

The Role of Segmented Markets in Monetary Policy

BY AUBHIK KHAN

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he popular press would lead us to believe that during the stock market boom of the 1990s just about everyone was buying and selling bonds every day. In fact, evidence shows that most households make only infrequent changes to their investment portfolio. In this article, Aubhik Khan discusses this market segmentation and its implication for the way monetary policy affects interest rates and inflation.

Reading the newspapers during the stock market boom of the late 1990s, one could be forgiven for thinking that every man, woman, and child was buying and selling stocks and bonds every day. Nothing could be further from the truth. Recently, economists have begun to assess evidence that shows that most households make only infrequent changes to the stocks, bonds, mutual funds, and money market funds they own. At any time, most households are not participating in the majority of financial markets. Jointly,

I call these observations evidence of *market segmentation* because only a segment of the population is participating in the market at any time, whether directly or through a broker.

Seemingly unrelated is a belief held by many, though not all, economists that when there is a change to the stock of money in the economy, interest rates respond immediately, while inflation responds slowly. More generally, changes in the supply of money in the economy appear to have persistent effects on economic activity, influencing consumption, investment, employment, and output.

Actually, the effects of monetary policy on interest rates and inflation may, in part, be a consequence of market segmentation. Recent advances in economic theory suggest that the real effects of open market operations — that is, the effect of changes in the money supply on output and employment — may be amplified by market segmentation.

MICROECONOMIC EVIDENCE OF SEGMENTED ASSET MARKETS

In most macroeconomic models, households are continuously participating in asset markets. The somewhat simplistic assumptions underlying these models imply that if it is worthwhile for one household to invest in a particular stock or bond, it is worthwhile for all households to do so. Of course, this does not imply that all households hold the same portfolio. The economic models are consistent with the observation that wealthier households tend to hold more assets than poorer ones. However, these models often predict that all households will hold the same fraction of their wealth in each asset, which requires all households to be readjusting their portfolios continuously.

Economist Annette Vissing-Jørgensen finds that this prediction is not consistent with the household data. To study the behavior of a representative sample of U.S. households, she uses data for 1968-93 from the survey research sample of the Panel Study of Income Dynamics from the University of Michigan. Supplements also provide data on financial wealth. In her paper, Vissing-Jørgensen finds that, over time, an increasing number of those households with positive financial wealth (just above 80 percent of the total number of households) are participating in the stock market. Nonetheless, even as recently as 1994, only 44.1 percent of households participated in the stock market. In this sense financial markets are segmented: Only a fraction of the population of households is trading at any time. This finding is



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of charge at: www.philadelphiafed.org/econ/br/index.html.

inconsistent with the simplest financial models of portfolio choice.

Interestingly, households that are active in the stock market change over time. In the data, some households held stocks, bonds, or both, in 1989, but not in 1994. Other households held either stocks, bonds, or both in 1994, but not in 1989. Thus, a simple model that assumes some households can never hold stocks would be inconsistent with the data. Instead, a useful model for these purposes must explain why a household is sometimes active and sometimes inactive. Vissing-Jørgensen also finds there are significant changes in the fraction of wealth held as stocks. In particular, it varies across households and also across time for a given household.

Examining several possible explanations for segmented stock and bond markets, Vissing-Jørgensen finds that transaction costs are the most likely explanation. These costs, which include broker's fees and the costs of informing oneself about the risks and returns associated with individual stocks and bonds, are more easily borne by wealthy households and are prohibitive for some poor households.

In related work, economists John Heaton and Deborah Lucas find that households whose income — excluding income from stocks and bonds — is very risky are less likely to participate in the stock market. For example, a household whose principal earner works in an industry where there are frequent layoffs is less likely to buy and sell stocks than another household, with the same average income but with less risk to its income. Stocks are relatively risky investments, and this finding suggests that households that already face considerable risk to their incomes are less tolerant of the additional risks associated with participating in the stock market. Economists James Poterba and Andrew Samwick

find that participation in the stock and bond markets varies with age. In their paper, they note that older households are more likely to hold stocks and less likely to hold tax-exempt bonds.

Motivated by these empirical findings about market segmentation, economists have incorporated segmented markets into their theoretical models.¹ By assuming that households are able to participate in stock markets infrequently, and different households have access to the market for stocks and bonds at different times, these models

open market operations. In an expansionary open market operation, the monetary authority buys government bonds. Since these bonds are bought with currency, these purchases reduce bond holdings but increase the cash balances of the private sector.

Economists (and others) believe that when the central bank adjusts the money supply through open market operations, this action affects interest rates, which, in turn, affect nonfinancial variables such as consumption, investment, output, and unemployment,

Heaton and Lucas find that households whose income is very risky are less likely to participate in the stock market.

capture some — but not all — of what the data show. In particular, most models of segmented markets don't explicitly take account of important differences across households, such as age and wealth, and simply assume that different households have access to the market for stocks and bonds at different times.²

MACROECONOMIC EVIDENCE OF THE EFFECTS OF OPEN MARKET OPERATIONS

Money Is Neutral in the Long Run. It is widely accepted among pundits and business people that monetary policy has real economic effects. The monetary authority adjusts the stock of currency in the economy through

as well as inflation. Put differently, unanticipated changes to the money supply are believed to have persistent real effects. While these effects are thought to persist for some time, most economists believe they are not permanent. Economists describe such phenomena as short-term nonneutralities.

Let's discuss the origin of this term. There is a widely held belief among economists that while changes in the money supply might be used to dampen fluctuations in the economy, they have no lasting effect on real economic activity. This is sometimes referred to as the classical *neutrality of money*, which says that there is a separation between the nominal side of the economy, where the amount of currency provided by the government determines the price level, and the real side of the economy, where production and employment take place.³

¹The paper by Fernando Alvarez, Robert E. Lucas, Jr., and Warren E. Weber provides a detailed introduction to monetary models with segmented markets and includes a list of references to related papers. The model we describe in this paper is based on the work of Alvarez, Andrew Atkeson, and Chris Edmond.

²In our working paper, Julia Thomas and I analyze a model where households choose when to adjust their portfolios.

³A variable that is nominal is being measured in dollars. In contrast, a variable that is real is being measured in its own units. For example, if potatoes cost \$0.25 each, and a family buys 10 of them, its nominal purchase of potatoes is \$2.50, while its real purchase is 10.

To understand the neutrality of money and short-term nonneutralities, it is useful to introduce the concept of the velocity of money. Simply put, velocity describes how many times in a given period money must change hands so that a given supply of money is sufficient to pay for all goods and services. (See *A Simple Example of the Determination of the Velocity of Money*.)

The neutrality of money is the proposition that if there were twice as much money in the economy, then the price of all goods and services would double. Despite this change in prices, no one would exert more effort to produce more, and real economic activity would be unaffected because people's (nominal) money balances have doubled as well. Thus, velocity would not change.

Figure 1 provides some evidence for the relative constancy of velocity in the long run using M2—a standard measure of the money supply—and personal consumption expenditures.⁴ We see that prices and the ratio of money to real consumption grow at roughly the same rate, at least until the late 1980s. As the money supply has grown, prices have risen proportionately. But this means that velocity is roughly constant in the long run, which is evidence in support of the long-run neutrality of money.

Money Is Not Neutral in the Short Run. However, there is evidence that when the supply of money relative to personal consumption expenditures rises, velocity falls in the short run (Figure 2). The figure plots the difference between the actual value of each variable and its long-run trend

rate of growth. When the money supply grows above or below its long-run trend, the figure shows money growth as positive or negative, respectively. Similarly for velocity.

Notice that whenever the ratio of money to consumption rises above trend, velocity tends to fall below 0. This suggests that prices adjust sluggishly, that is, slower than the rate of growth of the money supply, and that velocity falls. The decline in velocity indicates that there may be real short-run effects of a change in the money supply.

DOES MONETARY POLICY AFFECT THE REAL ECONOMY?

Academic economists, pundits, and policymakers agree that monetary policy—which directly affects the interest rate on government bonds—also affects other interest rates,

most specifically the fed funds rate, the interest rate banks charge one another for overnight loans of reserves.⁵

However, academic researchers disagree about the extent to which changes in the fed funds rate brought about by the central bank actually affect economic activity. While this may seem surprising, it is less so when you consider the difficulty of studying the effects of open market operations. It is very difficult to empirically link changes in the macroeconomy with

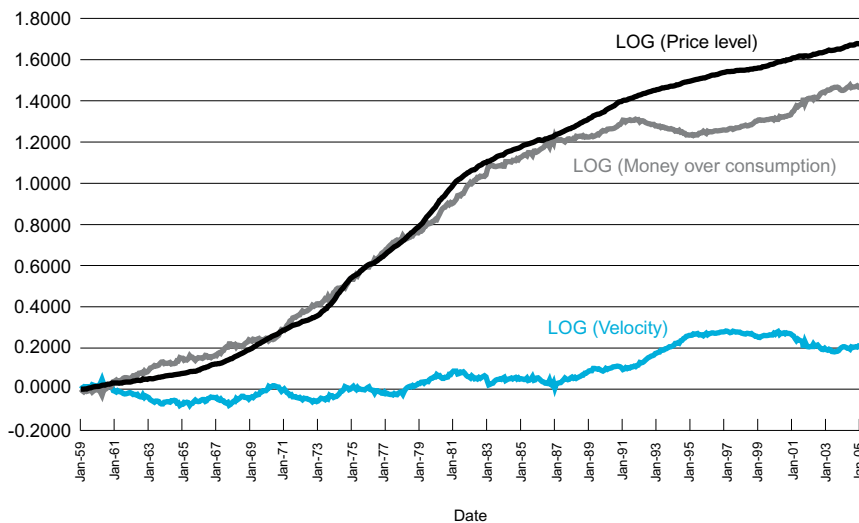
⁵ The interest rate on bonds moves closely with other short-term interest rates, since holding government bonds is one of many alternatives available to investors and the interest rates on close substitutes can't diverge too much. For example, instead of holding government bonds, a bank could instead buy mortgages—or more realistically, securities backed by mortgages—for its portfolio if the interest rate on mortgages rose substantially beyond the interest rate on a government bond of comparable maturity.

