Credit-less Recoveries

Neither a Rare nor an Insurmountable Challenge

Naotaka Sugawara

Juan Zaldueño

The World Bank
Europe and Central Asia Region
Office of the Chief Economist
May 2013

Abstract

This paper examines why some countries experience economic recoveries without pick-up of bank credit (credit-less) and how different this recovery pattern is from the case where credit is increased as an economy recovers (credit-with). To answer these questions, the paper uses quarterly data covering 96 countries and identifies 272 recovery episodes. It finds that more than 25 percent of all recoveries are credit-less and around 45 percent of all credit-less recoveries occurred in 2009–10. It also finds that output and investment growth tends to be lower in credit-less events but, by eight quarters after the trough date, the gap between credit-less and credit-with episodes is mostly exhausted. Results of the

probit estimations show that the size of the downturn and the extent of external adjustment are associated with the likelihood of credit-less recoveries. Moreover, fiscal loosening tends to be related to credit-less events while monetary easing and a country's decision to seek an International Monetary Fund-supported program reduce the probability of credit-less recoveries. Finally, the model suggests that many countries in the Europe and Central Asia region were likely to experience credit-less recoveries following the global financial crisis in 2008/09. What is more worrisome for them is the fact that they are facing another negative external shock.

This paper is a product of the Office of the Chief Economist, Europe and Central Asia Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at nsugawara@worldbank.org.

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Credit-less Recoveries: Neither a Rare nor an Insurmountable Challenge^{*}

Naotaka Sugawara[†]

Juan Zalduendo

JEL Classification: E32; E51; E52; E62; G01

Keywords: Credit; recoveries; fiscal policies; monetary policies; probit model

Sector Board: Economic Policy (EPOL)

^{*} The authors thank Yvonne M. Tsikata, Zeljko Bogetic, Abebe Adugna Dadi, Simon Davies, Roumeen Islam, Ivailo V. Izvorski, and participants of World Bank ECA PREM Economics Seminar in June 2012 for helpful comments and suggestions. The findings, interpretations and views expressed in this article are entirely those of the authors and do not necessarily reflect those of the World Bank, its Executive Directors or the governments they represent. This paper was written while Juan Zalduendo was in the Office of the Chief Economist for the Europe and Central Asia Region at the World Bank.

[†] World Bank.

I. Introduction

Private sector credit plays a crucial role in helping a country to recover from an economic recession. For instance, credit provided by commercial banks can re-energize the investment expenditure of enterprises and is an important option in handling household finances. While a recovery without private sector credit is possible, the empirical evidence suggests that such recoveries occur at a much slower pace. Indeed, a credit-less recovery, defined as a recovery from recession without a pick-up in real bank credit to the private sector, is not an unusual event but has been observed both among advanced and emerging economies.¹ Even with different samples, the literature tends to find that the share of credit-less recoveries is around 20 to 25 percent of all recoveries.

But, if a recovery without bank credit is such a commonly-observed event, what drives a country to experience a credit-less recovery? This is the focus of this paper; namely, what factors, including macroeconomic policy stances, make more likely a credit-less (or a credit-with) event following a recession. Understanding the determinants of such events sheds light on the challenges faced after a recession. For instance, it allows us to examine the difficulties faced by countries in Europe and Central Asia (referred here as ECA countries); that is, the likelihood of a credit-less or credit-with recovery pattern following the crisis in 2008–09.

In order to examine the issues mentioned above, this paper uses quarterly data series to identify credit-less recoveries. The analysis based on quarterly data has several advantages here. First, it can specify economic troughs and the subsequent recoveries more precisely. Unlike annual series, in which within-year differences are ignored, quarterly data can capture, say, specifically in which quarter of a given year an output collapse is observed. Secondly, with quarterly data series, the paper can cover the 2008–09 global financial crisis. As explained in the section below, in order to identify the trough-recovery patterns, several observations at the beginning and end of time-series data need to be excluded. This data omission can have more impact in the analysis with the annual series. More recent data points can be kept in the data set by using the quarterly data.

This paper contributes to the existing literature with the following findings. It first confirms that a credit-less recovery is not rare—more than 25 percent of all recoveries are credit-less—but also shows that global financial crisis is an unusual event (i.e., around 45 percent of all credit-less recoveries are concentrated in 2009 and 2010). This paper then examines the differences in output and investment growth between credit-less and credit-with episodes and finds that growth is lower in the former episodes but the gap between these two tends to disappear by two years since the trough. The regression analysis emphasizes the importance of output downturn and external adjustment as determinants of credit-less recoveries. It also finds that fiscal and monetary easing, respectively, increases and decreases the probability of credit-less recoveries and the availability of the program supported by the International Monetary Fund (IMF) also reduces the likelihood of credit-less events.

The rest of the paper is structured as follows. The next section briefly reviews the existing literature on the relationship between private sector credit and economic recoveries. Section III

¹ Conversely, a credit-with recovery indicates a recovery from recession with an increase in the private sector credit.

describes the definition and the nature of credit-less and credit-with events in our sample, and then the results of the econometric analysis on the determinants of a credit-less recovery are discussed in the subsequent section. Section V assesses the prediction performance of the estimated model and the role of macroeconomic policy indicators. Concluding remarks follow.

II. Literature Review

The literature that tries to capture whether or not economic recoveries occur together or without pick-ups in credit can be divided into three categories based on the type of data used in such analysis—macro (country-level) data, industry-level data, and firm-level data.

Country-level data

Calvo *et al.* (2006) use data for 31 emerging market economies that are integrated into the global capital markets over the period of 1980–2004 and look at output contractions and their recovery patterns after systemic sudden stops. They identify 22 output collapse episodes and find that, on average, although quick V-shaped recoveries are typically observed after a crisis, they are associated with weak investment pick-ups and virtually no domestic and external credit recoveries.² The study characterizes these recovery patterns as “Phoenix Miracles.”

Huntley (2008) considers the same 22 collapse episodes and investigates their characteristics further. The author argues that the distribution of recovery speed is bimodal, showing that economies recover in five years or less in 12 episodes, while in most of the remaining 10 episodes it takes more than 15 years to return to the pre-crisis levels of GDP output. This paper also argues that investment accounts for the largest share of output recoveries and fast recoveries tend to occur together with recovering banking sectors that fund investment through domestic savings. Using the same data as in Calvo *et al.* (2006), Biggs *et al.* (2009) argue that it is the flow, not the stock, of credit what impacts the recovery. They model the relationship between credit and growth and show that the flow of credit is correlated with growth in domestic demand after a financial crisis.

