

Can we predict volatility spikes and their consequences?

After a year of extraordinarily low levels of financial volatility in 2017, in 2018 the markets have shifted towards a more variable environment. However, for several years we saw relatively low volatility and very accommodative financial conditions coexist, with few interruptions. This raises questions about the accumulation of risks to financial stability, especially given the fear that the current situation has parallels with the years 2003-2007, which resulted in the last financial crisis. Can low volatility lead to episodes of instability in the future? What consequences can it have for economic growth? We address these questions below.

Recent lessons

Financial and economic crises tend to be preceded by a period of high volatility. For example, greater volatility can be a symptom of a high degree of uncertainty that depresses investment, employment and economic growth in general. However, the red alert flag provided by a spike in volatility can come too late. As can be seen in the first chart, in the last financial crisis, both the stock market volatility indicators, exemplified by the VIX index, and the financial stress indicators produced by the major central banks remained at very low levels and did not indicate the onset of a financial crisis until it was virtually underway.¹ In fact, it was precisely during the period of low volatility (2003-2007) that the imbalances that would ultimately lead to the crisis of 2007-2008 accumulated.

The volatility paradox: «stability is destabilising»

The experience of 2007-2008 fuelled interest in the theories of the American economist Hyman Minsky (1919-1996), who argued that the prolongation of an environment of low volatility acts as fertiliser for the accumulation of imbalances that can lead to a financial crisis.² In particular, according to this view, an environment of low volatility generates excess optimism,³ which in turn feeds strong growth in credit, leveraging and, ultimately, excess risk taking.⁴ For example, optimism about the economic outlook raises asset valuations, which encourages investment and indebtedness. In addition, by underestimating the risks,

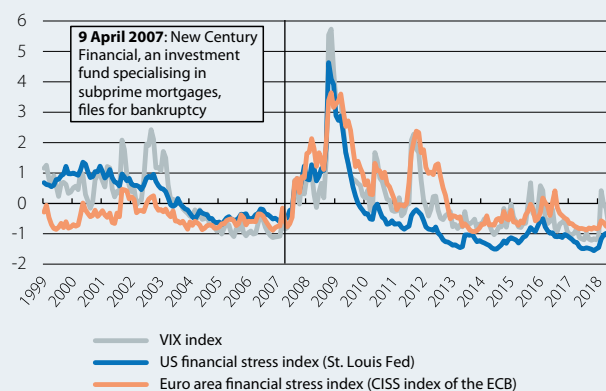
1. In the financial markets, the first clear signal appeared in April 2007, when New Century Financial, a US fund specialising in subprime mortgages, filed for bankruptcy. The tensions escalated rapidly in August 2007, when BNP Paribas was the first major bank to freeze investment products and to recognise problems in assessing the underlying assets linked to subprime mortgages.

2. See, for example, H. Minsky (1992), «The Financial Instability Hypothesis», Working Paper n° 74.

3. For example, because when economic players are unable to identify the true risk of an investment, they infer it based on the volatility observed in the past.

Financial stress and volatility indicators

Index (0 = historical average)



Note: * The three indicators have been normalised with an average equal to 0 and a standard deviation equal to 1.

Source: CaixaBank Research, based on data from Bloomberg.

economic players end up investing in lower-quality operations or in those with a higher probability of failure. Eventually, an increase in the number of failed projects and the resulting losses expose the poor decision-making of the past and cause a spike in volatility and, potentially, a financial crisis.

However, when this volatility spike is observed, it is already too late to take measures to prevent or mitigate a crisis. Therefore, this view calls into question both the idea of waiting to observe higher volatility before taking action against a possible crisis and the validity of using instruments, such as financial stress indices presented in the first chart, to predict a crisis sufficiently early.⁵ On the contrary, the «volatility paradox» shows us that it is precisely during periods of low volatility that we must try to detect the generation of imbalances.

Empirical Evidence

In the second chart, we present a first empirical estimate of the relationship between present and future volatility.⁶ This shows that periods of very low volatility tend to be followed by periods of slightly higher volatility, while

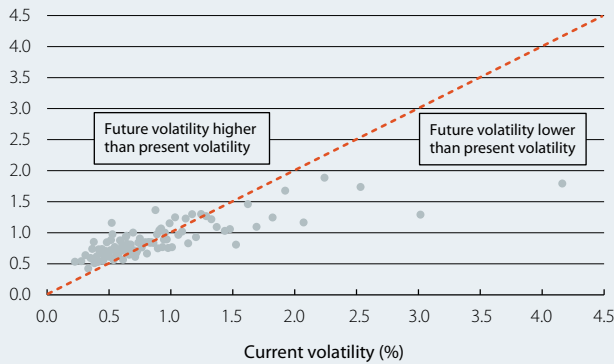
4. There are important studies documenting the link between strong growth in credit and the occurrence and severity of financial crises. See, for example, O. Jorda, M. Schularick and A. Taylor (2016), «Macroeconomic History and the New Business Cycle Facts», NBER Macroeconomics Annual, and other references that can be found in the Dossier «Bubbles and monetary policy» of the MR11/2017.

