



Have business cycles changed over the last two decades? An empirical investigation[☆]

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ABSTRACT

We document the properties of business cycles of 71 countries (23 industrial countries and 48 emerging market economies, or EMEs), from 1970q1 to 2012q4 using the Harding and Pagan dating algorithm. First, recessions are deeper, steeper and costlier among EMEs (especially in East Asia and Latin America). Second, recoveries are swifter and stronger among EMEs, partly due to stronger rebound effects. Third, recessions became less costly during the globalization period (1985–2007) for industrial countries and EMEs, thus reflecting institutional changes made during the “Great Moderation.” Fourth, the dynamic behavior of macroeconomic indicators around peaks in real GDP is more volatile in downturns associated with crisis compared to other downturns. Fifth, peaks in financial cycles (credit and asset prices) tend to precede peaks in real output cycles. Finally, although both industrial and emerging markets have experienced deep recessions during the recent global financial crisis, the emerging markets have recovered faster.

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1. Introduction

Emerging market economies (EMEs) have experienced greater macroeconomic volatility than industrial economies. Fluctuations in output, exchange rates, and current account balances are typically more frequent, sharper, and abrupt in EMEs. This phenomenon is typically attributed to country-specific factors that amplify external shocks and have led to a higher incidence of banking, currency, and external debt crises (The World Bank, 2007).¹ These country-specific characteristics include excessive dependence on a few volatile sectors, a narrow tax base, fragile financial systems, weak institutions, and poor economic

policies. More recently, however, the focus has gradually shifted towards the external (exogenous) environment faced by EMEs, including real shocks, e.g., shocks to commodity prices and to a country's external demand (Arora and Vamvakidis, 2005; Broda, 2004), financial shocks, such as rising world interest rates and global risk aversion (Neumeyer and Perri, 2005; Uribe and Yue, 2006), and natural disasters (Calderón and Levy-Yeyati, 2009; Loayza et al., 2012; Raddatz, 2007).

In the search for an explanation for the excess volatility of output fluctuations in EMEs relative to advanced economies, Aguiar and Gopinath (2007) build a real business cycle where shocks to trend growth are the main drivers of output fluctuations in EMEs while developed economies tend to experience transitory fluctuations around a stable trend. The introduction of stochastic productivity trends permits the authors to replicate the stylized facts of business cycles in EMEs vis-à-vis industrial countries. Other authors show that business cycle features of EMEs can be replicated in models with financial imperfections that amplify transitory productivity shocks (Chang and Fernández, 2013).

This paper attempts to describe the main features of the business cycles of emerging market economies and industrial countries as captured by the duration, amplitude, slope, and cost of downturns and upturns in real economic activity. To accomplish this task we use a comprehensive quarterly dataset for 71 countries (23 industrial economies and 48 emerging-market economies) from 1970q1 to 2012q4. The focus of our paper is to compare the main features of real output cycles in EMEs vis-à-vis industrial countries before the outbreak of the global financial crisis (1970–2007). Next, we examine whether those facts changed

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¹ Recent examples of such crisis episodes are the Tequila and East Asian crises and massive depreciations of the Brazilian and Russian currencies, the subprime crisis in the U.S., and the Greek sovereign debt crisis. The recurrence of crisis episodes has increased interest in disentangling the sources of economic crises.

with the advent of the recent global crisis by comparing the periods 1990–2006 and 2007–2012.²

The main contribution of this paper is three-fold: First, we use a *common methodology* for dating turning points for a large sample of countries using quarterly data.³ This analysis allows us to estimate comparable statistics of duration, depth, and speed of recessions and recoveries for both industrial and emerging-market economies. Second, we examine the evolution of the main business cycle characteristics over time. Specifically, we compare the main features of the cyclical output phases during the periods of pre-globalization and globalization (1970–84 and 1985–2007, respectively) for both industrial and emerging-market economies. Third, we assess whether the length and size of cyclical phases of real output for industrial and emerging markets have changed during the recent global financial crisis compared with the performance of real economic activity over the past 15 years. Here, we focus not only on the differences across country groups in the duration and depth of the recession but also on the speed and strength of the ensuing recovery.

We further document the excess volatility of real output fluctuations in EMEs when compared with industrial countries by first reporting the joint distribution of output contractions by duration (short, medium, long, and protracted) and amplitude (mild, moderate, severe, and depression).⁴ Second, we compare the main features of recessions during crisis and their ensuing recoveries with those that do not coincide with crisis episodes.⁵ Third, we zoom in on the correlates of real output cycles by exploring the dynamics of macroeconomic variables around recessionary periods using event study analysis. We report the trajectory during a four-year window around peaks in real GDP associated with banking crises and compare them with periods without crisis for the following real and financial indicators: private consumption, investment, real credit to the private sector, stock prices, and real exchange rates. Finally, this paper provides a first assessment of the traits of recessions and recoveries during the recent global financial crisis (GFC). We compute the duration, amplitude, and slope of recessions as well as their ensuing recoveries for industrial and emerging-market economies during the most recent cycle (2007–2012) and we compare these findings with those of output cycles over the last 15 years before the GFC (1990–2006). Next, we examine the dynamic pattern of real and financial indicators around peaks in real economic activity during 1990–2006 and 2007–2012.

In sum, we aim to answer the following questions: Are there systematic differences in the main features of business cycles (duration, amplitude, and cost) in industrial countries vis-à-vis emerging markets? Are business cycles alike within emerging markets? Are business cycles similar over time and across country groups? 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? Have the main stylized facts remained invariant during the recent global financial crisis? Are recessions longer and deeper this time around? Are the ensuing recoveries faster and stronger?

The evidence presented in this paper confirms that recessions in emerging-market economies are deeper, steeper, and hence, costlier than those in industrial countries, although they have the same duration.

On the other hand, the ensuing recoveries in EMEs are stronger and more intense but slower and more volatile. The strong recovery among EMEs could be attributed to a larger rebound effect or to the fact that these countries have experienced a larger trend-growth rate than industrial economies during the period of analysis. We provide evidence that recessions during the globalization period (1985–2007) are less severe for Latin America and the Caribbean (LAC) compared with the previous period (1970–1984) while the main traits of recessions in East Asia and the Pacific (EAP) and Eastern Europe and Central Asia (ECA) remain unchanged with the advent of globalization.

Deeper and costlier recessions in EMEs are associated with a higher incidence of (financial, currency, or debt) crises. During crisis-related downturns, troughs in consumption and investment are deeper while real credit and asset prices tend to be more volatile in EMEs (as opposed to regular recessions). Moreover, we find that peaks in real credit and stock prices tend to precede peaks in real output during crises in EMEs, and that the domestic currency tends to depreciate in real terms, while it appreciates for industrial countries.

Finally, recessions among industrial countries and EMEs, except for Latin America, are deeper and steeper during the recent global financial crisis when compared with the pre-crisis globalization period. Interestingly, the rebound from the profound downturns among industrial economies has been slower this time around, as opposed to the fast recovery of EMEs (excluding ECA).

The paper is divided into four sections. In [Section 2](#) we briefly describe some methodological issues regarding business cycle dating. Given the lack of consensus in the literature, we opt for a methodology to characterize business cycles that has the following characteristics: (a) it does not rely on arbitrary trend-cycle decompositions, (b) it provides a uniform statistical foundation to identify turning points, (c) it is robust to changes in the sample period, and (d) it is easy to replicate for a wide array of countries. Specifically, we implement the quarterly adaptation of the Bry–Boschan algorithm (BBQ) proposed by [Harding and Pagan \(2002\)](#). Following the traditional approach outlined by [Burns and Mitchell \(1946\)](#), we identify turning points in the level of output and define the different phases of the cycle (recession, recovery, and expansion) and their characteristics—including duration, amplitude, slope, and cumulative movements for each phase of the cycle. In [Section 3](#), we first discuss the business cycle features of our sample of 71 countries from 1970q1 to 2007q4 (before the onset of the global financial crisis). Then, we argue that the greater depth of business cycles in EMEs relative to industrial countries is influenced by their coincidence with crisis episodes. Therefore, we compute the main features of downturns and upturns associated with crisis and examine the correlates of downturns in economic activity using event-study analysis for consumption, investment, credit, and asset prices during crisis. Next, we compare the length, depth, and intensity of business cycles during the recent global crisis (2007–2012) and the pre-crisis period of 1990–2006. Recessions are significantly deeper in industrial economies and emerging markets, except for LAC. However, recoveries are faster and stronger in EMEs (other than ECA countries), and slower and weaker in industrial countries. Finally, [Section 4](#) concludes.

2. Measuring business cycles

This section outlines the methodology used to characterize business cycles for a sample of industrial countries and emerging market economies. The first part of the section discusses the advantages and disadvantages of some of the methodological options for detecting turning points, whereas the second part describes the statistical technique used in this paper; that is, the quarterly adaptation of the Bry–Boschan (BBQ) algorithm proposed by [Harding and Pagan \(2002\)](#).

2.1. Methodological issues

There is no single approach in the literature to characterizing the features of the business cycle. On the one hand, the seminal work by

² The full list of countries, including their regional and income classification as well as the sources of data, is presented in [Table A1](#).

³ Despite large output fluctuations in EMEs, empirical research on business cycles has been mainly conducted for advanced economies. Some important exceptions are [Hoffmaister et al. \(1998\)](#), [Agénor et al. \(2000\)](#), [Herrera et al. \(2000\)](#), [Neumeyer and Perri \(2005\)](#), [Raddatz \(2007\)](#), [Aguiar and Gopinath \(2007, 2008\)](#), [Cerra and Saxena \(2008\)](#), and [Aioifí et al. \(2011\)](#). However, 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.

⁴ We follow [Morsink et al. \(2002\)](#) in classifying the severity of recessions by duration and amplitude. The detailed discussion of this classification is presented in [Section 3.2](#).

⁵ Episodes of economic crisis, furthermore, are loosely defined in this paper as the occurrence of at least one of these types of crisis: banking crisis, currency crisis, sovereign default, and restructuring of external and domestic debt. The procedure followed to identify any of these types of crisis episodes will be described in [Section 3.2](#). Finally, we define recessions that coincide with crisis as those peak-to-trough phases that take place within a three-year window surrounding the occurrence of a crisis episode.

Hamilton (1989) dates peaks and troughs by modeling the shift in the growth rate of GDP using Markov-switching (MS) methods. Harding and Pagan (2002), on the other hand, propose a non-parametric approach, which is used in this paper, to identify cyclical turning points in quarterly series; this is the so-called BBQ algorithm. These two approaches have advantages and disadvantages as discussed in Harding and Pagan (2003a,b), Hamilton (2003), Chauvet and Hamilton (2005) and Chauvet and Piger (2008).

There is no consensus in the literature 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, they also find that the MS and BBQ approaches can accurately identify the NBER business cycle chronology of U.S. economic activity. Hence, both methodologies can provide similar results if the main purpose of the exercise is to document the historical chronology of turning points.

Harding and Pagan (2003a,b) argue that the BBQ algorithm provides a simple and transparent way to detect the turning points for a time series and is not sensitive to changes in the parameterization of the data-generating process (DGP) of real GDP or to changes in the sample period of the series. Hamilton (2003), on the other hand, argues that MS and BBQ are philosophically different methods, and that the adequacy of the MS approach lies on its goal to make optimal inference on an unobserved phenomenon (a recession) based on the DGP of a series of indicators of real economic activity. In his critical review of the BBQ algorithm, Hamilton argues that the rule for identifying turning points depends on whether the country is fast- or slow-growing and on the quality of GDP data.⁶ However, he concurs that the BBQ algorithm is more transparent (Hamilton, 2003, p. 1693).

The purpose of this paper is rather modest. We identify turning points in historical series of real GDP to characterize business cycles for a large sample of developed and developing countries.⁷ Predicting peaks and troughs in real time or undertaking comparisons among dating methods are beyond the scope of this paper. To accomplish the task set out, we apply the Harding and Pagan (2002) BBQ algorithm to the series of real GDP (in logs) for 71 countries. We argue that adopting a common criterion to identify cyclical phases in real economic activity is the proper way to proceed and, in that sense, the BBQ algorithm provides a transparent way to conduct cross-country comparisons of the different phases of the business cycle.

Once these peaks and troughs are identified, characterization of the business cycles is undertaken by computing the duration, amplitude, slope, and cumulative variation of recessions and recoveries for our sample of countries. Recent applications of the BBQ algorithm to characterize real and financial cycles include Claessens et al. (2009, 2011a,b, 2012) and Calderón and Servén (2013).

2.2. The Harding and Pagan algorithm⁸

The classical approach to analyzing business cycles, as outlined in the seminal work of Burns and Mitchell (1946), defines business cycles as the sequence of expansions and contractions in the level of either real output or employment. Specifically, this approach detects turning points in an aggregate series: typically, the log level of real GDP. Alternatively,

⁶ An example of the need for a country-specific rule is that we are unable to find a recession for China using the BBQ algorithm. Concerning the quality of the data, it is well known that the quality of statistics is lower for less developed economies or such economies have large informal sectors that conceal a portion of the output produced. For instance, Jerven (2010) extensively documents the implications of poor data quality on the measurement of real GDP in Africa.

⁷ We are aware that business cycles are characterized by more than just turning points in real GDP. The paper concentrates on documenting cross-country differences in the duration, amplitude, and slope of recessions and recoveries in real GDP for a large group of economies rather than describing a large number of series. Nevertheless, a characterization of other variables along the cycle is provided in Section 4.

⁸ The description of the methodology and statistics draws heavily from Harding and Pagan (2002, 2003a) and Claessens et al. (2009, 2011a,b, 2012).

empirical business cycle research has focused on identifying growth cycles by calculating deviations from long-run trends, and these trends are estimated using different techniques (deterministic trend models, the Hodrick–Prescott filter, and the band-pass filter, among others). However, the literature argues that this methodology tends to overestimate the frequency of turning points and underestimate their amplitude when compared with classical cycles (Morsink et al., 2002). Also, the dating of turning points using growth cycles rather than classical cycles is sensitive to the inclusion of new data (Claessens et al., 2009, 2011a,b, 2012).

Following the classical approach, we use the Harding and Pagan (2002) extension of the Bry and Boschan (1971) algorithm to identify cyclical turning points in quarterly series (the BBQ algorithm). In fact, this algorithm requires that:

- (1) Complete cycles 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 at least five quarters and each phase of the cycle must last for at least two quarters.

Local maximum and minimum values of real output (typically expressed in natural logs) can be determined by looking at the differences in 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:

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

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

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

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 two quarters on either side of y_{it} .⁹ This notion of local optimum and compliance with 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 an initial sample of 75 countries over the period 1970–2007. Our sample consists of 23 industrial countries and 52 emerging-market countries. Within the latter group, we gather information for 15 Latin American countries, 11 East Asian countries, 17 countries in Eastern Europe and 9 other economies. The full sample of countries—including their regional and income classification—is presented in the Annex, Table A1. Our quarterly real GDP data is expressed in local currency at constant prices. Detailed information on the time coverage, denomination, base year, and sources of data can also be found in Table A1. Note that the time coverage differs across countries. Most of the advanced economies and a few emerging markets have data from 1970 while the real GDP data for most emerging markets start in the second half of the 1970s or the 1980s. The real GDP figures for most transition economies (ECA countries) and lower-income emerging markets begin in the 1990s or early 2000s.

The BBQ algorithm is unable to find turning points in the real GDP data for China, Poland, the Slovak Republic, and Vietnam, leaving us with an effective sample of 71 countries with identified peak-to-trough and/or trough-to-peak phases of real output cycles. The steady and sharp growth in China's real GDP over the last 25 years prevents us from finding these

⁹ 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 Δy_t as a measure of the derivative of y_t with respect to t leads to consideration of the sequence $\{\Delta y_t > 0, \Delta y_{t+1} < 0\}$ as signaling a peak. The problem with this method is that it conflicts with the requirement that a phase lasts for at least two quarters.

turning points in that country's data, while the short time span of the real GDP series is the culprit for the other three countries.

After computing the turning points in real output, the main features of expansions (from trough to subsequent peak) and contractions (from peak to trough) in real economic activity are characterized in terms of duration, amplitude, slope, and cumulative variation. In addition, we consider more information, from a cyclical standpoint, to characterize real output upturns. Following Claessens et al. (2011a,b, 2012) 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.

The main features of business cycle fluctuations are defined as follows:

- (1) *Duration of the cycle*. This 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 quarters that it takes the real GDP to rebound from the trough to its previous peak.
- (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 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 four-quarter change in real GDP following a trough, as suggested by Sichel (1994) and Claessens et al. (2011a, 2012).
- (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) The *cumulative variation of the cycle* is estimated as the area of the triangle made up of the duration and amplitude. It reflects the idea of foregone output from peak to trough 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

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

3. Characterizing business cycles

In this section we estimate the main features of the different phases of the business cycle of 71 countries (23 industrial countries and 48 emerging market economies) from 1970q1 to 2012q4. Our analysis compares cross-country business cycle characteristics using two different types of country classification: (a) industrial countries and emerging-market economies, and (b) the regional classification of emerging markets. In the latter case, our effective sample includes nine countries from East Asia and the Pacific (EAP), 15 countries from Eastern Europe and Central Asia (ECA), and 15 countries from Latin America and the Caribbean (LAC).¹⁰

The first part of our analysis focuses on calculating the duration, amplitude, slope, and cumulative variation of recessions, recoveries and expansions of real economic activity before the outbreak of the global

financial crisis; that is, from 1970q1 to 2007q4.¹¹ In relation to the business cycle features of countries during this period, we also examine whether the main traits of recessions, recoveries, and expansions changed during the recent globalization period. We compare the pre-globalization period (1970–1984) to the globalization period (1985–2007).¹² The second part of the analysis examines whether cross-country differences in business-cycle features remain unchanged during the global financial crisis (which we refer to as the GFC period); hence, we compare the behavior of business cycles during the GFC period (2007–2012) and the pre-GFC period (which we define as 1990 to 2006).

3.1. Main features of real output cycles across the world before the 2008–2009 crisis

Table 1 presents the descriptive statistics (average, median, and standard deviation, among others) of the different phases of the cycle (recessions, recoveries, and expansions) for the full sample of countries as well as for the industrial countries and the emerging-market economies. Our discussion focuses on the various attributes of recessions and recoveries. Although we report the most important elements of expansions in real economic activity, we keep the discussion of their stylized facts to a minimum given that we are unable to distinguish temporary (cyclical) from permanent (long-term) shocks driving this trough-to-peak phase of the cycle.

Fact 1: recessions and recoveries for industrial countries and emerging market economies are not alike

Recessions in emerging markets tend to last as long as those in industrial markets—with an average duration from the peak-to-trough phase of the cycle of 3.7 and 3.6 quarters respectively (see Table 1). The coefficient of variation of the duration distribution is also similar across groups (0.54), implying that the standard deviation of the duration of recessions for both industrial and emerging-market economies is nearly half of the value of their average duration (approximately two quarters). However, emerging markets tend to experience deeper recessions: The median drop in real economic activity for emerging markets is larger and more abrupt than that of industrial countries. That is, real output declines by about 1.9% in recessions in industrial economies compared to a 4.8-percent drop in emerging-market economies. In other words, real economic activity declines at a rate of 0.5% per quarter among industrial countries while it falls at a rate of 1.4% per quarter among emerging markets.¹³ As expected, recessions are costlier among emerging markets, with a median cumulative loss of 7.5% (compared with 3.1% for industrial economies).

