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Laurence H. Meyer

This is a topic of very special interest to me as I served on the Federal Open Market Committee (FOMC) during the period the equity bubble was building. As the bubble was emerging, I was operating along the lines of what I have come to call the "indirect approach" to monetary policy, an approach that Greenspan clearly encouraged at the time and later defended vigorously and an approach that Ben Bernanke provided intellectual support for in a paper written before he became a governor and then chairman of the Fed (Greenspan 2002; Bernanke 2002).

According to the indirect approach, monetary policy should be adjusted only in response to changes in output gaps or inflation—current or prospective—and, therefore, should not directly respond to any other variables, including equity prices, housing prices, or exchange rates.

I have to admit, however, that the experience with the indirect approach in the second half of the 1990s did not turn out entirely well, though the Fed did very effectively execute what Alan Blinder has called the "mopping up" strategy: being alert to the possibility that a possible asset bubble will abruptly correct and quickly adjusting policy in the case of a discontinuous adjustment to maintain aggregate demand (Blinder and Reis 2005).

But with the benefit of hindsight, I look back at that experience and wonder whether monetary policy could have been better managed to mitigate the risks to future macroeconomic performance associated with an emerging equity bubble. I admit that today I still do not know the answer to that question, but my greatest regret about my time on the FOMC is how little time we as a committee devoted to thinking about the appropriate monetary policy response to the suspected equity bubble. So I appreciate

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that this conference gives me another opportunity to think about the experience and ask whether there is some approach beyond the indirect one that might have improved macroeconomic outcomes.

I start by identifying the three basic approaches to responding to a suspicion of an emerging equity bubble: the indirect approach, pricking the bubble, and an intermediate approach, sometimes referred to as "leaning against the bubble." I want to explore the meaning and case for the intermediate approach and then consider another way of potentially leaning against an emerging asset bubble—not through the adjustment of the policy rate, but through Fed communication.

Direct and Indirect Approaches

The indirect approach is actually a broader vision for monetary policy that implies policymakers should ignore more than just asset prices in setting policy. This approach, summarized well by the Taylor rule and its successors, holds that monetary policymakers should adjust policy in relation to actual or forecasted changes in output gaps and inflation, period. They should not respond directly to any other variables, be they asset prices or anything else. The beauty of the indirect approach in the context of today's conference is that monetary policy is driven to indirectly lean against asset bubbles by following this strategy, at least to the extent that the rise in asset prices strengthens aggregate demand and, hence, growth; raises output gaps; and increases the risk of higher inflation. But any move to tighter policy in this case should be in proportion to the increase in actual or prospective output gaps and inflation, not calibrated to bring about a given adjustment in asset prices themselves.

An alternative approach that deviates from these restraints is one that involves a direct response of monetary policy to asset prices, on top of the traditional focus on output gaps and inflation. Specifically, it allows for monetary policy to tighten by more than would be justified by output gaps and inflation when asset prices appear to be moving well beyond their fundamental value.

In principle, the direct approach does not call on the Fed to target asset prices, only to respond to asset price movements in the setting of its policy rate. But if we introduce this direct response into a Taylor rule, we would presumably do so by adding a response of the policy rate to the gap between prevailing asset prices and their estimated fair value. From the perspective of the Taylor rule, in this case, it appears that the Fed would be targeting asset prices every bit as much as it would be targeting a preferred inflation rate and the Fed's estimate of the economy's natural rate of unemployment. But perhaps the better way of viewing such an expanded Taylor rule is that it allows for a trade-off between improving the near-term macro performance by responding to changes in prevailing or near-term

expected levels of the output gap and inflation and protecting against the possibility of unfavorable macro outcomes later in the event of the abrupt correction of a significant equity bubble.

