Price bubbles – a central bank perspective

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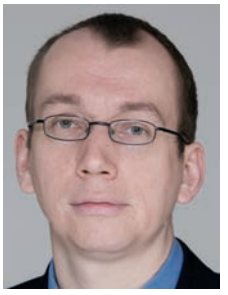
Recent discussions, in academia and among policymakers, have increasingly paid attention to price gyrations in the stock and housing markets. A major concern has been the connection between these price movements and both financial stability and real economic performance. A related concern has been whether – and if so, how – central banks should respond to wide fluctuations in asset values.

This article discusses price bubbles in the stock and housing markets, their effect on the economy, and their importance vis-à-vis the primary objectives of central banks. In addition, we briefly introduce a method that was developed at the Bank of Finland as an aid to identifying and predicting overshooting in asset prices.



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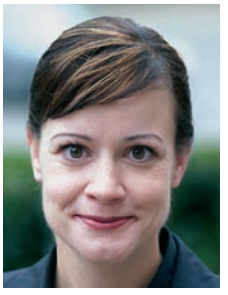

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What is a price bubble?

A bubble in the price of an asset (eg a share of stock) may refer to a number of phenomena. In the broadest sense, it may refer to the uncertainty associated with rapid economic growth (bubble economy) accompanied by an asset price bubble. A price bubble may also be a situation wherein it is observed, ex post, that asset prices diverge from the essential features (fundamentals) of the real economy, ie economic agents' price expectations turn out to be wrong in light of the fundamentals, perhaps because the agents' expectations of fundamentals were wrong. On the other hand, it may be the case that the market price of an asset has – for other reasons such as demand pressure – diverted from its reasonably expected (fundamentals-based) price, which leads to a more general asset price bubble. It is in the latter sense – rooted in economic theory – that we use the term in this article.

The most challenging aspect of detecting a price bubble is to determine the appropriate price level vis-à-vis the fundamentals. Generally, the answer has been sought via a pricing model in which all expected cash streams associated with an asset are discounted to the present time to obtain the asset's present value. Any market price that differs from its present value is then considered to contain a bubble. The problem with this approach is in determining the expectations. An expected cash stream is determined by the asset's price, and it is not easy in practice to distinguish between realistic and unrealistic expectations. Thus it is not possible to identify a bubble with complete certainty.

Despite the problems in identifying a bubble, history includes numerous examples of sharp rises in asset prices that have been, ex post, widely agreed to reflect bubbles. As an early example, we could cite the Netherlands' 'tulipmania' of the 1630s. Other examples include the strong rise in US equity prices that ended in 1929 and recent history's 'high-tech bubble' of the late 1990s,

which saw soaring share prices of ICT companies in particular, because of excessive growth expectations.

What is the significance of a price bubble for the central bank?

Today, most central banks have two primary objectives: to provide a favourable environment for economic growth by maintaining price stability and to promote financial stability. Thus, a matter of prime concern to a central bank is exactly how a rise – or bubble – in asset prices will impact on those two objectives. There are numerous channels for such effects, and these relate to activation of the economy by economic agents, mainly via-à-vis investment and consumption in response to an expanding bubble.

A bubble in share prices will encourage companies to issue additional shares. Share issues improve a company's financial position and provide incentive for new investments. A rise in asset prices will also increase the value of companies' and households' loan collateral and thus enable new, and larger, borrowings (the collateral effect). This in turn stimulates the economy's aggregate investment and consumption. The household asset and liquidity effects are particularly important for private consumption. The asset effect boosts household consumption because their wealth is increased by the bubble. The liquidity effect relates to the increased value of households' financial assets such as shares. In dire straits, a household will find it easier to sell a liquid asset than an illiquid one such as a dwelling, so that a rise in the value of liquid assets may be perceived by households as a reduction in the uncertainty surrounding their future financial positions. This would boost consumption.

Looking at how the above-mentioned effects are reflected in the economy and what is important for the operations of the central bank, attention is generally focused on three aspects of economic performance: allocation of economic resources, inflation and financial stability.

Via its various effects, a bubble can have a notable impact on the allocation of the economy's resources. During a bubble period, companies' investments may be channelled to sectors where expectations of future cash flows – and hence investment returns – are unrealistic. At the same time, investments that would allocate resources more efficiently may not be realised. A bubble may also boost household consumption too much, in light of actual income flows. When a bubble eventually bursts, the resulting changes in the growth of consumption and investment may be huge. For instance, the bursting of the high-tech bubble in the late 1990s is often ranked as the prime cause of the investment slump in the United States.