A Simple Example of the Determination of the Velocity of Money

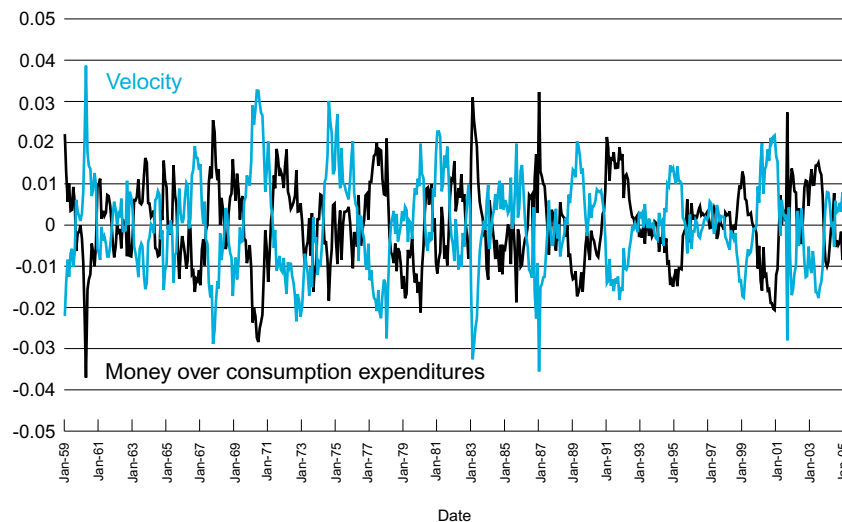
To better understand the concept of velocity, consider the following simple example. There are 100 residents of a deserted island, marooned there some time ago. At the time they arrived on the island, they had among them 250 identical silver coins that they shared equally. The only commodity on the island is a fruit. Half the residents live on the northern side of the island, where their trees bear fruit in the summer months; the other half live on the southern side of the island, where fruit trees are harvested in the winter. For the sake of discussion, assume that each islander harvests 10 pieces of fruit a year, and that each fruit is sold for one coin.

In the summer months, each southern resident buys five pieces of fruit from each northerner for five coins. The trade is reversed in the winter months. The 250 coins must pay for 500 pieces of fruit each year, and thus each coin must change hands twice. The velocity of money on the island is then two. It is the ratio of nominal spending, which is 500, divided by the money stock, 250. More generally, velocity is equal to price times output divided by the available stock of money.

⁴ M2 is a broad definition of money that includes both currency and interest-bearing assets that are relatively easy to convert into currency. Personal consumption expenditures are a measure of the goods and services purchased by consumers.

FIGURE 1**Money, Price, and Velocity****FIGURE 2****Ratio of Money to Consumption and Velocity**

Deviations from trend



their cause; at this level, the economy undergoes many simultaneous changes.

The problem in isolating the real effects of monetary policy is that policy typically responds to external factors. Therefore, it's difficult to separate the

real effect of these external factors from the real effect of monetary policy. Consider the following hypothetical example. Let's say there's a period of rapid productivity growth, as happened in the second half of the 1990s in the

United States. The rapid growth in productivity drives corporate earnings higher, and stock prices increase. As a result of the rise in the value of their assets, households increase spending. In an effort to prevent a rise in inflation, the central bank pushes up the fed funds rate. But rates for mortgages, automobiles, and credit cards also rise. In the end, inflation does not increase.

Did monetary policy prevent inflation from increasing? Although this conclusion may well be correct, it cannot be proven in the context of the events described in our example. It is certainly possible that the increase in interest rates prevented spending from growing too fast, thereby offsetting a rise in inflation. Alternatively, there may have been no effect on spending growth, and inflation failed to rise because higher productivity growth allowed firms to increase production without raising prices more rapidly. The real effect of the central bank's increasing interest rates is ambiguous because we did not study an event in which central bank policy operated independently of other events.

The Real Effects of Monetary Shocks. However, there may be instances when movements in the money supply occur independently of other economic events — what economists call a monetary shock. These events offer the best settings in which to study the real effects of monetary policy, since they are independent of other changes in the economy. At such times we can observe the real effects of monetary policy in isolation and improve our understanding of how it works.

How rapidly does a change in the central bank's interest rate affect non-financial variables? What is the size of this effect? How long does it last?

To the extent that there is a consensus among economists, it involves the following joint movements of money, interest rates, and prices in

response to a temporary rise in the growth rate of the money supply.⁶

Inflation responds slowly, and the rise in inflation persists for several quarters.

An expected increase in future inflation tends to reduce current real interest rates, which are measured by the difference between the nominal interest rates on bonds and the inflation rate.⁷ This has been shown, for example, by economists David Barr and John Campbell.

Because the inflation rate adjusts slowly and real interest rates decline more rapidly, an open market operation reduces nominal interest rates. (Remember, the nominal rate is the sum of the real rate plus the inflation rate.) The fed funds rate falls, as do other nominal interest rates, such as those on government and corporate bonds and on mortgages and car loans.

MONETARY POLICY IN THE STANDARD FULL-PARTICIPATION MODEL

Temporary changes in real interest rates and in the pace of economic activity brought about by an unanticipated change in the growth rate of the money supply (that is, short-term nonneutralities) are a challenge for theoretical macroeconomics. Standard full-participation models have difficulty reproducing such temporary changes.

When the Money Supply Increases, Prices Rise Proportionately. Figure 3 shows what happens in the standard model when the central bank increases the rate of growth of

the money supply by one percentage point and then lets it slowly return to its usual growth rate. Economists refer to this as a persistent shock to money growth rates.

As we can see, the inflation rate and the money growth rate are indistinguishable in the standard model. This is an implication of the neutrality of money in the classical model. That is, as the central bank increases the

in dollar terms does not buy any more goods or services. That's why the real interest rate hasn't changed at all.

The Real Economy Is Unaffected. The real rate of return on bonds measures how much more goods and services a household could consume in the future by forgoing consumption today. Since the real return on bonds is unaffected by the temporary change in the growth rate of money,

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supply of money to households, firms increase their prices by the same proportion. Prices perfectly track changes in the stock of money, and this implies that the growth rate of prices, that is, the inflation rate, is equal to the growth rate of money.

The Real Interest Rate Doesn't Change. In the bottom panel of Figure 3, we see that the change in the growth rate of money has had no effect on the real interest rate. In other words, though prices are changing, the temporary rise in the growth rate of money has no effect on the tradeoff facing households when they decide how much to spend and how much to save. This may surprise the reader; after all, the middle panel shows that the nominal interest rate has risen. Doesn't this mean that households can earn a higher return if they save their income by purchasing bonds? This is true only in the sense that for each dollar they save by buying bonds, they will earn more dollars in interest than before. However, since prices are rising faster than usual, this extra interest

households have no reason to change their consumption of actual goods and services, and there are no real effects of this monetary shock in the standard model. All that happens is that the temporary rise in money growth rates increases inflation and the nominal interest rate.

Before we leave our study of the standard full-participation model, look again at the middle panel of Figure 3. In this panel, the nominal interest rate rose with the growth rate of money. This prediction of the full-participation model is opposite of what most macroeconomists believe happens to nominal interest rates when there's an open market operation. Partly in response to the difference between the observed data and such predictions of the standard model, macroeconomists have begun to explore models that include segmented markets.