Claessens *et al.* (2009b) use quarterly data for 21 member countries of the Organization for Economic Co-operation and Development (OECD) over the period of 1960Q1–2007Q4 and examine how financial markets behave during recessions. This study focuses on credit crunches (measured by changes in the volume of real credit), house price busts and equity price busts. The authors identify 122 recessions of which 81 episodes are related to credit crunches and busts. Specifically, 21, 33 and 47 recession episodes are associated, respectively, with credit crunches, house price busts and equity price busts (including combinations of either two or three of these phenomena); 41 recessions cannot be attributed to either of these three phenomena. The paper’s focus is on the duration and depth of recessions. They find that a recession typically lasts for four quarters with an output decline of 2 percent and show that credit growth slows down before and during the recession and remains below the pre-recession level for at least three years after the onset of the recession. By arguing that credit crunches start three quarters before the beginning

² The study finds a total of 33 output contractions, but 11 episodes are, by definition, categorized as mild recessions. In the same vein, Zarazaga (2006) focuses on a crisis in Argentina in 2002 and discusses that V-shaped recoveries in output, investment and labor input are not miracles but what would be predicted by a neoclassical growth model with TFP as an exogenous factor.

of recessions and finish two quarters after these recessions end, the authors suggest that credit-less recoveries in both emerging market and industrial countries are a feature of business cycles.³

Focusing on 86 emerging and developing countries, Bijsterbosch and Dahlhaus (2011) discuss the characteristics and determinants of credit-less recoveries; in this respect, this paper is closer to the objectives of our own paper though it follows a somewhat different methodology. The paper uses annual data over the period of 1970–2009 and finds a total of 211 recoveries. Although several different definitions of credit-less recoveries—by measure (level or growth rate) and length (2 years or 3 years)—are suggested, the main specification identifies 50 credit-less recoveries (i.e., around 24 percent of total recovery episodes). The authors show that the incidence of credit-less recoveries doubles after banking or currency crises and that recoveries are more likely to be credit-less if they are preceded by large declines in output and financial sector stress, as well as high credit-to-GDP ratios and large capital inflows. The study computes the predicted probabilities of credit-less recoveries in several EU12 countries and finds a wide variety in the likelihood of such recoveries (from 1 percent in Poland to 94 percent in Latvia).

A paper by analysts at UniCredit (2012) uses an unbalanced sample of 183 countries over the period of 1963–2010. The analysis shows that 19 percent of all recoveries are credit-less and that the percentage is increased to 50 percent after banking crises events. The paper also mentions that both demand factors (measured by output gap and investment growth) and supply factors (indicated by banking crisis and deleveraging) explain the incidence of credit-less events. It also computes probabilities of a credit-less recovery among emerging European countries and shows higher probabilities in the Baltic states and Ukraine. By decomposing the probability into demand and supply factors, it argues that the contribution of the former component is higher.

Industry-level data

Coricelli and Roland (2011) look at industry-level data for 103 countries and 28 manufacturing sectors from the United Nations Industrial Development Organization (UNIDO) and employ two different criteria to define credit-less recoveries. The first one is the difference in credit-to-GDP ratios between the last and first year of a recovery (stock), and the other is the difference in growth rates of credit-to-GDP ratios between these two years (flow). They show that, during the period the study considered (1965–2002), 39 and 55 percent of the total number of recoveries are credit-less—following either a stock or a flow—and argue that recovery of credit “flow,” rather than “stock,” has a greater impact in the recovery of output. The authors find that faster recoveries are found in industries that are more dependent on external finance when the countries in question have high financial depth. They also conclude that industries that rely more on trade credit, which are typically less vulnerable to declines in bank credit, recover more quickly.

Using the same UNIDO data for 28 manufacturing sectors, Kannan (2012) tests the relationship between economic recoveries from financial crises and the dependence on external finance. The author uses quarterly GDP data over the period of 1970Q1 to 2004Q4 to identify business cycles in each country and then combines them to annual manufacturing data. The study focuses on 21

³ Claessens *et al.* (2009a) identify possible drivers of credit-less recoveries; e.g., the contribution of consumption during the recovery, availability of alternative financing sources (e.g., external finance), and the switch to less credit-intensive sectors.

developed economies (1970–2003) and, by employing the difference-in-difference approach, finds that industries more reliant on external finance recover more slowly after a financial crisis.

Abiad *et al.* (2011) use both macro-level and industry-level data to examine credit-less events. The authors first use the annual data over the period of 1960–2009 and identify 388 economic recoveries. The study finds that around 20 percent of all recoveries are credit-less and argues that recoveries without bank credit are associated with lower output growth, banking crises, credit booms and construction boom-bust cycles. They also show that the contribution of investment to growth is lower in credit-less recoveries and that, therefore, lower capital accumulation and productivity growth are observed. They also test the relationship between credit-less recoveries and disruptions of financial intermediation using industry-level UNIDO data for 48 countries across 28 manufacturing sectors over the period of 1964–2004. Following Braun and Larrain (2005), by employing the difference-in-difference methodology, they find that industries more reliant on external finance experience lower growth in credit-less events.

Firm-level data

Dagher (2010) studies recovery patterns following the Asian financial crisis using data for 480 firms in three countries in southeast Asia, namely Indonesia, Malaysia and Thailand. The paper finds that sales of firms recover relatively quickly but other market values and debt levels are found to remain below their pre-crisis levels, though there is heterogeneity stemming from firm size and the level of leverage that exists prior to the crisis. The author then builds a theoretical model that accounts for these patterns. In the model, shocks to trend productivity lead to a credit-less recovery under the presence of financial frictions in the form of borrowing constraints. While considering the role of leverage and firm size, the model simulations show that a permanent decline in trend productivity tends to result in a decline in market values and the debt levels of firms; still, output eventually recovers to its pre-crisis level.

Ayyagari *et al.* (2011) examine the relationship between sales of firms and external credit. The study considers nine systemic sudden stops in emerging market economies in the 1990s as well as the 2008–09 financial crises in the United States. By using the macro-level data for nine emerging markets, the authors argue that there is a pattern on how credit-less recoveries are observed, on average; still, there is significant heterogeneity across these episodes. The study then uses the data on firms in emerging market economies, which consist of 1,326 firms in five countries—Indonesia, South Korea, Mexico, Malaysia and Thailand—and shows that only around 30 percent of firms share a recovery of sales without a pick-up of external credit. Moreover, the authors do not find evidence of credit-less recoveries for firms in the United States during the period 2008–09. In the United States, both in country- and firm-level data, output and sales recover simultaneously with bank credit and current liabilities.

III. Recovery Patterns

This paper uses country-level data and, therefore, aims to provide additional evidence and insights to the first set of the literature reviewed in the previous section. It adds to existing work by showing the recovery patterns following the global financial crisis in 2008–09 and by using the quarterly data to cover more temporary troughs and their subsequent recoveries.

Identification of recoveries

In defining and identifying credit-less recoveries, this paper uses a method similar to what Abiad *et al.* (2011) employ. First, it identifies troughs and their corresponding preceding peaks in real GDP using a quarterly data series. Troughs are identified based on developments in the cyclical component of GDP, which is defined as the difference between the log of real GDP and trend (smoothed) GDP; the latter is computed by using the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997).⁴ For each country, data points where the cyclical component of GDP is below a negative one standard deviation are considered as troughs. To avoid what could be referred to as “double dip” episodes, this paper requires that there are at least eight quarters in between troughs. If two or more troughs are identified within eight quarters or less from each other, the one with the lowest cyclical component is chosen to date the trough of a recession. Similarly, the first and the last four quarters of the data for each country are excluded from the identification of troughs to ensure that enough time exists to categorize the recovery that follows as either a credit-with or a credit-less event. Once troughs are identified, the corresponding peaks are determined. Peaks are also defined by the cyclical component of GDP. A peak is simply the highest value between two troughs or, in the case of the first (or earliest) trough in each country, the highest cyclical component prior to the first trough. Every trough is recorded in our sample together with its corresponding peak information.

