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On the severity of economic downturns: Lessons from cross-country evidence☆

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ABSTRACT

We measure the severity of recessions as a function of their amplitude and duration. Within a quantile regression framework, we assess what causes economic downturns to be more or less severe. We find that the most severe downturns have striking similarities regarding cumulated domestic credit and large current account deficits.

1. Introduction

The occurrence of the global crisis in 2008 has revived the general interest in the determinants of economic boom–bust-cycles (Agnello and Schuknecht, 2011) and added relevance to the nexus between macroeconomic imbalances, financial stability and monetary stability.

The empirical literature on the determinants of economic crises is vast. Most recent studies focus on the cross-sectional dimension of the US subprime crisis (Rose and Spiegel, 2009) while others explore similarities between past economic crises and the current one (Bordo et al., 2001; Reinhart and Rogoff, 2008).

So far, no study has formally assessed whether the precursors of the most virulent recessions differ considerably from those associated with less severe economic contractions. Even if dramatic GDP drops are rare, their emergence requires extraordinary policy responses. The successful identification of what determine such extreme events is therefore a worthwhile goal for surveillance and precautionary purposes.

Our paper aims at closing this literature gap. Following a comprehensive characterization of the economic downturns experienced by 47 countries over the period 1970q1–2009q3, we apply a quantile regression model as developed by Koenker and Bassett (1978) to empirically assess what causes recessions to be more or less severe.

We show that the most severe downturns have striking similarities in the run-up to a crisis in terms of cumulated domestic credit and large current account deficits. By contrast, less costly downturns lack a common explanation and therefore are difficult to anticipate.

2. Methodology

While most of the existing studies measure the severity of economic downturns in terms of their amplitude, i.e. the change of real GDP from peak (P) to trough (T), we also account for another important dimension of the crises: their duration, i.e. the length (in periods) of recessions.

Specifically, we use the 'triangular approximation' method proposed by Harding and Pagan (2002) to compute the severity of downturns as a function of their amplitude and duration. Each recessionary phase can be thought of as a triangle, where the height

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Table 1
Severity (1st quartile).

Country	Trough	Duration	Amplitude	Country	Trough	Duration	Amplitude
Finland	1993q2	13	−0.148	Malaysia	1998q3	3	−0.119
Philippines	1985q3	9	−0.190	Japan	1972q2	2	−0.140
Peru	1989q1	5	−0.309	Peru	1990q3	2	−0.231
Bulgaria	1997q1	5	−0.276	Sweden	1992q4	11	−0.047
Indonesia	1998q4	4	−0.191	Denmark	1981q2	5	−0.053
Switzerland	1976q1	7	−0.141	China	2008q4	2	−0.197
Thailand	1998q3	8	−0.164	Japan	1999q1	8	−0.034
Estonia	2009q2	6	−0.199	Latvia	1995q1	4	−0.102
Latvia	2009q1	5	−0.254	Hungary	2009q2	5	−0.078
Mexico	1983q3	7	−0.107	Turkey	1989q1	5	−0.058
Argentina	2000q3	8	−0.063	Canada	1982q4	6	−0.050
Peru	1983q3	6	−0.130	Denmark	1990q4	7	−0.028
Romania	2000q1	5	−0.133	Mexico	2009q1	5	−0.128
Mexico	1995q3	3	−0.163	Russia	1998q3	3	−0.100
Hong Kong	1998q4	5	−0.093	Germany	1982q3	10	−0.028
Argentina	2002q1	4	−0.176	Russia	1996q3	4	−0.055
Lithuania	2009q2	4	−0.228	Czech Republic	1998q3	7	−0.024
Turkey	2009q1	4	−0.150	Slovakia	1999q4	3	−0.075
Turkey	2001q4	4	−0.095	Portugal	1984q1	5	−0.049
Croatia	1999q2	6	−0.059	Sweden	2009q1	3	−0.081
Turkey	1999q3	6	−0.071	Japan	2009q1	4	−0.087
UK	1981q1	7	−0.061	Australia	1983q2	7	−0.038
		Duration	Amplitude				
Average 1st quartile		**5.5**	**−0.118**				
Average (all episodes)		**3.6**	**−0.051**				

Note: Duration is expressed in quarters; amplitude is expressed as decline in real GDP in basis points.

is its amplitude while the base denotes its duration.[1] The associated severity is therefore assumed to correspond to the area of the underlying triangle.