MONETARY POLICY IN THE SEGMENTED MARKETS MODEL

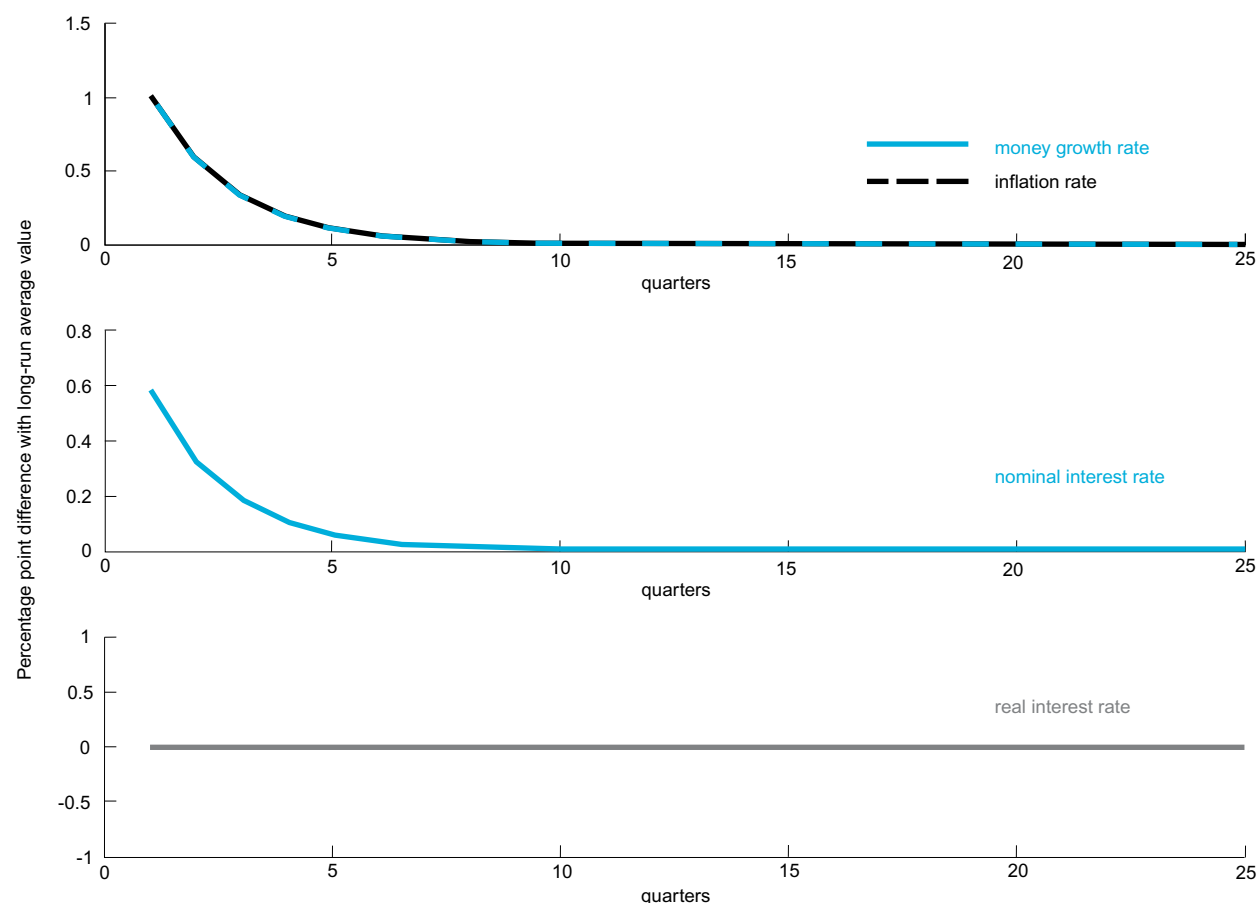
The segmented markets model we study is able to reproduce the decline

⁶Unfortunately, there is much disagreement about the proper approach to identifying monetary shocks. The paper by economist Harald Uhlig provides a summary of the current debate.

⁷To be more precise, I am referring to a bond that does not have its interest rate indexed to the rate of inflation. Also, since bonds differ by maturity, there is a real rate of interest corresponding to each maturity.

FIGURE 3

A Persistent Shock to Money Growth in Classical Model



in interest rates — both nominal and real — following an increase in the money supply (Figure 4). In this model, an open market operation that increases the money supply does not lead to a proportionate rise in inflation. Prices don't initially grow as fast as the money supply, and both real and nominal interest rates fall.

What is it that makes the short-run response of the segmented markets model so different from the full-participation model? This has to do with which households in each model participate in an open market operation. Sophisticated readers may complain that the idea of households participat-

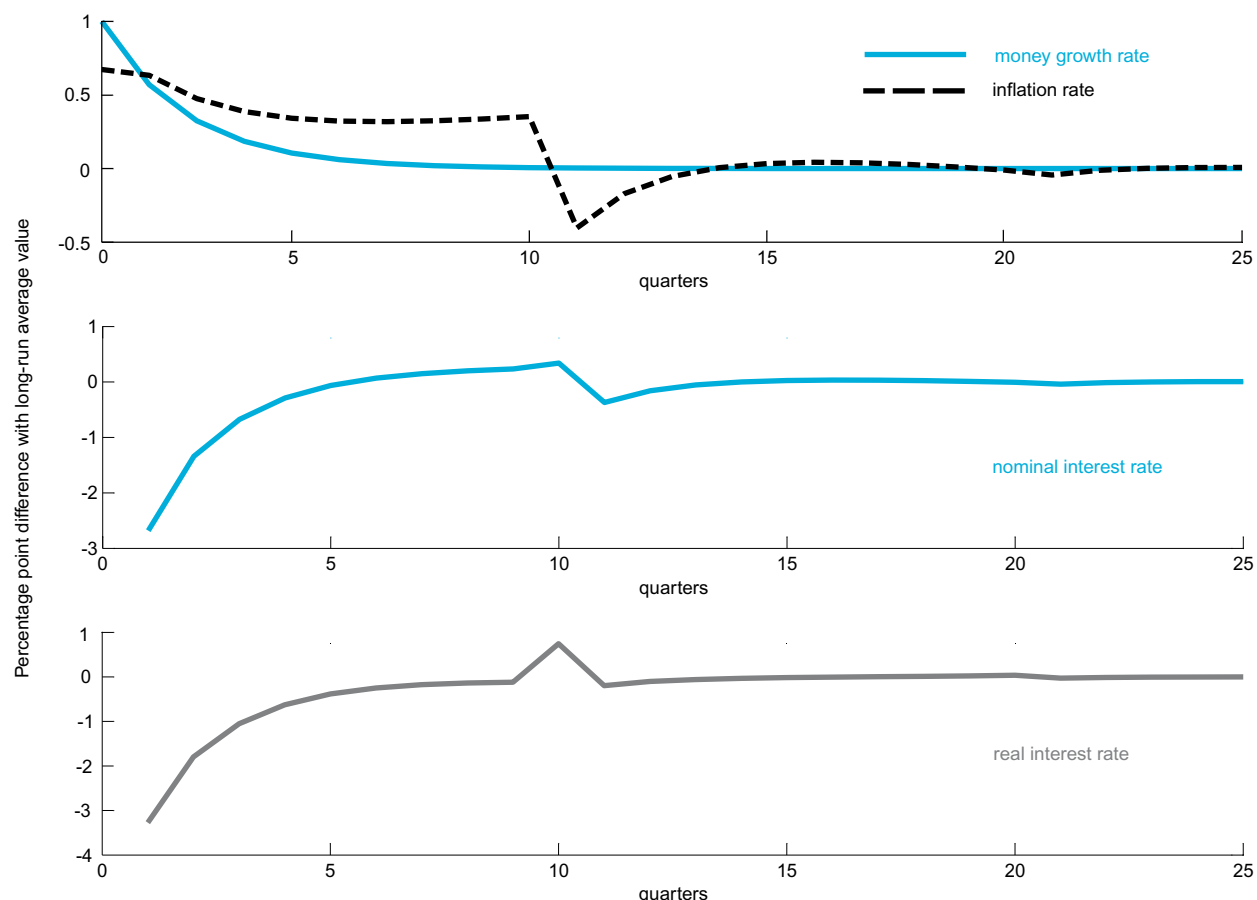
ing directly in open market operations is unrealistic, and for the most part, they are correct. Within the private sector, government bonds are ordinarily held by banks and other financial institutions. When the central bank buys government bonds, it increases the currency banks hold. Banks, in turn, lend these funds to households and firms. Our approach is to first study simple models with segmented markets that treat open market operations as if they involve direct transactions between households and the central bank. Later, we consider explicitly how including intermediaries may affect our conclusions.

With Segmented Markets, Prices Rise Less Than Proportionately When the Money Supply Increases.

In the segmented markets model, only some households buy and sell assets out of their portfolios at any given time. A household that sells bonds during an open market operation knows that it is not likely to participate again soon, and so it increases money balances by more than it intends to increase immediate spending. Since households' money balances have increased by more than their expenditures, prices increase less rapidly than the supply of money in percentage terms. That is, there is only a partial

FIGURE 4

A Persistent Shock to Money Growth in Segmented Markets Model



rise in inflation and an increase in real money balances.⁸

⁸ The careful reader might wonder how the spending of other households, those not selling bonds, is affected by the open market operation. The answer lies in the observation that these households experience no change in their money balances because they did not participate in the trading of bonds for money. Moreover, since they do not generally expect to participate soon, they must use what money they have to finance their spending not just today but also for some time in the future. Given this, and because prices are rising, they are unwilling to substantially increase their current spending. If they did, they would have to sharply lower the real quantity of goods and services they will be able to buy in the future. All in all, the spending of these households does not change very much.

Real Interest Rates Fall. Why do real interest rates fall? One way to think about this is to ask: What must happen to the real interest rate on bonds to make households willing to reduce their bond holdings and increase their real money balances — that is, for the government to successfully complete its open market operation? Real interest rates on bonds must fall. In summary, the monetary authority's expansionary open market operation has led to a decline in real interest rates, an increase in the real money supply, and a less than proportional rise in inflation.

This pattern is exactly what we


find in Figure 4, where we reconsider the effects of a persistent shock to the growth rate of money identical to the one we studied in the standard full-participation model. Now the same shock, but observed through the lens of the segmented markets model, leads to a fall in both the nominal and real interest rates. Moreover, as we suggested above, when the money supply increases faster than usual, prices don't rise as fast; so after one quarter, money grows faster than inflation and real balances rise. The slow adjustment of prices in the segmented markets model is also found in the data, suggesting that this model may be useful for shed-

ding light on how the economy actually works.