The direct approach itself comes in two forms. The boldest version calls for the use of monetary policy to prick an equity bubble. One could interpret this as a directive for the central bank to tighten until it appeared that asset prices are moving back to their fundamental value. There appear to be very few, if any, observers of bubbles that argue for this direction. Instead, there is more support for a milder version—and this is what I refer to by "leaning against the bubble"—that calls on monetary policymakers to tighten modestly more than could be justified by movements in output gaps and inflation in the face of a suspected emergence of an equity bubble. This is the approach captured by the modified Taylor rule discussed in the preceding.

Why the Indirect Approach Didn't Work

As I noted in the preceding, the indirect approach itself is intended to lean against equity bubbles. But, in fact, the FOMC, despite following this approach, did not tighten during most of the period in second half of the 1990s when equity prices were soaring and when the wealth effect triggered by rising equity values was powerfully boosting consumer spending. What went wrong?

First, the productivity acceleration was providing a disinflationary impetus to the economy at the same time it was boosting profits and the expected growth rate of earnings. Meeting after meeting, Greenspan would warn that above trend growth and tightening labor markets were signaling possible inflationary pressures ahead, and we should, therefore, be alert to the need to tighten—but not yet, not while core inflation was itself actually declining, especially when we didn't fully understand why.

In effect, even though may of us on the Committee saw ourselves as following an indirect approach, the policy response that otherwise would have been expected from that approach was short-circuited by Chairman Greenspan's perception of a structural break in productivity growth. There is little doubt now that the productivity break did occur and that Greenspan was well out in front of both the Committee and the Fed staff in detecting it. Nevertheless, with the benefit of hindsight, I wonder today whether the resulting policy path was the best for the economy—and, more specifically, whether policy lingered at too low of a funds rate over most of 1999, when equity prices were soaring.

Second, while the FOMC nevertheless thought about tightening on a number of occasions during this period, it was pulled back again and again by some external shock—the Asian financial crisis spreading to Korea, for example, and later the global financial turbulence of the fall of 1998, culmi-

nating with the implosion of Long-Term Capital Management (LTCM). Indeed, in the end, the FOMC eased in the fall of 1998 rather than tightened, and perhaps not surprisingly, the equity market really blew out in 1999.

The question this experience raises is whether there are conditions under which the indirect approach is destined to fail to lean against emerging bubbles (for example, during a period of a productivity acceleration) or whether the problem is simply that the indirect approach was not really executed during this period.

The "Leaning against the Bubble" Approach

Maybe, and quite likely, the indirect approach is the best we can do, and we simply have to accept that occasionally we will have periods of speculative excess that will impart some instability to the real economy. But we should at least be open-minded and indeed actively search for a better approach. In that spirit, let me offer a few thoughts on the "leaning against the bubble" approach described in the preceding.

Broadening the Indirect Approach

It seems to me that the indirect approach is often defined too narrowly. The case for leaning against an asset bubble is not some fetish about keeping asset prices close to some measure of fundamental value, but concern with the consequences for broader macroeconomic performance should an asset bubble emerge and then correct discontinuously (as is typically the case for an equity bubble). In a forward-looking approach to monetary policy—one in which monetary policy is set in light of the forecast for output gaps and inflation—the indirect approach in principle is consistent with policymakers taking into account the potential risk to future macroeconomic performance from an emerging equity bubble.

The issue here is that policy response dictated by the indirect view seems to depend importantly on the horizon employed. Consider, for example, monetary policy during a period of rapidly escalating equity prices to levels that the central bank saw as unwarranted by fundamentals. Does the indirect approach consider the effect of equity prices on output today, or in a year, or in two years? Would the magnitude of the policy response increase the longer the horizon considered in the policy rule?

The broader view focuses on the trade-off between less favorable economic performance in the near term from leaning against a bubble and more favorable economic performance later as a result of avoiding or mitigating the adverse effects of the eventual asset market correction. In this sense, leaning against the bubble really should be classified as part of the indirect approach—just one that takes into consideration the entire future path of output and inflation, rather than their values today or in the near-term future.

