

## Can we predict market crashes and financial crises?

Sergio Focardi, PhD

If you were to ask an investment professional what his/her major preoccupation is right now, you would likely receive the following response: To be able to predict *when* stock markets will crash. This preoccupation is understandable. In the last 20 years, the U.S. stock market has twice hit historic highs only to be followed by steep losses.

Let's take a look at how the S&P 500 Index, widely regarded as representative of the U.S. stock market, performed over the last 20 years, starting with the most recent financial crisis. In the midst of the 2007-2009 market crash, the S&P 500 Index reached bottom at 682 in March 2009. Then the index grew steadily reaching an historic high just above 2,900 in September 2018. That is, in the space of slightly more than 8 years, the S&P 500 Index rose 400% or on average 20% per year for the period. Then the Index dropped to less than 2600 by December 2018 but recovered to above 2700 by February 2019

Now consider the six-year period from November 1994 to November 2000, a period often referred to as the dot.com bubble. During this period, the S&P 500 Index went from 460 to 1,432 – an increase of 305% or 20% per year. Then from November 2000 to March 2003, the Index fell 44% to 800, that is, the Index lost 23% per year for slightly more than two years. Thereafter, the valuation of the S&P 500 again rose rapidly, reaching 1,562 by August 2007 - an increase of 195% in three and a half years or 21% per year during the period. But the Index again fell - to 682 in March 2009 as mentioned above, losing 56% of its value in 20 months.

The SP500 index represents the market capitalization of 500 US firms. These large fluctuations of the SP500 capitalization, which represent some 80% of the global US stock market capitalization, cannot be entirely ascribed to changes in corporate profit. For example, between March 2009 and February 2019 total US corporate profit doubled while the index rose four times.

Understandably, asset managers are afraid that a new crisis is in the making. The crucial question, both theoretical and practical, is: Can we assess the evolution of the probability of major reversals of market trends? And can we assess the probability and the depth of an economic downturn following a sharp fall in stock market valuations? In other words, can we estimate the likelihood, the timing, and the impact of a financial crisis?

Mainstream academic thinking has paid little attention to these questions. The reason: The theoretical framework of current mainstream economics is based on three key notions: rational expectations, equilibrium, and optimization. That is, mainstream economic theory posits that economic agents endowed with rational expectations optimize their utility function - a quantitative representation of the ordering of their preferences - thereby maintaining the economy in a situation of dynamic equilibrium. Under current mainstream economic theory,

financial and economic crises are temporary phenomena due to unpredictable exogenous shocks. During a widely cited visit to the London School of Economics in November 2008, as some indexes were experiencing record-breaking drops, Queen Elisabeth II asked why economists had not predicted the crisis. The response: Crises cannot be predicted. In fact, even assessing the *probability* of a major market fall or an economic downturn requires a major conceptual overhaul of prevailing economic theory.

To understand how Economics needs to change, let's first clarify a few points starting with the notion of investment. In common parlance, people who buy stocks are likely to say that have made an investment from which they expect a return. And even in finance literature, people or firms who buy financial assets expecting a return are called investors. From the economic point of view, this is misleading in the sense that the purchase of a stock is simply the transfer of the property of the stock from one entity to another.

A firm might make an investment by buying new equipment or devoting resources to research. If this investment is financed by issuing new stocks, than the entity who buys the newly emitted stocks is making an investment. However, if the firm's investment is made with retained earnings, than the entity who purchases an existing stock is not making an investment in the economic sense.

The notion that exchanges allocate capital to the most productive entities is partially misleading. Exchange favor the circulation of capital and therefore help attracting capital to new genuine investments. However, purchasing stocks in itself is not an investment. If the demand for stocks exceeds the offer than the price of stocks will go up. When assessing the growth of market capitalization it is important to distinguish between growth really due to new investment from growth due to asset inflation.

To understand how the probability of a crisis can be assessed it is useful to start from the analysis of economic instability made by Hyman Minsky. Minsky's analysis begins with the observation that there are two price systems in any capitalistic economy: A price system for goods and services, based on the cost plus mark-up pricing rule, and a price system for financial assets, based on expected future cash flows.

Minsky's analysis assumes that industrial projects are financed by banks. Immediately after a crisis both banks and firms are conservative and undertake only safe projects. But progressively both banks and firms become more confident and begin to undertake riskier projects. Profit increases and so does the value of stocks. As long as credit is granted on the possibility of the debtor to repay the debt the economy is stable. However, as the economy grows and asset value increases we might reach the point where credit is given on the basis of future appreciation of assets and not on the ability of debtors to repay debts.

At this point the economy enters in a phase, that Minsky calls Ponzi financing, where crises are likely to happen. If debtors cannot repay debts assets are sold producing a negative price trend of

assets. As banks begin to worry and demand repayment of debts, more assets are sold starting a price spiral down that might become a true crisis.

In Minsky's framework we can assess the likelihood of crises by looking at the quality of credit, that is, by looking at the ability of debtors to repay debts. Consider the recent U.S. housing bubble, where both endogenous and exogenous factors were at work. As documented by Gjerstad and Smith (2014), over the nine-year period from 1997-2006, home prices were unconnected to income growth. According to their study, inflation-adjusted home prices were up 85% over the period, a 7.1% annual increase in excess of inflation. During the same nine-year period, median real household income grew by only 3.7%. Clearly disequilibrium was forming in the economy. Gjerstad and Smith link the housing bubble to the interplay between huge foreign investments in the U.S. stock market and the domestic expansion of credit to households in the form of mortgages.

Minsky's analysis has to be adapted to the current state of markets and economies in general. There are two key changes: 1) in aggregate firms do not borrow to finance their operations and 2) innovation is so rapid that in some sectors the notion of inflation is meaningless.