As discussed at the beginning of this section, this paper uses quarterly GDP to identify economic downturns. The data are taken from line 99B of the International Financial Statistics (IFS) of the IMF; where the quarterly data is not available in IFS this study uses the OECD Quarterly National Accounts Statistics, the database provided by the United Nations Economic Commission for Europe (UNECE), Haver Analytics, Datastream, or data from national statistical offices. As a result, the quarterly GDP data are available for 96 countries and, at most, the data is available for the period 1965Q1–2011Q4; i.e., inevitably, ours is an unbalanced panel as a result of the large differences in data availability.⁵ Based on this methodology, this paper identifies a total of 272 peak-trough combinations (i.e., recovery episodes), which in turn can be divided into 105 episodes for advanced economies, 113 for emerging markets, and 54 cases other developing and offshore countries (Annex Table 1). The top two panels of Figure 1 present one example of the methodology followed in this paper; they show the real and cyclical GDP for Argentina. As per the above description, two recessions are identified and the corresponding dates for each trough are 1995Q3 and 2002Q1. Furthermore, the peak dates are found to be 1994Q1 and 1998Q2 for the former and latter case. Peak-to-trough periods are expressed as two shaded areas in light gray in Figure 1.

⁴ The smoothing parameter is 1,600. Filtering is done with seasonally-adjusted real GDP data. For countries where seasonally-adjusted data are not available, the X-12-ARIMA program obtained from the web site of the U.S. Census Bureau is used to adjust the series. For details on the program, refer to U.S. Census Bureau (2011).

⁵ There are several countries where the data on GDP deflator are unavailable or incomplete. In such cases, consumer price index (CPI) is used as a price deflator, instead. Also, annual GDP deflator is used to deflate the quarterly GDP data in Uzbekistan.

Figure 1. Dating Recoveries—Case of Argentina

Note: Recovery identification excludes first and last four quarters. For Argentina, high GDP volatility implies that the GDP decline in 2009 is not large enough to be considered as a trough. In the middle panel, the standard deviation of the cyclical component of GDP over the whole period is 0.048.
Source: Authors' calculations.

Nature of credit-less recoveries

The next step is to decide if each of the recovery episodes is credit-with or credit-less using data on private sector credit. This paper uses line 22D of IFS, which is a measure of bank credit to

the private sector.⁶ This series is converted into a “real” indicator by using a price deflator; namely, the GDP deflator except for a few cases where only the CPI is available on a quarterly basis. Using this real credit data series, this paper defines that a recovery is credit-less when the average of year-on-year growth rates of real bank credit during the first eight quarters of the recovery is less than or equal to zero. In other words, for a recovery to be classified as credit-less, an average negative year-on-year real credit growth occurs from the first quarter since the trough, $t+1$, to the eighth quarter since the trough, $t+8$. The bottom panel of Figure 1 shows the two recovery patterns for Argentina. For instance, the recovery following the trough dated in 1995Q3 is considered to be credit-with as the average real credit growth over the eight quarters (the dark gray shade) is positive (i.e., 6.0 percent). In contrast, the second recovery is credit-less since a negative real credit growth is found (i.e., -34.6 percent).

The recovery-type definition used here reveals that more than 25 percent of all recoveries with credit data are credit-less events (that is, 72 out of the 266 recovery episodes; six of our recoveries do not have credit data—Annex Table 2).⁷ Moreover, it is found that credit-less recoveries occur in both advanced and emerging market economies. In sum, as already noted, credit-less recoveries are far from rare events. Figure 2 shows the number of recoveries—both credit-less and credit-with—by country groups and, from the figure, the following three conclusions can be noted. First of all, by looking at the episodes in advanced and emerging market economies separately, credit-less recoveries are only slightly more common in emerging markets; the share of credit-less recoveries in advanced and emerging market economies is 25 and 30 percent. This might be related to the degree of the development of financial markets; indeed, Abiad *et al.* (2011) find that there is a negative relationship between financial development, measured by credit-to-GDP ratio, and the incidence of credit-less events.

Secondly, as clearly shown in the figure, the global financial crisis in 2009 is an unusually important event. For advanced economies, including recoveries identified in 2010, credit-less recoveries in these two years account for about 45 percent of all credit-less recoveries. For the emerging market counterparts, the share is a little lower but still important—38 percent of all credit-less recoveries. In fact, out of 18 recoveries recorded in 2009 and 2010 for advanced countries, 12 recoveries are considered to be credit-less (i.e., around 67 percent of all recoveries in these two years). By contrast the case of emerging markets is less stark in line with the fact that many of these countries performed better during the 2008–09 financial crisis.

The third point to be noted is that, in both advanced and emerging market economies, there is variation over time in the frequency of credit-less recoveries. Specifically, credit-less episodes are more likely to be linked to large economic events, such as recessions in the mid 1970s in developed countries, the collapse of the European Exchange Rate Mechanism (early 1990s

⁶ As discussed in Abiad *et al.* (2011), line 22D of IFS covers credit extended by banks only and, therefore, non-bank financial intermediaries are ignored from the discussion. It should be noted that line 22D has breaks in the series in some countries even though data are some times reported. Guided by the IFS country notes, this paper disconnects the series when breaks are reported and treats it separately before and after the breaks to avoid misidentification of recovery patterns. Also, where line 22D has been discontinued, this paper extends the series using the growth rate the fuller coverage line 22S (bank claims on other sectors).

⁷ Alternative definition, which is based on the level of real credit (i.e., a credit-less recovery if the level of real credit in the eighth quarter of the recovery, $t+8$, is lower than that of the trough, t), is also tried and shows that the share of credit-less recoveries is around 20 percent. Moreover, the definition based on a shorter span of time, four quarters, is tried. It shows more frequent incidence of credit-less recoveries using this definition (i.e., 33 percent and 25 percent of all recoveries are credit-less for the growth and level data, respectively). But this definition was considered inadequate to judge the recovery due to its short length.

among advanced economies in Europe), East Asian crisis (late 1990s, emerging market economies), and Latin American crisis (early 2000s, emerging market economies).⁸

Figure 2. Number of Recovery Episodes, 1965–2010

Note: Recoveries are first defined with the quarterly data and then aggregated by year. All the episodes identified in 2010 are based on private sector credit data for less than eight quarters.

Source: Authors' calculations based on data from the IMF, OECD, UNECE, Haver Analytics, Datastream and country sources.

Figure 3. Growth Performance, eight quarters before and after trough

Note: A trough date is set t . Median values of year-on-year real GDP growth rates within each country group are shown, and they are smoothed by calculating three-quarter moving averages ($t-1$, t , and $t+1$). Due to this smoothing adjustment, the value at the trough date is not necessarily the lowest.

Source: Authors' calculations based on data from the IMF, OECD, UNECE, Haver Analytics, Datastream and country sources.

The paper also looks at how credit-less and credit-with events are different in terms of growth and investment performance. Under credit-less recoveries, output growth is found to be weaker, especially in emerging markets (Figure 3). At the trough t , the difference in growth rates between credit-less and credit-with episodes is 3 and 8 percentage points for advanced and emerging market economies. In both country groups, though especially in the group of advanced

⁸ Due to the data availability, debt crisis in Latin America in the early 1980s is not fully captured. The data are only available for Mexico (credit-with) and Peru (credit-less).

economies, growth rates two years (or, eight quarters) before a trough, $t-8$, are similar between credit-less and credit-with events. However, the growth gap gets wider and becomes quite noticeable at least a year (i.e., four quarters) prior to the trough t . In the year the recovery occurs, credit-less episodes experience slow growth rates; however, this gap narrows after a year from the trough. By eight quarters after the trough, growth in credit-less recoveries is 1.5 percentage point lower than that in credit-with recoveries in developed countries. For emerging markets, the growth gap is even wider four and five quarters after the trough, but it also narrows during the rest of the second year following the trough. As a result, the growth differential in the group of emerging markets ends up at broadly the same level as in advanced economies.

