Discussion

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Introduction

This discussion raises five questions. First, what are the questions that policy-makers are posing to economic historians about asset-price inflation and monetary policy? Second, what is the relationship between medium-term equity price inflation and higher frequency equity price volatility? Third, what can be said of the relationship of such volatility to monetary volatility? Fourth, how should we conceive of financial openness to the rest of the world: as a cause of equity volatility or as a propagating mechanism? Finally, what sort of answer did the evidence marshalled by the historian of land prices in Chicago offer to the question of the connection between monetary policy regime and asset-price inflation?

What are the questions?

What do policy-makers want from the economic historian on this subject? They want answers to the following questions:

1.   Does the successful stabilisation of consumer prices imply that asset inflation and associated credit excesses are less likely?

2.   Or should asset inflation and credit excess be expected to appear more or less without regard to the monetary regime?

3.   Or should we expect asset inflation to be a bigger or more frequent problem in a regime of stable prices or in the transition thereto?

In arguing for the benefits of lower inflation, central bankers tended to promise greater financial stability, as if only highly variable nominal returns (or tax distortions) under inflation caused inflation of real assets like equities or real estate. More recently, the thought that low inflation is no proof against asset inflation and associated credit excesses has gained acceptance.[2] Now, some observers have begun to argue that low inflation can actually make asset inflation more likely or worse.

In this conference, Charles Bean noted that the credibility of a low-inflation policy can reduce the transmission of asset prices into consumer prices, allowing potentially hazardous imbalances to build up without producing a ready justification to respond

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to them under a policy of inflation targeting (Bean, this volume).[3] Another argument is that falling inflation interacts with money illusion to make asset inflation more likely. In the equity market, the Modigliani-Cohn effect means that lower inflation provides a spurious fillip to profit growth as nominal interest rates fall in response to lower inflation.[4] In the real estate market, standard housing affordability criteria (such as monthly mortgage servicing in relation to income) hard-wire money illusion. In particular, lower (nominal but not real) interest payments from lower inflation put home purchase within reach of households further down the income scale.

What's vol got to do with it?

It is easy both to overstate and to neglect the relationship between asset inflation and asset-price volatility. Asset inflation, sometimes referred to as asset-price misalignment, is something like a medium-term deviation from trend, and can be measured by something like an integral. Associated extension of credit cumulates into a stock that gets large in relation to underlying income. Volatility, as traded in the market and measured by economists, is a summary measure of the (*ex ante* or *ex post*) change over some short period in price or return (BIS 1996). Volatility ignores the sign of movements, while asset inflation or deflation requires the predominance of one sign over a sustained period. In principle, asset-price inflation does not imply high volatility nor does high volatility imply asset-price inflation. The former can be of first order macroeconomic importance, as high equity prices boost consumption and investment. In contrast, the effect of volatility, taken in isolation, is typically hard to detect.

In practice, Black (1976) and later Christie (1982) found that volatility is 'directional', that is, tends to be higher in down markets. The implication is that volatility can be moderate in the period of asset inflation but tends to be higher in a period of asset deflation.[5] Why this is so is not well understood. Black proposed a 'leverage effect': a lower share price puts the value of the firm closer to the put to the creditors, raising the option element in share prices and thereby making them more volatile. But Borio and McCauley (1996) found higher volatility in bond market sell-offs, as seen most recently in June–July 2003, which cannot have the same explanation. Instead, we suggested that leverage at the level of the holder of the security, whether banks, securities firms or hedge funds, forced stop-loss sales into declining markets.

The implication of the distinction between asset inflation and volatility is that Eichengreen and Tong are not really addressing the questions in which policy-makers are primarily interested. In particular, findings that monetary volatility or financial

3.   See also Borio and Lowe (2002) and Kent and Lowe (1997).

4.   See McCauley, Ruud and Iacono (1999, pp 215–219) for estimates of the portion of profit growth in the US in the late 1990s that derived from the Modigliani-Cohn effect. See Shiller (2000, pp 36–39) for a discussion.

5.   This means that short-term measures of financial risk, like value-at-risk, can misleadingly signal low risk at the top, when risk is highest.

openness are associated with somewhat higher volatility do not move forward a discussion that involves, not marginal if statistically significant differences in volatility, but rather sustained asset inflation and deflation.

The implication of the directionality of volatility is that the estimation of the latent variable of volatility in the paper could in all likelihood be improved. Technically, this latent variable is estimated as a moving average of squared errors from a (poor) model of price movements – so that, in practice, volatility is a moving average of squared returns. The latent measure of volatility should be allowed to be greater in response to downward price movements ('bad news') than to price rises ('good news'), as in Nelson (1991), Glosten, Jagannathan and Runkle (1993) and Hentschel (1995). A dummy for negative returns interacted with the (squared) return would probably work as well as anything.

What is the relationship between equity volatility and monetary volatility?

Eichengreen and Tong find that monetary volatility is associated with equity volatility across their sample of now-industrialised countries. It is, however, not clear whether this relationship should be read right to left or left to right. Looking just at the US, Wilson, Sylla and Jones (1990) argue reverse causation, from stock market crashes to monetary panics, especially in 1893 and 1907. Most recently, the Federal Reserve put aside its characteristic gradualism in 2001 in responding to a shallow recession but a large loss of stock market wealth.

