

Box I

A GLOBAL INDEX OF FINANCIAL TURBULENCE

In order to understand the impact and assess the severity of episodes of financial turmoil, including the current financial crisis, it is useful to highlight the key features of stress in global financial markets and to put them into a historical perspective. This box presents the key features of a global index of financial turbulence (GIFT) that identifies a number of dimensions of financial stress that have been emphasised in the literature.¹ This index shows that, although stresses in global financial markets remain at historical highs, financial market turbulences continued to abate after the finalisation of the June 2009 FSR.

In order to measure financial stress, the GIFT captures developments in three financial market segments, namely in the fixed income, equity and foreign exchange markets. Measures of financial turbulence in these markets are constructed by looking at indicators of price pressures, along with volatility, the latter a proxy for heightened uncertainty, and increased risk-aversion. Episodes of financial stress are identified using an index based on high-frequency price variables. The index is constructed as a variance-weighted average of sub-indices associated with stress in the corresponding market sub-segment. There are many potential candidate variables for inclusion in the GIFT, but the objective is to effectively capture underlying market developments and risks using timely data. The index includes data for the world's 29 main economies.²

Stress in fixed income markets is identified by changes in the term spread, the so-called TED spread and the international spread. The term spread is calculated as the difference between the three-month and three-year yields on securities issued by the government. As financial intermediaries generate income by intermediating short-term liabilities into longer-term assets, a negative term spread implies significant stress for the financial system. The TED spread is calculated as the difference between the three-month money market rate and the three-month government bond yield. It indicates the degree of perceived credit risk in the economy: when the TED spread increases, it often indicates that lenders believe that counterparty risk is rising. The international spread is defined as the difference between the three-month government bond yield and the average of the three-month government bond yield in the sample, representing the relative stress of the economy's financial system.

Tensions in equity markets are identified by calculating monthly stock market returns, with a drop in stock prices implying a rise in financial stress. In addition, time-varying stock return volatility and turbulence in foreign exchange markets are derived from a GARCH(1,1) model specification. They capture the degree of uncertainty in equity and foreign exchange markets.

1 The GIFT builds on and extends related work conducted at the IMF. See R. Cardarelli, S. Elekdag, and S. Lall, "Financial Stress, Downturns, and Recoveries," *IMF Working Paper Series*, No 09/100, IMF, 2009; and IMF, *World Economic Outlook*, October 2008 and April 2009.

2 The sample includes the following economies: Argentina, Australia, Brazil, Canada, China, the Czech Republic, Denmark, the euro area, Hong Kong, Hungary, India, Indonesia, Korea, Malaysia, Mexico, New Zealand, Poland, Philippines, Russia, Singapore, South Africa, Sweden, Switzerland, Taiwan, Thailand, Turkey, the United Kingdom and the United States. One reason for choosing a limited set of variables is that the marginal information content of additional variables is diminishing, as many contain very similar qualitative patterns. Second, the chosen markets cover a large set of macroeconomic factors – reflected in equity market valuations, the term structure of interest rates, and exchange rates – as well as financial market variables reflecting money market conditions, corporate bond markets, volatility, etc. Finally, concentrating on the main financial market segments allows a broad set of countries to be included over a reasonably long time horizon, while at the same time ensuring data availability in real time. As a result, the construction of the GIFT is deliberately parsimonious at this stage.