A bubble may also be important in terms of inflation. One can conceive of a situation wherein the formation of a bubble and a more

general rise in asset prices leads to an increase in demand while productive capacity remains unchanged. In this way a bubble may portend a shrinkage of available productive resources and hence an acceleration of inflation. However, studies in this area are not of one mind as to whether this is an accurate scenario.[1]

The connection between bubbles and financial stability relates to the above-mentioned collateral effect.[2] Asset price changes associated with a bubble make it easier for both households and companies to go into debt because financing becomes easier to obtain as collateral values rise. Financial stability will be threatened if the wealth increase and related lending decisions are based on unrealistically inflated prices and collateral values. Equally important is the banks' financial position in the event of the bubble bursting. If the banks' balance sheets are strong, they may be well equipped to withstand the inevitable price corrections. If this is not the case, a bubble burst could significantly destabilise the banking system and pose a threat of banking crisis and – in the case of a bank-centred financial system – a credit crunch.

How should the central bank react to a price bubble?

In recent years a much-discussed topic has been whether central banks should react to big movements in asset prices and, if so, how. Some discussants feel that the central bank should not react at all to these changes while, at the other end of the spectrum, it is argued that the level of asset prices should be part of the central bank's inflation objective. Frequently, opinions on the optimal behaviour of a central bank will vary according to whether a price rise is based on a bubble. But the central bank faces the immediate problem of deciding whether a bubble is actually present; if this is the case, the central bank must then determine its size. A third problem is how the monetary policy tool (policy interest rate) should be used to eliminate the bubble.

Because of the big problems related to defining and dealing with a bubble, the prevailing policy stance of central banks regarding bubbles is passiveness. Accordingly, a central bank will not react directly to a rise in asset prices. Instead, it will wait until the bubble bursts and then deal with the aftermath. There are several arguments for such passiveness.[3] The central bank does not have any information that eg the stock markets would not take into account in pricing shares. Thus it is impossible to know how big an error is contained in share prices, for example. This renders it impossible to actively intervene in the market with precise policy actions. A policy over-

[1] Eg Filardo (2000) found evidence of its forecasting power.

[2] This has been studied by eg Bean (2004).

[3] See eg Bernanke and Gertler (2001).

reaction could induce a sizable correction of asset prices and cause a sharp slowdown of the economy. Moreover, the danger of overreaction may also increase as the bubble expands because the scale of required actions is greater after a bubble burst than before. Further, a badly timed monetary tightening could magnify the effects of a bubble burst because monetary policy actions take a long time to affect the economy.

On the other hand, the impact of a bubble via the above channels could be huge, so there is some basis for active policies. In the academic literature on optimal central bank policy, opinions regarding active versus passive policy are sharply divided. Those who favour active policy argue that the central bank should tighten its monetary policy if it is shown that asset prices are rising too fast.[4] But opinions vary as to the magnitude and timing of such a tightening. One view is that any monetary tightening during the formation of a bubble should be modest, because an overreaction could virtually halt economic growth but still not abort the birth of the bubble. On the other hand, one can argue that a pronounced tightening in the early stage of a bubble is necessary in order to minimise the negative impact of a bubble burst on economic growth.

The main problem regarding an active policy regime is the great difficulty of identifying a bubble. For this reason, numerous studies in the area have attempted to develop a variety of bubble indicators. While the need for such indicators is large, developing them has proven to be a huge challenge.

How can we spot a price bubble?

Many ways of spotting a bubble have been proposed. Some of these are based on movements in key stock market numbers, or ratios between stock and bond markets. Other, somewhat more technical, approaches employ econometric methodology. The most attractive approaches to testing for the presence of bubbles at present are those methods that try to measure changes in asset price levels relative to values based on fundamentals.

An indicator based on econometric methodology has also been developed at the Bank of Finland[5], one that produces frequently updated measures of the level of asset prices. The indicator is used to examine a rolling time-window of data on changes in the relation between asset yields (eg dividends) and prices over at least the past three years. Developments in the ratios are more extensively analysed via time series analysis and unit root tests. The

[4] This view is expressed in eg Cecchetti et al (2000).

These situations often involve the 'moral hazard' problem, ie that agents' risk-taking may increase during a boom if it is clear ex ante that the central bank will act to prevent the onset of a bubble or to resolve the problems of the aftermath.