Interestingly, we find that the dispersion of the amplitude and slope is wider within the group of emerging-market economies than among industrial countries (the standard deviation among EMEs is more than three times that of industrial economies and the coefficient of variation is slightly larger). However, that is not the case for the cumulative loss: The variation coefficient (as an absolute value) of the cumulative loss

¹⁰ Note that our sample of countries includes 9 emerging market economies from other regions: 6 countries from the Middle East and North Africa, 1 country from South Asia, and 2 countries from Sub-Saharan Africa. We also conduct an analysis by groups of countries classified according to income levels (30 high-income countries, 23 upper-middle-income countries, and 13 lower-middle-income countries) but the results do not provide more compelling evidence than that presented in this paper. Those results are not reported here but are available from the authors upon request.

¹¹ Related research has been conducted by Claessens et al. (2011b) and Gupta and Miniane (2009). The former analyze the cycles of 23 emerging economies for the period 1978:1–2007:4 using a similar methodology; their main concern is the correlation between recessions and credit and asset price cycles. They compare those results with results for a group of 21 OECD economies. The latter paper concentrates on contractions and recoveries for 8 Asian economies, comparing them with non-Asian emerging economies and industrial economies. Altuğ and Bildirici (2012) use a univariate Markov switching model developed by Hamilton (1989) to compare business cycles in a sample of 13 emerging-market economies and 14 developed economies. Their study analyzes the synchronization of cycles across these groups of economies and compares parametric and non-parametric methods for dating cycles.

¹² There is no clear consensus on the definition and starting date of the globalization period. We consider 1985 to be the starting year given that it coincides with the onset of the Uruguay Round of trade negotiations which sped up unilateral trade liberalization programs in several developing nations (see Deardorff and Stern, 2002; Kose et al., 2012).

¹³ Statistical tests show that there are no significant differences in the duration of recessions in EMEs vis-à-vis industrial countries, but that differences in terms of the amplitude and slope of recessions are statistically considerable.

Table 1

Basic features of real output cycles. Sample of 71 countries, 1970–2007 (quarterly information).

	Recessions					Recoveries				Expansions		
	Time (%, median)	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Cum. Loss (%, median)	Time (%, median)	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Duration (quarters)	Amplitude (%, median)	Slope (%, median)
<i>All countries</i>												
Average	14.5%	3.8	−4.94%	−1.32%	−11.24%	22.0%	4.1	6.06%	2.85%	18.6	23.48%	1.46%
Median	12.5%	3.0	−2.88%	−0.87%	−4.95%	19.1%	3.0	4.81%	1.76%	13.0	15.85%	1.26%
Standard deviation	8.3%	2.1	5.63%	1.36%	18.27%	12.0%	3.6	4.98%	3.98%	17.8	24.89%	1.12%
Coefficient of variation	0.57	0.54	−1.14	−1.03	−1.63	0.54	0.88	0.82	1.39	0.96	1.06	0.77
25 th percentile	8.1%	2.00	−6.29%	−1.69%	−12.41%	14.7%	2.00	2.67%	0.63%	5.25	7.41%	0.82%
75 th percentile	19.7%	5.00	−1.37%	−0.44%	−1.90%	27.1%	5.00	7.51%	3.41%	26.00	31.16%	1.84%
Maximum	0.0%	2.0	−35.03%	−7.53%	−137.73%	4.0%	1.0	0.12%	0.02%	2.0	0.24%	0.12%
Minimum	37.5%	13.0	−0.13%	−0.06%	−0.01%	60.0%	21.0	41.47%	41.47%	102.0	192.48%	9.38%
Number of events	244	244	244	244	244	221	221	221	221	228	228	228
<i>Industrial countries</i>												
Average	12.2%	3.9	−2.34%	−0.61%	−6.25%	17.0%	3.6	3.34%	1.76%	22.8	20.10%	0.92%
Median	12.5%	3.0	−1.85%	−0.49%	−3.12%	15.8%	3.0	2.82%	1.05%	18.0	14.98%	0.87%
Standard Deviation	4.5%	2.1	2.13%	0.44%	11.21%	6.2%	2.9	2.06%	2.04%	20.0	20.62%	0.66%
Coefficient of variation	0.36	0.54	−0.91	−0.71	−1.79	0.36	0.80	0.62	1.16	0.88	1.03	0.72
25 th percentile	7.9%	2.00	−2.98%	−0.86%	−6.58%	13.8%	2.00	1.97%	0.38%	7.75	6.82%	0.60%
75 th percentile	15.8%	5.00	−0.93%	−0.29%	−1.31%	19.3%	5.00	4.34%	2.22%	32.00	26.96%	1.08%
Maximum	3.9%	2.0	−13.45%	−2.17%	−93.96%	6.9%	1.0	0.12%	0.02%	2.0	0.37%	0.12%
Minimum	21.1%	13.0	−0.13%	−0.06%	−0.14%	34.8%	18.0	11.47%	11.47%	101.0	130.26%	5.93%
Number of events	101	101	101	101	101	96	96	96	96	98	98	98
<i>Emerging markets</i>												
Average	15.6%	3.8	−6.78%	−1.82%	−14.76%	24.5%	4.4	8.16%	3.69%	15.4	26.03%	1.86%
Median	13.5%	3.0	−4.83%	−1.39%	−7.51%	21.2%	3.0	6.67%	2.33%	9.5	16.95%	1.63%
Standard deviation	9.5%	2.0	6.55%	1.56%	21.28%	13.4%	4.0	5.53%	4.82%	15.3	27.49%	1.22%
Coefficient of variation	0.61	0.54	−0.97	−0.86	−1.44	0.55	0.91	0.68	1.30	1.00	1.06	0.66
25 th percentile	8.0%	2.00	−9.47%	−2.26%	−17.10%	15.4%	2.00	4.74%	1.17%	4.75	8.28%	1.25%
75 th percentile	21.5%	5.00	−2.12%	−0.69%	−2.32%	32.1%	5.50	10.59%	4.55%	21.00	35.57%	2.04%
Maximum	0.0%	2.0	−35.03%	−7.53%	−137.73%	4.0%	1.0	0.27%	0.03%	2.0	0.24%	0.12%
Minimum	37.5%	13.0	−0.14%	−0.07%	−0.01%	60.0%	21.0	41.47%	41.47%	102.0	192.48%	9.38%
Number Of events	143	143	143	143	143	125	125	125	125	130	130	130

Note: Recessions are defined as the period (in quarters) between a peak in real GDP and its subsequent trough. Expansions, on the other hand, cover the period between a trough and the next peak in real output. Recoveries in real output represent the early stages of the expansion and take place in the period that it takes real GDP to increase from a trough to its previous peak level. Time in recession (recovery) is defined as the number of quarters in which 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 recession is computed as the percentage variation in the real GDP from its peak to its trough, while the amplitude of the recovery is computed as the 4-quarter cumulative variation in real output following a 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.

is smaller in EMEs compared with industrial economies (1.44 vs. 1.79, respectively).

Recoveries tend to be slower among emerging markets vis-à-vis industrial economies (4.2 and 3.6 quarters, respectively) although differences in the duration of the recovery period are not statistically significant. There is greater variability in the duration of recoveries among EMEs as compared with industrial countries (a standard deviation of 4 vs. 2.9 quarters). The strength and intensity of recoveries are different across groups: Trough-to-peak phases are sharper in both amplitude and slope for emerging markets (medians of 6.7 and 2.3%, respectively) than those of industrial countries (2.8 and 1.1%, respectively). Not only are recoveries stronger and more intense among emerging markets but they are also more volatile—i.e., the standard deviation of the amplitude and slope of recoveries in emerging-market economies more than doubles that of industrial countries. Finally, we should point out that expansions in real output tend to be longer in industrial countries as opposed to EMEs (23 vs. 15 quarters) and although the rhythm of these expansions is slower (0.9 vs. 1.6% per quarter), they resume, on average, after milder downturns.

In sum, although the average duration of recessions and recoveries is roughly similar in emerging markets and industrial economies, real output contractions in the former group are deeper and more intense than those in the latter group. Moreover, country cycles show a greater degree of heterogeneity across the group of emerging economies than among industrial countries (see Table 1 and Annex Table A.2). We should note that deeper recessions in emerging markets (as opposed to industrial countries) are followed by stronger recoveries; that is, there is a more powerful cyclical rebound effect.

Fact 2: the duration of recessions and recoveries is similar across geographical regions. However, recessions are deeper (in amplitude and slope) for Latin America and the Caribbean (LAC) and Eastern Europe and Central Asia (ECA), while recoveries are more dynamic in East Asia and the Pacific (EAP) and ECA

Fact 1 illustrates that, on average, the duration of recessions is roughly similar for emerging markets and industrial countries. Not surprisingly, differences in the duration of peak-to-trough phases of the cycle across regional groups of emerging-market countries are statistically negligible (see panel (a) of Fig. 1). However, there are large differences in the depth and cost of recessions across emerging market regions. For instance, the median amplitude of the recession is −3.8% for EAP countries, −5.5% for ECA countries, and −5.8% for LAC countries (see panel (b) of Fig. 1). Overall, recessions tend to be costlier in ECA and LAC (with cumulative losses in real output of 8.6 and 8.4%, respectively) relative to EAP (which registers a cumulative loss of 6.8%).

Real economic activity recoveries, on the other hand, tend to be faster in EAP (4 quarters) as opposed to ECA and LAC (4.6 and 4.8 quarters, respectively). Their amplitude is larger in EAP (7.7%) and Eastern Europe (8.1%) compared with Latin America and the Caribbean (6.1%). Also, note that the slope or intensity of the recovery is greater in the ECA region (2.7% per quarter) (see panel (c) of Fig. 1).

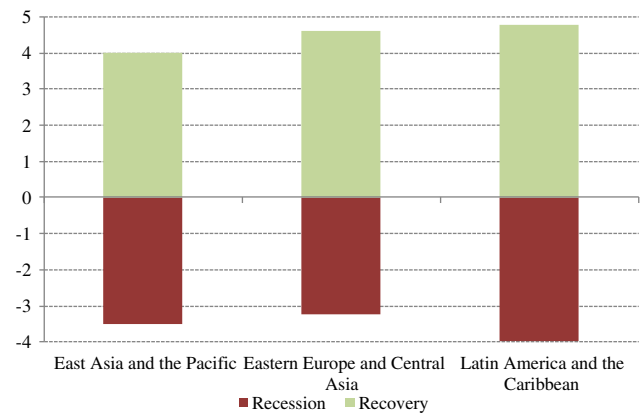
Fact 3: during the globalization period, recessions tend to be less frequent for industrial countries but shorter only for emerging economies when compared with the pre-globalization period. Recoveries are slower and expansions are shorter for both industrial and emerging market economies in the globalization period

We next examine whether the main features of the business cycle in industrial countries and emerging-market economies have changed during the globalization period. Table 2 compares the average duration, median amplitude and slope of real cycles during the pre-globalization and globalization periods (1970–1984 and 1985–2007, respectively).

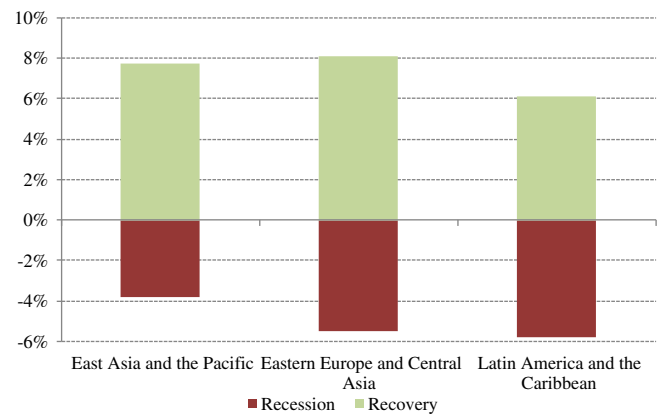
Real output contractions during the globalization period tend to be less frequent among industrial countries (time in recession falls from

Business Cycle Features, By Region

a) Duration (average, in quarters)



b) Amplitude (median, %)



c) Slope (median, %)

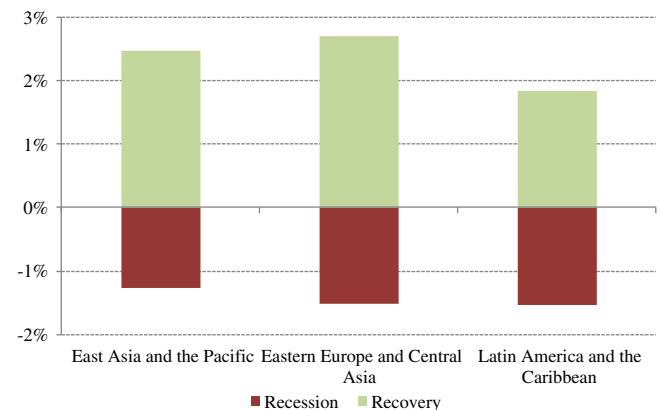


Fig. 1. Business cycle features, by region. (a) Duration (average, in quarters). (b) Amplitude (median, %). (c) Slope (median, %).

18.6 to 9.4%) but those recessions tend to last slightly longer (4.2 quarters). In emerging markets, the frequency of a country experiencing a cyclical downturn goes up to 15% but recessions are statistically shorter (3.6 quarters, down from 4.4).

Real output recoveries, on the other hand, are significantly slower during the globalization period for both industrial countries (increasing from 3.5 to 3.9 quarters) and emerging-market economies (increasing from 3.5 to 4.6 quarters). Hence, it takes more time (between one and three more months) to reach the previous peak after the trough. In terms of expansions, the duration of trough-to-peak phases in the

Table 2

Basic features of real output cycles: pre-globalization vs. globalization. Sample of 71 countries, 1970–2007 (quarterly information).

	Recessions						Recoveries					Expansions			
	Time (%, median)	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Cum. Loss (%, median)	Number of Events	Time (%, median)	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Number of Events	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Number of Events
<i>All countries</i>															
Pre-globalization (1970–1984)	16.4%	3.9	−2.7%	−0.8%	−4.6%	83	28.5%	3.5	4.3%	1.5%	71	20.7	15.6%	1.0%	84
Globalization (1985–2007)	12.0%	3.8	−3.2%	−1.0%	−5.5%	160	17.4%	4.4	5.1%	1.8%	147	12.7	13.3%	1.4%	116
2-sided equality test (p-value)		(0.556)	(0.557)	(0.052)	(0.529)			(0.080)	(0.148)	(0.563)		(0.000)	(0.474)	(0.003)	
<i>Industrial countries</i>															
Pre-globalization (1970–1984)	18.6%	3.7	−2.4%	−0.6%	−3.3%	56	28.9%	3.5	3.9%	1.4%	54	20.6	15.2%	0.9%	59
Globalization (1985–2007)	9.4%	4.2	−1.5%	−0.5%	−2.4%	45	10.9%	3.9	2.3%	0.8%	42	15.8	7.7%	0.6%	24
2-sided equality test (p-value)		(0.282)	(0.091)	(0.197)	(0.276)			(0.491)	(0.007)	(0.150)		(0.243)	(0.104)	(0.002)	
<i>Emerging markets</i>															
Pre-globalization (1970–1984)	11.0%	4.4	−5.4%	−1.4%	−8.2%	27	27.3%	3.5	6.4%	3.1%	17	20.9	21.4%	1.5%	25
Globalization (1985–2007)	14.7%	3.6	−4.7%	−1.4%	−7.2%	115	21.4%	4.6	7.0%	2.2%	105	11.9	15.1%	1.7%	92
2-sided equality test (p-value)		(0.059)	(0.199)	(0.831)	(0.521)			(0.313)	(0.601)	(0.601)		(0.007)	(0.618)	(0.687)	
<i>Country groups by region</i>															
<i>East Asia and the Pacific (EAP)</i>															
Pre-globalization (1970–1984)	5.1%	4.2	−4.0%	−1.2%	−6.8%	6	14.3%	1.6	14.7%	6.7%	5	48.4	71.2%	2.1%	5
Globalization (1985–2007)	10.9%	3.3	−3.8%	−1.3%	−6.4%	20	18.5%	4.5	9.7%	2.1%	22	17.1	18.5%	1.6%	15
<i>Eastern Europe and Central Asia (ECA)</i>															
Pre-globalization (1970–1984)	11.9%	7.0	−4.1%	−0.6%	−8.6%	1	19.2%	4.0	5.2%	8.9%	1	30.0	45.7%	1.5%	1
Globalization (1985–2007)	13.3%	3.1	−7.0%	−1.8%	−8.7%	23	21.4%	4.7	1.3%	2.8%	21	10.8	14.0%	1.8%	18
<i>Latin America and the Caribbean</i>															
Pre-globalization (1970–1984)	21.9%	4.5	−8.2%	−1.9%	−18.9%	15	50.0%	5.6	6.5%	6.1%	7	14.2	13.8%	1.5%	15
Globalization (1985–2007)	18.5%	3.8	−4.7%	−1.3%	−7.2%	53	27.9%	4.8	2.0%	1.8%	44	10.3	11.9%	1.5%	43

Note: We report the average duration of real output recessions, recoveries, and expansions. The statistics for time in the cyclical phase, amplitude, slope, and cumulative loss refer to the sample median across episodes. Averages for those statistics are not reported but are available from the authors upon request. The duration of real output recessions is the number of quarters from peak to trough, while that of expansions is the number of quarters from trough to peak. Recoveries in economic activity, on the other hand, are defined as the early stage of the expansion (recovery phase), consisting of the period in which output rebounds from a trough to its previous peak. The amplitude of the recession is the distance between a peak in real output and its subsequent trough while that of expansions is the distance between a trough and the next peak in real output. Moreover, the amplitude of the recovery is computed as the 4-quarter cumulative variation in real output following a trough. The slope of the recession (expansion) is the ratio of the amplitude of the peak-to-trough (trough-to-peak) phase of the cycle to its duration. The cumulative loss combines information on the duration and amplitude of the peak-to-trough phase of the cycle to measure the overall cost of the recession.

business cycle for industrial economies has declined during the globalization period (from 21 to 16 quarters) and it also decreases from 21 to 12 quarters for emerging markets.

In sum, recoveries tend to be slower during the globalization period (when compared with the pre-globalization years) and expansions in real output have become shorter for industrial and emerging-market economies.

Fact 4: recessions are slightly less deep during the globalization period, while the strength of recoveries diminishes for industrial countries

In the pre-globalization era, the median pace of recessions in EMEs (as indicated by the slope of peak-to-trough phases of the cycle) is more than twice as fast as that of industrial economies (-1.4% and -0.6% , respectively). Recoveries, on the other hand, are twice as fast; that is, 3.1 and 1.4% for EMEs and industrial countries, respectively (see Table 2). Hence, in that era, emerging markets reach the trough of their recessions and exit from them at a faster pace than industrial countries.

During the globalization period, recessions are not as deep for either industrial or developing countries. The median amplitude of the peak-to-trough phase for industrial countries increases from -2.4% in 1970–84 to -1.5% in 1985–2007, and from -5.4 to -4.7% over the same time frame for emerging markets. On the other hand, the pace of recessions remains statistically invariant during the globalization period for both industrial and emerging-market economies. The median slope of the recessions in industrial countries increases from -0.6 to -0.5% whereas that of emerging markets stays fixed at -1.4% .