Figure 4 shows the investment performance difference between credit-less and credit-with events following the format in Figure 3. As with growth patterns, there is lower investment growth in credit-less episodes in general, especially in emerging markets, and the differential in investment growth between credit-less and credit-with recoveries is more pronounced than in the case for output growth; for example, emerging markets incur a negative investment growth of around 27 percent at the trough date. Although investment growth rates eight quarters before the trough are similar to each other in advanced economies and, indeed, are higher in credit-less events than in credit-with episodes among emerging markets, this deterioration is more rapid during credit-less episodes. Still, once economies bottom out, investment recovers relatively fast and rapidly reaches the same level as is the case in credit-with events. For advanced economies, by eight quarters after the trough, the gap between two types of investment growth patterns is exhausted. Because of this upward trend in investment growth in credit-less events, especially for advanced economies, the GDP growth gap between credit-less and credit-with recoveries is likely to disappear within the following two years that follow the $t+8$ quarter. In fact, Figure 4 also shows that investment growth two years after the trough is above the level before the trough.

Figure 4. Investment Performance, eight quarters before and after trough

Note: A trough date is set t . Median values of year-on-year real investment growth rates within each country group are shown, and they are smoothed by calculating three-quarter moving averages ($t-1$, t , and $t+1$). Due to this smoothing adjustment, the value at the trough date is not necessarily the lowest.
Source: Authors' calculations based on data from the IMF, OECD, UNECE, Haver Analytics, Datastream and country sources.

IV. Drivers of Credit-less Recoveries

Empirical model

As shown in the previous section, credit-less recoveries are less desirable from a growth perspective. But what makes it more likely for a country to experience such a disappointing event? This section now investigates why some countries experience recoveries without pick-up of bank credit and specifically which factors drive the incidence of this kind of recovery pattern. In so doing, this paper employs a probit model, constructing, as the dependent variable, a binary variable that reflects whether or not a recovery is credit-less.⁹ The specification is:

$$\Pr(y_{i,t} = 1 | X_{i,t}) = \Phi(X'_{i,t}\beta), \quad (1)$$

where $y_{i,t}$ is the binary dependent variable taking a value of 1 if a recovery is credit-less in country i in period t and a value of 0 otherwise. The function, Φ , is the cumulative normal distribution, and $X_{i,t}$ contains a vector of regressors that drives the incidence of credit-less events.

This paper considers three sets of explanatory variables in the main estimation specification. Each of them explains different types of determinants of credit-less recoveries. The first set captures how macroeconomic shocks affect the recovery pattern; namely, the severity of the GDP decline during a recession. The second set of explanatory variables focuses in the process of external adjustment that precedes the recovery period; namely, changes in the real exchange rate and the current account balance. The last set captures how open countries are prior to a recession, both in terms of external trade and capital accounts. The definitions are as follows.

GDP growth differential: This variable captures a bounce-back effect and is defined as the percentage-point difference in year-on-year quarterly real GDP growth rates from the peak to the trough. Since a large decline in economic activity during the recession phase increases the likelihood of available unused production capacity during the recovery, an economy is more likely to recover without much need for credit; that is, investment needs are less pressing. In other words, the larger the difference in growth rates between the peak and trough, the higher the probability of a credit-less recovery; i.e., the expected sign of this indicator is negative.¹⁰

Real exchange rate adjustment: A devaluation of the local currency might in effect generate a pick-up on exports. The resulting greater availability of resources to firms might in itself reduce their need for credit financing. Exchange rate adjustment is measured by a peak-to-trough percentage change in the IMF's real effective exchange rate (REER) where a decline represents a devaluation (i.e., a negative relationship between the REER and a credit-less event is expected).

Change in current account balance: An improvement in the current account potentially implies a sharper economic adjustment. The variable is defined as a peak-to-trough percentage-point difference in the current account balance expressed as a percent of GDP. To limit seasonality

⁹ The probit (or logit) estimation method is the one frequently used in the empirical literature dealing with such issues as financial crises (e.g., Berg and Pattillo, 1999; and Kamin *et al.*, 2007).

¹⁰ This paper also explored a different definition in which the focus is on the percentage change in real GDP between peak and trough with similar results.

factors, a four-quarter moving sum is computed for both the numerator (i.e., current account balance) and denominator (i.e., GDP). Different from the REER adjustment series, the expected direction of this variable is positive, which means that large positive changes (i.e., deep economic adjustment) increase the probability of a credit-less recovery.

Exports of goods and services at the peak: This variable aims at capturing initial conditions in terms of openness to external trade and is defined as exports of goods and services as a percent of GDP at the peak preceding each trough. As with the current account balance adjustment indicator, both the numerator and denominator are used as four-quarter moving-sum values. Having high exports-to-GDP ratio, a country can recover from a recession by revitalizing export activities (i.e., a credit-with event—a negative coefficient). A variety of factors support such outcome; especially the fact that trade credit is a more stable source of funding).

Capital account openness at the peak: A country's openness to capital is captured by an index prepared by Chinn and Ito (2006 and 2008). Unlike exports of goods and services, financially-open countries are more exposed to capital outflows and more likely to experience a credit-less recovery. Since a higher value indicates more financial openness, a positive sign is expected.¹¹

Results

Table 1 shows the estimation results. Although the main specification is under Column 4, different combinations of explanatory variables are presented to check the sensitivity of the model. The number of observations (i.e., peak-trough episodes) is set at 150 and 69 countries; basically, a balanced panel of recovery observations that have all possible utilized regressors.

As shown in the table, all coefficients have the expected signs and most are statistically significant. The coefficient on GDP shock is negative, indicating that countries with large declines in GDP growth rates are more likely to experience recoveries without bank credit (i.e., unused installed capacity enables a recovery without credit). Countries whose currencies depreciate the most, and whose current account balance is also improved the most, have higher probabilities of experiencing a credit-less recovery (i.e., a reflection of sharp economic adjustment and that a depreciation is likely to soften the financing constraint of exporting economic activities). The indicator on financial openness also shows the expected result; that is, more financially open economies are more likely to recover without bank credit. It is however weakly defined. Finally, regarding trade openness, estimation results indicate that higher export-to-GDP ratios at the peak reduce the likelihood of credit-less recoveries and the relationship is statistically significant. The two variables on initial conditions emphasize that economic openness is a two-sided story.¹² On the one hand, trade openness might imply a greater role for trade credit, which increases the likelihood of a credit-with event. On the other, capital account openness exposes countries to capital outflows and, thus, to the risk of bank deleveraging.

¹¹ Because the data are only available on annual basis, all four quarters in a given year have the same values.

¹² A dummy variable for banking crises, which is taken from Laeven and Valencia (2008, 2010 and 2012), is also tried, but it seems the effects are captured by other explanatory variables as it is not statistically significant.