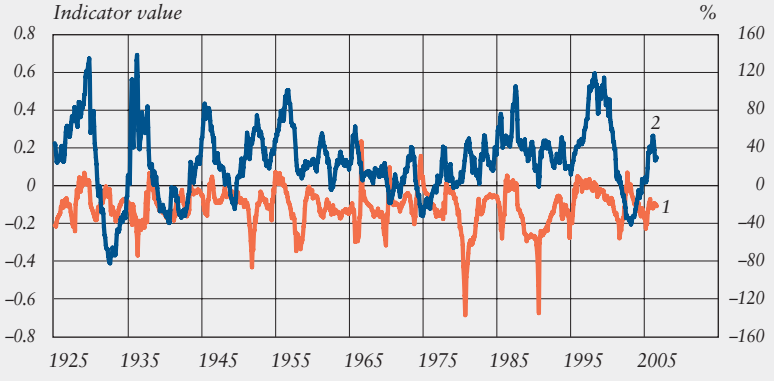
[5] Taipalus (2006).

basic idea behind this methodology is simple: over a certain time period, dividends and share prices cannot differ too much from each other. If they do, and eg share prices rise faster than dividends, the indicator will signal the presence of a bubble.

When the indicator is applied to the US stock markets for the period 1871–2004, it works quite well and is able to identify almost all the significant positive and negative deviations of share prices from the normal level. In Chart 1 the bubble signals show up as indicator values exceeding zero. This happened many times in the late 1990s whereas, according to the indicator, the US stock market is not currently in a bubble situation. The same can be said for the Finnish stock market (Chart 2). Testing the housing

Chart 1.

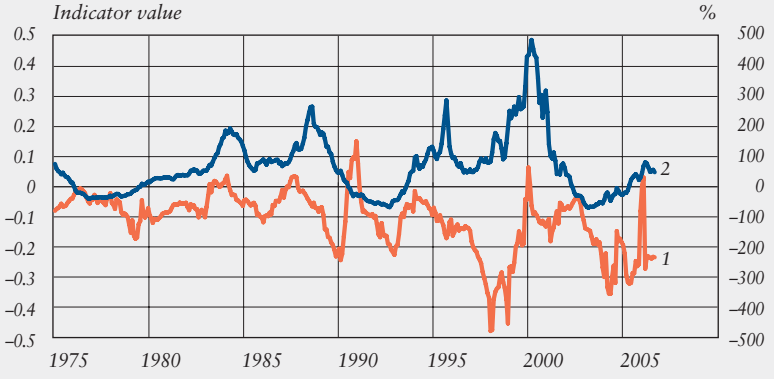
Identified bubbles in US stock market, 1925–2006



1. Bubble indicator: 3-year rolling time periods
2. Price index: 3-year change
Sources: Global Financial Data, Bloomberg, Robert Shiller and Bank of Finland.

Chart 2.

Identified bubbles in Finnish stock market, 1925–2006



1. Bubble indicator: 3-year rolling time periods
2. Price index: 3-year change
Sources: Global Financial Data, Bloomberg, Helsinki Stock Exchange and Bank of Finland.

markets is especially difficult because in many countries rent controls are or have been applied, whereas the indicator method requires market-determined rents. Overall, the indicator seems to offer one option for trying to identify asset price bubbles, albeit further testing is needed.

The problem with bubble indicators is that they can at best pinpoint the timing and calculate the probabilities of bubbles, but they will hardly ever give the magnitude of a pricing error. This type of indicator is used to best advantage if its information output is examined in conjunction with a variety of economic-performance indicators. In this connection, what is crucial for the central bank is that it be on the alert for a conjunction of simultaneous signals of instability in different segments of the economy. This means that the central bank should monitor indicators for the different segments of the economy, coalesce the pieces of information, and consider case-by-case exactly what problems might ensue if instabilities do develop. Only in this way will it be possible for the central bank to choose appropriately from its set of alternative actions.

Keywords: bubbles, asset prices, monetary policy, financial stability

References

Bean, C R (2004), Asset Prices, Financial Stability, and Monetary Policy. AEA Papers and Proceedings, Vol. 94, No. 2.

Bernanke, B S and Gertler, M (2001), Should Central Banks Respond to Movements in Asset Prices? American Economic Review, Vol. 91, No. 2.

Cecchetti, S – Genberg, H – Lipsky, J – Wadhwani, S (2000) Asset Prices and Central Bank Policy. Geneva Reports on the World Economy 2. CEPR and ICMB.

Filardo, A J (2000) Monetary Policy and Asset Prices. Federal Reserve Bank of Kansas City Economic Review. Third Quarter.

Taipalus, K (2006) Bubbles in the Finnish and US equities markets. Bank of Finland Studies E:35.