For industrial countries, the strength and intensity of the real economic recovery during the globalization period is nearly halved: The amplitude declines from 3.9 to 2.3% whereas the slope falls to 0.8 from 1.4% per quarter. Emerging-market recoveries are slightly sharper, with the median amplitude moving from 6.4% in the pre-globalization period to 7% in 1985–2007. However, the initial recovery phase occurs at a slower pace; that is, the median slope of the recovery during the globalization period is 2.2% (down from 3.1%).

Fact 5: the cost of recessions, as measured by either amplitude or cumulative loss of output, is greater in Latin America and Eastern Europe than in East Asia. However, the cost of recessions for LAC falls sharply during the globalization period compared with EAP countries

Recessions are shorter and less profound for all regional emerging-market groups during the globalization period (when compared with the 1970–84 period). As shown in Fig. 2, the duration of recessions decreases from 4.2 to 3.3 quarters in EAP, from 7 to 3.1 quarters in ECA, and from 4.5 to 3.8 quarters in LAC. Moreover, the amplitude of those recessions also declines sharply for LAC (with the median amplitude of the contraction shrinking from -8.1 to -4.7%) whereas the reduction is meager for EAP. In terms of the cumulative loss of output, we observe that the cost of recessions declines across all groups. However, the reduction is sharper among LAC countries: The median cumulative output loss drops from nearly 19% in 1970–1984 to approximately 7% in 1985–2007.

Interestingly, as Fig. 2 shows, upturns have become slower in East Asia (recoveries take 4.5 quarters as opposed to just under 2 quarters during the pre-globalization period). The amplitude of the recovery has sharply declined across all EM regional groups during 1985–2007; most notably, the median amplitude of the recoveries declines from 14.7% in 1970–84 to 9.7% in 1985–2007 among EAP countries. The drop is also sharp among LAC economies, decreasing from 6.5 to 2% over the same time period. Finally, the length and amplitude of expansionary periods has also declined during the globalization period (from 48 to 17 quarters among EAP countries and from 14 to 10 among LAC economies).

3.2. Crisis and business cycles

Section 3.1 shows that economic downturns in emerging markets are deeper, steeper, and costlier than those in industrial countries. Across regional groups of emerging markets, recessions are particularly costly in LAC during the pre-globalization period (-18.9%) and EAP in the globalization period (-6.4%). These periods coincide with the Latin American debt crisis and the East Asian financial crisis.

Fig. 3 depicts the frequency of recessions by their duration (short, medium, long, and protracted) and their amplitude (mild, moderate, severe, and depression).¹⁴ On average, two out of five recessionary periods in industrial countries and emerging markets last between three and four quarters (regardless of their amplitude). Regardless of their duration, nearly 75% of recessions in industrial countries are mild (0–2%) or moderate (2–4%) while the proportion for emerging markets is below 40%. Finally, the mode of the distribution of recessions is different across groups: mild contractions with medium duration are more frequent among industrial countries whereas severe contractions of medium duration are more likely among emerging markets.

The depth of recessions among emerging-market economies (where three out of five contractions are considered severe or depression) is related to the higher sensitivity of these countries to episodes of turmoil and crisis. Fig. 4 reports the frequency of different types of crises for industrial and emerging-market economies. Regardless of the type of crisis, we find that these events are more likely to occur in EMEs. Moreover, these crisis episodes are preceded by overvalued currencies, excess leverage, deposit runs, or balance of payment problems. Overall, sharp output fluctuations associated with crisis episodes are more likely to occur in emerging markets than in developed economies (Calderón and Servén, 2013; Claessens et al., 2009, 2011b, 2012; Tornell and Westermann, 2002).

Greater output volatility and proneness to sharp recessions in EMEs (vis-à-vis industrial countries) are tightly linked to other patterns of cyclical behavior that differ from those of industrial countries: (a) greater sensitivity to fluctuations in prices of primary commodities and intermediate goods; (b) the inability of the current account to act as a buffer to smooth consumption, as reflected by higher consumption volatility (in excess of output) and a countercyclical trade balance, and (c) procyclical macroeconomic policies resulting from highly volatile and countercyclical interest rates and procyclical government spending. Explanations of these features have been provided in a long list of works pioneered by Mendoza (1991) and Backus et al. (1992), and followed by Kose (2002), Kydland and Zarazaga (2002), Neumeier and Perri (2005), Uribe and Yue (2006), Aguiar and Gopinath (2007, 2008), and Boz et al. (2008), among others.

The empirical literature is very extensive for developed economies; for instance, see Crucini et al. (2011), Centoni et al. (2007) and the references therein. One strand of the literature suggests that productivity shocks are the main driver of business cycle fluctuations. However, in regard to cyclical fluctuation drivers in emerging markets, the literature examines the importance of both domestic and external factors (e.g., Kose et al., 2003).¹⁵ Historical analysis of output fluctuations for selected Latin American countries shows that external factors are the main drivers of business cycles in Argentina, Brazil, Chile, and Mexico during periods of inward and outward orientations (Aioilfi et al., 2011). Relatedly, there is evidence that: (a) financial and political crises tend to drive up the cost of recessions in EMEs (Cerra and Saxena, 2008), (b) the procyclicality of capital flows (and of access to world capital markets) heightens the vulnerability of emerging markets to sudden stops (Calvo, 1998; Mendoza,

¹⁴ We follow Morsink et al. (2002) in classifying the severity of recessions by duration and amplitude. In terms of duration, they define recessions as short (2 quarters), medium (3–4 quarters), long (5–6 quarters), and protracted (more than 7 quarters). According to their depth (amplitude), recessions can be mild (0–2 percent), moderate (2–4 percent), severe (4–10 percent), and depressions (more than 10 percent).

¹⁵ Kose et al. (2003) find that less developed economies are more likely to experience country-specific business cycles.

Business Cycle Features during the globalization period By Region

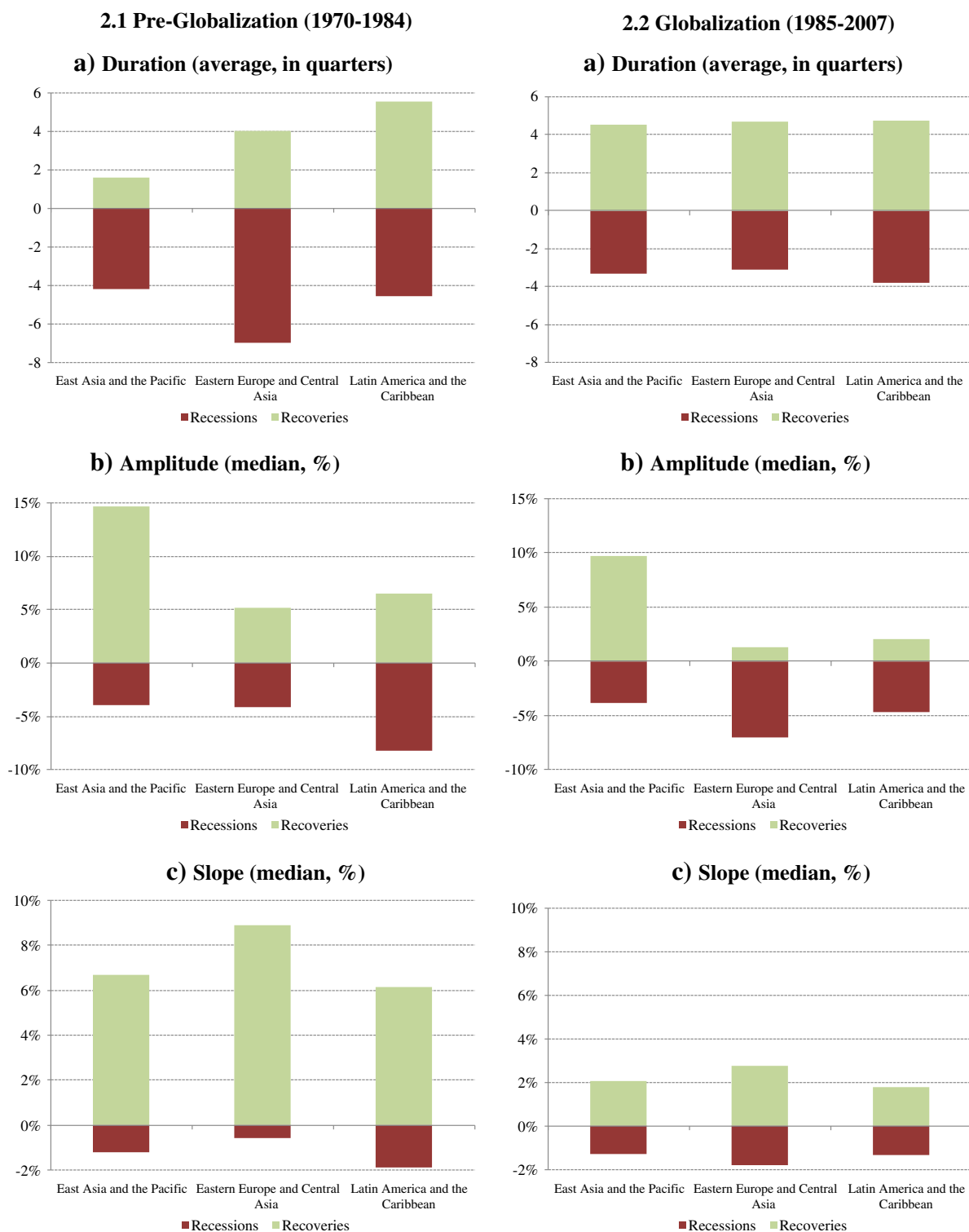


Fig. 2. Business cycle features during the globalization period By Region. 2.1 Pre-globalization (1970–1984). 2.2 Globalization (1985–2007).

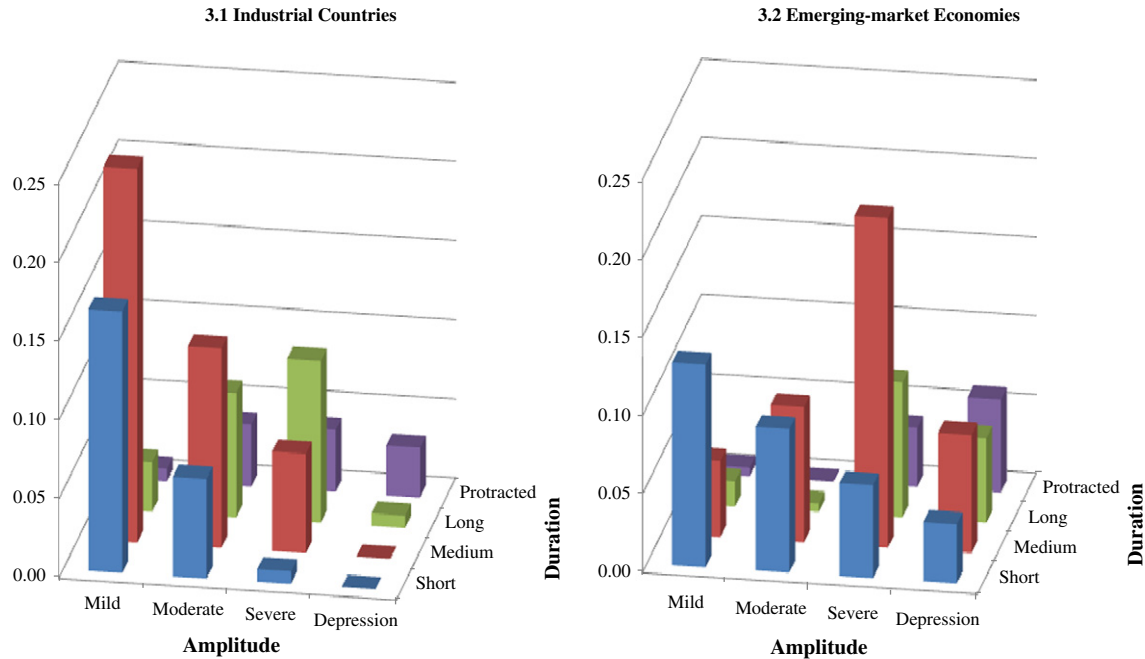
2006) and amplifies the output effect of adverse external shocks in countries with domestic financial frictions (Caballero, 2002).

The tight association between financial cycles and real output cycles for a wide array of countries is thoroughly documented in Claessens et al. (2009, 2012). They find that financial factors (credit, equity, and housing prices) play a role in explaining the duration and amplitude

of the different phases of the business cycle. For instance, recessions associated with financial disruptions—notably, credit contractions and housing price busts—tend to be deeper and costlier while recoveries in the presence of credit and housing price booms are stronger.

This section documents the main features of recessions and recoveries associated with crisis episodes—more specifically, systemic banking

Severity of Recessions, 1970–2007



Note: The classification of recessions by duration and amplitude follows Morsink, Helbling, and Takorick (2002). The duration of recessions is defined as short (2 quarters), medium (3–4 quarters), long (5–6 quarters), or protracted (more than 7 quarters). The amplitude of recessions is defined as mild (0–2 percent), moderate (2–4 percent), severe (4–10 percent), and depression (more than 10 percent). The figures depict the frequency of recessions in each of these categories for both industrial and emerging market economies.

Reference: Morsink, James, Thomas Helbling, and Stephen Takorick (2002). *Recessions and Recoveries*, Chapter 3, IMF World Economic Outlook, April.

Fig. 3. Severity of recessions, 1970–2007. Note: The classification of recessions by duration and amplitude follows Morsink et al. (2002). The duration of recessions is defined as short (2 quarters), medium (3–4 quarters), long (5–6 quarters), or protracted (more than 7 quarters). The amplitude of recessions is defined as mild (0–2%), moderate (2–4%), severe (4–10%), and depression (more than 10%). The figures depict the frequency of recessions in each of these categories for both industrial and emerging market economies. Reference: Morsink et al. (2002). *Recessions and Recoveries*, Chapter 3, IMF World Economic Outlook, April.

crises, currency crises, and what we denote as economic crises. Here we distinguish crisis-related recessions (banking, currency, and economic crises) from recessions that do not coincide with crisis episodes (regular recessions).

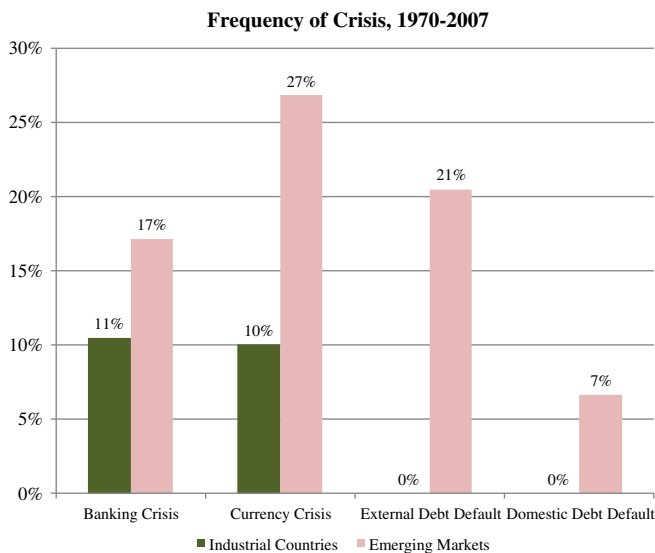


Fig. 4. Frequency of Crisis, 1970–2007. The dating of the different types of crises (banking, currency, external debt default and restructuring, and domestic debt default and restructuring) are taken from Reinhart and Rogoff (2010). The data is publicly available at: <http://www.carmenreinhardt.com/data/browse-by-topic/topics/7/>.

3.2.1. Recessions associated with crisis episodes

The greater severity of output contractions in EMEs vis-à-vis industrial countries, depicted in Fig. 3, can be attributed to the fact that EMEs are not only more prone to experience sharp (and adverse) external shocks but also to the structural features of these economies (for example, non-diversified output and export structures, high-liability dollarization, fragile financial systems), which tend to amplify rather than mitigate the effects of these shocks (Becker and Mauro, 2006; Caballero, 2001; Loayza and Raddatz, 2007; Raddatz, 2007). The combination of sharp and more frequent external shocks and the difficulty mitigating them results in a greater likelihood that EMEs will experience crisis episodes (Calderón and Servén, 2013; Mendoza and Terrones, 2012; Tornell and Westermann, 2002).

Table 3 reports the main features of recessions associated with banking crisis, currency crisis, and economic crisis episodes as well as their ensuing recovery periods. We identify banking crisis episodes using the recent database by Laeven and Valencia (2010, 2012). The authors define systemic banking crises as those episodes with: (a) financial distress in the banking sector signaled by bank runs, losses in the banking system, and bank liquidations, and (b) significant intervention policy responses to financial distress.¹⁶ Currency crisis episodes, on the other hand, are identified following the Frankel and Rose (1996) methodology based on large exchange-rate depreciations: They occur when the

¹⁶ State interventions in the banking sector are significant, according to these authors, if at least three of the following take place: (i) the state provides extensive liquidity support (5 percent of deposits and liabilities to nonresidents), (ii) bank restructuring costs are at least 3 percent of GDP, (iii) the state undertakes significant bank nationalizations, (iv) the state puts in place significant guarantees, (v) the state undertakes significant asset purchases (at least 5 percent of GDP), and (vi) the state orders deposit freezes and bank holidays (Laeven and Valencia, 2010, pp. 6–7).

Table 3

Basic features of real output cycles: crisis vs. regular phases of the cycle. Sample of 71 countries, 1970–2007 (quarterly information).