Table 1. Determinants of Credit-less Recoveries

	[1]	[2]	[3]	[4]
Output Shock				
GDP Growth (change; trough minus peak)	-0.055 [0.016]***	-0.050 [0.015]***	-0.054 [0.017]***	-0.058 [0.019]***
External Adjustment				
Real Effective Exchange Rate (% change; trough to peak)	-0.025 [0.009]***		-0.021 [0.009]**	-0.021 [0.010]**
Current Account Balance (% of GDP; change; trough minus peak)		0.052 [0.021]**	0.048 [0.022]**	0.053 [0.023]**
Openness Characteristics at Peak				
Exports of Goods and Services (% of GDP; peak)			-0.006 [0.003]*	-0.007 [0.003]**
Capital Account Openness (index: higher, more open; peak)				0.107 [0.085]
Constant	-1.092 [0.184]***	-1.149 [0.187]***	-1.006 [0.206]***	-1.113 [0.226]***
Number of Episodes	150	150	150	150
Number of Countries	69	69	69	69
Pseudo R ²	0.12	0.11	0.15	0.16
Log Pseudolikelihood	-83.02	-84.03	-79.68	-78.85

Note: Robust standard errors are in brackets. *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Source: Authors' estimations.

By using a probit method, it can be assessed how the probability of credit-less recoveries varies as a regressor is changed while holding the others constant at their average values. Based on column 4 of Table 1, the probability of credit-less recoveries is 50 percent when the real GDP growth differential is 20 percentage points while the other four variables are held constant. This probability is lower—20 percent—if the GDP differential is 5 percentage points. Similarly, while the likelihood of the incidence of credit-less events is 50 percent when the REER depreciates by 25 percent, a lower devaluation of 5 percent still implies a high probability of a credit-less recovery—30 percent. Also, when the index of capital account openness is changed from -1 to 1 the probability of credit-less recoveries is increased by about 8 percentage points.¹³

V. Discussion

This section first assesses how the estimation model in the previous section performs and then provides additional sets of regression estimates with three macroeconomic policy variables; namely, fiscal and monetary policies, and the country's choice to avail itself to IMF credit. The likelihood of credit-less recoveries among ECA countries is also examined as a part of the assessment of the estimation model.

¹³ This information is available from the authors upon request.

Assessment of prediction performance

The predictability assessment of the model is done by using the regression results in Column 4 of Table 1. This paper uses Brier's Quadratic Probability Score (QPS), which is defined as:

$$QPS = \frac{1}{N} \sum_{n=1}^N (p_n - y_n)^2, \quad (2)$$

where p_n is the predicted probability of credit-less recovery in episode n , and y_n is the actual recovery in episode n (i.e., the dependent variable in Table 1, a dummy variable taking 1 if a recovery is credit-less). N is the total number of episodes ($N = 150$). QPS ranges from 0 to 1 and a score of 0 implies perfect accuracy. For the estimation model in Table 1, the computed QPS is 0.18; that is, the prediction performance of the model is quite accurate.

In addition, this paper looks at individual countries in ECA to see whether the model correctly specifies the recovery pattern these countries have experienced. It focuses on episodes related to the 2008–09 global financial crisis and covers 17 ECA countries for which the data required for probability calculations is available. In order to evaluate the performance for individual countries, this paper sets two thresholds: 0.5 and 0.3. The former is taken from Canova (1994) and also used in the analysis done in Bijsterbosch and Dahlhaus (2011), and the latter is the average share of credit-less recoveries in our sample for all emerging market economies. Using these two thresholds, this paper investigates the presence of the type-I and type-II errors (i.e., false positive and false negative, respectively). In this context, the type-I error means that a recovery is predicted as credit-less though in reality it is not, while the type-II error means that a recovery is not predicted as credit-less but turns such a type of event. From the perspective of the adequacy of policy responses, type-II errors can be viewed as more costly; that is, not predicting a credit-less event might lead to unwanted lags in the policy response.

Figure 5 shows the predicted probability for each of recovery episodes in ECA countries over the period of 2009–10. High probability of credit-less recoveries is predicted for the Baltic states, especially Latvia, as well as Russia and Ukraine. The results are largely driven by the fact that these countries experienced large contractions in economic activity and/or a sharp depreciations of their currencies. Recoveries are predicted as credit-less if the probability is above a threshold of 0.5 (i.e., black bars) and as credit-with if it is below 0.3 (i.e., light gray bars). Any episodes located in between 0.3 and 0.5 are treated as borderline cases. Out of 17 episodes (or, countries), 9 episodes are predicted as credit-less recoveries and 5 are not predicted as credit-less recoveries. By combining this figure with the actual recovery patterns experienced by these countries (that is, the evidence on credit performance), it is found that there are three type-I errors (i.e., Armenia, Georgia and Turkey) and one type-II error (i.e., Kyrgyz Republic).¹⁴ The existence of only one costly mis-prediction (i.e., a type-II error) is somewhat comforting from a modeling perspective.

¹⁴ A caveat is that the calculations are made in-sample. Still, given that ECA countries represent a small part of the recovery sample, it is safe to say that the risk of an in-sample bias is low.

Figure 5. Probability of Credit-less Recoveries in ECA, 2009–2010

Note: The solid line is 0.5 and the dash line is 0.3, which is the share of credit-less events in the sample of emerging market economies. The trough dates are shown next to the corresponding country codes.

Source: Authors' estimations.

Macroeconomic policies

Table 2 shows probit regression results with macroeconomic policy indicators. The purpose is to ascertain if certain policies might decrease or increase the likelihood of a credit-less recovery. The table looks specifically at two policy indicators: (i) changes in fiscal policy and (ii) changes in monetary policy. Due to data availability, all the policy variables are computed on annual data; the data is taken from the IMF World Economic Outlook database (October 2012). Also, the policy indicators used reflect the stance during the recession, thus reducing the likelihood of endogeneity biases. Interestingly, as shown also, the conclusions drawn are not affected if policies are looked at in their different combinations; i.e., the estimated coefficients are largely unchanged.

Table 2. Credit-less Recoveries and Macroeconomic Policies

	[1]	[2]	[3]	[4]
	Fiscal	Monetary	Fiscal Monetary	Interaction with Income
Output Shock				
GDP Growth	-0.050	-0.060	-0.057	-0.052
(change; trough minus peak)	[0.020]**	[0.025]**	[0.024]**	[0.025]**
External Adjustment				
Real Effective Exchange Rate	-0.025	-0.020	-0.028	-0.029
(% change; trough to peak)	[0.012]**	[0.012]	[0.013]**	[0.014]**
Current Account Balance	0.062	0.052	0.061	0.060
(% of GDP; change; trough minus peak)	[0.028]**	[0.026]**	[0.030]**	[0.031]*
Openness Characteristics at Peak				
Exports of Goods and Services	-0.015	-0.014	-0.016	-0.018
(% of GDP; peak)	[0.005]***	[0.006]**	[0.005]***	[0.006]***
Capital Account Openness	0.170	0.172	0.153	0.205
(index: higher, more open; peak)	[0.104]	[0.103]*	[0.106]	[0.117]*
Macroeconomic Policies				
Fiscal Policy Easing	0.149		0.146	0.172
(change; trough minus peak)	[0.055]***		[0.056]***	[0.078]**
Monetary Policy Easing		-0.006	-0.006	-0.006
(change; trough minus peak)		[0.003]**	[0.003]*	[0.003]*
Income Level				
Advanced Economy				-0.123
(dummy variable)				[0.424]
Interaction Terms				
Fiscal Policy Easing				0.050
× Advanced Economy				[0.154]
Monetary Policy Easing				-0.056
× Advanced Economy				[0.030]*
Constant	-1.167	-0.888	-1.046	-0.927
	[0.269]***	[0.277]***	[0.264]***	[0.295]***
Number of Episodes	109	109	109	109
Number of Countries	56	56	56	56
Pseudo R ²	0.24	0.22	0.27	0.29
Log Pseudolikelihood	-50.84	-52.08	-48.98	-47.36

Note: Robust standard errors are in brackets. *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Source: Authors' estimations.