Risk management and Erring on the Side of Restraint

Another way to think about "leaning against the bubble" is the risk management approach. That is, given the asymmetric downside risks some time in the future associated with a likely correction of an emerging bubble, is there a case for tightening more than would otherwise be appropriate to mitigate the size of the bubble and, therefore, the eventual downside shock to the economy? This seems very much in the spirit of the risk management approach, taking out insurance against some high cost but low probability event. Actually, in this case, at least after some point, it seems like taking out insurance against a high cost and not so low possibility event, but one whose timing and severity is still highly uncertain.

The risk management approach suggests that monetary policy should "err on the side of restraint" when there is a suspicion of an emerging equity bubble. I think back to the experience in the second half of the 1990s. Meeting after meeting we would talk about the possibility of tightening but, most of the time, pull back. In the case of suspicion of an emerging bubble, perhaps the tie should always go to tighter policy.

Bernanke, while ultimately concluding that the indirect approach is the best that central bankers can do in practice, nevertheless has offered a rather sympathetic discussion of the "leaning against the bubble" option (Bernanke 2002). He says that doing so would be analogous to taking out insurance against the destabilizing effects of the emergence and ultimate popping of the bubble. And then he goes on to note that the optimal degree of insurance is rarely zero. However, he concludes that such an approach, while plausible in principle, is not likely to be effective in practice, because a moderate "lean" would have little effect on any asset bubble. That is at least the question, if not the answer.

Bernanke's position on leaning against a bubble quite dramatically highlights the theme of this conference, the two-way relationship between monetary policy and asset prices—that is, not only how monetary policy should respond to asset prices, but also how asset prices respond to monetary policy. Bernanke's argument about the practical limits of leaning against the bubble suggests that the two sides of this interrelation may be importantly related. Specifically, the intermediate approach is more likely to be effective if monetary policy has a relatively large effect on equity prices (or housing prices) relative to its effect on broader aggregate demand. Because Bernanke's reading of the impact of monetary policy on equity prices is that the effect is surprisingly small, this feeds into his conclusion that leaning against a bubble is unlikely to be effective in practice.

The risk management approach, of course, is very much about taking insurance against asymmetric risks. In the case of asset price movements, the risks seem much greater when asset prices are above than when they are below a level consistent with fundamentals. If this is the case, there is a

powerful asymmetry in the response to asset price movements that is not captured in the simple expanded Taylor rule discussed in the preceding.

Asset markets seem asymmetric in the sense that asset prices seem more likely to rise smoothly and, beginning from a point of significant overvaluation, to collapse more abruptly. In this case, the risk management approach would be more relevant to a case when asset prices were above fundamentals than when asset prices were below fundamentals.

The risk management approach might also call for a nonlinear response to an emerging asset bubble. When asset prices are only modestly above fair value, given the uncertainty in the estimate of fair value, policymakers might not want to respond at all. But beyond some threshold, a response could be called for and one that gets disproportionately greater in response to the divergence from fair value.

Challenges to Going beyond the Indirect Approach

There are to be sure a number of daunting challenges that confront any strategy that tries to move beyond the narrow indirect approach.

First, there is the so-called identification problem, the difficulty in identifying in real time whether there really is a bubble, given the limits of our knowledge of the determinants of fair value. This may be more relevant, however, to how quickly it makes sense to take an emerging asset bubble into account. But I doubt that this consideration should have made policymakers cautious in concluding that that equities were materially over valued when the price-earnings (P-E) ratio (for the S&P 500, based on lagged earnings) got to 25, and they should have been still less cautious about reaching such a conclusion when the P-E ratio passed 30, and perhaps there should have been no question at all when the P-E ratio surpassed 40. The identification problem sometimes seems to be thrown out as an excuse for not acting, reflecting a false sense of humility about what we know. There really are some things we do know!

Second, and related to the first challenge, if it is difficult to respond early in the process of an emerging bubble, perhaps all the Fed will do if it responds late in the process is put its fingerprints on the inevitable correction. Doing so would appear to put the Fed in the "wealth destruction" business, not a good place for a central bank to be.