	Recessions					Recoveries				Expansions			
	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Cum. Loss (%, median)	Number of events	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Number of events	Duration (quarters)	Amplitude (%, median)	Slope (%, median)	Number of events
I. Financial crisis													
1. All countries													
No Financial Crisis	3.8	−2.65%	−0.79%	−4.09%	206	3.7	4.70%	1.89%	187	19.0	15.37%	1.12%	179
Financial crisis	4.0	−6.75%	−1.88%	−11.26%	38	6.2	5.93%	1.05%	33	19.8	19.94%	1.46%	31
2-sided equality test (p-value)	(0.627)	(0.003)	(0.000)	(0.008)		(0.000)	(0.038)	(0.186)		(0.812)	(0.436)	(0.006)	
2. Industrial countries													
No financial crisis	3.9	−1.85%	−0.50%	−3.16%	98	3.6	2.85%	1.08%	92	22.8	14.79%	0.87%	92
Financial crisis	4.7	−1.37%	−0.39%	−1.57%	3	4.7	2.40%	0.47%	3	27.3	3.67%	0.46%	3
2-sided equality test (p-value)	(0.529)	(0.546)	(0.076)	(0.546)		(0.539)	(0.082)	(0.082)		(0.705)	(0.570)	(0.082)	
3. Emerging markets													
No financial crisis	3.7	−4.17%	−1.24%	−6.76%	108	3.8	6.95%	2.75%	95	15.0	15.84%	1.80%	87
Financial crisis	3.9	−7.06%	−2.05%	−12.09%	35	6.4	6.13%	1.42%	30	19.0	21.57%	1.52%	28
2-sided equality test (p-value)	(0.628)	(0.007)	(0.022)	(0.036)		(0.002)	(0.228)	(0.014)		(0.237)	(0.357)	(0.211)	
II. Currency crisis													
1. All countries													
No Financial crisis	3.7	−2.40%	−0.69%	−3.65%	188	3.6	4.27%	1.75%	170	19.5	14.81%	0.98%	161
Financial crisis	4.2	−7.12%	−1.70%	−11.39%	56	5.6	7.65%	1.81%	50	17.9	23.13%	1.84%	49
2-sided equality test (p-value)	(0.107)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.872)		(0.595)	(0.253)	(0.000)	
2. Industrial countries													
No financial crisis	3.9	−1.68%	−0.48%	−3.08%	97	3.6	2.82%	1.06%	92	23.2	14.77%	0.85%	91
Financial crisis	4.8	−4.29%	−0.93%	−6.35%	4	3.3	4.09%	1.05%	3	16.0	17.50%	1.21%	4
2-sided equality test (p-value)	(0.417)	(0.043)	(0.317)	(0.043)		(0.860)	(0.545)	(0.570)		(0.455)	(0.625)	(0.297)	
3. Emerging markets													
No financial crisis	3.5	−4.03%	−1.17%	−5.77%	91	3.5	6.36%	2.47%	78	14.6	15.52%	1.54%	70
Financial crisis	4.2	−7.61%	−1.83%	−11.66%	52	5.8	8.37%	1.86%	47	18.1	23.53%	1.84%	45
2-sided equality test (p-value)	(0.072)	(0.004)	(0.011)	(0.002)		(0.002)	(0.036)	(0.628)		(0.252)	(0.158)	(0.158)	
III. Economic crisis													
1. All countries													
No financial crisis	3.6	−2.14%	−0.68%	−3.27%	162	3.4	4.21%	1.86%	148	19.4	14.53%	0.95%	140
Financial crisis	4.2	−6.13%	−1.56%	−9.97%	82	5.3	6.63%	1.70%	72	18.5	20.70%	1.69%	70
2-sided equality test (p-value)	(0.033)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.565)		(0.749)	(0.143)	(0.000)	
2. Industrial countries													
No financial crisis	3.8	−1.76%	−0.49%	−3.10%	94	3.6	2.85%	1.09%	89	23.1	14.79%	0.86%	88
Financial crisis	4.7	−3.03%	−0.46%	−5.85%	7	4.0	2.60%	0.69%	6	20.9	11.86%	0.77%	7
2-sided equality test (p-value)	(0.296)	(0.251)	(0.675)	(0.251)		(0.753)	(0.414)	(0.097)		(0.780)	(0.716)	(0.716)	
3. Emerging markets													
No financial crisis	3.3	−2.95%	−1.08%	−3.90%	68	3.2	6.59%	2.75%	59	13.1	13.60%	1.44%	52
Financial crisis	4.2	−6.68%	−1.80%	−10.81%	75	5.5	7.04%	1.81%	66	18.3	21.15%	1.75%	63
2-sided equality test (p-value)	(0.012)	(0.001)	(0.002)	(0.002)		(0.001)	(0.651)	(0.181)		(0.082)	(0.074)	(0.157)	

Note: The statistics for amplitude, slope, and cumulative loss for recessions, recoveries, and expansions refer to the sample median across countries. Averages are presented for the duration. The duration of recessions is the number of quarters between peak and trough. Real recoveries are defined as the expansion (recovery phase) that takes place during the period where output rebounds from a trough to its previous peak. The amplitude of recessions calculated as the distance between the real output at its peak and its subsequent trough. On the other hand, the amplitude of the recovery is computed as the one-year cumulative variation in real output following a trough. The slope of the recession is the ratio of the amplitude of the peak-to-trough phase of the cycle to its duration. The slope of recovery is the amplitude from trough to the previous peak divided by its duration. The cumulative loss combines 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 crises are identified as in [Laeven and Valencia \(2010, 2012\)](#). 2/Currency crisis episodes are taken from [Reinhart and Rogoff \(2009\)](#). 3/Economic crises 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.

year-on-year currency depreciation exceeds 25% and the increase in the rate of nominal depreciation is also at least 10%. Sovereign defaults, as defined in Reinhart and Rogoff (2009), 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 criteria we distinguish between sovereign defaults on external

Business Cycle Features: Regular vs. Crisis-related Episodes, Economic Crisis By Region

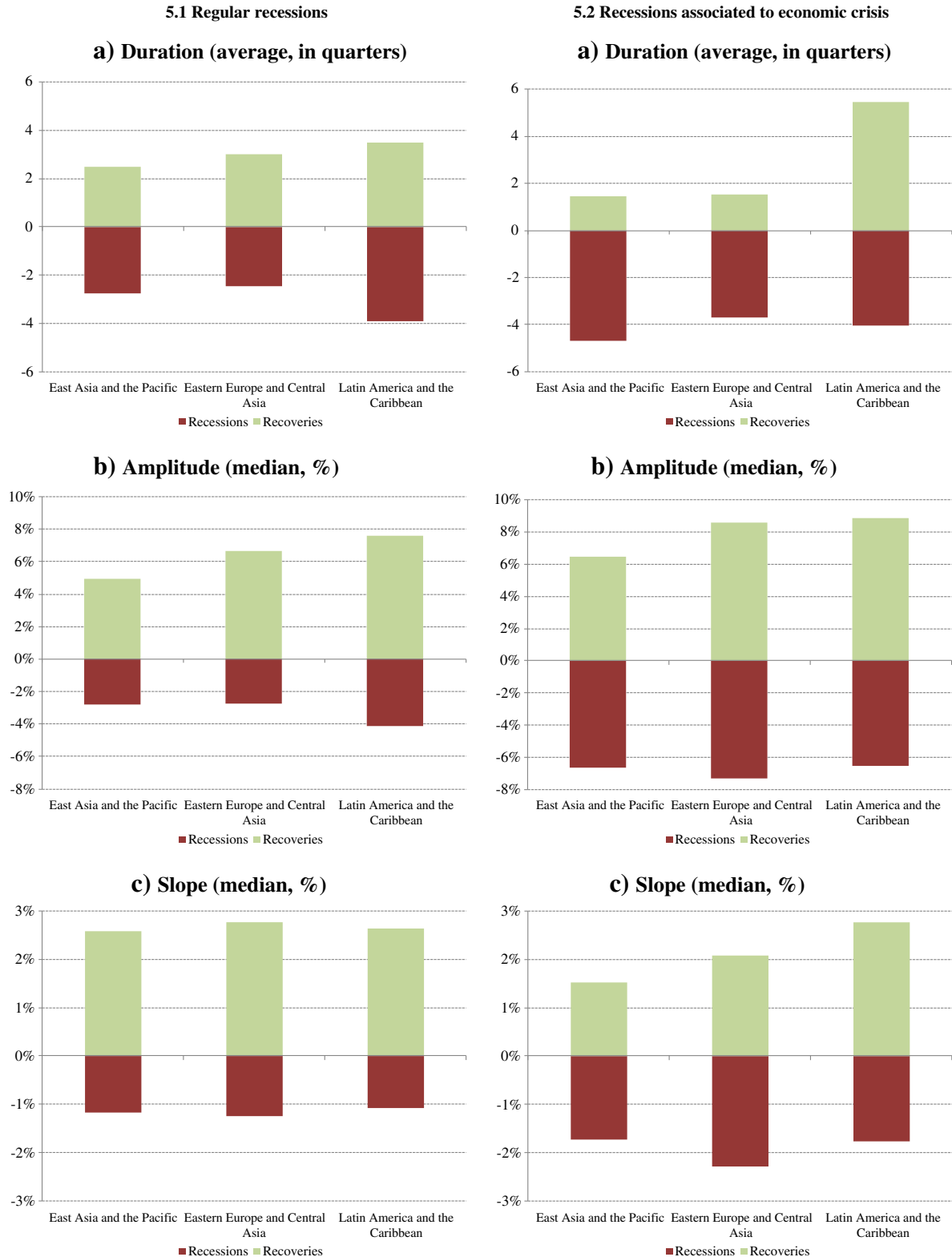


Fig. 5. Business cycle features: regular vs. crisis-related episodes, economic crisis by region. 5.1 Regular recessions. 5.2 Recessions associated to economic crisis.

debt and domestic debt.¹⁷ Finally, this paper identifies episodes of economic crisis as those where at least one of the following types of crisis takes place: (a) banking crisis, (b) currency crisis, (c) sovereign external debt default, or (d) sovereign domestic debt default. In this section, we consider that recessions are associated with crisis episodes if the peak in GDP, which marks the start of the recession period, coincides with a dated crisis within a quarter interval ($T - 4, T + 4$, where T is the quarter where the peak in real GDP takes place).

As shown in Table 3, crisis-related recessions have, on average, a duration similar to those unrelated to crisis; however, they tend to be deeper (greater amplitude), more intense (steeper slope) and costlier (larger cumulative real output losses). The median peak-to-trough change in real GDP for recessions associated with banking crises is approximately -6.8% (-2.7 in regular recessions), and their speed is nearly three times as fast as those of regular recessions (-1.9 vs. -0.7% per quarter, respectively). Overall, recessions associated with currency crises are costlier, as reflected by the greater cumulative output loss (11.4% relative to 3.7% in regular recessions). On the other hand, recoveries following crisis-related recessions (regardless of the type of crisis) tend to be slower than other upturns; the average duration of recoveries after banking crises is 6.2 quarters while that of regular recessions is approximately 3.7 quarters. They also tend to be stronger, with real output growing 5.9% from trough in recessions associated with banking crises as opposed to 4.7% following other recessions. Next, we focus our discussion on the differences between recessions and recoveries associated with what we generally refer to in this paper as economic crisis episodes.

Recessions associated with economic crisis, on average, tend to last longer in industrial countries than in emerging markets (4.7 and 4.2 quarters, respectively). Nonetheless, in the event of a crisis, the downturn in industrial countries is smaller (3%) than the output drop in emerging markets (6.7%). The drop in real output is also steeper among emerging markets when compared with industrial countries, with declines of 1.8 and 0.5% per quarterly respectively. Overall, recessions associated with economic crisis in emerging markets are costlier than in industrial countries (with a cumulative loss of -11 vs. -5.9% , respectively).

On the other side of the coin, recoveries are stronger for emerging markets when they follow an economic crisis. The amplitude of the recovery after crisis is 7% (as opposed to 6.6% when there is no crisis). However, this recovery is slower (it takes 5.5 quarters to reach the previous peak vs. 3.2 quarters when there is no crisis) and less intense (the speed of recovery drops from 2.8 to 1.8% per quarter).

Focusing on the regional groups of emerging markets, the average duration of recessions in LAC (nearly 4 quarters) does not appear to be influenced by the occurrence of a crisis (Fig. 5). In the case of EAP and ECA countries, recessions are longer in duration when associated with economic crisis (they last almost 5 and 4 quarters as opposed to nearly 3 and 2.5 quarters, respectively). The depth of recessions tends to be deeper and more intense when they coincide with a crisis episode. For instance, the amplitude of peak-to-trough phases in EAP during crisis (-6.7%) is larger than otherwise (-2.8%). The same holds for ECA (-7.3 vs. -2.7%) and LAC (-4.1 vs. -6.5%).

Recoveries after crisis episodes in Latin America and the Caribbean are slower (they take almost 5.5 quarters) than other upturns (approximately 3.5 quarters), as shown in Fig. 5. However, they are relatively stronger (8.9 vs. 7.6%). In the case of East Asia and the Pacific, recoveries are fast: It takes almost 2 quarters for real output to reach its previous peak from the trough.¹⁸ Moreover, EAP recoveries following an economic crisis are larger (6.5 vs. 5.0% otherwise). Finally, Eastern Europe and Central Asia also experience faster and stronger recoveries after crisis-related recessions (see Fig. 5).

¹⁷ Episodes of sovereign default on external debt include debt rescheduling that is eliminated with less favorable terms than the original liability. Default on domestic debt includes the freezing of bank deposits and forced conversions of those deposits from foreign to local currency (Reinhart and Rogoff, 2009, pp. 11).

¹⁸ However, that is not the case when a financial crisis takes place (it takes almost 10 quarters for real economic activity to recuperate).

We should point out that recoveries following a systemic banking crisis deserve special attention in EAP: (a) It takes almost 10 quarters for these countries' real GDP to reach the pre-crisis peak, (b) the amplitude of recoveries is similar in crisis and non-crisis periods (around 7.5%), and (c) the rhythm of the recovery is slow, with the median slope declining from 3.1% per quarter to 1% per quarter. Clearly, the sharp output fluctuations experienced in EAP during episodes of systemic banking crisis correspond to the 1997–98 financial crisis experienced by the region. In fact, the peak-to-trough drop in real output during the crisis is nearly 20% in Indonesia, 16% for Thailand, 12% for Malaysia, and 9% for Hong Kong. Overall, EAP countries experience the most severe recessions when banking crises ensue, but they also experience the strongest rebound from crisis-related recessions among EMEs.

3.2.2. Dynamic behavior of real, financial, and external indicators around recessions

For this analysis, we run panel data regressions of real and financial variables on time effects for a 17-quarter window centered on the peak of real GDP (i.e., where period T denotes the start of the recession) and distinguishing between peaks associated with crisis and peaks that are not. These regressions are conducted for the sample of industrial countries and emerging market economies over the period 1970q1–2007q4, and the coefficient estimates of these regressions are depicted in Fig. 6 for recessions associated with banking crises.¹⁹ We interpret our coefficient estimates as deviations from the average growth outside the four-year window associated with the crisis episode. For the sake of simplicity, we refer to this average growth outside the window of analysis as trend growth.

Fig. 6 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 of GDP), stock prices (in real terms), and the real exchange rate. By construction, the dynamic behavior of growth in real output around a recession is as expected for both industrial and emerging-market economies. After reaching a peak above trend in period T , real output drops below average in $T + 1$ and reaches its trough four quarters after the start of the recession ($T + 4$) for industrial countries and emerging-market economies. At the trough, output growth is 4 to 5 percentage points below trend for industrial countries regardless of whether the recession is associated with a banking crisis. On the other hand, the trough for emerging markets is almost 12 percentage points below trend in recessions with crisis (compared with 8 percentage points below trend for downturns without crisis). Once it reaches its trough in episodes associated with crisis, real output growth tends to converge to trend growth at a faster pace for emerging markets than for industrial countries (see Figs. 6.1a and 6.2a).

The behavior patterns of private consumption and investment around peaks in real GDP is depicted in Figs. 6.1b and 6.1c for industrial countries and Figs. 6.2b and 6.2c for emerging markets, respectively. Qualitatively, we observe that the behavior pattern of private consumption and investment for both groups of countries mimics that of real output; that is, the trough in consumption and investment takes place in period $T + 4$. We should point out not only that the drop in consumption is smaller than that of output (relative to its trend growth) but also that the decline in investment is sharper than that of output for both samples of countries. In addition, the trough in consumption and investment in emerging markets is deeper compared with that of industrial countries (3.5 and 7 percentage-point differences, respectively).²⁰ Consumption and investment tend to converge to trend growth at a faster pace for

¹⁹ Although the regressions are not reported here, they are available from the authors upon request.

²⁰ Empirical evidence shows that households in EMEs have a low cost of substitution between market time and unmeasured home time (Deaton, 2005; Hicks, 2012). This creates artificially higher consumption volatility in EMEs relative to industrial countries. Moreover, the existence of a large informal sector in EMEs may create larger income volatility if recessions induce movements from formal to informal sectors.

emerging markets than for industrial countries as a result of a stronger rebound effect.

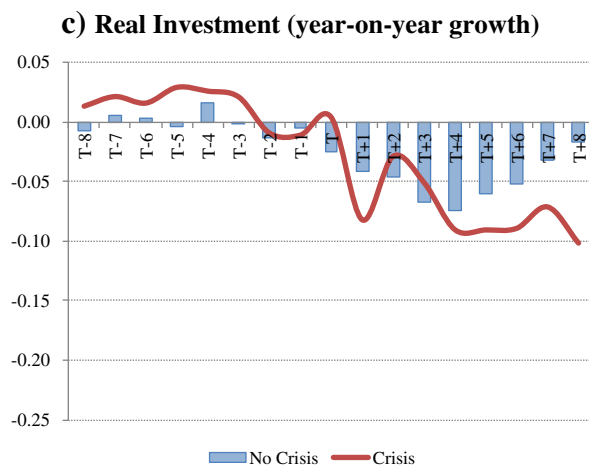
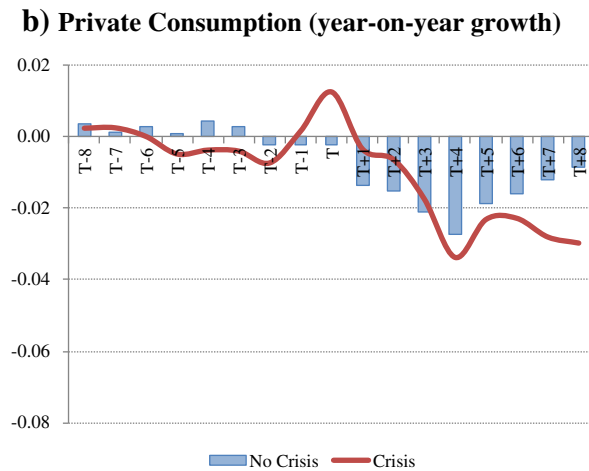
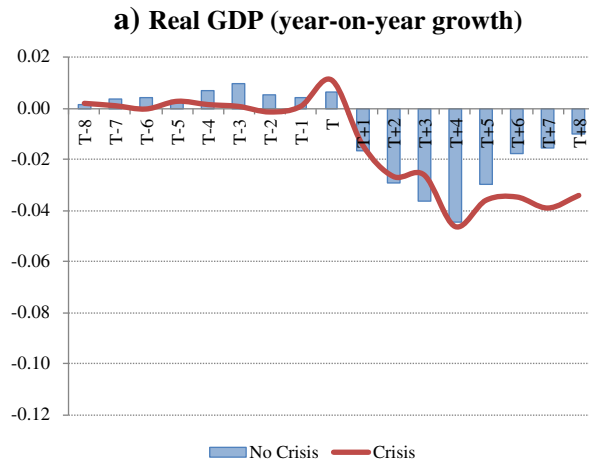
We next take a look at the dynamic behavior of credit and asset prices around peaks in real GDP. Our goal is to ascertain whether there is statistical precedence of credit and/or asset prices to real output cycles. In this context, Fig. 6 shows the evolution of real credit per capita (Figs. 6.1d and 6.2d), real stock prices (Figs. 6.1e and 6.2e) and the real

exchange rate (Figs. 6.1f and 6.2f) for industrial countries and emerging markets around recessions that are associated with banking crises and those that are unrelated with episodes of financial turmoil.