CONCLUSION

Recent models that have segmented asset markets are able to explain some of the effects of monetary policy. They help us understand how increases

in the money supply can reduce both nominal and real interest rates in the short term and why inflation responds slowly to such movements in money. These models explicitly model differences in households' participation in financial markets that are found in household data. In doing so, they con-

tinue a long trend in macroeconomic research of building models that explicitly acknowledge differences across households and firms and explore the economic consequences of such differences. 

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Housing: Boom or Bubble?

BY TIMOTHY SCHILLER

In recent years, the U.S. has seen an extraordinary increase in demand for housing and a rapid rise in house prices. Data show that nationally, the average price of an existing home, adjusted for inflation, rose more than 8 percent in 2004 and 2005, a faster pace than in any previous year. Some people have questioned whether this rapid rise was sustainable, and recent declines in the housing market have made this question more urgent. In this article, Tim Schiller asks whether there was a so-called bubble in house prices or whether fundamental economic factors explain the rapid increase.

Between 2001 and 2005, the United States saw an extraordinary increase in demand for housing and a rapid rise in house prices. In 2005, for the fifth consecutive year, sales of both new and existing homes hit record highs, according to the National Association of Realtors. The national average price of an existing home increased more than 8 percent, after inflation, in both 2004 and 2005, according to the Office of Federal Housing Enterprise Oversight (OFHEO) — the highest annual rates in the history of

OFHEO data, which begin in 1975.¹ Some people questioned whether such a rapid rise was sustainable. Slowing in price appreciation and a decline in home sales this year have made this question more urgent. Was there a

¹ The data on house prices compiled by the OFHEO are for single-family homes. The sale prices of repeated sales of the same properties are tracked over time for those properties whose mortgages are purchased or securitized by the Federal National Mortgage Association (Fannie Mae) or the Federal Home Loan Mortgage Association (Freddie Mac). To be included in the data, the mortgage on the sold property must meet the underwriting standards of Fannie Mae or Freddie Mac and cannot exceed a maximum loan limit (\$417,000 in 2006). By their nature, OFHEO data include homes that have been improved but do not adjust the appreciation for the value of the improvement. They also exclude homes that have been mortgaged for amounts above the limit, even if they were previously included. Nevertheless, by tracking specific properties over time, the data provide measures of the broad trend of house-price movements.

so-called “bubble” in house prices? Or can the rapid increase be explained by fundamental economic factors? We will review the historical context of house prices nationally and in the region and outline the way economists view fundamental influences on house prices versus a “bubble” in the housing market.

HISTORICAL TRENDS IN HOUSE PRICES

Data from the OFHEO indicate that the real price of houses (that is, house prices adjusted for inflation) has gone through periods of increase and decrease since the beginning of the data series in 1975, although instances of nominal price declines have been rare.² The long-run trend has been up, and in 2005, real house prices reached historical highs. Real house prices are more than 60 percent higher today than they were in 1975. Almost all of that increase has occurred since 1995.

There has been considerable variation among regions of the country (see map). The West and the Northeast have had greater price appreciation than the national average. Within these two regions, the Pacific and Mountain states have had greater percentage increases in real house prices in recent years than they did in the previous episode of rising prices in the 1980s. The New England states have had less price appreciation recently than in the 1980s, and the mid-Atlantic states have had roughly equivalent

² To measure house prices adjusted for inflation, we use the consumer price index for all urban consumers to deflate the OFHEO data, which are in nominal terms.

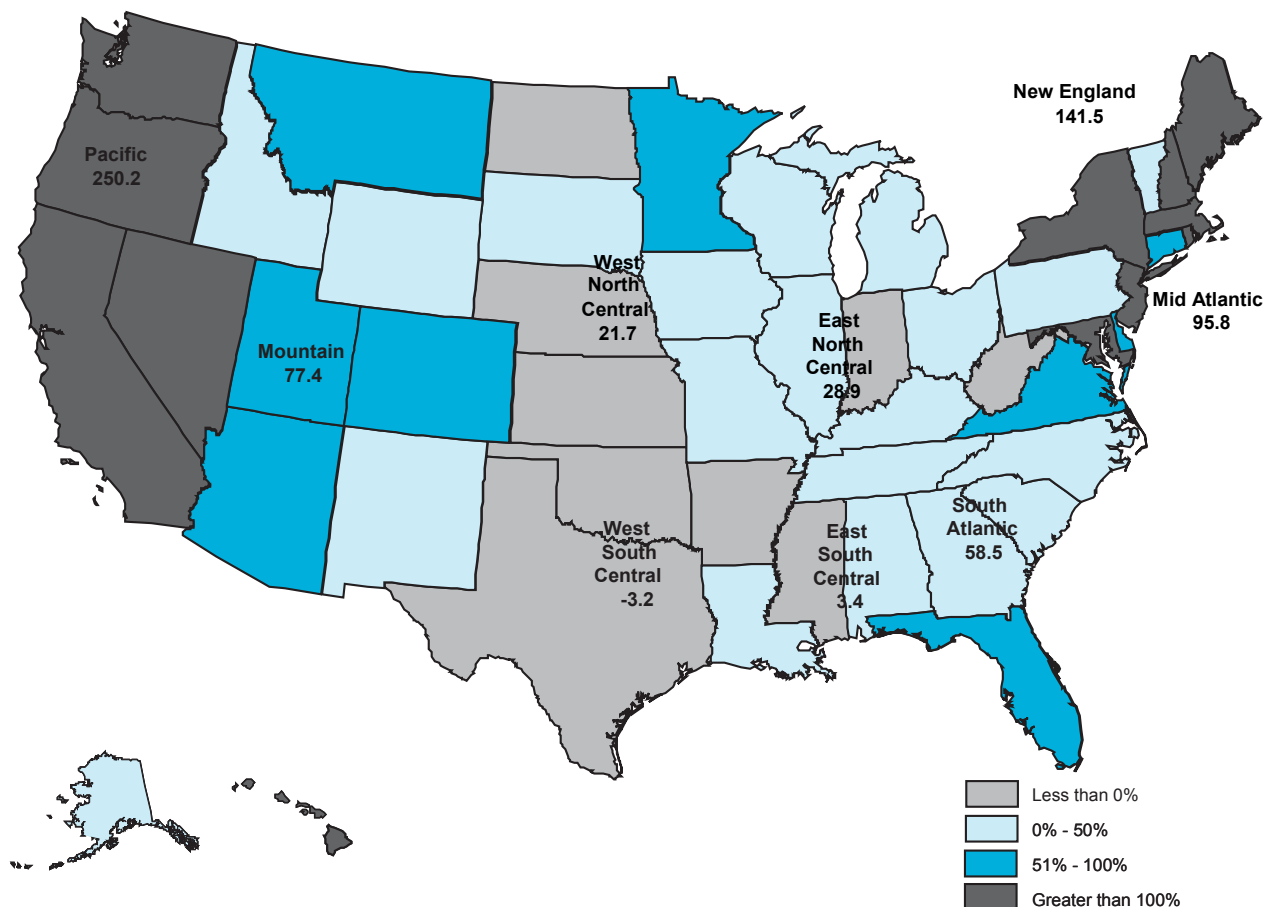


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MAP

Real House-Price Change for States and Census Divisions 1975-2006



appreciation. This is evident in Figure 1a, where house prices are plotted on a logarithmic (log) scale.³ Other parts of the country have had lower price appreciation, and in the West South

³ Equal vertical distances on a log scale represent equal percentage changes, making it easier to compare changes at different points in time when the price levels are different. For example, on a log scale the distance between 100 and 200 (a 100 percent increase) is the same as the distance between 200 and 400 (a 100 percent increase).

Central U.S., there has been a slight decline in the real price of houses since 1975. Nevertheless, even in the census divisions that have had smaller house-price gains than the nation since 1975, the increase in house-price appreciation has been greater in recent years than it was in the 1980s (see Figure 1b).

The regions with the greatest appreciation have also had the most price volatility, with alternating periods of real price appreciation and deprecia-

tion. Limits placed on the supply of new housing by zoning and other land-use regulations have been a factor in this greater-than-average appreciation and in the volatility in some parts of the country.⁴ Several states have been identified as having higher price increases and more volatility as a result of limitations on new construction:

⁴ See the article by Edward Glaeser and Joseph Gyourko.

California, Hawaii, Connecticut, New Hampshire, Rhode Island, Massachusetts, New York, and New Jersey.⁵ It is interesting to note that all of these states are in or near coastal areas. Evidently, demand for housing in coastal areas has risen, while supply of housing in these areas has been limited by geography and government regulation.

For the three states in the Philadelphia Federal Reserve District (Pennsylvania, New Jersey, and Delaware), the timing of real house prices has followed the same basic pattern as in the nation. The percentage increases and decreases, however, have varied widely, and in each state, the recent run-up in house prices has not been unprecedented. The recent increase has been proportionally similar to the increase that occurred in the 1980s. House-price increases and decreases in Delaware tracked national ups and downs fairly closely. In Pennsylvania, periods of changes in house prices occurred along with national changes, but the increase since 1995 has been less than in the nation. As a result, by 2005, house prices in Pennsylvania had not risen as much since 1975 as in the nation (Figure 2).

House prices in New Jersey have shown greater volatility than house prices in either Pennsylvania or Delaware and more than the national average. House prices increased more rapidly in New Jersey than in the nation in the 1980s, declined more rapidly in the early 1990s, and have risen more sharply since 1995. Consequently, house prices in New Jersey were more than twice as high in 2005 as they were in 1975, a much greater gain than the national average.