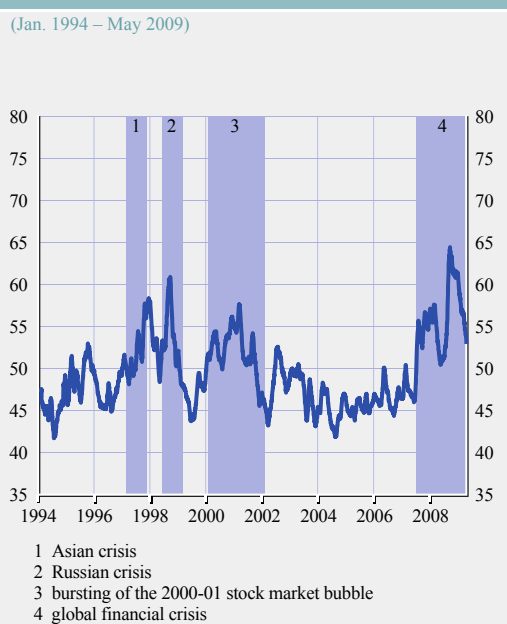
Each time series is adjusted for the sample mean, standardised by the sample standard deviation and subsequently filtered to minimise noise stemming from the highest frequencies. To ensure that the index is restricted to values in the range of 0 (low stress) to 100 (high stress), the filtered standardised time series is converted through a logistic transformation. For each market and economy, regional market-specific indices are calculated by taking the average of the converted components. As a result, the corresponding world index is a weighted average of the individual country and market-specific indices, and changes in the GIFT can be attributed to developments in a specific market or country.

The global index of financial turbulence is presented in Chart A. The global financial crisis that started in 2008 represented a historical peak for the GIFT. Sub-market indices indicate that the peak of the GIFT during October 2008 was associated with a massive fall in stock market returns, a rise in spreads and an increase in stock market and foreign exchange volatility (see Chart B).

Since then, and including the period since the finalisation of the June 2009 FSR, the GIFT has declined steadily, mainly on account of the rebound of stock prices and a normalisation of money market conditions, but also because of narrowing spreads and decreasing volatility in foreign exchange markets. Nevertheless, financial market stress remains at historically high levels, comparable only with those reached during the currency crises in the late 1990s and the stock market crash that followed the bursting of the New Economy bubble around the turn of the century.

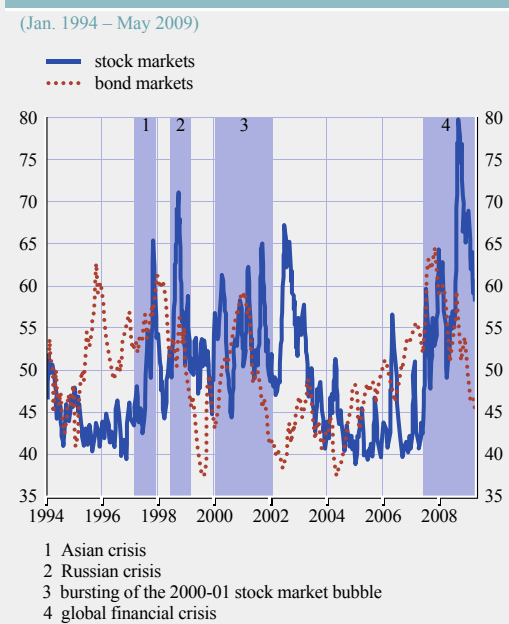
The GIFT also performs well in identifying other past periods of financial turbulence, such as the increase in financial stress associated with the Asian crisis that started in July 1997. Similarly, the Russian debt crisis in August 1998 and the collapse of LTCM in September 1998 are also

Chart A GIFT – global index of financial turbulence
(Jan. 1994 – May 2009)



Sources: Bloomberg and ECB calculations.

Chart B GIFT – market sub-indices
(Jan. 1994 – May 2009)



Sources: Bloomberg and ECB calculations.

identified by the GIFT. The terrorist attacks of 11 September 2001 and the Enron scandal at the end of that year, as well as the Argentine crisis, are also signalled by the index.

Overall, the GIFT serves as a tool for the monitoring of contemporaneous global financial stress that is useful for policy purposes. Its strength lies in identifying financial stress in real time, allowing market sources of increased turbulence to be understood, as well as geographic differences and transmission patterns. Of course, given these objectives, the GIFT cannot serve as a tool to anticipate stress in a forward-looking manner, or to identify the underlying structural sources of financial stress, for which other, complementary tools are required.