Growth in real credit is above trend in the run-up to the recession up to period T ($T - 1$) for industrial countries (emerging-market economies) and it fluctuates below trend after 2 quarters. However, it still remains below average for industrial countries while it steadily declines

Recession and Banking Crisis: Event Analysis

6.1 Industrial Countries



6.2 Emerging markets

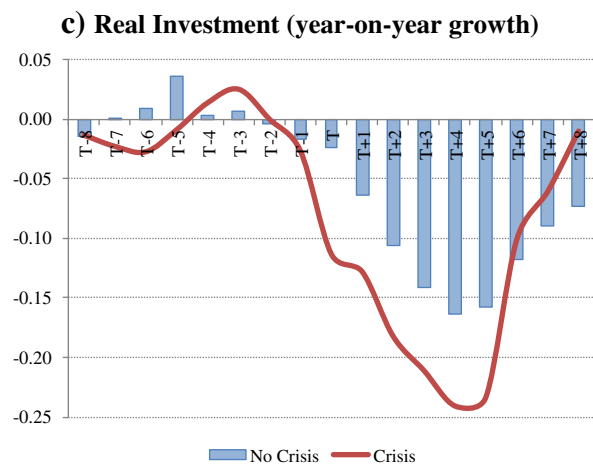
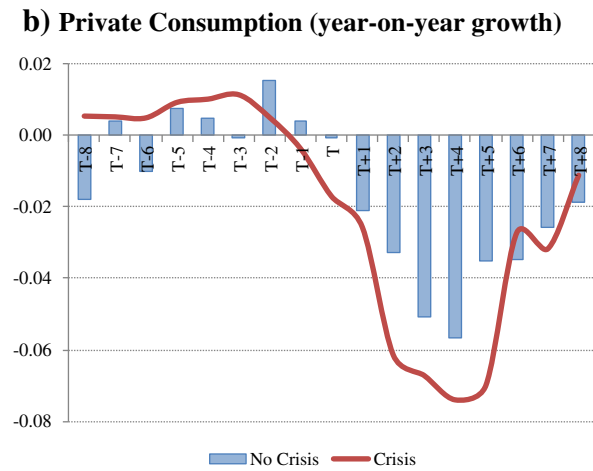
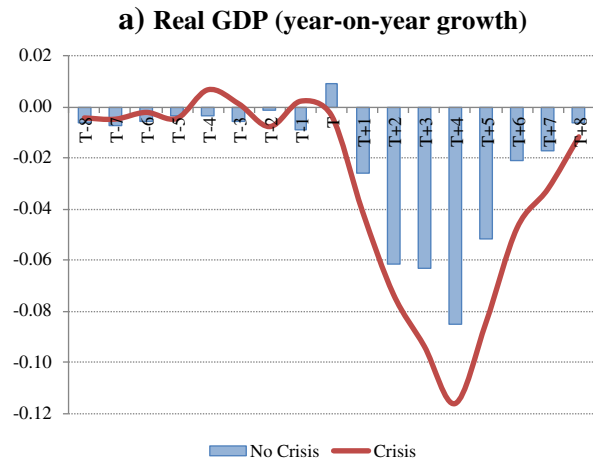
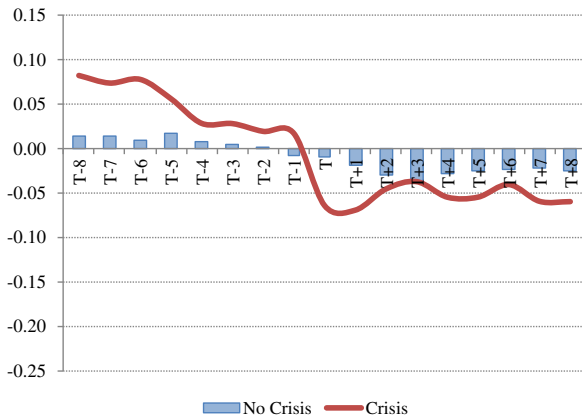


Fig. 6. Recession and banking crisis: event analysis. 6.1 Industrial countries. 6.2 Emerging markets.

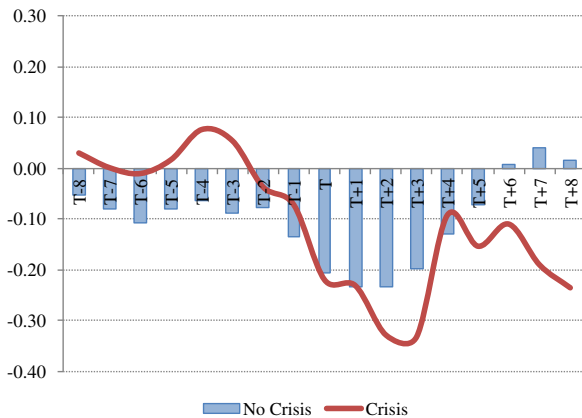
Recession and Banking Crisis: Event Analysis

6.1 Industrial Countries

d) Real credit per capita (year-on-year growth)



e) Stock prices (year-on-year growth)

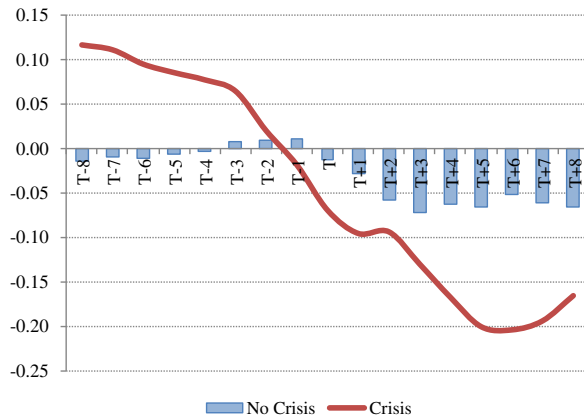


f) Real exchange rate (year-on-year growth)

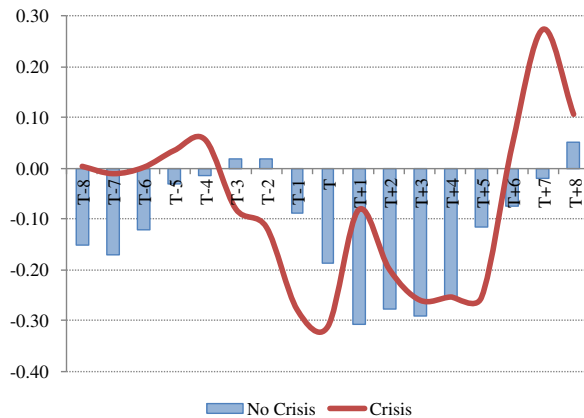


6.2 Emerging markets

d) Real credit per capita (year-on-year growth)



e) Stock prices (year-on-year growth)



f) Real exchange rate (year-on-year growth)

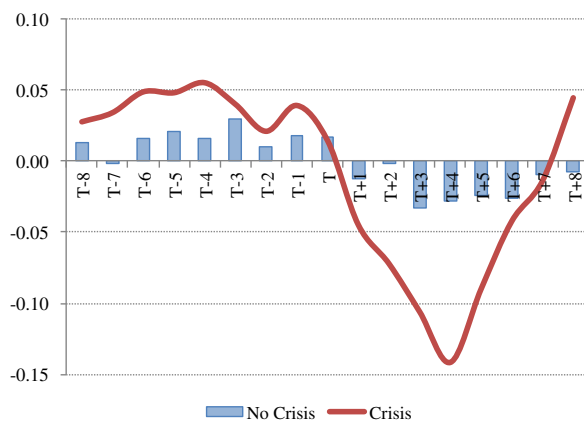
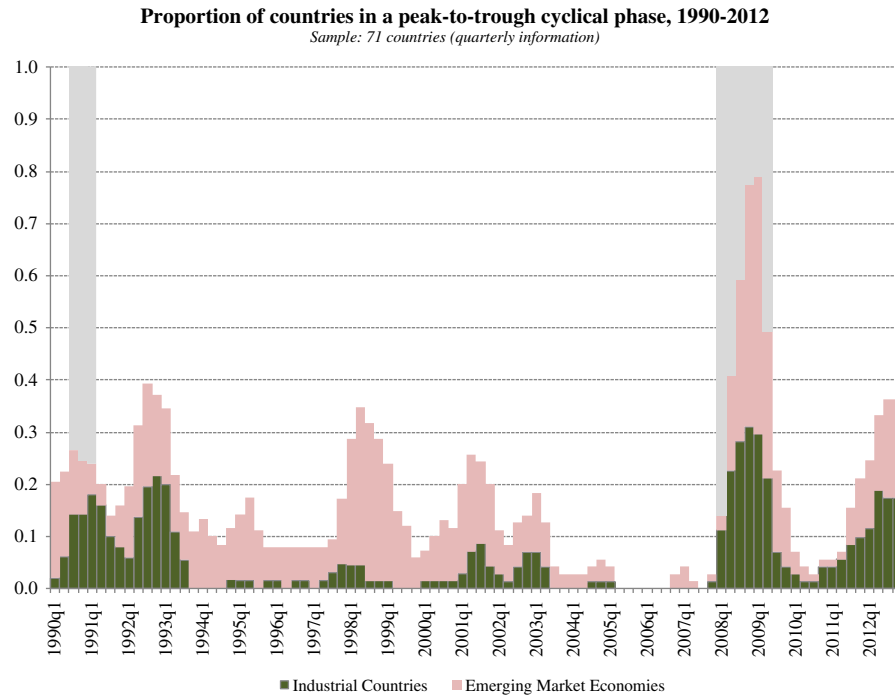


Fig. 6 (continued).

after 8 quarters for emerging markets. We should point out not only that deviations from trend in the growth of real credit per capita are larger in recessions associated with banking crises than otherwise, but also that these deviations are larger in emerging markets than industrial countries (Figs. 6.1d and 6.2d).

Growth in stock prices (in real terms) decline below trend 2 (3) quarters before the start of the recession for the group of industrial

(emerging-market) economies; that is, in period $T - 2$ ($T - 3$). Stock prices reach their trough in period $T + 2$ for industrial countries at more than 40 percentage points below trend in recessions associated with crisis (as opposed to 20 percentage points below in recessions without crises). Also note that stock prices grow above trend in period $T + 6$ for industrial countries during regular recessions and they take more time to recover during recessions that coincide with banking



Note: The gray shaded area represents the recessionary phases in the United States business cycle as identified by the BBQ algorithm.

Fig. 7. Proportion of countries in a peak-to-trough cyclical phase, 1990–2012. Sample: 71 countries (quarterly information). Note: The gray shaded area represents the recessionary phases in the United States business cycle as identified by the BBQ algorithm.

crises. The same qualitative behavior holds for emerging markets although stock prices recover sharply by $T + 8$ in recoveries associated with crisis periods (see Figs. 6.1e and 6.2e).²¹

Finally, fluctuations from trend in real exchange rates are more volatile around recessions with crisis than recessions without crisis. Interestingly, the real exchange rate appreciates significantly in recessions with banking crises 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 their currency in real terms, which reaches its trough in period $T + 5$ at approximately 15 pp below trend growth (see Figs. 6.1f and 6.2f). This finding may reflect the fact that crises in EMEs are usually accompanied by capital repatriation to advanced economies, which induces the real depreciation of the local currency in EMEs.

3.3. The recent global financial crisis: is this time different?

So far, we have conducted an analysis of the main features of real output cycles for industrial and emerging-market economies using quarterly data up to 2007. However, the recent global financial crisis deserves special attention. This section compares the main features of real output fluctuations during 2007–2012 vis-à-vis the 1990–2006 period. The first year of the global financial crisis (GFC) period was determined based on the appearance of early manifestations of the crisis in 2007, with liquidity disruptions in the interbank lending market of advanced economies. The full-blown, global credit collapse occurred in 2008q3–2009q1, when almost 80% of the countries in the sample experienced a downturn phase in real credit (see Fig. 7).

Table 4 reports the average duration, median amplitude, and slope of recessions and recoveries for industrial countries and emerging markets during the 1990–2006 and 2007–2012 periods. First, we find that the average duration of recessions among industrial countries during the

GFC is nearly one quarter longer than that of the pre-GFC period (4.9 vs. 4 quarters, respectively). For EMEs, the average duration of recessions is roughly similar across sub-periods. However, we should point out that the average duration increases for ECA, while it diminishes for the LAC and EAP regions.

The amplitude of recessions during the GFC period is more than three times larger than the pre-GFC downturns among industrial economies (−5.1 and −1.5%, respectively). In contrast, the amplitude of the recent recession is −7.3% in EMEs, which is not quite twice the median downturn in the previous period (−4.2%). It is important to note that the severity of the recession in EMEs when compared with advanced economies is mainly influenced by EAP countries (−7.8%) and Eastern Europe (−10%). The amplitude of the recession in Latin America in 2007–2012 is roughly of a similar order of magnitude as that of 1990–2006 (−4.4 and −4.1%, respectively).²² Finally, the cost of recessions has significantly increased for industrial countries: The cumulative output loss during recessions rises sharply from 2.3% in 1990–2006 to 9.4% in 2007–2012. For emerging markets, recessions also become costlier during the GFC period (climbing from 7 to 9.8%) but this increase is not statistically significant. We should note that of the regional EME groups, the cost of recessions almost triples for ECA (from 8.7 to 24.2%).

Fig. 8 shows the trajectory of real GDP in 2007–2012 for industrial and emerging-market economies as well as for regional groups of EMEs. The figure clearly shows that the recession in industrial countries has been as deep as that of emerging markets but that the ensuing recovery in the former group has been not only slower but also weaker. Interestingly, the behavior of real GDP across regional EMEs provides evidence of a heterogeneous response to the crisis. While LAC appears to have dodged the crisis and resumed robust growth rapidly, the recovery in ECA is still a work in progress.

A closer look at the recovery phase in 2007–2012 shows that the number of quarters needed for an industrial country to move from a trough to its previous peak increases from nearly 4 quarters in the

²¹ As mentioned earlier, Claessens et al. (2009, 2011b, 2012) show that recessions are more closely related to credit contractions and housing price busts than stock market crashes.

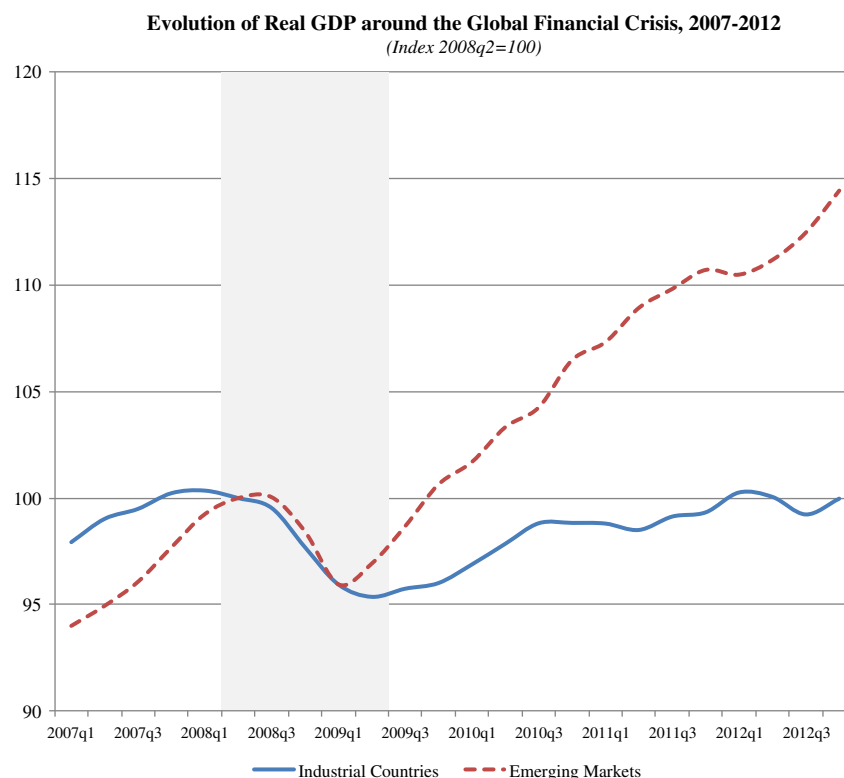
²² An analogous result is obtained when looking at the slope of the recession.

Table 4

Basic features of real output cycles: is this time around different? Sample of 71 countries, 1990–2012 (quarterly information).

	Recessions						Recoveries				
	Time (%)	Duration	Amplitude	Slope	Cum. Loss	Events	Time (%)	Duration	Amplitude	Slope	Events
<i>All countries</i>											
Previous cycle (1990q1–2006q4)	11.8%	3.7	−2.73%	−0.96%	−4.39%	138	19.7%	4.3	5.12%	1.85%	128
Global financial crisis (2007q1–2012q4)	20.8%	4.3	−5.71%	−1.38%	−9.59%	66	33.3%	4.9	5.12%	1.29%	38
2-sided equality test (p-value)		(0.029)	(0.013)	(0.000)	(0.002)			(0.423)	(0.201)	(0.885)	
<i>Industrial countries</i>											
Previous cycle (1990q1–2006q4)	7.4%	4.0	−1.51%	−0.46%	−2.25%	39	12.5%	3.8	2.37%	0.86%	37
Global financial crisis (2007q1–2012q4)	33.3%	4.9	−5.09%	−1.14%	−9.37%	25	37.5%	6.5	2.61%	0.54%	11
2-sided equality test (p-value)		(0.118)	(0.007)	(0.000)	(0.000)			(0.009)	(0.004)	(0.303)	
<i>Emerging market economies</i>											
Previous cycle (1990q1–2006q4)	13.8%	3.5	−4.23%	−1.36%	−6.98%	99	21.1%	4.6	7.06%	2.17%	91
Global financial crisis (2007q1–2012q4)	16.7%	4.0	−7.04%	−1.92%	−9.81%	41	25.0%	4.2	7.44%	2.97%	27
2-sided equality test (p-value)		(0.213)	(0.185)	(0.016)	(0.264)			(0.690)	(0.721)	(0.348)	
<i>EM Country groups by region</i>											
<i>East Asia and the Pacific (EAP)</i>											
Previous cycle (1990q1–2006q4)	11.8%	3.6	−3.07%	−1.27%	−6.44%	23	14.7%	4.2	7.7%	2.3%	17
Global financial crisis (2007q1–2012q4)	8.3%	3.0	−7.85%	−2.30%	−10.13%	17	16.7%	3.0	11.1%	3.9%	8
<i>Eastern Europe and Central Asia (ECA)</i>											
Previous cycle (1990q1–2006q4)	14.3%	3.1	−7.01%	−1.82%	−8.73%	18	23.2%	4.9	8.5%	2.7%	20
Global financial crisis (2007q1–2012q4)	33.3%	5.2	−10.03%	−1.92%	−24.20%	8	45.8%	6.7	5.0%	0.7%	3
<i>Latin America and the Caribbean</i>											
Previous cycle (1990q1–2006q4)	14.0%	3.7	−4.07%	−1.14%	−6.28%	41	27.8%	4.9	6.1%	1.7%	37
Global financial crisis (2007q1–2012q4)	12.5%	3.5	−4.43%	−1.20%	−6.50%	10	16.7%	4.3	6.7%	3.0%	10

Note: The statistics for time, amplitude, slope, and cumulative loss for recessions and recoveries refer to the sample median across countries. Averages are presented for the duration. The duration of recessions is the number of quarters between peak and trough. Real recoveries are defined as the expansion (recovery phase) that takes place during the period where output rebounds from a trough to its previous peak. The amplitude of recessions is calculated as the distance between real output at its peak and at its subsequent trough. On the other hand, the amplitude of the recovery is computed as the one-year cumulative variation in real output following a trough. The slope of the recession is the ratio of the amplitude of the peak-to-trough phase of the cycle to its duration. The slope of recovery is the amplitude from trough to the previous peak divided by its duration. The cumulative loss combines information on the duration and amplitude to measure the overall cost of the recession.