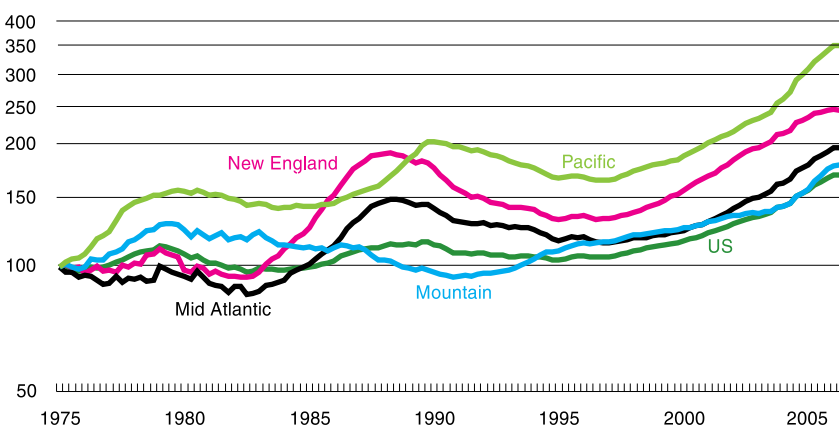
Within the three states of the region, the OFHEO currently reports price changes for 22 metropolitan areas

⁵ See the article by Karl Case and Robert Shiller.

FIGURE 1a

OFHEO House-Price Index (Real) — High Appreciation Census Divisions*

Index: 1975 Q1 = 100
Log scale

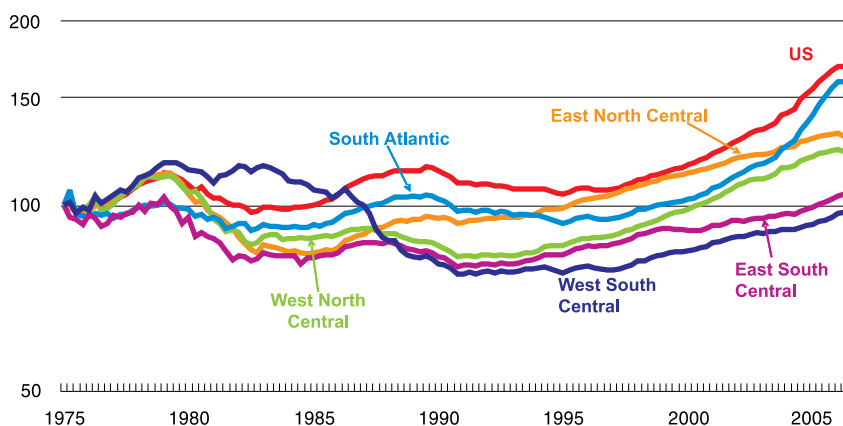


*OFHEO house-price index deflated by CPI.

FIGURE 1b

OFHEO House-Price Index (Real) — Low Appreciation Census Divisions*

Index: 1975 Q1 = 100
Log scale



*OFHEO house-price index deflated by CPI.

and divisions.⁶ The data for all of these areas or divisions extend back only 10 years, although they go back further for some areas. All of these areas and divisions have had real house-price appreciation since 1995, but the range of increases varies widely (Table). The area with the greatest gain, the Ocean City, New Jersey, metropolitan area, had an increase 16 times the increase in the Erie, Pennsylvania, metropolitan area, the area with the lowest gain.

From the historical swings in house prices, we can draw four conclusions: (1) House prices have increased in the long run relative to the overall price level, and most of that increase has occurred in the past 10 years. (2) Real house prices do indeed rise and fall, and at the national level, the most recent run-up is unprecedented. (3) Although nominal prices have rarely declined nationally, there have been nominal declines in those areas with greater price volatility. (4) There is a great deal of variation among regions in the volatility of house prices as well as in the long-run rate of increase.

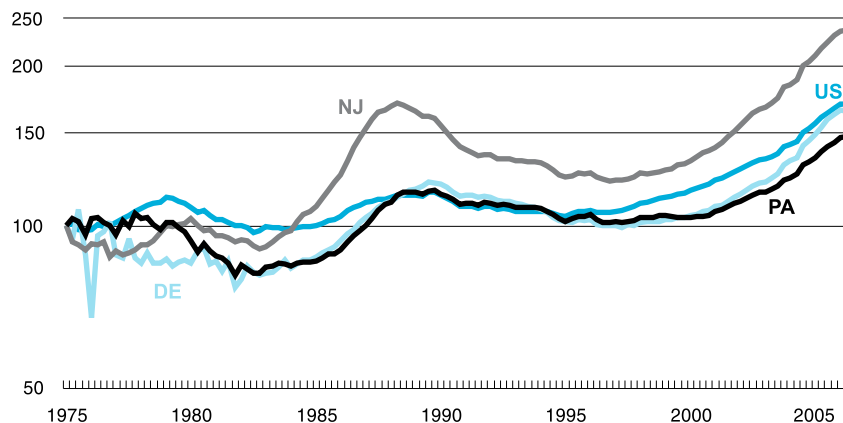
Until this year, the recent rise in house prices has also brought them to levels that are high relative to incomes and rents. These three measures — historically high house prices, the ratio of house prices to income, and the ratio of house prices to rents — are commonly mentioned when asking whether the house-price increase was a “bubble.” Are these measures good evidence of this? Do the historical data suggest that the rapid increase in

⁶ A metropolitan area is a county or a group of contiguous counties with an urban core of at least 50,000 in population and close economic ties, as measured by commuting to work, among the counties. A metropolitan division is a county or a group of counties within a large metropolitan area (population of at least 2.5 million) that has a concentration of employment and extensive commuting between adjacent counties. Metropolitan areas and divisions are delineated by the U.S. Office of Management and Budget.

FIGURE 2

OFHEO House-Price Index (Real) for the Region*

Index: 1975 Q1 = 100
Log scale



*OFHEO house-price index deflated by CPI.

the 2001-2005 period was a bubble? To answer that question, we need to define a bubble.

DEFINING AND IDENTIFYING BUBBLES

As noted earlier, real house prices have risen and fallen over the past 30 years. But mere price increases and decreases do not make a bubble. Economists define a bubble as a rise in price that cannot be explained by fundamental factors influencing price. The most common “nonfundamental” factor driving price increases is a belief that prices will rise in the future. In other words, as Joseph Stiglitz has noted: “If the reason the price is high today is *only* because investors believe the selling price will be high tomorrow — when ‘fundamental’ factors do not seem to justify such a price — then a bubble exists” (*italics in original*).⁷

⁷ See the article by Joseph Stiglitz.

Some analysts who study asset-price behavior have found evidence that in recent years, a growing number of home buyers have become convinced that prices will rise and produce large gains for them.⁸

A rise in house prices in the absence of fundamental factors would suggest that they are in a bubble. But a rise in house prices can also be the result of fundamental factors, that is, objective factors that are economically related to price and influence it. Two fundamental determinants of house prices that can be measured are income and rents. We can look at the price to income ratio of houses and the price to rent ratio of houses to evaluate whether fundamental factors are influencing prices. We do that in the next two sections, and we point out some necessary qualifications in the use of these measures.

⁸ See the article by Robert Shiller.

TABLE

Real House-Price Appreciation in the Region* First Quarter 1995 - Second Quarter 2006

Metropolitan Area or Division	Percent Increase
Ocean City, NJ	143.1
Atlantic City, NJ	100.0
Edison, NJ	98.0
New Jersey	86.1
Newark-Union, NJ	83.4
Trenton-Ewing, NJ	72.5
Camden, NJ	65.0
Philadelphia, PA	62.6
Delaware	60.3
United States	58.5
Wilmington, DE	57.6
Vineland-Millville-Bridgeton, NJ	51.4
Allentown-Bethlehem-Easton, PA	47.8
Dover, DE	44.4
Pennsylvania	40.8
York-Hanover, PA	31.8
State College, PA	28.5
Reading, PA	27.9
Lancaster, PA	26.2
Lebanon, PA	22.0
Scranton-Wilkes-Barre-Hazleton, PA	20.9
Harrisburg-Carlisle, PA	19.5
Altoona, PA	18.7
Johnstown, PA	17.7
Pittsburgh, PA	16.5
Williamsport, PA	15.0
Eric, PA	8.8

*OFHEO house-price index deflated by CPI

IS THERE A RELATIONSHIP BETWEEN INCOME AND HOUSE PRICES?

One indicator that has been cited to support the argument that there has been a house-price bubble is that house prices have risen too high in relation to income. Implicit in this argument is the idea that there is a stable, or

fundamental, ratio of house prices to income, and that when this ratio has been exceeded, house prices are in a bubble and, absent a rise in income, are liable to fall. Is this a valid argument?