Once downturns are ranked based on their severity, we estimate a quantile regression (QR) to identify economic indicators which impact on the conditional distribution of the severity.

The QR is based on the minimization of the asymmetrically weighted sum of absolute errors:

$$\underset{\beta\in\Re^k}{\text{Min}}\ \tau \sum_{Y\geq X'\beta} \left|Y - X'\beta\right| + (1-\tau) \sum_{Y<X'\beta} \left|Y - X'\beta\right| \quad (1)$$

where Y is the severity associated to each identified downturn, $\mathbf{X}$ denotes a set of predictors at observed $t-j$ periods in the run-up to the crisis and β is the vector of coefficients conditional to the τ-th quantile.[2]

3. Data

Our analysis covers a sample of 47 countries over the period 1970q1–2009q3.[3] The set of predictors ($\mathbf{X}$) includes variables which capture different aspects of external and internal vulnerabilities. However, the availability of quarterly data is somewhat limited, in particular for developing countries. In our analysis, we therefore look at the following indicators[4].

External vulnerability indicators: trade balance (T), current account balance (CAB), foreign direct investment (FDI) and the real effective exchange rate (REER).

Internal vulnerability indicators: domestic credit to the private sector (CR), lending rate (LR), money market rate (MMR) and domestic price level index (P).[5]

We test different transformations of these variables. First, to account for the fact that vulnerabilities gradually emerge over a reasonable time horizon and are not necessary reflected by the level of the monitored variables at quarter t, all quarterly indicators have been expressed in annualized growth rates with the exception of the series T, FDI and CAB which have been transformed in annual terms by summing up their respective flows during one year.

Second, we consider the possibility that the crisis might be a culmination of internal and/or external imbalances accumulated over a period longer than one year (e.g. continuous credit growth or persistent declines in competitiveness) and express REER and CR in terms of their cumulative growth rates over a two-year horizon. Similarly, T, FDI and CAB variables have been observed over the horizon of two years by summing up their respective flows for eight consecutive quarters.

Finally, in order to account for the temporal distance between the detection of vulnerability signals and the consequent economic downturn, we have also tested the predictive power of each transformed indicator, $\tilde{x}, (t-j)$ periods before the onset of the crisis, with $j = 1, \ldots, 5$.

We overall test the predictive power of 65 indicators. Similarly to Rose and Spiegel (2009), we first assess the predictive power of each transformed indicator in a QR bivariate context, i.e. each $\tilde{x}$ is regressed (one-by-one) on the dependent variable Y.[6] Then, we estimate a multivariate QR model including only the variables which have been found statistically significant in the previous step.

[1] The method involves the identification of cyclical turning points using the Bry and Boschan (1971) approach.

[2] Robust standard errors of β come from the non-parametric bootstrapping method (Kocherginsky et al., 2005).

[3] The countries included in the analysis comprise 21 industrialized and 26 emerging economies.

[4] All series are expressed in quarterly terms and retrieved from the International Financial Statistics (IFS) database. Except for interest rates and index-based variables all series are expressed in local currency.

[5] The series T, CAB, FDI and CR are expressed as percentage of GDP. Fiscal data have not been considered because such series are not available on a quarterly basis for most of the countries included in our study.

[6] A dummy variable (EME) is also included in the regressions to distinguish between emerging and industrialized countries. It takes the value one for emerging economies and zero otherwise.