Column 1 of Table 2 is for a change in fiscal policy stance and indicates that loosening of fiscal policy increases the probability of credit-less recoveries. This is an expected result since easing fiscal policy can crowd out bank private credit during the recovery phase. The variable of fiscal policy easing is measured by a percentage-point difference in the cyclically-adjusted structural fiscal balances as a share of GDP from the peak to the trough dates, and is multiplied by -1 to show positive and negative changes as loosening and tightening, respectively. The cyclical adjustment is done by the Hodrick-Prescott filter and applied to the revenue side only.¹⁵ A note of caution is needed, however. The direction of causality is unclear as demand for credit might

¹⁵ The smoothing parameter is 6.25, as in Ravn and Uhlig (2002). For the computation of cyclically-adjusted fiscal balances, refer to Bornhorst *et al.* (2011).

itself be lagging despite the many controls added to the estimation. In such case, a fiscal impulse is warranted. More likely, the lesson is that fiscal impulses should be temporary so that there is soon room for private sector credit once conditions are returning to normal.

Column 2 shows the effect of a change in monetary policy stance and, different from the fiscal policy indicator, monetary easing reduces the probability of credit-less recoveries. Again, the interpretation seems straightforward—a monetary expansion leads to the availability of more funding for the private sector and recoveries are achieved with pick-up of bank private credit. The variable is measured by a percentage-point change in velocity of broad money (i.e., GDP divided by broad money) from the peak to trough dates and, as in structural fiscal balances, it is multiplied by -1 so that an increase represents a loosening of monetary policy.

In Column 3, both fiscal and monetary policy stances are included in the equation. The coefficients of macroeconomic policy variables remain statistically significant and have the same signs as shown in Columns 1 and 2. In Column 4, each of policy stance changes is interacted with a dummy variable for advanced economies. By having the interaction terms, it can be assessed whether or not the difference in income level—or, difference in institutions—is related to the effects of macroeconomic policies. The significant relationship is found when the advanced economy dummy is interacted with a change in monetary policy stance. The result suggests that monetary easing reduces the likelihood of credit-less recoveries in advanced economies as compared to emerging and other developing and offshore economies. Monetary policy is found to be more effective in developed countries.

Table 3 has another set of probit regression results but focuses on the effect of the IMF-supported programs in economic recoveries. The table includes the variable on the use of IMF credit, which is measured as a dummy variable taking a value of 1 if there is a positive annual percentage change in the use of IMF credit expressed in SDR (i.e., IFS line .2EGSZF) at the trough date. Here, a year-on-year (annual) change, rather than a peak-to-trough change, is used because in the decision that countries make in accessing IMF credit their economic conditions at the peak seem less important. The results show that countries' decision to rely on IMF credit reduces the likelihood of credit-less recovery.

Column 1 of Table 3 has the dummy variable on the use of IMF credit at the trough date and shows that the coefficient is negative but not statistically significant. In Columns 2 and 3, several variables controlling for economic conditions at the trough are added. Specifically, gross public debt, international reserves and inflation are controlled for. The variable on public debt is annual and expressed as a percentage of GDP. International reserves (as a share of GDP) and inflation are based on quarterly data, and the latter is measured by a year-on-year percentage change in consumer price index. By including these control variables, the dummy variable on IMF-supported program keeps the negative sign and becomes statistically significant. The result is not affected by the inclusion of fiscal and monetary policy variables (Column 4).

Table 3. Credit-less Recoveries and IMF-Supported Programs

	[1] IMF Program	[2] Economic Conditions 1	[3] Economic Conditions 2	[4] Economic Policies
Output Shock				
GDP Growth (change; trough minus peak)	-0.100 [0.023]***	-0.120 [0.027]***	-0.120 [0.030]***	-0.173 [0.039]***
External Adjustment				
Real Effective Exchange Rate (% change; trough to peak)	-0.008 [0.013]	-0.005 [0.014]	-0.002 [0.015]	-0.006 [0.017]
Current Account Balance (% of GDP; change; trough minus peak)	0.057 [0.032]*	0.059 [0.034]*	0.070 [0.038]*	0.120 [0.046]***
Openness Characteristics at Peak				
Exports of Goods and Services (% of GDP; peak)	-0.021 [0.009]**	-0.022 [0.010]**	-0.022 [0.008]***	-0.037 [0.010]***
Capital Account Openness (index: higher, more open; peak)	0.288 [0.123]**	0.272 [0.134]**	0.401 [0.149]***	0.547 [0.192]***
IMF Program at Trough				
Use of IMF Credit (GRA) (dummy variable; trough)	-0.639 [0.548]	-0.901 [0.533]*	-1.354 [0.596]**	-2.178 [0.680]***
Economic Conditions at Trough				
Public Debt (% of GDP; trough)		0.013 [0.006]**	0.011 [0.006]*	0.016 [0.007]**
International Reserves (% of GDP; trough)		0.001 [0.018]		0.019 [0.018]
Inflation (year-on-year % change; trough)			0.052 [0.025]**	0.121 [0.038]***
Macroeconomic Policies				
Fiscal Policy Easing (change; trough minus peak)				0.201 [0.069]***
Monetary Policy Easing (change; trough minus peak)				-0.022 [0.006]***
Constant	-1.148 [0.381]***	-2.007 [0.571]***	-2.266 [0.650]***	-3.290 [0.729]***
Number of Episodes	93	93	93	93
Number of Countries	52	52	52	52
Pseudo R ²	0.24	0.28	0.32	0.47
Log Pseudolikelihood	-42.37	-40.20	-38.29	-29.53

Note: Robust standard errors are in brackets. *, ** and *** denote statistical significance at the 10 percent, 5 percent and 1 percent levels, respectively.

Source: Authors' estimations.

VI. Concluding Remarks

Credit-less recoveries are neither rare nor insurmountable challenges. The empirical evidence suggests that such recoveries occur at a much slower pace and are only somewhat more common among emerging markets. But recoveries do eventually occur. In fact, economic performance is in large measure correlated with the depth of the correction triggered during the economic adjustment that precedes the trough; specifically, the size of the downturn and the extent of external adjustment that typically accompany a recession (from the current account adjustment to developments in exchange rates). Also, openness has a dual role. Trade openness decreases the likelihood of a credit-less recovery as trade is a more stable source of financing. Conversely,

capital account openness might have a large impact by the deleveraging process that typically follows a recession. But one must also be careful as to what this implies for countries going forward as the pre-recession period might have also meant large benefits in terms of growth.

As to policies during the recession, policymakers must be aware that excessive fiscal loosening might end up exacerbating the likelihood of a credit-less recovery, though more research would be needed to understand better their medium- to long-term implications. In contrast, monetary policy seems to play a more beneficial role by not increasing the likelihood of a credit-less event, especially in advanced economies. Finally, the country choice to avail itself of an IMF-supported program is negatively correlated with the likelihood of a credit-less recovery. Seeking an IMF program tends to help countries recover with an increase in private sector credit. The relationship becomes statistically meaningful when the economic conditions at the trough are controlled for.

And what can be concluded from the estimation about the likelihood of credit-less events in ECA? Here the model seems to suggest that indeed many countries in the ECA region were likely to experience a credit-less recovery—and they indeed did. But one must also draw hope from the fact that investment—and presumably eventually growth—typically recovers 8 quarters after a trough. This would suggest that a credit-less recovery is not a reason for extreme concern. More worrisome is that the region is now facing a renewed negative external shock.