Note: We depict the regional median real GDP index. The gray shaded area represents the quarters where more than 40 percent of countries in our sample share a recessionary phase.

Fig. 8. Evolution of real GDP around the global financial crisis, 2007–2012. (Index 2008q2 = 100). Note: We depict the regional median real GDP index. The gray shaded area represents the quarters where more than 40% of countries in our sample share a recessionary phase.

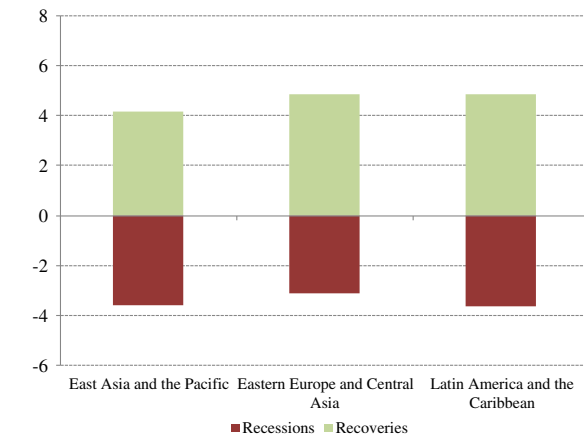
pre-GFC period to 6.5 quarters in the GFC period (see Table 4). We should point out that the average duration of recoveries among industrial countries in the GFC period is underestimated, as many countries in this group have yet to reach the pre-GFC peak. The median amplitude

of the recovery among industrial countries in 2007–2012 is slightly larger than before (2.6 vs. 2.3%) but pales in comparison with the larger drop experienced in the latter period. The same cannot be said of emerging markets: Their recoveries are stronger (nearly 7.5%) and

Business Cycle Features: Is this time around different? By Region

9.1 Real cycles, 1990–2006

a) Duration (average, in quarters)



b) Amplitude (median, %)

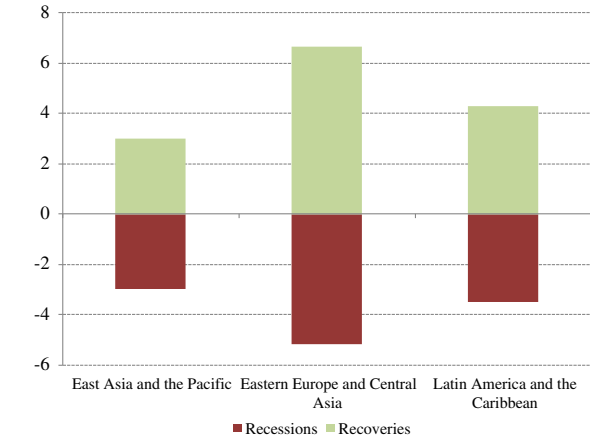


c) Slope (median, %)

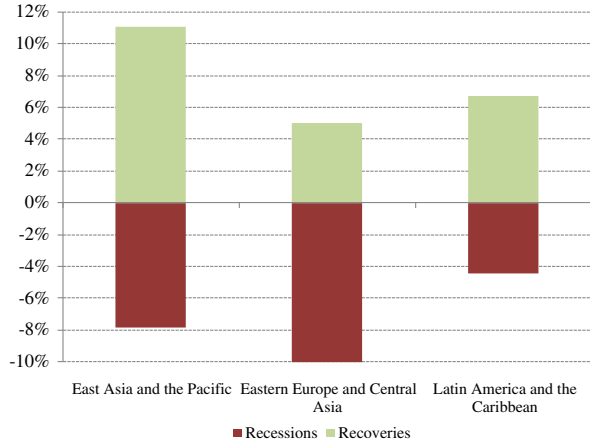


9.2 Real cycles during the global financial crisis, 2007–12

a) Duration (average, in quarters)



b) Amplitude (median, %)



c) Slope (median, %)

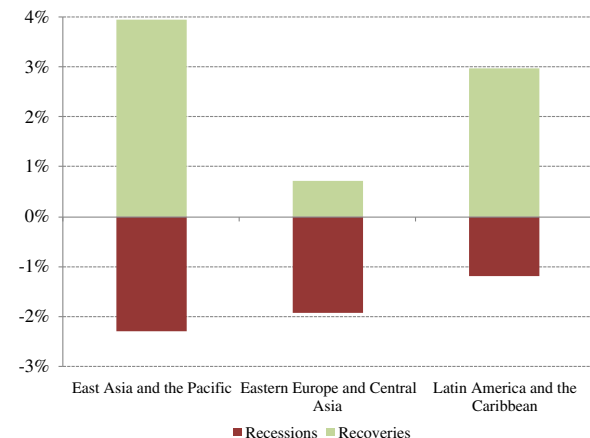


Fig. 9. Business cycle features: is this time around different? By region. 9.1 Real cycles, 1990–2006. 9.2 Real cycles during the global financial crisis, 2007–12.

more intense (approximately 3% per quarter). For the group of emerging markets, Fig. 9 shows that the amplitude of recoveries in Latin America is slightly larger in the GFC period than before (6.7 vs. 6.1%), East Asia experiences a stronger recovery in the GFC period (11.1 vs. 7.7%), and Eastern Europe is going through a slower

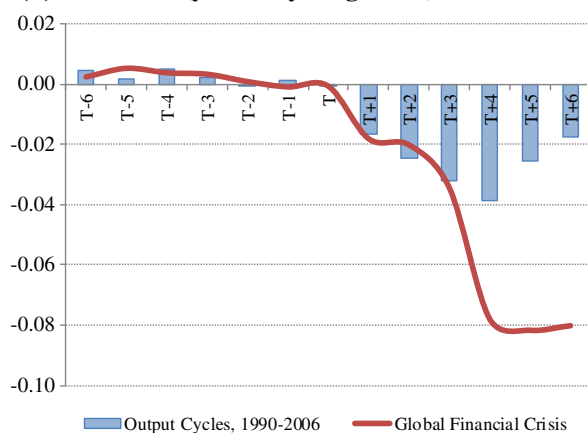
recovery when compared with its corresponding pre-GFC period (5 vs. 8.5%).

Overall, the recent global financial crisis produces longer and deeper recessions among industrial countries and emerging markets. The ensuing recoveries have been longer and slower-paced among industrial

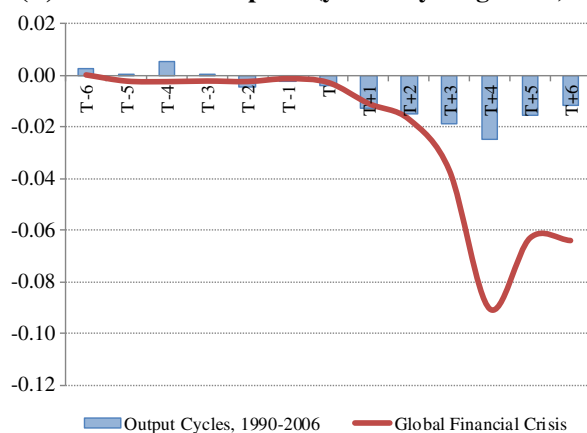
Recession and the Global Financial Crisis: Event Analysis

10.1 Industrial Countries

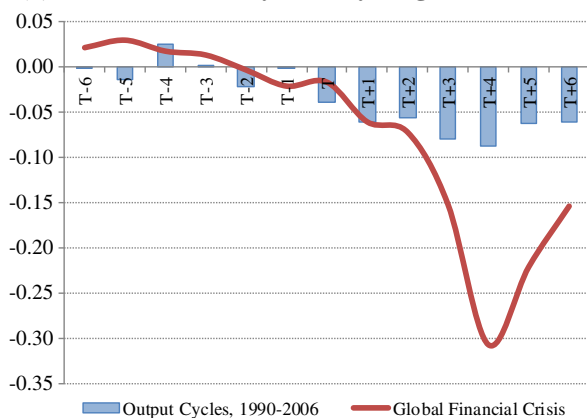
(a) Real GDP (year-on-year growth)



(b) Private Consumption (year-on-year growth)

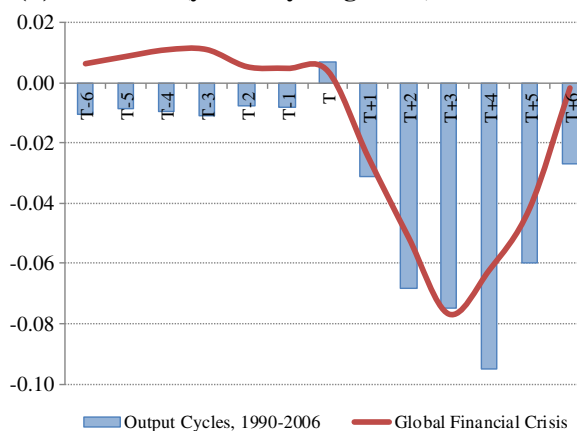


(c) Real Investment (year-on-year growth)

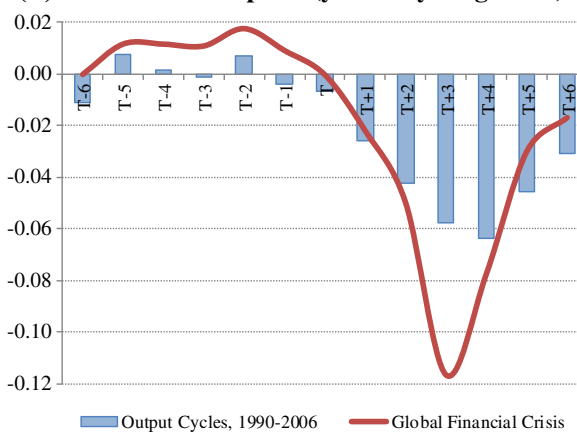


10.2 Emerging markets

(a) Real GDP (year-on-year growth)



(b) Private Consumption (year-on-year growth)



(c) Real Investment (year-on-year growth)

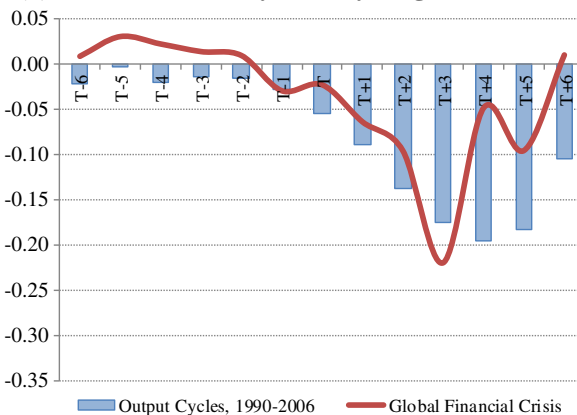
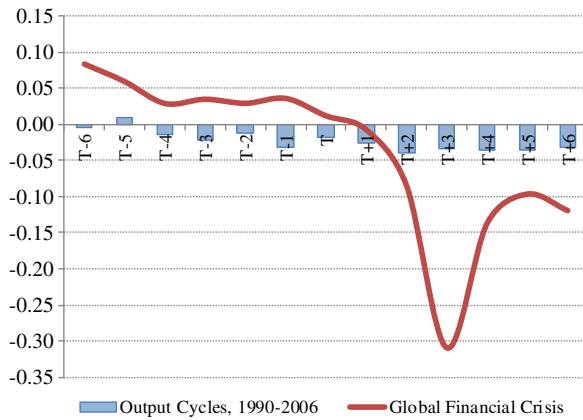


Fig. 10. Recession and the global financial crisis: event analysis. 10.1 Industrial countries. 10.2 Emerging markets.

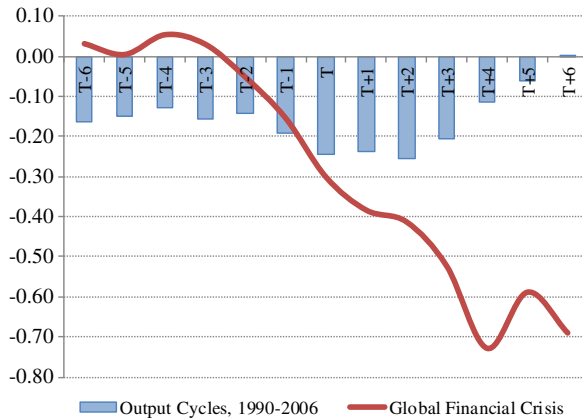
Recession and the Global Financial Crisis: Event Analysis

10.1 Industrial Countries

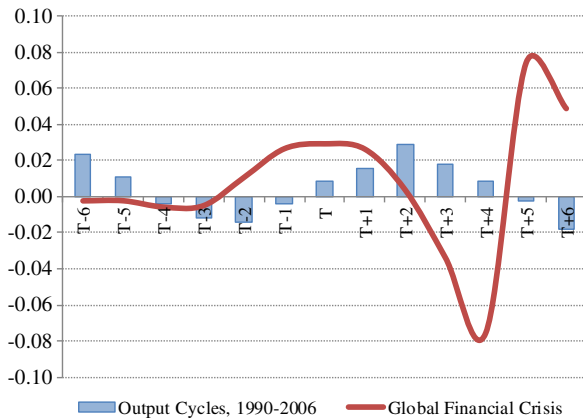
(d) Real credit per capita (year-on-year growth)



(e) Stock prices (year-on-year growth)

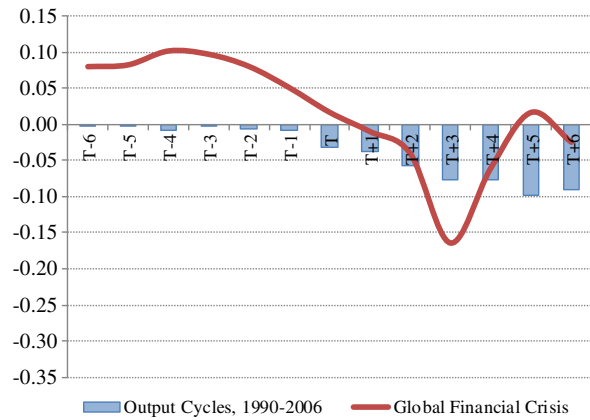


(f) Real exchange rate (year-on-year growth)

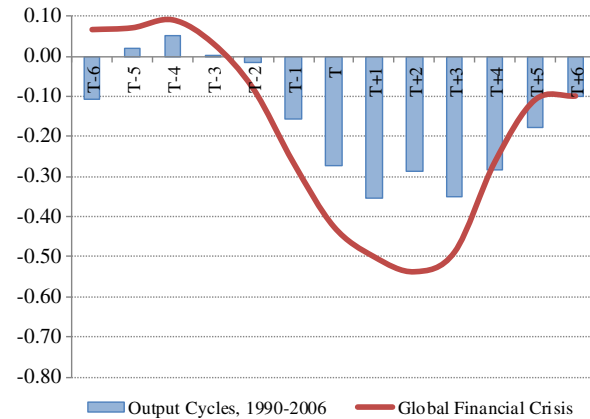


10.2 Emerging markets

(d) Real credit per capita (year-on-year growth)



(e) Stock prices (year-on-year growth)



(f) Real exchange rate (year-on-year growth)

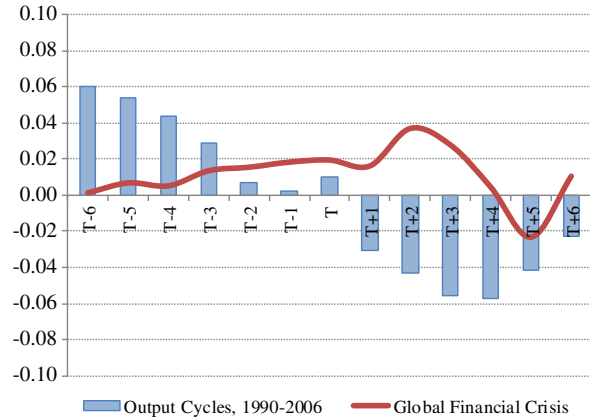


Fig. 10 (continued).

countries, and slightly shorter and fast-paced among emerging markets. Within the EME regional groups, ECA experiences the deepest recessions and this group's recovery is weak. EAP also suffers a sharp recession (more than twice as deep as those in the pre-GFC period) but recovers almost twice as fast. Finally, LAC's recession is, on average, similar to previous episodes in 1990–2006. However, the recovery is not only slightly shorter than before (by two months) but also more intense. The deeper recession experienced by ECA countries is partly attributed

to their close trade and financial connections with Western Europe as well as their own fiscal and external imbalances, which render the region more vulnerable than EAP and LAC.

Fig. 10 presents the evolution of the real and financial variables around the date of the crisis. As mentioned before, output contractions during the global financial crisis have been deeper than previous ones, and this pattern of behavior holds for consumption and investment. While these two variables approach trend growth faster after six

Annex

Table A.1

Sample of countries, sources of data for quarterly real GDP.