5. Analyses of the 2007-2008 financial crisis also conclude that indicators of this type would not have been capable of anticipating it sufficiently early. See Rose and Spiegel (2009), «Could an early warning system have predicted the crisis?», column at vox.eu.org, and S. Giglio *et al.* (2016), «Systemic Risk and the Macroeconomy: An Empirical Evaluation», NBER Working Paper.

6. Figures relating to the realized volatility in US stock market returns in the period 1926-2018.

Volatility: persistence and mean reversion

Average volatility 12 months in the future (%) *



Note: * Realized monthly volatility of the daily returns of a portfolio that includes all the companies listed on the NYSE, AMEX, and NASDAQ with a CSR code equal to 10 or 11.
Source: CaixaBank Research, based on data for the period 1926-2018 from the website of Kenneth R. French.

periods of high volatility tend to fade and give rise to an environment of lower volatility. Although this historical relationship suggests that it is reasonable for the extraordinarily low volatility of 2017 to result in a somewhat more unstable financial environment in 2018, it does not indicate that an environment of very low volatility causes upheaval in the future.

However, the hypothesis of the «volatility paradox» finds empirical support in a more refined analysis of the data. According to the 2018 study by Danielsson *et al.*,⁷ which analyses a long period of time and a wide range of countries (they have information for 60 countries and 211 years of history, with an average of 62 years per country), over the course of history, a persistent decline in volatility has foretold episodes of financial instability. Specifically, although they observe that the level of volatility does not in itself predict an upturn in financial tensions, they do find that persistent reductions in volatility below its recent trend tend to indicate financial tensions in the future. In particular, as shown in the third chart in which we present the main results of the study, the effect varies depending on the persistence of the environment of low volatility. For example, when volatility lies 1% below its trend for five years, the likelihood that this will lead to a financial crisis increases by 1.0%. Furthermore, the authors find evidence that long periods of low volatility induce excessive credit growth and an increase in leverage.

Consequences for growth

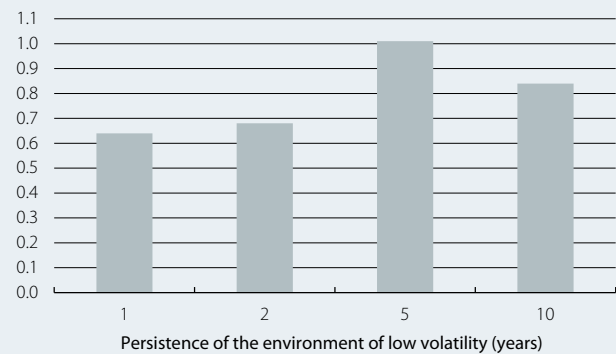
The relationship between the persistence of an environment of low volatility and future financial crises has parallels with the impact that an accommodative financial environment has on future economic growth. Specifically, although favourable for short-term growth,

7. J. Danielsson *et al.* (2018), «Learning from History: Volatility and Financial Crises», *The Review of Financial Studies*.

the prevalence of very lax financial conditions may have a negative impact on economic activity in the medium and long term. Following on from this, in the fourth chart we set out the results of a recent study by Adrian and co-authors,⁸ which analyses the consequences of a relaxation of the financial conditions on the future growth of the economy. Their analysis of the data indicates that, in the short term, easier financial conditions reduce the severity of a risk scenario. However, according to their results, the data also suggest that this may have a cost in the medium and long term: easier current financial conditions exacerbate the impact on growth of an adverse scenario, if one arises in the medium term. Therefore, it is important to avoid complacency in an accommodative financial environment and, especially at the current juncture, to remain alert to the risks associated with the process of normalisation of monetary policy and geopolitical tensions and trade.

Low volatility and financial instability

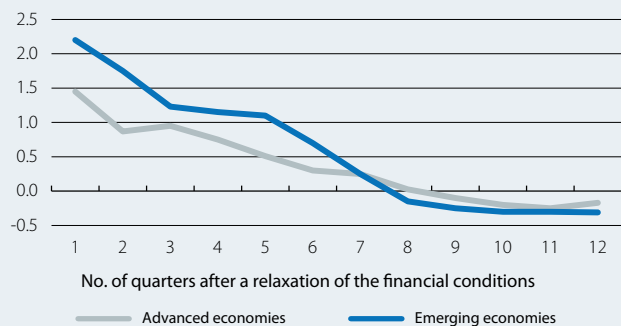
Increase in the likelihood of a banking crisis following a period of low volatility (%) *



Note: * Effect of a reduction of volatility of 1% below its average level.
Source: CaixaBank Research, with the calculations and estimates of J. Danielsson *et al.* (2018), «Learning from History: Volatility and Financial Crises», *The Review of Financial Studies*.

Impact on growth of a relaxation of the financial conditions *

(pps)



Note: * Impact on GDP growth in an adverse scenario with a 5% probability of occurrence. Positive values indicate that a relaxation in the financial conditions today increases the GDP growth forecast in the adverse scenario. Negative values indicate that the growth forecast in the adverse scenario decreases.
Source: CaixaBank Research, with the calculations and estimates of T. *et al.* (2018), «The Term Structure of Growth-at-Risk», *IMF Working Paper*.

8. T. Adrian *et al.* (2018), «The Term Structure of Growth-at-Risk», *IMF Working Paper*.