References

- Abiad, Abdul, Giovanni Dell’Ariccia, and Bin Li. 2011. “Creditless Recoveries.” IMF Working Paper 11/58, International Monetary Fund, Washington, DC.
- Ayyagari, Meghana, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2011. “Do Phoenix Miracles Exist? Firm-Level Evidence from Financial Crises.” Policy Research Working Paper 5799, World Bank, Washington, DC.
- Berg, Andrew, and Catherine Pattillo. 1999. “Predicting Currency Crises: The Indicators Approach and an Alternative.” *Journal of International Money and Finance* 18 (4): 561–586.
- Biggs, Michael, Thomas Mayer, and Andreas Pick. 2009. “Credit and Economic Recovery.” DNB Working Paper 218, De Nederlandsche Bank, Amsterdam, Netherlands.
- Bijsterbosch, Martin, and Tatjana Dahlhaus. 2011. “Determinants of Credit-Less Recoveries.” ECB Working Paper 1358, European Central Bank, Frankfurt, Germany.
- Bornhorst, Fabian, Gabriela Dobrescu, Annalisa Fedelino, Jan Gottschalk, and Taisuke Nakata. 2011. “When and How to Adjust Beyond the Business Cycle? A Guide to Structural Fiscal Balances.” Technical Notes and Manuals 11/02, International Monetary Fund, Washington, DC.
- Calvo, Guillermo A., Alejandro Izquierdo, and Ernesto Talvi. 2006. “Sudden Stops and Phoenix Miracles in Emerging Markets.” *The American Economic Review* 96 (2): 405–410.
- Canova, Fabio. 1994. “Were Financial Crises Predictable?” *Journal of Money, Credit and Banking* 26 (1): 102–124.
- Chinn, Menzie D., and Hiro Ito. 2006. “What Matters for Financial Development? Capital Controls, Institutions, and Interactions.” *Journal of Development Economics* 81 (1): 163–192.
- Chinn, Menzie D., and Hiro Ito. 2008. “A New Measure of Financial Openness.” *Journal of Comparative Policy Analysis* 10 (3): 309–322.
- Claessens, Stijn, M. Ayhan Kose, and Marco E. Terrones. 2009a. “A Recovery without Credit: Possible, but....” VoxEU.org, 22 May 2009.
- Claessens, Stijn, M. Ayhan Kose, and Marco E. Terrones. 2009b. “What Happens during Recessions, Crunches and Busts?” *Economic Policy* 24 (60): 653–700.
- Coricelli, Fabrizio, and Isabelle Roland. 2011. “How do Credit Conditions Shape Economic Recoveries?” CEPR Discussion Paper 8325, Centre for Economic Policy Research, London, United Kingdom.

- Dagher, Jihad C. 2010. “Sudden Stops, Output Drops, and Credit Collapses.” IMF Working Paper 10/176, International Monetary Fund, Washington, DC.
- Hodrick, Robert J., and Edward C. Prescott. 1997. “U.S. Business Cycles: An Empirical Investigation.” *Journal of Money, Credit and Banking* 29 (1): 1–16.
- Huntley, Jon. 2008. “Phoenix Falling: Recovering from Sudden Stops in Emerging Markets.” Unpublished mimeo, Northwestern University, Evanston, IL.
- Kamin, Steven B., John Schindler, and Shawna Samuel. 2007. “The Contribution of Domestic and External Factors to Emerging Market Currency Crises: An Early Warning Systems Approach.” *International Journal of Finance and Economics* 12 (3): 317–336.
- Kannan, Prakash. 2012. “Credit Conditions and Recoveries from Financial Crises.” *Journal of International Money and Finance* 31 (5): 930–947.
- Laeven, Luc, and Fabian Valencia. 2008. “Systemic Banking Crises: A New Database.” IMF Working Paper 08/224, International Monetary Fund, Washington, DC.
- Laeven, Luc, and Fabian Valencia. 2010. “Resolution of Banking Crises: The Good, the Bad, and the Ugly.” IMF Working Paper 10/146, International Monetary Fund, Washington, DC.
- Laeven, Luc, and Fabian Valencia. 2012. “Systemic Banking Crises Database: An Update.” IMF Working Paper 12/163, International Monetary Fund, Washington, DC.
- Ravn, Morten O., and Harald Uhlig. 2002. “On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations.” *The Review of Economics and Statistics* 84 (2): 371–376.
- UniCredit. 2012. “CEE Banking Outlook – Banking in CEE: The New ‘Normal.’” UniCredit CEE Strategic Analysis, January 2012, UniCredit, Vienna, Austria.
- U.S. Census Bureau. 2011. “X-12-ARIMA Reference Manual, Version 0.3.” The software documentation prepared by the Statistical Research Division, U.S. Census Bureau, February 2011, U.S. Census Bureau, Washington, DC.
- Zarazaga, Carlos E.J.M. 2006. “The Role of Total Factor Productivity in ‘Phoenix Miracles:’ Insights from an Emerging Market Crisis.” Research Department Working Paper 0605, Federal Reserve Bank of Dallas, Dallas, TX.

Annex Table 1. Country Groups and Number of Episodes

Advanced		Emerging Market		Other	
Name	N	Name	N	Name	N
Australia	6	Argentina	2	Albania	2
Austria	6	Armenia	2	Azerbaijan	1
Belgium	2	Brazil	3	Belarus	1
Canada	8	Bulgaria	1	Bolivia	2
Denmark	5	Chile	3	Botswana	3
Finland	5	China	2	Brunei Darussalam	2
France	7	Colombia	2	Cambodia	1
Germany	6	Costa Rica	3	Cyprus	3
Greece	3	Croatia	1	Georgia	2
Iceland	3	Czech Republic	1	Ghana	1
Ireland	3	Dominican Republic	2	Hong Kong SAR, China	5
Italy	4	Ecuador	4	Iran, Islamic Rep.	3
Japan	2	Egypt, Arab Rep.	1	Kenya	2
Luxembourg	3	El Salvador	4	Kyrgyz Republic	3
Netherlands	4	Estonia	2	Macao SAR, China	2
New Zealand	3	Guatemala	2	Malta	2
Norway	8	Hungary	1	Mauritius	2
Portugal	2	India	3	Moldova	3
Spain	5	Indonesia	1	Mozambique	1
Sweden	5	Israel	2	Namibia	2
Switzerland	4	Jamaica	1	Singapore	5
United Kingdom	5	Jordan	4	Slovenia	1
United States	6	Kazakhstan	2	Tajikistan	2
		Korea, Rep.	5	Uzbekistan	1
		Latvia	2	West Bank and Gaza	2
		Lithuania	2		
		Macedonia, FYR	2		
		Malaysia	2		
		Mexico	5		
		Morocco	1		
		Paraguay	2		
		Peru	2		
		Philippines	3		
		Poland	3		
		Romania	1		
		Russian Federation	2		
		Serbia	2		
		Slovak Republic	3		
		South Africa	7		
		Sri Lanka	2		
		Taiwan, China	6		
		Thailand	2		
		Tunisia	1		
		Turkey	4		
		Ukraine	1		
		Uruguay	1		
		Venezuela, RB	1		
		Vietnam	2		
Total					
Episodes	105		113		54
Countries	23		48		25

Note: N is the number of recovery episodes (i.e., peak-trough combinations).

