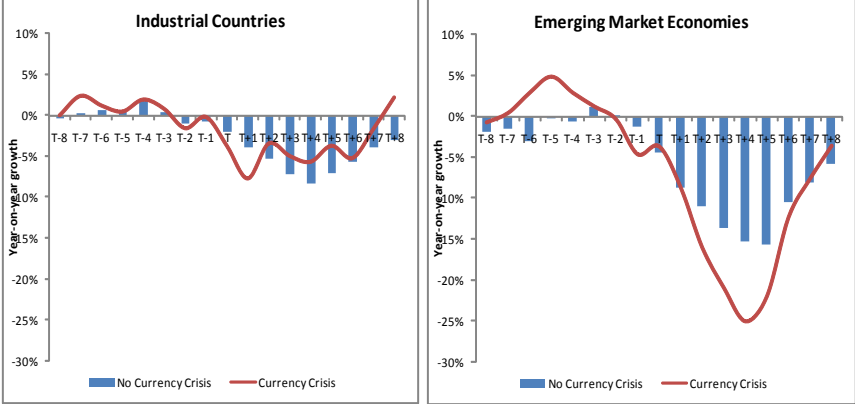
**2.1 Real GDP**



**2.2 Real Private Consumption**

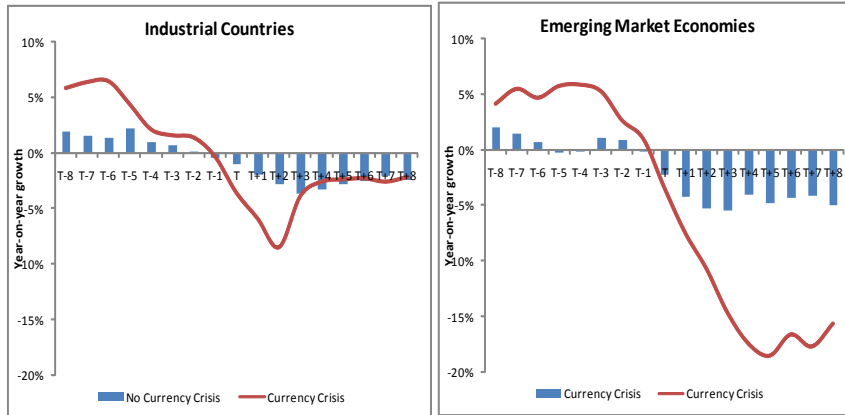


**2.3 Real Investment**

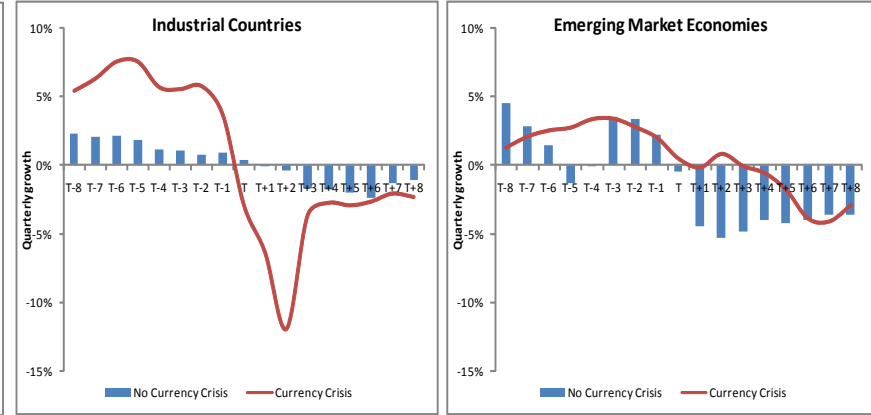


**Figure 2**  
**Recession and Currency Crisis: Event Analysis**

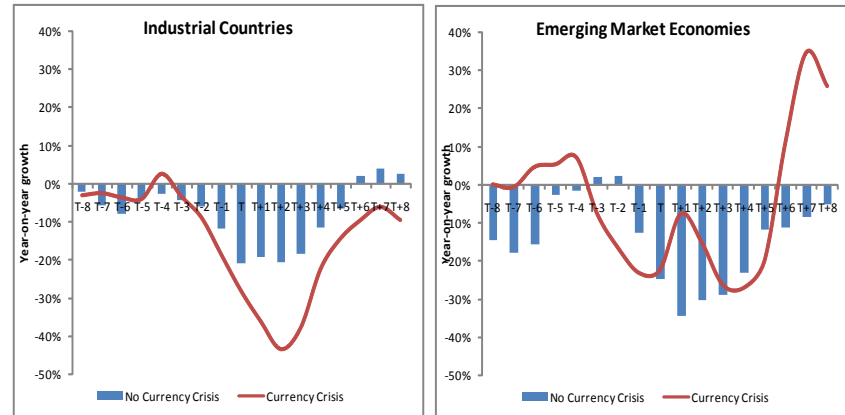
**2.4 Bank credit to the private sector (constant prices, per capita)**



**2.5 Bank credit to the private sector (ratio to GDP)**



**2.6 Stock prices (in real terms)**



**2.7 Real effective exchange rate**