In modern economies, there are essentially three sources of new money: money created by commercial banks when some agent takes on a new loan, money created by the central bank when it prints banknotes and when it buys assets from non-bank, in/out flows of money from abroad. Now, the volume of banknotes is marginal and, therefore, banknotes can be ignored. As regards foreign investments, there are inflows as well as outflows as domestic agents invest in foreign markets. In terms of volume we can say that the balance of money flowing in and out of modern advanced economies is generally small, some 2-3% of GDP. Central banks began massive purchases of assets from non-bank with a procedure called Quantitative Easing – (QE) – immediately after the crises. As a first robust approximation, we can assume economies are closed and there are only two sources of new money: credit given by commercial banks and purchase of assets by central banks.

If credit is used only by firms to finance production, firms and therefore the capitalists who own the firms, can make a profit but no monetary profit. In fact, with this assumption, the amount of money that salaried people can spend is only less or equal to the amount of wages they receive. Firms do make profit as they produce more than salaried people can buy; this excess production is the profit of firms and capitalists. The extra production of goods and services not consumed by wage earners can either be consumed or invested, following the famous profit equation of Michael Kalecki:  $P=C+I$ . However, no monetary profit is possible and no accumulation of profit cash is possible.

However, in modern advanced economies, firms are net lenders not borrowers. The main borrower is the general public. In the US, for example, credit given to firms is only some 20% of total credit given by bank. The main source of borrowing is relative to financing homes and

private properties, followed by financing education, purchase of vehicles, and, increasingly, consumer items. Today, the general public is the main generator of money. Credit increases the purchasing power of the public and allows firms to make monetary profit. Firms no longer need to borrow to finance their operation as they can use their monetary profit.

With QE central banks injected a huge amount of money in the economy. In the US alone, the FED bought some 4.5 trillion dollars worth of asset, while the total amount of borrowing is approximately 10 trillion dollars. But this money did not reach the economy but remained confined in financial markets. It did not create profit but boosted the price of assets.

The monetary profit of firms is distributed to capitalists through dividends. This money is spent on consumption or in purchasing assets. After the 2007 crisis, monetary profit and QE were the main sources of asset price increase. At this point we could jump to the conclusion that the main causes of crisis seem to be excess borrowing with respect to salaries and the eventual unwinding of Quantitative Easing. For example, we can observe that the SP500 Index stopped growing and entered a highly volatile phase with a downward trend when the FED began to sell assets in 2018.

However, we need to delve a bit deeper in the process of profit generation. We observe that the widely used concept of a single measure of a global price level does not make sense in modern economies where we have segregated sub-economies and a high level of product complexity and innovation. Here we need a more fine-grained reading of inflation, indeed a vector of inflation rates, to reflect the different rates in different sectors of the economy. And there might indeed be sectors where measuring inflation is impossible as, for example, in the highly innovative or military sectors, or in sectors where a high price is perceived as a positive factor, as in the luxury goods sector or art markets. Money might remain largely confined to these sectors where inflation is not measured, and possibly cannot be measured, while the bulk of the economy experiences neither growth nor inflation. Such a scenario is likely now playing out in many Western economies.

More precisely, the most innovative sectors including those sectors, such as the art market and the luxury sector where the symbolic value of products is paramount, escape inflation measurement. Profit that originates in these sectors can increase without generating any measurable inflation. In these sectors, price increase is a positive feature of products and services. As price increase translates into profit increase there is a powerful incentive to innovate at any cost and increase price.

Firms tend to reduce cost by reducing salaries and by increasing automation and delocalization of production. People react by borrowing to maintain their lifestyle. Firms are not interested in the general ability of people to consume by spending wages. Firms are interested only in credit driven consumption that generates monetary profit. On the other hand, firms are interested in increasing that fraction of production financed by profit or, eventually, by central bank money.

Monetary profit and QE generate the extra cash that is used to purchase assets thus increasing asset prices.

Given this scenario, what are the critical elements that might lead to a crisis? Leaving aside long term risks, we can identify three critical elements:

First, excessive indebtedness of the general public. The public needs to borrow an increasing amount of money to maintain their purchasing power. With stagnant wages, it is only a matter of time for people to be unable to repay their loans. For instance, in the US delinquent education loans have already reached some 10% of the total. If the public stops borrowing and becomes incapable of repaying loans a deep crisis is almost inevitable.

Second, rewinding QE. This is a political problem, more than an economic problem. The idea that the state becomes a major shareholder runs against the ideology of truly capitalistic economies. But massive unwinding of QE would almost certainly bring a market crash of large proportions.

Third, the risk of a recession. Reducing salaries and more in general reducing cost in every possible way, might not reduce profit but at a certain point begins to be felt by the GDP. Thus far, economic growth has been concentrated in a small fraction of the population. But, if the trend to pauperize the economy with cost reduction, the gains of minority might be unable to compensate the losses of the economy at large. The GDP might start to decrease. This could rapidly become a serious political problem.

In the current situation, evaluating the risk of crisis implies looking at the indebtedness of the public in relationship to wages, assessing the likelihood of unwinding QE and, ultimately, looking at the risk of a recession. Could this have avoided the 2007 crisis? Yes, as discussed by Gjerstad and Smith looking at the ratios wages/property values would have given important clues that a crisis were forming. Today one has to look at a bigger picture of debt, profit, and wages. And all this in a very uncertain international situation.

It is significant that in his last letter to CEOs, the Chairman and CEO of Black Rock, Larry Fink, urges the CEOs of the firms in their portfolios to have a longer term view. The letter formulates a deep preoccupation for the increasing fragility of advanced economies and the need to reverse the current trend.