Third, as reflected in Bernanke's views, there is some question about the relative effect of a rising policy rate on asset prices (especially at a time when the latter are being driven by speculative frenzy) relative to the effect more broadly on aggregate demand. The argument here is that it would take such a large increase in interest rates to blunt an asset bubble that moving in this direction would almost certainly produce very adverse macroeconomic outcomes. This is a possibility, but the case here is hardly definitive and is worth exploring further.

Fourth, even if we believe there might be an equity bubble and that this

might pose a risk to future macro performance, this recognition is not likely to be very helpful in pinpointing when or how discontinuously the bubble might burst. That is, the suspicion of an emerging bubble is simply not very useful for near-term forecasting. The trade-off is, as a result, between the high probability of less favorable performance in the near term against the possibility that there might be more favorable economic performance at some unspecified point in the future, perhaps outside the policy horizon of the central bank.

Fifth, the appropriate policy response has to depend on the assumption about the bubble process going forward. If the bubble were assumed to continue to escalate, then presumably the policy response would be considerably larger even under the indirect approach. If it were assumed to quickly pop, the indirect approach might advocate no response at all, or even an easier policy stance. The lack of understanding of bubble dynamics makes it very difficult to operationalize the broader vision of the indirect approach developed in the preceding.

Sixth, the fact that the emergence of the equity bubble initially strengthens aggregate demand while the ultimate correction will potentially seriously undermine aggregate demand further increases the challenge to monetary policymakers. Indeed, it raises a question about the merits of raising interest rates to mitigate the risks to future macro performance of an emerging equity bubble. If the policy response comes too late in the speculative cycle, it could precipitate and indeed reinforce the adverse effect on aggregate demand of the bursting of the bubble.

Fed Communication: A Tool for Addressing Bubbles

While I have tried to open up the discussion of moving beyond the narrow indirect approach, I have not definitively made the case for doing so. I did the best I could. But given the challenges associated with using the policy rate for combating a bubble, perhaps we should look for other vehicles.

It seems to me that there may also be an important and mostly unexploited role for Fed communication in leaning against emerging bubbles. When we think of Fed communication in the context of suspected bubbles, we usually focus on comments by a Fed chairman directly raising the possibility that asset prices may be overvalued. The most famous of these, of course, was Greenspan's "irrational exuberance" comment in December 1996 (Greenspan 1996). However, such direct verbal interventions tend to be rare.

The question of whether a Fed chairman should ever talk about equity prices reminds me of one of my favorite Fed stories that I included in my book *A Term at the Fed* (Meyer 2004). The incident was about the foreign exchange market rather than the equity market, but could equally well have been about the equity market. Joe Coyne, the Fed's director of public affairs

at the time, was imploring then chairman Paul Volcker to say something to calm the foreign exchange market. Volcker was of the school that you did not talk about equity prices or exchange rates, so he resisted. The argument went on as Volcker sat down in the barber's chair. In the middle of a further attempt by Coyne to persuade the chairman, Volcker interrupted Joe and turned to Lenny the barber and asked him what he thought. Lenny responded with a very thoughtful answer supporting the chairman, prompting Volcker to turn to Coyne and ask, "Joe, can you cut hair?" So the point is that Fed chairman have traditionally been reluctant to comment on the reasonableness of equity values or exchange rates.

I would argue that this is the wrong perspective. In fact, the Fed should talk often and forcefully about how it sees asset prices relative to their fair values. Why is this taboo? The two most common explanations are, one, that markets may overreact to such proclamations and, two, that fundamentals are hard to measure. In my view, the second consideration should not stop the central bank. Market participants are aware of the challenges involved here—they do it for a living. The markets will take the information for what it is worth—a reasonable but imperfect measure of the appropriate valuation of asset prices. It gives market participants an additional piece of information to use to the degree that they see fit, and I believe that they will filter it considerably, which should mitigate any concerns about a market overreaction.