Code	Name	Region	Income	Start	End	Denomination 1/	Source 2/
ARG	Argentina	AMER	UMC	1970.1	2012.4	Mill. 1993 ARS	DS, HA, Indec (NSO)
ARM	Armenia	ECA	LMC	1994.1	2011.4	Mill. 2005 AMD	DS, HA, Central Bank of Armenia
AUS	Australia	1IND	HIC_OECD	1970.1	2012.4	Mill. 2009–10 AUD (Ch.)	Reserve Bank of Australia
AUT	Austria	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
BEL	Belgium	1IND	HIC_OECD	1970.1	2010.1	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
BGR	Bulgaria	ECA	UMC	1994.1	2012.4	Mill. 2005 BGN	OECD, European Central Bank
BOL	Bolivia	AMER	LMC	1990.1	2012.4	Thou. 1990 BOB	National Statistical Institute of Bolivia (NSO)
BRA	Brazil	AMER	UMC	1975.1	2012.4	Mill. 2005 BRL	DS, HA, IGBE (NSO)
BWA	Botswana	SSA	UMC	1994.1	2012.4	Mill. 2006 BWP	HA, Statistics Botswana
CAN	Canada	1IND	HIC_OECD	1970.1	2012.4	Mill. 2007 CAD (Ch.)	DS, Statistics Canada
CHE	Switzerland	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 CHF	DS, Swiss State Secretariat for Economic Affairs (SECO)
CHL	Chile	AMER	UMC	1977.1	2012.4	Mill. 2008 CLP (Ch.)	DS, HA, Central Bank of Chile
CHN	China	EAP	LMC	1979.1	2012.4	Bill. 2000 CNY	DS, China National Bureau of Statistics (NSO)
COL	Colombia	AMER	UMC	1977.1	2012.4	Bill. 2005 COP	HA, DANE Colombia (NSO)
CRI	Costa Rica	AMER	UMC	1991.1	2012.4	Mill. 1991 CRC	Central Bank of Costa Rica
CYP	Cyprus	MENA	HIC	1995.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
CZE	Czech Republic	ECA	UMC	1993.1	2012.4	Mill. 2005 CZK (Ch.)	OECD, European Central Bank
DEN	Denmark	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 DKK (Ch.)	OECD, European Central Bank
DEU	Germany	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
DOM	Dominican Republic	AMER	UMC	1980.1	2012.4	Mill. 1991 DOP (Ch.)	HA, Central Bank of Dominican Republic
ECU	Ecuador	AMER	LMC	1970.1	2012.4	Thou. 2007 USD	DS, Central Bank of Ecuador
EGY	Egypt	MENA	LMC	2002.1	2012.4	Bill. 2011–12 EGP	DS, Central Bank of Egypt
ESP	Spain	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
EST	Estonia	ECA	UMC	1993.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
FIN	Finland	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
FRA	France	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
GBR	United Kingdom	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 GBP (Ch.)	OECD, European Central Bank
GRC	Greece	1IND	HIC_OECD	2000.1	2012.4	Mill. 2005 EUR (Ch.)	Hellenic Statistical Authority
HKG	Hong Kong, China	EAP	HIC	1973.1	2012.4	Mill. 2010 HKD (Ch.)	HA, Hong Kong Census and Statistics Department
HRV	Croatia	ECA	UMC	1993.1	2012.4	Mill. 2010 HRK (Ch.)	DS, European Central Bank
HUN	Hungary	ECA	UMC	1995.1	2012.4	Mill. 2005 HUF (Ch.)	European Central Bank
IDN	Indonesia	EAP	LMC	1970.1	2012.4	Bill. 2000 IDR	HA, Badan Pusan Statistik (Statistics Indonesia)
IND	India	SA	LMC	1990.1	2012.4	Bill. FY 2004 INR	HA, Reserve Bank of India
IRL	Ireland	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
IRN	Iran	MENA	LMC	1988.1	2011.4	Bill. 1997–98 IRR	HA, Central Bank of Iran

ISL	Iceland	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 ISK (Ch.)	DS, Statistics Iceland
ISR	Israel	MENA	HIC	1980.1	2012.4	Mill. 2005 NIS (Ch.)	DS, Central Bank of Israel
ITA	Italy	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
JPN	Japan	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 JPY (Ch.)	OECD, Bank of Japan
KAZ	Kazakhstan	ECA	UMC	1994.1	2012.4	Bill. 1994 KZT	HA, Agency of Statistics for the Republic of Kazakhstan
KOR	Korea, Rep.	EAP	UMC	1970.1	2012.4	Bill. 2005 KRW (Ch.)	HA, Bank of Korea
LTU	Lithuania	ECA	UMC	1993.1	2010.1	Mill. 2005 LTL (Ch.)	OECD, European Central Bank
LUX	Luxembourg	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
LVA	Latvia	ECA	UMC	1990.1	2012.4	Mill. 2005 LVL (Ch.)	OECD, European Central Bank
MAC	Macao, China	EAP	HIC	1998.1	2012.4	Thou. 2010 MOP (Ch.)	HA, Statistics and Census Services of the Government of Macao SAR (NSO)
MAR	Morocco	MENA	LMC	1990.1	2012.4	Mill. 1998 MAD (Ch.)	Haver Analytics, Haut-Commissariat du Plan (NSO)
MEX	Mexico	AMER	UMC	1970.1	2012.4	Mill. 2003 MXN	Haver Analytics, INEGI (NSO)
MLT	Malta	MENA	HIC	2000.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
MYS	Malaysia	EAP	UMC	1980.1	2012.4	Mill. 2005 MYR	DS, Department of Statistics Malaysia (NSO)
NLD	Netherlands	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
NOR	Norway	1IND	HIC_OECD	1970.1	2012.4	Mill. 2010 NOK	OECD, Statistics Norway
NZL	New Zealand	1IND	HIC_OECD	1970.1	2012.4	Mill. 1995–96 NZD (Ch.)	OECD, Statistics New Zealand
PAN	Panama	AMER	UMC	1998.1	2012.4	Mill. 1996 PAB	HA, Instituto Nacional de Estadística y Censo (NSO)
PER	Peru	AMER	UMC	1979.1	2012.4	Mill. 1994 PEN	Central Reserve Bank of Peru
PHL	Philippines	EAP	LMC	1981.1	2012.4	Mill. 2000 PHP	HA, National Statistical Coordination Board of the Philippines
POL	Poland	ECA	UMC	1990.1	2012.4	Mill. 2005 PLN (Ch.)	OECD, European Central Bank
PRT	Portugal	1IND	HIC_OECD	1970.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
PRY	Paraguay	AMER	LMC	1994.1	2012.4	Mill. 1994 PYG	Central Bank of Paraguay
ROM	Romania	ECA	UMC	1997.1	2012.4	Mill. 2000 RON	DS, HA, Romania Institutul National de Statistica (NSO)
RUS	Russian Federation	ECA	UMC	1995.1	2012.4	Bill. 2008 RUB (Ch.)	HA, Russian Federation Federal State Statistics Service (NSO)
SGP	Singapore	EAP	HIC	1975.1	2012.4	Mill. 2005 SGD	DS, HA, Department of Statistics of Singapore
SLV	El Salvador	AMER	LMC	1990.1	2012.4	Mill. 1990 USD	Central Reserve Bank of El Salvador
SRB	Serbia	ECA	UMC	1999.1	2012.4	Mill. 2005 CSD	DS, National Bank of Serbia
SVK	Slovak Republic	ECA	UMC	1993.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
SVN	Slovenia	ECA	UMC	1992.1	2012.4	Mill. 2005 EUR (Ch.)	OECD, European Central Bank
SWE	Sweden	1IND	HIC_OECD	1970.1	2012.4	Bill. 2012 SEK	DS, OECD, Statistics Sweden
THA	Thailand	EAP	LMC	1980.1	2012.4	Mill. 1998 THB	HA, Thailand National Economic and Social Development Board (NSO)
TUR	Turkey	ECA	UMC	1970.1	2012.4	Mill. 1998 TRY	OECD, State Institute of Statistics (NSO)
TWN	Taiwan, China	EAP	HIC	1970.1	2012.4	Mill. 2006 TWD	Taiwan Directorate-General of Budget Accounting & Statistics (NSO)
UKR	Ukraine	ECA	LMC	2001.1	2012.4	Mill. 2007 UAH (Ch.)	HA, State Statistic Services of Ukraine
URY	Uruguay	AMER	UMC	1988.1	2012.4	Mill. 2005 UYU	HA, Central Bank of Uruguay
USA	United States	1IND	HIC_OECD	1970.1	2012.4	Bill. 2005 USD (Ch.)	Bureau of Economic Analysis
VEN	Venezuela, Rep. Bol.	AMER	UMC	1980.1	2012.4	Thou. 1997 VEB	HA, Central Bank of Venezuela
VNM	Vietnam	EAP	LIC	1992.1	2012.4	Bill. 1994 VND	HA, GSOV (NSO), ADB's Asia Regional Integration Center
ZAF	South Africa	SSA	UMC	1970.1	2012.4	Mill. 2005 ZAR	HA, Statistics South Africa

Notes: All quarterly real GDP series are seasonally adjusted using X-12 ARIMA method. 1/All data on GDP is expressed in real terms and we use the ISO code for currency of denomination. (Ch.) stands for Chained prices. 2/DS = DataStream, HA = Haver Analytics, OECD = Organization for Economic Cooperation and Development National Accounts Statistics, NSO = National Statistics Office.

Table A.2

Basic features of real output cycles: all countries. Sample of 71 countries, 1970–2012 (quarterly data).

Country	Region	Income level	Recessions						Recoveries					Expansions			
			Number of Recessions	Time (% median)	Duration (quarters)	Amplitude (% median)	Slope (% median)	Cum. loss (% median)	Number of recoveries	Time (% median)	Duration (quarters)	Amplitude (% median)	Slope (% median)	Number of expansions	Duration (quarters)	Amplitude (% median)	Slope (% median)
Argentina	AMER	UMC	9	33.1%	5.6	−10.7%	−2.3%	−29.0%	7	37.3%	5.9	9.9%	2.4%	10	11.5	20.7%	1.7%
Armenia	ECA	LMC	2	11.1%	2.5	−17.8%	−6.6%	−27.7%	1	25.5%	2.0	12.0%	6.0%	2	21.0	75.1%	3.0%
Australia	1IND	HIC_OECD	5	8.7%	3.0	−2.1%	−0.8%	−3.6%	5	9.0%	2.0	5.1%	3.6%	4	16.0	16.2%	1.0%
Austria	1IND	HIC_OECD	7	11.0%	2.7	−1.7%	−0.6%	−3.1%	7	18.2%	3.0	2.9%	1.7%	6	20.0	14.8%	0.8%
Belgium	1IND	HIC_OECD	7	14.5%	3.1	−1.5%	−0.5%	−2.2%	7	19.5%	3.3	2.8%	1.2%	7	18.3	11.8%	0.6%
Bulgaria	ECA	UMC	3	26.3%	4.7	−12.0%	−2.5%	−32.5%	1	39.1%	12.0	3.5%	0.3%	4	14.0	22.3%	2.6%
Bolivia	AMER	LMC	1	3.3%	3.0	−1.8%	−0.6%	−2.1%	1	5.2%	2.0	4.3%	2.2%	0	..	..	..
Brazil	AMER	UMC	10	19.7%	3.0	−4.7%	−1.6%	−6.8%	8	34.9%	3.8	5.7%	1.9%	9	9.2	12.4%	1.5%
Botswana	SSA	UMC	5	30.3%	3.4	−7.9%	−2.9%	−11.9%	5	32.8%	3.2	10.0%	4.6%	6	8.8	19.3%	3.0%
Canada	1IND	HIC_OECD	4	8.7%	3.8	−3.3%	−0.8%	−6.8%	4	18.2%	5.0	3.5%	1.5%	3	34.0	27.5%	1.1%
Switzerland	1IND	HIC_OECD	7	15.7%	3.9	−2.8%	−0.6%	−8.6%	6	34.2%	6.7	2.2%	0.9%	6	18.8	11.0%	0.5%
Chile	AMER	UMC	5	10.4%	3.0	−8.0%	−2.3%	−17.0%	5	22.5%	5.0	7.6%	4.5%	4	27.8	45.9%	1.8%
Colombia	AMER	UMC	2	4.2%	3.0	−4.0%	−1.1%	−9.0%	2	13.0%	7.0	3.8%	1.2%	1	62.0	59.8%	1.0%
Costa Rica	AMER	UMC	2	14.8%	5.0	−3.0%	−0.7%	−4.5%	2	10.0%	2.0	9.0%	6.7%	2	28.0	40.5%	1.4%
Cyprus	MENA	HIC	1	0.1	4.0	−2.9%	−0.7%	−7.4%	1	41.2%	5.0	2.7%	0.5%	1	6.0	3.1%	0.5%
Czech Republic	ECA	UMC	2	20.0%	3.5	−3.8%	−1.2%	−6.2%	1	28.8%	8.0	0.3%	0.0%	3	21.3	20.4%	0.9%
Denmark	1IND	HIC_OECD	8	23.3%	5.0	−2.4%	−0.5%	−6.1%	6	20.9%	2.5	3.9%	2.2%	7	16.4	11.9%	0.8%
Germany	1IND	HIC_OECD	8	19.8%	4.3	−2.2%	−0.5%	−4.4%	7	22.4%	3.9	2.6%	1.1%	7	15.1	12.0%	0.6%
Dominican Republic	AMER	UMC	5	17.4%	3.8	−9.0%	−2.1%	−11.4%	5	23.7%	4.4	6.9%	1.9%	5	14.4	28.7%	2.5%
Ecuador	AMER	LMC	6	12.2%	3.5	−5.3%	−1.5%	−8.0%	6	19.5%	2.7	7.6%	3.9%	5	17.8	20.3%	1.2%
Egypt	MENA	LMC	1	4.5%	2.0	−5.2%	−2.6%	−3.9%	1	30.0%	2.0	6.0%	3.0%	0	..	..	..
Spain	1IND	HIC_OECD	5	14.5%	3.8	−1.9%	−0.4%	−5.8%	4	15.7%	3.3	2.1%	0.8%	5	25.4	19.1%	0.5%
Estonia	ECA	UMC	3	16.3%	4.3	−10.5%	−2.1%	−26.0%	2	32.5%	2.0	7.0%	4.3%	2	25.0	46.2%	1.9%
Finland	1IND	HIC_OECD	5	19.8%	5.2	−6.2%	−1.1%	−24.9%	4	27.6%	6.8	2.7%	0.5%	6	23.0	23.0%	1.0%
France	1IND	HIC_OECD	4	10.5%	3.8	−2.3%	−0.6%	−5.0%	3	16.9%	3.7	2.5%	0.8%	4	33.8	20.0%	0.6%
United Kingdom	1IND	HIC_OECD	6	16.3%	4.7	−3.8%	−0.8%	−11.0%	3	21.4%	5.3	2.3%	0.7%	5	25.6	21.4%	0.9%
Greece	1IND	HIC_OECD	1	38.5%	5.0	−4.2%	−0.8%	−9.4%	0	15.0%	0.0	0.0%	0.0%	2	16.0	14.9%	0.6%
Hong Kong, China	EAP	HIC	9	15.6%	2.8	−3.5%	−1.2%	−5.8%	9	20.1%	2.4	7.7%	4.2%	8	15.6	29.2%	1.7%
Croatia	ECA	UMC	3	33.8%	5.3	−7.1%	−1.5%	−25.3%	2	18.1%	3.0	12.2%	4.0%	4	13.3	20.5%	1.3%
Hungary	ECA	UMC	2	22.2%	4.0	−5.0%	−1.0%	−12.7%	1	52.0%	3.0	2.2%	0.7%	3	18.7	15.5%	0.7%
Indonesia	EAP	LMC	3	5.2%	3.0	−7.3%	−1.7%	−18.0%	3	19.2%	7.0	11.6%	4.9%	2	29.5	58.3%	2.0%
India	SA	LMC	3	10.9%	2.7	−1.6%	−0.5%	−3.3%	3	9.5%	1.3	8.7%	7.6%	3	24.3	46.4%	2.0%
Ireland	1IND	HIC_OECD	3	9.3%	4.7	−4.8%	−0.8%	−18.3%	2	13.9%	2.0	4.4%	2.2%	3	35.0	47.4%	0.9%

Iran	MENA	LMC	3	19.8%	5.3	−9.0%	−1.8%	−26.4%	2	15.2%	4.0	9.5%	4.3%	3	9.3	25.8%	3.3%
Iceland	1IND	HIC_OECD	6	18.0%	4.7	−4.1%	−0.8%	−10.8%	5	29.3%	4.0	2.5%	0.9%	6	15.2	16.3%	0.9%
Israel	MENA	HIC	4	9.1%	3.0	−3.6%	−1.3%	−4.4%	4	14.4%	3.5	5.9%	4.0%	3	22.7	31.3%	1.4%
Italy	1IND	HIC_OECD	7	19.2%	3.9	−2.3%	−0.6%	−4.8%	6	20.1%	2.7	3.4%	1.3%	7	17.1	11.1%	0.7%
Japan	1IND	HIC_OECD	8	19.2%	3.8	−3.3%	−1.0%	−6.3%	8	20.4%	3.0	5.5%	4.0%	8	15.4	15.1%	1.2%
Kazakhstan	ECA	UMC	2	14.5%	2.5	−9.0%	−3.2%	−13.2%	2	19.1%	5.0	11.0%	2.1%	2	4.5	6.0%	1.2%
Korea, Rep.	EAP	UMC	3	7.6%	4.3	−5.9%	−1.6%	−10.0%	3	7.4%	2.3	10.5%	6.5%	2	53.0	101.1%	1.8%
Lithuania	ECA	UMC	2	16.3%	4.5	−10.1%	−1.9%	−32.3%	1	29.8%	3.0	4.8%	1.6%	2	27.5	43.7%	1.5%
Luxembourg	1IND	HIC_OECD	4	11.0%	3.8	−4.9%	−1.3%	−7.5%	3	20.6%	5.3	3.1%	1.6%	4	33.8	37.4%	0.9%
Latvia	ECA	UMC	2	27.2%	4.5	−16.3%	−3.1%	−41.0%	1	28.4%	6.0	3.3%	0.5%	2	27.0	47.3%	1.8%
Macao, China	EAP	HIC	3	25.0%	3.7	−6.3%	−2.9%	−9.7%	3	19.6%	2.0	25.7%	21.4%	3	9.7	35.9%	4.8%
Morocco	MENA	LMC	4	17.4%	3.0	−9.5%	−3.9%	−18.1%	4	36.5%	6.3	12.0%	3.1%	4	13.3	23.1%	2.6%
Mexico	AMER	UMC	6	15.1%	4.3	−5.9%	−1.4%	−11.3%	4	32.0%	5.8	5.5%	1.2%	5	16.8	17.7%	1.0%
Malta	MENA	HIC	3	15.4%	2.7	−3.7%	−1.7%	−3.8%	3	30.6%	4.0	3.5%	1.3%	2	12.5	11.2%	0.8%
Malaysia	EAP	UMC	4	9.1%	3.0	−6.1%	−2.2%	−11.2%	4	18.9%	4.3	6.4%	1.9%	3	27.7	49.6%	1.8%
Netherlands	1IND	HIC_OECD	6	18.6%	4.2	−2.7%	−0.9%	−4.3%	5	17.5%	2.6	5.3%	3.6%	6	21.2	16.9%	1.2%
Norway	1IND	HIC_OECD	3	9.3%	5.3	−2.8%	−0.6%	−10.1%	3	19.4%	5.7	2.2%	1.1%	2	36.5	30.3%	0.8%
New Zealand	1IND	HIC_OECD	8	18.6%	4.0	−3.5%	−0.9%	−9.3%	5	27.3%	3.6	2.9%	1.5%	7	15.1	14.2%	1.4%
Panama	AMER	UMC	2	6.7%	2.0	−1.6%	−0.8%	−2.0%	1	16.3%	2.0	3.9%	1.9%	1	3.0	0.9%	0.3%
Peru	AMER	UMC	9	22.1%	3.3	−10.1%	−2.8%	−17.0%	6	44.4%	6.0	8.0%	3.1%	8	9.9	19.8%	2.3%
Philippines	EAP	LMC	4	13.3%	4.3	−6.5%	−1.2%	−24.3%	3	21.0%	6.3	4.7%	1.3%	3	15.0	17.5%	1.0%
Portugal	1IND	HIC_OECD	5	19.8%	5.0	−3.5%	−0.7%	−6.9%	4	21.2%	4.8	3.3%	0.8%	5	24.2	21.2%	0.8%
Paraguay	AMER	LMC	6	31.6%	3.3	−5.0%	−1.5%	−8.4%	4	39.4%	3.8	7.7%	3.0%	6	7.7	11.8%	1.5%
Romania	ECA	UMC	4	32.8%	5.3	−13.5%	−2.5%	−55.9%	1	51.6%	21.0	7.0%	0.3%	3	12.3	22.6%	2.8%
Russian Federation	ECA	UMC	4	18.1%	3.3	−6.9%	−2.0%	−12.5%	3	34.3%	5.3	7.5%	3.2%	3	14.0	25.2%	1.6%
Singapore	EAP	HIC	5	13.8%	3.6	−5.1%	−1.5%	−10.9%	5	17.0%	2.8	9.7%	4.8%	5	18.0	38.9%	2.2%
El Salvador	AMER	LMC	1	4.3%	4.0	−4.1%	−1.0%	−8.4%	1	57.9%	10.0	1.5%	0.1%	0	..	..	..
Serbia	ECA	UMC	3	21.4%	4.0	−7.1%	−2.7%	−11.9%	1	33.3%	4.0	12.8%	3.2%	2	17.5	24.9%	1.1%
Slovenia	ECA	UMC	1	16.7%	4.0	−10.0%	−2.5%	−18.6%	0	47.4%	..	..	..	2	35.0	39.1%	0.8%
Sweden	1IND	HIC_OECD	5	18.0%	6.2	−3.9%	−0.6%	−12.9%	5	19.5%	5.6	2.7%	0.6%	4	30.5	23.6%	0.8%
Thailand	EAP	LMC	2	7.6%	5.0	−12.0%	−2.9%	−29.2%	2	33.3%	9.0	9.7%	2.1%	1	40.0	49.8%	1.2%
Turkey	ECA	UMC	7	18.0%	4.4	−8.0%	−2.3%	−15.6%	7	23.9%	3.7	10.5%	4.1%	6	15.2	27.0%	2.0%
Taiwan, China	EAP	HIC	3	6.4%	3.7	−5.3%	−1.4%	−9.8%	3	7.1%	2.7	11.0%	6.8%	2	64.5	114.0%	1.6%
Ukraine	ECA	LMC	2	16.7%	3.0	−11.9%	−3.2%	−15.5%	1	37.0%	2.0	8.9%	4.5%	2	18.5	30.5%	1.5%
Uruguay	AMER	UMC	5	29.0%	5.2	−7.1%	−1.2%	−26.9%	4	28.4%	5.3	7.4%	2.7%	5	6.4	10.3%	1.5%
United States	1IND	HIC_OECD	5	12.8%	3.6	−2.9%	−0.9%	−5.3%	5	17.8%	4.6	3.4%	1.1%	5	27.2	24.8%	1.0%
Venezuela, Rep. Bol.	AMER	UMC	9	35.6%	4.6	−8.9%	−1.7%	−19.5%	6	0.392	5.2	10.2%	1.9%	9	8.2	14.8%	1.4%
South Africa	SSA	UMC	6	19.2%	5.5	−3.3%	−0.6%	−8.9%	6	0.2012987	4.3	3.9%	1.6%	5	21.2	19.9%	1.0%

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 Slovak Republic.

quarters in EMEs, this is not the case for industrial countries, where they remain 6 percentage points (consumption) and 16 percentage points (investment) below the trend.