Research on the history of house prices and income does not support the existence of a stable ratio of prices

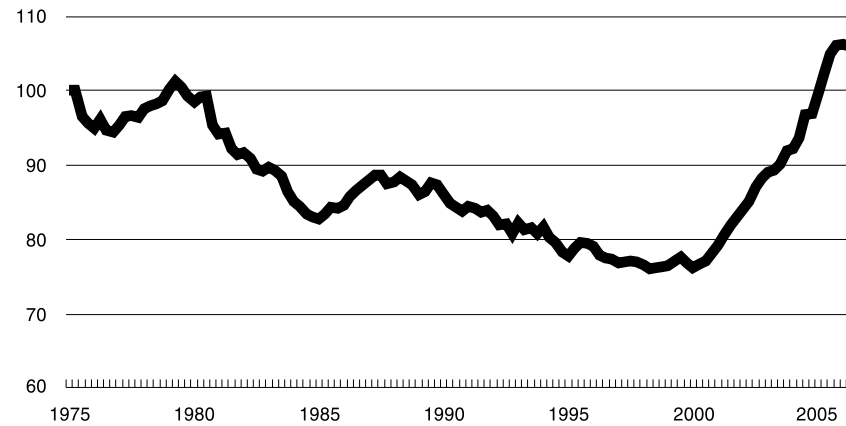
to income. The ratio of house price to income trended downward during most of the period from 1975 to 2000, with brief rising episodes in the late 1970s and 1980s, before it began a strong increase, which has only recently flattened out (Figure 3). Over the years for which house-price data are available, statistical tests indicate that there is no consistent relationship between house prices and income.⁹ Therefore, although income could be a fundamental factor influencing house prices, the ratio of house prices to income does not appear to be stable or exact. Thus, we cannot draw any conclusions about the sustainability of house prices from the level of income.

The economics of housing markets alerts us to why income is unlikely to completely determine house prices. Housing is considered a normal good in economics; that is, as income rises, more housing is demanded (in the form of larger homes or second homes). However, in itself this increase in the amount of housing demanded because of an increase in income does not imply a fixed relation between income and the price of a constant-quality house. If the supply of housing can be readily increased when the demand for housing increases, the amount of housing purchased (for example, the size of the house or lot or the number of houses purchased per capita) will increase with income, and there will be no increase in its price. If the supply of housing cannot be increased readily when demand increases, the increase in demand due to an increase in income will only raise the price. In reality, the housing market is somewhere between these two extremes, so an increase in demand raises prices and increases the amount of housing available at the same time.

⁹See the 2006 article by Joshua Gallin.

FIGURE 3**Index of House Price/Income Ratio***

Price/Income Index: 1975=100



*OFHEO house-price index and per capita personal income, both deflated by CPI.

The index does not represent the price-income ratio for any specific type of house. Rather, it indexes the ratio of house prices to per capita income at 100 in 1975. It shows how the ratio has changed since 1975 based on changes in house prices as measured by the OFHEO house-price index and changes in per capita income. The chart illustrates that house prices have increased around 6 percent more than per capita income since 1975. However, house prices generally declined relative to income from 1975 to 1999. Since then, house prices have increased around 40 percent more than per capita income.

The housing supply's response to demand varies from place to place. As noted earlier, it appears that it has become more difficult to increase the supply of houses in recent years. This limitation on supply has tended to raise prices more as demand has increased than was the case before the past decade or two. Research indicates that limits on the supply of new housing — zoning and other regulatory restrictions — have been a major factor in limiting the increase in the supply of housing in response to increasing demand.¹⁰ The more restrictive limitation of supply makes historical comparisons of the house price-income ratio inappropriate.

Even if we assume there should be

¹⁰ See the article by Edward Glaeser and Joseph Gyourko and the one by Glaeser, Gyourko, and Raven Saks.

a stable relationship between income and the cost of housing, it is not clear that the purchase price of the house is the correct measure of the cost of housing. The purchase price of a house is the price of an asset, but to the homeowner, the cost of housing is the monthly or annual cost of ownership. Therefore, the correct measure of the cost of housing is one that takes into account all the expenses of homeownership, and this measure is usually called the user cost of owner-occupied housing. (See *The User Cost of Housing*.) We can compare this measure with income and rents to gauge whether the cost of owner-occupied housing has diverged from historical averages or from a fundamental level.

When the recent level of interest rates and the historical average price appreciation rate (as a proxy for expected capital gains) are used

to calculate user cost, the current house cost to income ratio is not extraordinarily high relative to its historical range of values. However, the ratio has approached historical highs in some areas, suggesting that there is an element of bubble psychology in house prices in those areas.¹¹ As in previous periods of rapidly rising house prices, the greatest increases have been in areas on the coasts: for example, many areas in California (such as Oakland, Orange County, San Bernardino-Riverside, and San Diego) and on the East Coast (such as Boston, Miami, and Fort Lauderdale).

HOW ARE RENTS RELATED TO HOUSE PRICES?

We can also use the user cost measure to compare house prices with rents. The cost measure should equal the imputed rent of the house, that is, the value of the housing services it provides, as measured by the market rent the house could bring. If the after-tax user cost exceeds the market rent, it would be less expensive to rent than to buy, and demand to buy should fall, thereby reducing house prices. Therefore, when markets are in equilibrium, the after-tax user cost of an owner-occupied house should be roughly equal to the actual market rent of a comparable renter-occupied house.

In relating house prices to rents, we can think of the house price much like the price of corporate stock, and we can think of the rent like the dividend the stock pays. Historically, periods during which stock prices have been high relative to dividends have been followed by periods during which stock prices grew slowly or declined.¹²

¹¹ See the article by Charles Himmelberg, Christopher Mayer, and Todd Sinai.

¹² See the article by John Campbell and Robert Shiller.

The User Cost of Housing

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or a homeowner, the user cost of housing is the cost of providing himself with housing services over a given period. It is generally calculated on an annual basis and as the after-tax cost, since there are

a number of tax advantages to homeownership. Several items are included in calculating the annual cost of owner-occupied housing.

(1) The opportunity cost of the investment in a house is the main item, and the calculation depends on how the house is financed. A person who buys a house with cash forgoes the income that could have been earned on an alternative asset with the money used to purchase the house. The opportunity cost should be calculated as the return on a similarly risky asset. The excess of this income, expressed as a rate of return, over the risk-free rate of return represents a risk premium to compensate for the fact that the buyer of a house is exposed to the risk of financial loss (from price depreciation), a risk that a person renting a house does not bear. This return would be included in taxable income, but the rental value of owner-occupied housing is not included in taxable income. Therefore, the opportunity cost of the owner's equity in a house should be reduced by the income tax rate to calculate the after-tax user cost. A person who buys a house relying completely on a mortgage loan makes interest payments equal to the purchase price times the mortgage interest rate. Mortgage interest can be deducted

from income subject to tax, so this element of user cost should also be reduced by the income tax rate. If the actual rate of return on nonhousing investments differs from the mortgage rate, the investment return should be used for the cash portion and the mortgage rate for the borrowed portion of the purchase price.*

(2) Costs associated with buying and selling a house (transaction costs) and an imputed compensation to the owner for the fact that houses are not readily sold (houses do not have the liquidity of financial assets, for example) must be estimated and added to the user cost of housing.

(3) Property taxes must be added to the cost of housing but reduced by the income tax rate because they are tax deductible in most cases.

(4) Maintenance costs, including insurance, are another item that must be added to the cost of housing. They are not tax deductible.

(5) The expected capital gain on the house is a benefit to ownership, so the expected amount of this gain should be subtracted from the cost of ownership. For most homeowners capital gains on their primary residence is exempt from federal income tax. However, overly optimistic expectations for capital gains are the impetus for a bubble psychology, and they can drive prices above fundamental values.

* See the article by James Poterba.

Similar behavior might be expected for house prices and rents. So the argument that a house-price bubble exists would take this form: When house prices are too high relative to rents, prices are liable to fall. Of course, the price-rent ratio is not constant over time; like a stock price-dividend ratio, it will vary depending on market interest rates and expectations about future increases or decreases in the level of rent payments. If the price-rent

ratio exceeds its appropriate value for a given interest rate, or if expectations about future increases prove to be too optimistic, real house prices are likely to decline. Computing the price-rent ratio with interest rates and average historical increases in rents as of 2005 indicates that house prices have not risen to excessive levels nationally. However, they have risen above historical norms and near bubble levels in some areas, the same areas identified

as high priced by the house price-income ratio.¹³

FUNDAMENTAL FACTORS: THE INTEREST RATE AND THE HOUSING PREMIUM

Changes in income and user cost, appropriately measured, can explain

¹³ See the article by Himmelberg, Mayer, and Sinai, and the one by Jonathan McCarthy and Richard Peach.

the historical variation in real house prices, including the strong increase of the past few years. They indicate that house prices were not a bubble nationally, although they appear to have risen to near bubble levels in some areas. Can user cost tell us more? The interest rate is an important element in computing the user cost of housing, and it largely influences the rental rate that a landlord would have to charge in order to achieve a market rate of return when renting a house. Therefore, the user cost calculation highlights the sensitivity of fundamental values of house prices to the interest rate.

Mortgage interest rates have trended down throughout most of the recent period of rising house prices. (Conventional mortgage rates generally declined from 1995 to 2004, and they have risen only slightly since.) The decline in mortgage rates is the reason home buyers have been able to pay more for houses without a commensurate increase in the share of their income spent on monthly mortgage payments, a fact reflected in the improvement in the National Association of Realtors' affordability index from 1995 to 2004.¹⁴ The decline in mortgage interest rates also contributes to the rise in the ratio of house prices to rent, as described above (Figure 4). In fact, one could argue that innovations in mortgage financing that have reduced down-payment requirements and closing costs have made house prices even more sensitive to interest rates in the past few years because the interest rate forms a proportionately larger part of the total cost of buying a home.¹⁵

¹⁴ The index is set to equal 100 when the median family income qualifies for a mortgage on the median price home, assuming a 20 percent down payment at the current mortgage rate. See the website of the National Association of Realtors listed in the References to this article.