Eichengreen and Tong find lower volatility under fixed exchange rates, contrary to the widely held 'ball of volatility' notion – you can hold down volatility in one market but it only rises in another. This finding contrasts with that of Eichengreen and Mitchener (2003), who observe that 'the amplitude of credit booms as measured by the standard deviation was greater in periods when exchange rates were pegged than when they were floating'.

Have the authors measured monetary volatility in a satisfactory manner? Almost surely their measure of money is not consistent across time or across countries. At the same time, it is not clear that a consistent measure is desirable or practical given the financial innovation that can make a narrower aggregate less stable or useful than a broader aggregate. The authors could test for robustness using short-term interest rate volatility where possible, although the results of Wilson *et al* (1990) are not encouraging.

Financial openness: cause or propagating mechanism?

The authors treat financial openness as a factor additional to monetary volatility as a potential explanation for equity price volatility. Clearly, financial openness allowed the 1987 crash, for instance, to spread to continental Europe, even though prices of German stocks had not shared in much of the rise in US or UK stocks. But did financial openness explain the volatility of German stocks? Or did financial openness permit volatility to be communicated from New York to Frankfurt? To take

another example, most of the recent bond market sell-off was transmitted from the US dollar market to the euro and Australian dollar bond markets. Again, financial openness permitted propagation. But some explanation (e.g. interaction of a revised outlook for monetary policy and leverage in mortgage holdings and elsewhere) is needed to explain the sell-off and accompanying volatility in the US.

What did Homer Hoyt find regarding asset inflation and monetary regime?

Writing 70 years ago, Homer Hoyt found that there had been five major peaks in land prices in Chicago. He found that some, but not all, of these had followed (or in the case of the 1920s, preceded) equity price peaks, and that conversely, some, but not all, equity price peaks had been associated with peaks in land prices.[6] Hoyt's asset-price cycles span gold standard, floating exchange rates and gold exchange standard. They also span wildcat banking and the *National Bank Act*, as well as a long span with no proper central bank and a shorter span after the founding of the Federal Reserve. The post-Bretton Woods combination of floating exchange rates and an activist Federal Reserve has featured further episodes of real estate booms in Chicago and national equity booms. Prima facie, it seems that asset-price inflation is a hardy plant that can grow in very different climates.

Table 1: Hoyt on US Asset-price Inflation over 100 years

Land peak	1836	1856	1873	1892	1925	
Equity peak	1835 (−50.6%)	1853 (−50.6%)		1881 (−26.7%)	1906 (−19.4%)	1929 (−73.4%)

Note: Declines in parentheses are peak-to-trough movements in stock prices as reported by Bordo in Eichengreen and Mitchener (2003, p 85).

Source: Hoyt (1933)

Conclusions

Eichengreen and Tong have made an important contribution to the study of long-term equity price volatility. Policy-makers will continue to look for guidance from economic historians on the connection between monetary regimes and policy, on the one hand, and asset-price inflation, on the other.

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6.   See BIS (2003, pp 116–119) for evidence on the lag between equity price peak and housing price peak.

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2. General Discussion

A number of conference participants raised issues about the statistical methodology of Eichengreen and Tong's paper. One participant noted that in general it is difficult

to measure volatility, as statistical measures will tend to be dominated by large, one-off events, such as the Great Depression or the 1987 stock market crash. The participant suggested that when these events are removed the pattern of the level of volatility in the stock market may look substantially different. In addition, it was also raised that there is a conceptual issue as to whether it was appropriate to treat these one-off events as volatility, rather than as shifts in the level of share prices. Another participant wondered whether a methodology of starting with a higher-order polynomial and then paring down the insignificant powers would still have yielded the 'u' or 'n' shape found for volatility in most countries. Two participants suggested that, rather than treating each country separately, it might have been interesting to use panel-regression techniques, as this would have captured the effects of common (global) shocks.

There was also comment about the use of monetary aggregates to measure the stance and conduct of monetary policy in the paper, as changes in the financial intermediation process have caused the relationship between monetary aggregates and the real economy to change over time. In response, Eichengreen agreed that monetary aggregates were an imperfect measure, however he argued that it was difficult to obtain consistent historical series of interest rates for all of the countries.

Much of the discussion focused on possible other variables that might explain the observed pattern of equity market volatility. One participant noted that over the second half of the 20th century there was a considerable decline in the volatility of the real economy for the G7 countries, however, only financial variables had been considered in this paper. The size of financial markets relative to the real economy was also suggested as a possible explanatory variable. Some participants thought that differences in the level of equity market volatility across countries could in part reflect differences in financial and legal structures, and the consequent variation in the extent of reliance on equity financing by businesses.

Focusing on the Australian stock market, a factor raised as a possible explanation for the decrease in equity market volatility over the past two decades was the change in industrial composition that has occurred. The example cited was the considerably lower weight of resource stocks in the overall market today. This could have led to lower volatility as the prices of resource stocks tend to be more volatile than the broader market as they are heavily influenced by fluctuations in global commodity prices. Another factor cited as possibly contributing to the decline of volatility was the process of financial deregulation that occurred in the early 1980s.

The question of whether asset-price misalignments were more common during periods of low and stable inflation was also discussed. Some participants questioned the tentative conclusion reached by Eichengreen and Tong that the adoption of inflation targeting may have caused the decrease in equity market volatility observed in Australia. They noted that decreases in volatility were not reflected in the results for other countries that had also followed inflation targeting (or pseudo inflation targeting). It was also noted that historically, asset-price misalignments have frequently occurred in times of low inflation (or deflation), such as during the 1920s in the United States, the 1880s in Victoria and the 1980s in Japan.