The dynamic behavior of real credit per capita and real stock prices is somewhat similar to that of the real variables described above. Real credit and asset prices remain way below trend for industrial countries (approximately 6 quarters after the peak in real GDP). In contrast, real credit per capita and stock prices recover and stay above trend after 6 quarters. The real exchange rate has a more erratic pattern, with the currency appreciating in real terms among EMEs and depreciating in real terms among developed countries. In sum, the behavior of financial and real variables during the current global financial crisis differs from that of previous recessions in the 1990–2006 period among industrial countries. However, the pattern of behavior does not appear to be statistically significant for EMEs.

4. 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. Specifically, we apply the BBQ algorithm developed by [Harding and Pagan \(2002\)](#) to quarterly series of real GDP data for the period 1970q1–2012q4 for a sample of 71 countries, of which 48 are emerging-market economies and 23 are industrial economies.

The analysis of this large data set using a common methodology for all economies allows us to confirm some previous results in the literature and to document new ones, which will help to direct future research efforts. We confirm the evidence that real output contractions in emerging markets are deeper and more intense than those in developed economies. For instance, the median cumulative loss in real output during recessions in EMEs is more than double that of industrial countries (7.3 vs. 2.7%).

On the other side of the coin, deeper recessions in EMEs (as compared with industrial countries) are followed by stronger recoveries. The median amplitude of the upturn (measured as the 4-quarter change in real GDP following a trough) in EMEs is 6.7% as opposed to 2.8% in developed economies. This paper also confirms that national cycles exhibit a greater degree of heterogeneity across emerging economies than among industrial countries.

By comparing the pre-globalization (1970–1984) and globalization (1985–2007) periods, we confirm that recessions are on average shorter in duration, smaller in amplitude, and less costly during the globalization period compared with the pre-globalization period. Recoveries, on the other hand, are slightly slower and stronger during the globalization period (although these differences are statistically negligible). We can argue that the lower variability of the main features of the business cycles during the 1985–2007 period may be partly attributed to the institutional and structural changes in advanced countries that led to the “Great Moderation” ([Bernanke, 2004](#); [Davis and Kahn, 2008](#)).

Moreover, some new findings emerge from our analysis of recessions and recoveries across EME regions during both periods. In the pre-globalization period, recessions are costlier in LAC than in EAP, while recoveries are more dynamic in EAP. There are no differences in the severity (amplitude, slope, and cumulative losses) of downturns between the two periods for EAP and ECA, while the downturns become milder for LAC.

A closer look at the distribution of recessions according to their duration and amplitude shows some stark differences between EMEs and industrial countries. While EMEs tend to experience medium-length and severe recessions more frequently (3–4 quarters and output drop between 4 and 10%), the mode for industrial countries is a medium-length and mild recession (3–4 quarters and output drop between 0 and 2%). The fact that recessions among EMEs are deeper, steeper, and costlier relative to those in industrial countries is associated with the higher incidence of and greater vulnerability to economic crises (banking, currency, and debt crises). Therefore, we zoom in on recessions that coincide with

crisis episodes and their ensuing recoveries (as opposed to regular or non-crisis recessions and recoveries). Real output downturns associated with crisis episodes tend to be deeper, steeper, and costlier. Symmetrically, recoveries following crises (regardless of the type of crisis) are slower than other upturns (5.3 vs. 3.4 quarters) and the amplitude of the median upturn after a crisis episode is larger than that of other upturns (6.6 vs. 4.2%).

Crisis-related recessions tend to last longer in industrial countries as opposed to emerging markets; however, these downturn episodes are deeper in the latter group. These findings imply that the intensity and cost of recessions in EMEs, as measured by their slope and cumulative output loss, are greater than in industrial economies. Real economic activity drops at a rate of 1.8% per quarter among EMEs (as opposed to 0.5% per quarter in industrial countries) during crisis-related downturns, whereas the cumulative output loss in EMEs amounts to 10.8%, almost double the 5.9% loss in industrial countries. Furthermore, the proportion of recessions that coincide with crisis in EMEs (75 out of 143) is much higher than in developed economies (7 out of 101). The lower frequency of crisis found for industrial countries in the first part of our analysis is attributed to the fact that we examine the period before the global financial crisis (1970–2007). Recoveries in real economic activity after a crisis take longer for EMEs than for industrial countries, but this is not the case for recoveries that follow non-crisis recessions. The pace of recovery after a crisis, as measured by either the amplitude or the slope, is almost three times larger in EMEs than in industrial countries.

The dynamic behavior of consumption and investment around recessions (more specifically, in a 17-quarter window centered on the peak of real GDP) resembles that of real GDP. In line with theoretical implications of business cycle models, consumption (investment) fluctuates less (more) than output for both industrial economies and emerging markets.²³ However, we should point out that this dynamic behavior is amplified when the downturn coincides with any type of crisis (financial, currency, or debt crisis).

Our estimations confirm that the dynamic behavior of financial variables (bank credit and stock prices) closely follows that of GDP around peaks in real economic activity, although to different degrees. Stock price declines tend to precede recessions for both industrial economies and EMEs. Credit cycles are more concurrent with output cycles and tend to be much wider for EMEs than for industrial economies around banking crisis episodes. The real exchange rate moves in opposite directions for industrial countries (real appreciation) and EMEs (real depreciations). These movements coincide with the peak of the cycle and are especially large in the face of a crisis-related recession.

Finally, we present a preliminary assessment of the main features of real output cycles during the recent global financial crisis as compared with the average cycle of the pre-crisis globalization period (1990–2006). Our findings show that the depth of the peak-to-trough phase of the cycle is not different for emerging economies (except for Eastern European economies) than it was in the recent past. But it is different for developed economies in terms of GDP, consumption and investment; the recent recessionary period is three times deeper than the average cycle in the previous 15 years. At the same time, the ensuing recovery has been slower and weaker among industrial countries as opposed to emerging markets. This could be attributed to the severe deleveraging process and wealth destruction in the former group that resulted from the global financial crisis.

²³ In contrast, the empirical literature on business cycles in developing countries finds that on average consumption fluctuates less than output in EMEs, especially around peaks in real output associated with either regular recessions or crisis-related recessions. This could be attributed to the fact that: (a) this paper implements a methodology to detect output cycles rather than growth cycles, (b) we look at the volatility of consumption and output in shorter windows around recessions rather than throughout the entire sample period, or (c) our finding depicts the average behavior of emerging markets and it is likely that some EMEs display consumption paths that are more volatile than output.

References

- Agénor, P.R., McDermott, C.J., Prasad, E.S., 2000. Macroeconomic fluctuations in developing countries: some stylized facts. *World Bank Econ. Rev.* 14 (1), 251–285.
- Aguiar, M., Gopinath, G., 2007. Emerging market business cycles: the cycle is the trend. *J. Polit. Econ.* 115 (1), 69–102.
- Aguiar, M., Gopinath, G., 2008. The role of interest rates and productivity shocks in emerging market fluctuations. In: Cowan, K., Edwards, S., Valdés, R.O. (Eds.), *Current Account and External Financing*. Santiago, Chile: Central Bank of Chile Series on Banking, Analysis and Economic Policies, pp. 345–367.
- Aioilfi, M., Catao, L.A.V., Timmerman, A., 2011. Common factors in Latin America's business cycles. *J. Dev. Econ.* 95 (2), 212–228.
- Altug, S., Bildirici, M., 2012. Business cycles in developed and emerging economies: evidence from a univariate Markov switching approach. *Emerg. Mark. Financ. Trade* 48 (6), 4–38.
- Arora, V., Vamvakidis, A., 2005. How much do trading partners matter for economic growth? *IMF Staff. Pap.* 52 (1), 24–40.
- Backus, D.K., Kehoe, P.J., Kydland, F.E., 1992. International real business cycles. *J. Polit. Econ.* 100 (4), 745–775.
- Becker, T., Mauro, P., 2006. Output drops and the shocks that matter. *IMF Working Paper WP/06/172* (July).
- Bernanke, B.S., 2004. The great moderation. Remarks at the Meetings of the Eastern Economic Association, Washington, DC (February (<http://www.federalreserve.gov/BOARDDOCS/SPEECHES/2004/20040220/default.htm>)).
- Boz, E., Daude, C., Durdu, C.B., 2008. Emerging market business cycles revisited: Learning about the trend. Board of Governors of the Federal Reserve System. *International Finance Discussion Paper*, 927 (April).
- Broda, C., 2004. Terms of trade and exchange rate regimes in developing countries. *J. Int. Econ.* 63 (1), 31–58.
- Bry, G., Boschan, C., 1971. *Cyclical Analysis of Time Series: Selected Procedures and Computer Programs*. NBER, New York.
- Burns, A.F., Mitchell, W.C., 1946. *Measuring Business Cycles*. NBER, New York.
- Caballero, R.J., 2001. Macroeconomic volatility in Latin America: a view and three case studies. *Estud. Econ.* 28 (1), 5–52.
- Caballero, R.J., 2002. Coping with Chile's external vulnerability: a financial problem. In: Loayza, N.V., Soto, R. (Eds.), *Economic Growth: Sources, Trends, and Cycles*. Santiago, Chile: Central Bank of Chile Series on Central Banking, Analysis and Economic Policies, pp. 377–416.
- Calderón, C., Levy-Yeyati, E., 2009. Zooming in: from aggregate volatility to income distribution. *The World Bank Policy Research Working Paper* 4895 (April).
- Calderón, C., Servén, L., 2013. Macropudential policies over the cycle in Latin America. In: Didier, T., Schmukler, S.L. (Eds.), *Emerging Issues in Financial Development*. The World Bank, Washington, DC, pp. 395–468.
- Calvo, G., 1998. Capital flows and capital market crises: the simple analytics of sudden stops. *J. Appl. Econ.* 1 (1), 35–54.
- Centoni, M., Cubadda, G., Hecq, A., 2007. Common shocks, common dynamics and the international business cycles. *Econ. Model.* 24, 149–166.
- Cerra, V., Saxena, S.C., 2008. Growth dynamics: the myth of economic recovery. *Am. Econ. Rev.* 98 (1), 439–457.
- Chang, R., Fernández, A., 2013. On the sources of aggregate fluctuations in emerging economies. *Int. Econ. Rev.* 54 (4), 1265–1293.
- Chauvet, M., Hamilton, J.D., 2005. Dating business cycles turning points. *NBER Working Papers* No. 11422.
- Chauvet, M., Piger, J., 2008. A comparison of the real-time performance of business cycle dating methods. *J. Bus. Econ. Stat.* 26 (1), 42–49.
- Claessens, S., Kose, M.A., Terrones, M.E., 2009. What happens during recessions, crunches and busts? *Econ. Policy* 24, 653–700.
- Claessens, S., Kose, M.A., Terrones, M.E., 2011a. Financial cycles: What? How? When? In: Clarida, R., Givazzzi, F. (Eds.), *NBER International Seminar on Macroeconomics 2010*. University of Chicago Press for NBER, Chicago, IL, pp. 303–343.
- Claessens, S., Kose, M.A., Terrones, M.E., 2011b. Recessions and financial disruptions in emerging markets: a bird's eye view. In: Céspedes, L.F., Chang, R., Saravia, D. (Eds.), *Monetary Policy under Financial Turbulence*. Santiago, Chile: Central Bank of Chile Series on Central Banking, Analysis, and Economic Policies, pp. 59–104.
- Claessens, S., Kose, M.A., Terrones, M.E., 2012. How do business and financial cycles interact? *J. Int. Econ.* 87 (1), 178–190.
- Crucini, M., Kose, M.A., Otrok, C., 2011. What are the driving forces of international business cycles? *Rev. Econ. Dyn.* 14 (1), 156–175.
- Davis, S.J., Kahn, J.A., 2008. Interpreting the great moderation: changes in the volatility of economic activity at the macro and micro levels. *J. Econ. Perspect.* 22 (4), 155–180.
- Deardorff, A., Stern, R., 2002. What you should know about globalization and the world trade organization. *Rev. Int. Econ.* 10 (3), 404–423.
- Deaton, A., 2005. Measuring poverty in a growing world (or measuring growth in a poor world). *Rev. Econ. Stat.* 87 (1), 1–19.
- Frankel, J.A., Rose, A.K., 1996. Currency crashes in emerging markets: an empirical treatment. *J. Int. Econ.* 41 (3–4), 351–366.
- Gupta, S., Miniane, J., 2009. Recessions and Recoveries in Asia: What Can the Past Teach Us About the Present Recession? International Monetary Fund, Asia Regional Economic Outlook, Washington, DC 29–41.
- Hamilton, J.D., 1989. A new approach to the economic analysis of nonstationary time series and the business cycle. *Econometrica* 57 (2), 357–384.
- Hamilton, J.D., 2003. Comment on 'A Comparison of Two Business Cycle Dating Methods'. *J. Econ. Dyn. Control* 27 (9), 1691–1693.
- Harding, D., Pagan, A., 2002. Dissecting the cycle: a methodological investigation. *J. Monet. Econ.* 29, 365–381.
- Harding, D., Pagan, A., 2003a. A comparison of two business cycle dating methods. *J. Econ. Dyn. Control* 27 (9), 1681–1690.
- Harding, D., Pagan, A., 2003b. Rejoinder to James Hamilton. *J. Econ. Dyn. Control* 27 (9), 1695–1698.
- Herrera, S., Perry, G., Quintero, N., 2000. Output fluctuations in Latin America: what explains the recent slowdown? *The World Bank Policy Research Working Paper* 2333 (May).
- Hicks, D.L., 2012. Consumption volatility, marketization, and expenditures in emerging market economies. *SSRN Working Paper* id2164457.
- Hoffmaister, A.W., Roldós, J.E., Wickham, P., 1998. Macroeconomic fluctuations in Sub-Saharan Africa. *IMF Staff. Pap.* 45, 132–160.
- Jerven, M., 2010. The reliability of poverty and income: how reliable are African economic statistics? *Afr. Aff.* 109, 77–96.
- Kose, M.A., 2002. Explaining business cycles in small open economies: how much do world price matter? *J. Int. Econ.* 56 (2), 299–327.
- Kose, M.A., Otrok, C., Whiteman, C.H., 2003. International business cycles: world, region, and country-specific factors. *Am. Econ. Rev.* 93 (4), 1216–1239.
- Kose, M.A., Otrok, C., Prasad, E., 2012. Global business cycles: convergence of decoupling? *Int. Econ. Rev.* 53 (2), 511–538.
- Kydland, F.E., Zarazaga, C.E.J.M., 2002. Argentina's lost decade. *Rev. Econ. Dyn.* 5 (1), 152–165.
- Laeven, L., Valencia, F., 2012. Systemic banking crises database: An update. *IMF Working Paper WP/12/163* (June).
- Laeven, L., Valencia, F., 2010. Resolution of banking crises: the good, the bad, and the ugly. *IMF Working Paper WP/10/146* (June).
- Loayza, N.V., Raddatz, C., 2007. The structural determinants of external vulnerability. *World Bank Econ. Rev.* 21 (3), 359–387.
- Loayza, N.V., Olaberria, E., Rigolini, J., Christiaensen, L., 2012. Natural disasters and growth: going beyond the averages. *World Dev.* 40 (7), 1317–1336.
- Mendoza, E.G., 1991. Real business cycles in a small open economy. *Am. Econ. Rev.* 81, 797–818.
- Mendoza, E.G., 2006. Endogenous sudden stops in a business cycle model with collateral constraints. *NBER Working Paper* 12564.
- Mendoza, E.G., Terrones, M.E., 2012. An anatomy of credit booms and their demise. *NBER Working Paper* 18379 (September).
- Morsink, J., Helbling, T., Tokarick, S., 2002. Recessions and recoveries. *IMF World Economic Outlook* International Monetary Fund, Washington 104–137 (April).
- Neumeyer, P.A., Perri, F., 2005. Business cycles in emerging economies: the role of interest rates. *J. Monet. Econ.* 52 (2), 345–380.
- Raddatz, C., 2007. Are external shocks responsible for the instability of output in low income countries? *J. Dev. Econ.* 84 (1), 155–187.
- Reinhart, C.M., Rogoff, K.S., 2009. *This Time is Different: Eight Centuries of Financial Folly*. Princeton University Press, Princeton and Oxford.
- Reinhart, C.M., Rogoff, K.S., 2010. Growth in a time of debt. *Papers and Proceedings. Am. Econ. Rev.* 100, 573–578.
- Sichel, D.E., 1994. Inventories and the three phase of the business cycle. *J. Bus. Econ. Stat.* 12 (3), 269–277.
- Tornell, A., Westermann, F., 2002. Boom-bust cycles in middle income countries: facts and explanation. *IMF Staff. Pap.* 49 (Special Issue), 111–155.
- Uribe, M., Yue, V., 2006. Country spreads and emerging countries: who drives whom? *J. Int. Econ.* 69, 6–36.
- World Bank, 2007. *Country Insurance: Reducing Systemic Vulnerabilities in LAC*. The World Bank, Office of the Chief Economist, Washington, DC (Report No. 43066-LAC).