¹⁵ See the article by Christopher Mayer.

Another factor contributing to the rise in the house price-rent ratio is an apparent decline in the risk premium that is factored into the user cost calculation. Other causes might be a decline in liquidity premium (the amount owners require to compensate for the difficulty in buying and selling a house) and a decline in transaction costs associated with buying and selling a house. These three factors — risk, liquidity, and transaction costs — are known collectively as the housing premium.

If the decline in interest rates and the housing premium explain a good deal of the recent rise in house prices, what might happen to prices if the interest rate or the housing premium rises?

If the decline in interest rates and the housing premium explain a good deal of the recent rise in house prices (rising incomes have also been a factor), what might happen to prices if the interest rate or the housing premium rises? Since mortgage interest rates have gone up during the past year, this question takes on some urgency. If interest rates rise, the house price-rent ratio will have to fall, and this is likely to occur through a combination of rising rents and falling real house prices. Research indicates that when the price-rent ratio has risen to high levels in the past, it subsequently fell as rents rose, and the increase in real house prices slowed down or real prices actually declined. Furthermore, research by Joshua Gallin of the Federal Reserve Board suggests that slowing real house-price appreciation (or a decline in prices) was a larger factor in the decline of the price-rent ratio than rising rents.¹⁶

¹⁶ See the 2004 article by Joshua Gallin.

How far could real house prices fall? Using past relationships between house prices and interest rates, researchers have estimated the possible decline in real house prices. Richard Rosen of the Chicago Fed estimates that if mortgage rates rise around one percentage point, real house prices will decline about 6 percent in the year after the increase. An increase of around two percentage points would have an estimated impact more than twice as large, resulting in a decline of around 15 percent within a year.¹⁷

Other researchers estimate some housing markets will experience larger price declines but over a longer period.¹⁸ An increase in the housing premium would also lead to a decline in prices; some researchers estimate a 10 percent decrease in price for a 0.5 percentage point increase in the housing premium.¹⁹

REGIONAL VARIATIONS IN THE OUTLOOK

As noted earlier, house-price appreciation and volatility have not been uniform around the nation. Some areas have had higher appreciation over the long term and, occasionally, greater downward moves in real prices than others. If there is, in fact, a period

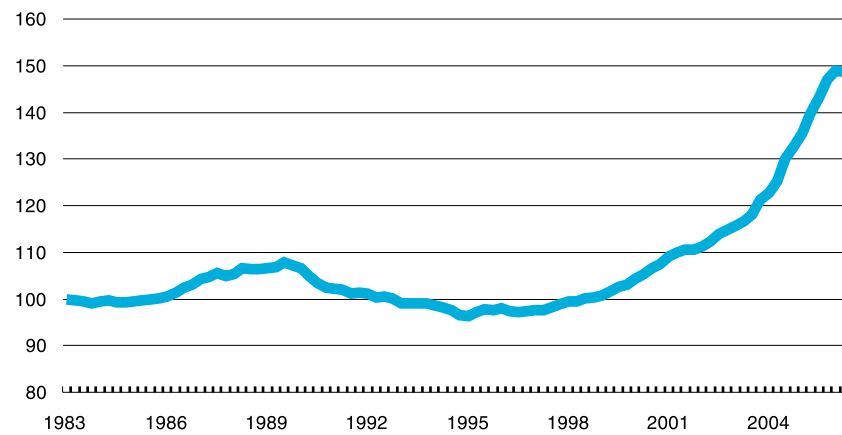
¹⁷ See the article by Richard Rosen.

¹⁸ See Global Insight/National City Corporation.

¹⁹ See the article by Sean Campbell and co-authors.

FIGURE 4**Index of House Price/Rent Ratio***

Price/Rent Ratio Index: 1983=100



*House price is OFHEO index. Rent is CPI for owner's equivalent rent (data begin in 1983).

The index does not represent the price-rent ratio for any specific type of house. Rather, it indexes the ratio of house prices to rents at 100 in 1983. It shows how the ratio has changed since 1983 based on changes in house prices as measured by the OFHEO house-price index and changes in owner's equivalent rent as measured by the CPI. The chart illustrates that house prices have increased around 50 percent more than owner's equivalent rent since 1983. Most of the differential increase has occurred since 1999.

of declining real house prices ahead, these areas are more likely to be affected. In some of these areas, prices in excess of fundamental factors, reflected most saliently in a rising price-rent ratio, suggest "bubble" aspects to the run-up in prices.

Researchers generally agree that in most metropolitan areas in California and many in Florida, house prices reached or exceeded the highest levels


that can be explained by fundamental factors.²⁰

Among the states in the Third District, New Jersey has been noted for high appreciation and volatility, particularly the shore areas of Atlantic City and Ocean City. If real house prices in these areas do enter a period

²⁰ See the articles by Edward Leamer; John Krainer; and National City Corporation.

of decline and the historical pattern of price movements are repeated, the downward price movement could extend over several years, during which nominal house prices would slow to a standstill or even decline while the general price level moved up, taking real house prices down.

SUMMARY

The rise in house prices over the past 10 years can be explained mainly by fundamental factors, namely, rising income and falling interest rates. However, in some areas, mostly on the coasts (including, in our region, New Jersey's coastal areas), prices have risen to estimated levels of peak fundamental value. These are areas where housing demand has been strong and new supply is limited. These areas have seen sharper real price increases and declines than most parts of the country in the past. It is likely they will experience sharper real price declines as demand for homes declines. A key factor affecting demand is the mortgage interest rate. That rate rose through most of 2005. It has not exceeded previous peak levels during the recent surge in house prices. However, if it does continue to rise significantly above its high point of the past several years, the fundamental demand for housing will be reduced. In that event, a repetition of the historical pattern of a multi-year period of stagnant nominal house prices and declining real prices becomes more likely. 

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What Will the Next Export Boom Look Like?

Some Hints from the Late 1980s

BY KEI-MU YI

Despite the recent decline in the value of the U.S. dollar, the U.S. trade deficit remains at historic highs. When this deficit eventually shrinks, it will likely be accompanied by an export boom. In this article, Kei-Mu Yi examines the nature of the last export boom in the United States, which occurred in the late 1980s. He documents whether the increase in exports was accompanied by an increase in the number of export markets, export industries, or exporting firms and plants.

Since February 2002, the value of the dollar, adjusted for differences in inflation rates, against a broad set of world currencies has fallen about 15 percent.¹ Standard economic reasoning suggests that the weaker value of the dollar will make foreign goods more expensive for U.S. consumers and

¹This is based on the Board of Governors' price-adjusted broad dollar index as of October 2006. The price adjustment is made so that the purchasing power – in terms of goods and services – of the currencies can be compared.



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firms and, simultaneously, make U.S. goods cheaper for foreign consumers and firms. According to this logic, these two forces should eventually lead to lower imports and higher exports, thus yielding a smaller trade deficit.² In the short run, however, the dollar depreciation may lead to a worse deficit because it takes time for consumers and firms to adjust to the new prices.

Indeed, in 2003 and 2004, the U.S. trade deficit widened sharply as imports grew considerably faster than exports. However, more recently, there have been signs that export growth is picking up steam. In 2005, real exports — that is, exports adjusted for inflation — were 7 percent higher than in 2004, while imports were only 6.4 percent higher. This is consistent with the economic logic discussed above, but it should be noted that the U.S. trade

²A trade deficit exists when a country imports more goods and services than it exports.

deficit continued to widen in 2005.³

Of course, many economic forces besides the value of the dollar affect the U.S. trade deficit. Most prominent among the causes is the fact that, in recent years, the U.S. economy has grown faster than the economies of most of its important trading partners, thus leading to a greater rate of increase in U.S. demand for imports than in foreign demand for U.S. exports, thereby widening the trade deficit. Nevertheless, the fact that growth of U.S. gross domestic product (GDP) continues to exceed growth of GDP in foreign countries suggests that the dollar's decline has been a force behind the recent strong performance of exports.

Two recent articles, one by Caroline Freund and Frank Warnock and the other by Freund, have documented the pattern of macroeconomic adjustment following the trough of a large trade deficit. Freund and Warnock identify 26 such adjustment episodes in OECD countries from 1980 to 2003.⁴ They focus on the broadest measure of international trade balances, the current account. The current account deficit is the sum of the trade deficit in

³The growth in the deficit occurred because imports currently exceed exports by 50 percent. Consequently, even though exports grew at a faster rate, the total increase in imports in dollar terms was greater than the total increase in exports.

⁴The Organization for Economic Cooperation and Development is an international organization of industrialized countries whose membership includes most European countries; the countries belonging to the North American Free Trade Agreement (NAFTA) — the United States, Canada and Mexico; and Japan, South Korea, Australia, and New Zealand.

goods and services, and the “income” deficit, which is the difference between income earned by U.S. residents from investments in foreign countries and income earned by foreign residents from investments in the United States.

A major finding of these articles is that when the current account deficit shrinks — as they all eventually do — it is accompanied simultaneously by an export boom.⁵ By contrast, imports are flat or may even continue to grow. This is an important finding because as a simple matter of accounting, it is entirely possible that a decrease in the current account deficit could be brought about via a fall in imports with little or no change in exports. These papers find little evidence for that type of adjustment. The papers do not investigate the fundamental causes of this adjustment, but regardless of the causes, their evidence suggests that the United States will likely experience an export boom when its current account deficit begins to shrink.