Source: Authors' calculations.

Annex Table 2. Recovery Episodes and Trough Dates

	Trough Date (bold = credit-less recovery) (date in parenthesis = credit data unavailable)							Episodes		
								All	Credit-less	No credit data
Albania	2007Q2	2009Q4						2	0	0
Argentina	1995Q3	2002Q1						2	1	0
Armenia	2000Q3	2010Q3						2	1	0
Australia	1968Q1	1977Q4	1983Q1	1991Q4	1997Q1	2000Q4		6	0	0
Austria	1969Q1	1975Q3	1981Q4	1987Q1	2005Q1	2009Q2		6	0	0
Azerbaijan	2004Q4							1	0	0
Belarus	1994Q1							1	1	0
Belgium	1998Q3	2009Q2						2	1	0
Bolivia	1993Q3	2003Q3						2	1	0
Botswana	1996Q4	2001Q4	2009Q1					3	0	0
Brazil	1999Q1	2003Q2	2009Q1					3	1	0
Brunei Darussalam	2004Q4	2009Q2						2	2	0
Bulgaria	1997Q1							1	0	0
Cambodia	2003Q3							1	0	0
Canada	1968Q1	1971Q1	1975Q2	1982Q4	1986Q4	1992Q4	2003Q3 (2009Q2)	8	1	1
Chile	1999Q2	2003Q4	2010Q1					3	0	0
China	1990Q2	2009Q1						2	0	0
Colombia	1999Q2	2010Q3						2	1	0
Costa Rica	1997Q1	2005Q1	2009Q1					3	1	0
Croatia	1999Q2							1	1	0
Cyprus	1997Q2	2003Q2	2009Q4					3	0	0
Czech Republic	1993Q4							1	0	0
Denmark	1978Q1	1981Q2	1993Q3	2003Q2	2009Q3			5	4	0
Dominican Republic	1996Q4	2004Q2						2	1	0
Ecuador	1993Q3	1999Q4	2003Q2	2010Q1				4	1	0
Egypt, Arab Rep.	2006Q2							1	0	0
El Salvador	1991Q1	1996Q3	2004Q3	2009Q2				4	1	0
Estonia	1994Q3	2009Q2						2	1	0
Finland	1971Q1	1978Q3	1986Q2	1993Q2	2009Q2			5	1	0
France	1968Q2	1975Q3	1987Q1	1993Q4	1997Q1	2003Q2	2009Q1	7	1	0
Georgia	2000Q2	2009Q3						2	0	0
Germany	1968Q1	1975Q2	1982Q4	1989Q4	2005Q1	2009Q1		6	1	0
Ghana	2010Q4							1	0	0
Greece	2002Q4	2005Q2	2010Q4					3	1	0
Guatemala	2005Q4	2009Q2						2	1	0
Hong Kong SAR, China	(1975Q1)	(1985Q4)	1998Q4	2003Q2	2009Q1			5	1	2
Hungary	2009Q3							1	1	0
Iceland	1998Q1	2003Q4	2010Q1					3	1	0
India	1997Q3	2003Q1	2009Q1					3	0	0
Indonesia	1998Q4							1	1	0
Iran, Islamic Rep.	1989Q3	1995Q1	2001Q1					3	1	0
Ireland	1998Q4	2003Q3	2009Q4					3	1	0
Israel	1974Q2	1977Q4						2	0	0
Italy	1969Q4	1975Q2	1983Q1	1993Q3				4	1	0
Jamaica	2008Q4							1	1	0
Japan	1975Q1	2009Q1						2	1	0
Jordan	1993Q4	1999Q1	2003Q2	2009Q4				4	1	0
Kazakhstan	1998Q4	2009Q1						2	1	0
Kenya	2002Q3	2009Q4						2	1	0
Korea, Rep.	1967Q3	1975Q3	1980Q4	1998Q3	2009Q1			5	0	0

(continue to the next page)

(continued from the previous page)

	Trough Date (bold = credit-less recovery) (date in parenthesis = credit data unavailable)						Episodes			
							All	Credit- less	No credit data	
Kyrgyz Republic	2003Q2	2006Q2	2010Q2					3	1	0
Latvia	1992Q4	2009Q4						2	2	0
Lithuania	1995Q1	2009Q4						2	2	0
Luxembourg	1996Q3	2003Q1	2009Q2					3	1	0
Macao SAR, China	2003Q2	2009Q2						2	0	0
Macedonia, FYR	2002Q3	2010Q1						2	0	0
Malaysia	1998Q4	2009Q1						2	1	0
Malta	1994Q4	2001Q4						2	1	0
Mauritius	2002Q1	2006Q3						2	0	0
Mexico	1983Q3	1988Q3	1995Q3	2005Q1	2009Q1			5	2	0
Moldova	1996Q2	2000Q2	2009Q3					3	1	0
Morocco	1995Q2							1	0	0
Mozambique	2004Q3							1	0	0
Namibia	2005Q3	2009Q1						2	1	0
Netherlands	1983Q1	1993Q4	2003Q3	2009Q2				4	0	0
New Zealand	1992Q3	1998Q3	2009Q3					3	0	0
Norway	1975Q1	1978Q1	1982Q4	1989Q1	1993Q2	1997Q1	2002Q1 (2010Q3)	8	1	1
Paraguay	2002Q4	2009Q2						2	1	0
Peru	1983Q3	1990Q3						2	1	0
Philippines	1985Q3	2002Q3	2009Q1					3	1	0
Poland	1996Q4	2003Q1	2010Q1					3	0	0
Portugal	1985Q1	1994Q4						2	1	0
Romania	1998Q1							1	0	0
Russian Federation	1998Q4	2009Q2						2	1	0
Serbia	2003Q4	2009Q4						2	0	0
Singapore	1986Q1	1992Q2	1998Q3	2003Q2	2009Q1			5	0	0
Slovak Republic	1999Q4	2004Q2	2009Q3					3	1	0
Slovenia	2009Q3							1	0	0
South Africa	(1969Q4)	1973Q2	1977Q4	1983Q2	1992Q4	2003Q4	2009Q2	7	2	1
Spain	1971Q2	1986Q4	1993Q2	1998Q4	2009Q4			5	2	0
Sri Lanka	2004Q3	2009Q1						2	0	0
Sweden	1983Q1	1993Q1	1997Q1	2003Q2	2009Q3			5	2	0
Switzerland	1976Q1	1983Q2	2003Q2	2009Q2				4	0	0
Taiwan, China	1969Q4	1975Q1	1983Q1	1985Q3	2003Q2	2009Q1		6	0	0
Tajikistan	2001Q2	2005Q4						2	0	0
Thailand	1998Q3	2009Q1						2	1	0
Tunisia	2002Q4							1	0	0
Turkey	1989Q2	1994Q2	2001Q4	2009Q1				4	1	0
Ukraine	2009Q2							1	1	0
United Kingdom	1971Q1	1975Q3	1981Q2	1992Q2	2009Q2			5	2	0
United States	1970Q4	1975Q1	1982Q4	1991Q4	2003Q1	2009Q2		6	3	0
Uruguay	2003Q1							1	1	0
Uzbekistan	(2010Q3)							1	0	1
Venezuela, RB	2003Q1							1	0	0
Vietnam	2003Q4	2010Q1						2	0	0
West Bank and Gaza	2002Q3	2006Q4						2	1	0
Total								272	72	6

Source: Authors' calculations.