It seems likely that market participants would dismiss small deviations from the fair values published by the Fed. After all, it is hard to predict what might happen to a 5 percent over- or undervaluation in the S&P 500. However, the approach would have more bite when asset prices moved well out of line, as in the late 1990s. If the Fed were to publish a deviation of that magnitude, it might make market participants think more clearly about the fundamentals that must be assumed to justify current equity prices. This could have been a useful deterrent to rising equity market values in the late 1990s, in that the assumptions required were quite extreme.

Thus, this approach could effectively lean against bubbles without requiring a response of the short-term interest rate and the economic costs associated with it. It also seems consistent with Bernanke's emphasis on transparency.

Let me offer a specific proposal: the Fed should publish an official report on the determinants of fair value in the equity market (and perhaps in other asset markets) and then provide periodic (perhaps quarterly) updates assessing the value of asset prices relative to fair value. The report, and periodic updates of the measures it includes, would be posted on the Board's Web site.

One advantage of this approach is that the Fed chairman would not have to decide if or when to make verbal interventions in the case of a suspected emergence of an asset bubble. The updates would follow a fixed schedule,

and media stories focused on equity valuations would inevitably include the assessment of fair value from the Fed's analysis, increasingly so when there was the suspicion of an emerging equity bubble. The chairman and other FOMC members could reinforce this by explicitly noting any important divergence, but the media would do most of the work. The coverage on the Web site could also include comments and analysis from scholars in the field so that the public had easy access to an academic consensus as well as the Fed's own reading.

This approach could be broadened to apply to a variety of risk spreads as well as equity prices. Indeed, what I am suggesting is very close to what Donald L. Kohn did in a speech delivered last July (Kohn 2005). In that paper, Kohn noted that the Fed routinely monitors risk premiums on equities, corporate bonds, and Treasury securities, in part because these measures are viewed as indicators of economic conditions but also because they can directly affect real economic activity. And they are also important tools for monitoring financial stability.

Kohn followed this speech up with the following comment in a talk earlier this year:

> Notwithstanding the controversial aspects of identifying bubbles, policymakers may still want to warn the public about the possibility of asset price misalignments when the evidence merits. Such talk might do some good by prompting investors to stop and rethink their assumptions. And talk by itself should not do much lasting harm even if valuations turn out to be justified—provided, of course, that words are not seen as precursors to action under circumstances in which conventional policy would still be the best approach. (Kohn 2006)

This approach might take the Fed in the direction of some other central banks in publishing a financial stability report that focuses on financial vulnerabilities.

How would this have worked in the second half of the 1990s? Recall that the P-E ratio (for the S&P 500 based on lagged earnings) at the time that Greenspan uttered his famous irrational exuberance remark was about 18. That was basically in the middle of the range of estimates of fair value for the P-E ratio—from a low of about 14 or 15 that is the longer run historical average for the P-E ratio to the low 20 range that Jeremy Siegel has argued is warranted today (Siegel 2002). In any case, a P-E ratio of around 18 would not really have seemed the critical time to weigh in about the possibility of an equity bubble. So this approach probably would have taken some of the sting out of Greenspan's question—although the fact is that there was not much sting to begin with—less than a 2 percent drop that day. This simply reflects the fact that, in my view, Greenspan was rather precocious at this point.

Still, we wonder if this approach might have had some restraining effect

if it had been in play during the subsequent period when the case for a bubble became more compelling. The Fed presumably would have been on record as believing that fair value is somewhere between, say, 14 and, say, 21 for the P-E ratio and would have strongly emphasized the evidence of the mean reverting nature of equity prices. That might itself help. Every time a story was written on whether there was a bubble, the Fed's study would invariably be mentioned and the authority of the Fed would be put behind a presumption that a bubble was emerging.

As I noted earlier, a clear case could have been made that equity valuations were very rich when the P-E ratio surpassed, say, 25, and, by the time it crossed 30, there should have been few doubters that a bubble was emerging, and when it approached and surpassed 40—well, you get the picture.

The emphasis on the fundamental value of asset prices will likely highlight the role of mean reversion. One thing market participants should be confident about is that when equity valuations move dramatically above the fair value range, they will ultimately correct back.

Some will perhaps argue that this approach would not have been very convincing in this episode because the fundamentals of the period were unusually favorable to equity valuations, and it was simply not so obvious that the historical norms applied anymore. We were after all in the "new economy," and the economy did at the time seem to be breaking all the old rules. That is precisely the reasoning that should have been leaned against, I say with the benefit of hindsight.

Still the argument might go, even with the benefit of hindsight, if there was an acceleration of productivity in play at the time and that meant faster growth in output, earnings, and dividends. Plug that into your dividend discount model. Doesn't that justify an increase in the sustainable P-E ratio? The answer is not necessarily and, in any case, not necessarily by much.

The Fed report could point out the difference between arithmetic and economics when it comes to assessing equity valuations. It is arithmetically correct that a persistent increase in the growth rate of earnings, *ceteris paribus,* would raise the value of equities in the dividend discount framework. But *ceteris paribus* is just a fancy Latin name for partial equilibrium. Sound economic analysis is about general equilibrium. In a general equilibrium model, we would have to ask how a productivity acceleration affects other pieces of the dividend discount model. The answer, of course, is that a productivity acceleration, if persistent, would also raise the equilibrium real interest rate, offsetting much if not all the increase in the P-E ratio associated with the faster growth in earnings.

The same logic applies to the argument that soaring equity values was a reasonable response to a plausible decline in the equity premium in a world with less real side volatility and less inflation volatility than previously. A decline in the equity premium, of course, *ceteris paribus,* would raise equity values in the dividend discount model. There is that pesky ceteris paribus

again, I know you are thinking. But a decline in the equity premium would also lead, over time, to an increase in the equilibrium real rate, reversing some or all of the earlier rise in equity prices.

So perhaps the message should be that it is hard for changes in economic fundamentals to dramatically alter fair value norms and that asset prices are powerfully mean reverting (relative to fundamentals), and, therefore, attention should always be focused on the fair value norm.

The Bottom Line

The bottom line is that we ought be actively engaged in a discussion about whether monetary policy could improve relative to the narrow interpretation of the indirect approach. I hope I have been able to contribute to that discussion. I do not have much confidence in the leaning against the bubble approach, but I think we have to seriously consider what the risk management approach implies during such periods in the context of a broader vision of the indirect approach and consider whether it would be prudent in such circumstances to at least to err on the side of restraint. I am somewhat more confident that the direction I suggested in terms of Fed communication might at least provide a modest restraining effect during a period of an emerging asset bubble. I think the Fed should consider moving in this direction, and I actually believe they may already have begun to do so.

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William C. Dudley

As I see it, a Federal Reserve consensus exists on how monetary policy should respond to asset bubbles. It consists of three major observations:

1. Asset bubbles are hard to identify.
2. Monetary policy is not well-suited to respond to bubbles.
3. The cost/benefit trade-off of "leaning against the wind" against asset bubbles is unfavorable.

From these propositions, two important policy implications directly follow:

1. The central bank should only take asset bubbles into consideration in the conduct of monetary policy to the extent that these asset bubbles affect the growth/inflation outlook.
2. The monetary authorities should be there to "clean up" after bubbles burst, both to prevent systemic problems and undesired downward pressure on economic activity or inflation.

Relative to this consensus, I would argue that:

1. Asset bubbles are not that hard to identify—especially large ones.
2. If one means by monetary policy the instrument of short-term interest rates, then I agree that monetary policy is not well-suited to deal with asset bubbles. But this suggests that central bankers should examine the efficacy of other instruments in their toolbox, rather than simply ignore the development of asset bubbles. Parenthetically, this may require development of additional policy tools if the current tools are deemed inadequate.
3. When the possibility of additional instruments is added to the mix, this may improve the cost/benefit trade-off from addressing asset bubbles early, prior to these bubbles bursting.

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