What will this boom look like? More specifically, will the United States expand the number of countries it exports to? Will it expand the number of goods it exports? If the latter happens, will the number of goods expand because existing plants begin exporting or because new plants start to export? Or will the U.S. simply export more of the same goods to the same countries? The manner in which export expansion occurs will have ramifications for how sustained the export boom will be because in order to export a good to a new market, firms often need to incur costs, known as “sunk” costs, to establish business relationships, distribution channels, and marketing.

⁵Two other key findings are that GDP growth tends to slow and the real exchange rate — that is, the exchange rate adjusted for differences in purchasing power — tends to depreciate.

If a large share of the growth in U.S. exports is from new exporters or new plants, we would expect that even if the forces that led to the export boom diminished or disappeared, many U.S. firms would choose to stay in the export market, rather than pulling out and re-incurring the sunk costs at some point in the future, should the market become desirable again.

A further decline in the dollar might be necessary for new markets — especially industries and plants beginning to export — to be developed.

This would help to ensure that future declines in exports will be less severe than in the absence of this “stay put” behavior.

We will examine the last great U.S. export boom — the export growth that occurred in the late 1980s and early 1990s — to see if it led to new export markets for goods. Specifically, we will look at the extent and nature of U.S. exports from 1986 to 1990, including changes in the total value of exports, as well as changes in export destinations and the types of goods exported. Finally, we will discuss findings from a very detailed study of U.S. exports during roughly the same period.

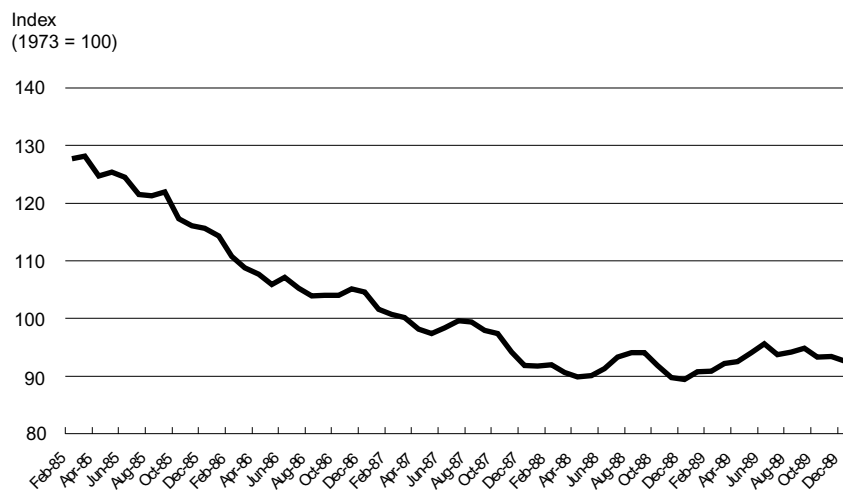
The main findings are: (1) Exports responded significantly, but high growth rates did not occur until 1987 and 1988, more than two years after the dollar started depreciating. (2) Geographically, no major new markets were developed. The U.S. did not expand the geographic reach of its exports; rather, the U.S. simply

exported more to its existing trading partners. (3) In terms of industries, no new markets were developed, as well. There were no industries that began to significantly export; rather, the U.S. simply exported more products from the same industries. (4) In terms of goods or, more specifically, manufacturing plants, some new markets were developed, as discussed in a recent article by Andrew Bernard and Bradford Jensen. The authors find that almost 40 percent of U.S. manufacturing export growth between 1987 and 1992 was by “new” exporters, i.e., manufacturing plants that had not previously exported. However, there are good reasons to believe that this growth was driven by the sharp and prolonged depreciation of the dollar in the mid-1980s. Consequently, a further decline in the dollar might be necessary for new markets — especially industries and plants beginning to export — to be developed. Otherwise, the adjustment in the U.S. will mainly take the form of exporting more of the same goods to the same destinations.

BROAD OVERVIEW OF THE U.S. TRADE EXPERIENCE: MID AND LATE 1980s

Starting in early 1985, the value of the dollar started declining. Between February 1985 and April 1988, the real value of the dollar fell 30 percent (Figure 1).⁶ When the dollar’s value declines, or depreciates, foreign firms exporting their goods to the United States that want to maintain their earnings in *their currency* must raise the prices they charge in *dollars*. At the same time, U.S. firms can lower their prices in the currency of the countries they sell in, and they can still earn the same amount, or more,

⁶Real value means the value of the dollar adjusted for different inflation rates so that it measures changes in purchasing power between the United States and its trading partners.

FIGURE 1**Broad Real Dollar Index
February 1985 - December 1989**

Source: Federal Reserve Board

in terms of dollars.⁷ As suggested in the introduction, this makes the price of U.S. imports rise, while the price of U.S. exports falls.

These price changes have apparently affected U.S. trade. Between 1986 and 1990, the trade deficit in goods and services shrunk by about \$55 billion, equivalent to 1.6 percent of GDP.⁸ The decline in the trade deficit was spread pretty evenly among

its trading partners: When we look at the data, most bilateral trade deficits — that is, the U.S. trade deficit vis-à-vis each of its trading partners — shrunk or surpluses grew. For example, the U.S. deficits with its two largest trading partners at the time, Canada and Japan, each shrunk by about \$15 billion.⁹

The components of the U.S. trade deficit are, of course, exports and imports. Between 1986 and 1990, exports of goods and services rose 72 percent. Part of this increase simply reflected higher prices for these goods and services. But real exports of goods and services — that is, exports adjusted for inflation — still rose 56 percent during this period. In fact, real export growth was at 9 percent or higher for four consecutive years (1987-1990), the

⁹ Data on bilateral deficits, that is, deficits with a particular trading partner, refer to deficits in goods only.

largest rate of growth in any four-year period over the past 25 years.

Growth of real exports in 1985 and 1986 was low, just 3 percent and 7.7 percent, respectively. Most of the growth was in the ensuing years, with 1988 being the peak year for export growth. Note that 1988 was more than three years after the dollar started declining.

Imports continued to grow, but at a slower rate than before. While our focus is on exports, it is worth mentioning that imports continued to increase. But in each year between 1987 and 1990, inflation-adjusted imports grew at a slower rate than exports, averaging only 4.5 percent per year.

DID THE U.S. DEVELOP NEW MARKETS (COUNTRIES)?

The top 20 U.S. export partners (as of 1985) accounted for 78.2 percent of U.S. merchandise exports in 1986. In 1990, these partners accounted for a slightly higher share, 79.8 percent. Had the United States been shipping goods to new destinations, the share of U.S. trade going to these top trading partners would have decreased; this fact suggests that the export boom did not significantly involve new destinations. Instead, most of the increase in U.S. exports went to the top 20 countries. These top export destinations can be broken out into broad regions, such as East Asia, Europe, the NAFTA countries, and others.¹⁰ Figure 2 shows that U.S. export shares to these regions also changed only slightly.

We can use a scatter plot to show the change over time in each individual export partner's share of total U.S. exports (Figure 3). The horizontal axis of Figure 3 measures the share of total U.S. exports going to each destination

¹⁰ In January 1994, the U.S., Canada, and Mexico ratified the North American Free Trade Agreement (NAFTA).

⁷ If the dollar declines 30 percent, for example, U.S. firms that do not change the prices they charge in terms of foreign currency will earn approximately 30 percent more in dollars. U.S. firms could reduce the prices they charge in terms of foreign currency by up to 30 percent, and they would still earn the same amount or more in terms of dollars.

⁸ Because of data availability, unless there is an explicit reference to real data, that is, data adjusted for inflation, the numbers in the text hereafter are nominal dollars, or dollars not adjusted for inflation. Measured in real terms (and with 2000 as the base year), the U.S. net export deficit shrunk by \$100 billion, or 1.7 percent of GDP, between 1986 and 1990.

in 1986. The vertical axis measures the share of total U.S. exports going to each destination in 1990. Each dot represents a different export partner (country). If the share of U.S. exports going to a destination did not change between 1986 and 1990, the dot for that destination would be on the diagonal line. The figure shows that most export destinations are very close to the diagonal. There is very little change between the two years with the exception of Mexico (increase from 5.7 percent to 7.2 percent), South Korea (increase from 2.9 percent to 3.7 percent), and the United Kingdom (increase from 5.3 percent to 6.0 percent).

In summary, there is no evidence that the U.S. export boom in the late 1980s led to the opening up of new markets in terms of countries. The United States simply exported more to its largest trading partners. Some partners, such as Mexico and South Korea, experienced strong economic growth during this period; hence, their demand for U.S. goods rose more rapidly than other countries' demand.

DID THE U.S. DEVELOP NEW MARKETS (INDUSTRIES)?

To examine whether the U.S. developed new markets in terms of industries or, more specifically, whether the U.S. export surge included industries that had not historically been very export-intensive, we examine two levels of industry data. The first divides U.S. merchandise exports into 67 industries (two-digit Standard International Trade Classification, or SITC). The second divides U.S. merchandise exports into 635 industries (three- and four-digit SITC).¹¹

¹¹ An example of an SITC (revision 2) two-digit industry is industry 76, "telecommunications, sound recording, and reproducing equipment." An example of a three-digit industry is industry 761, "television receivers." An example of a four-digit industry is industry 7611, "television receivers, color."

FIGURE 2

U.S. Export Share of Top 20 Destinations Grouped by World Regions

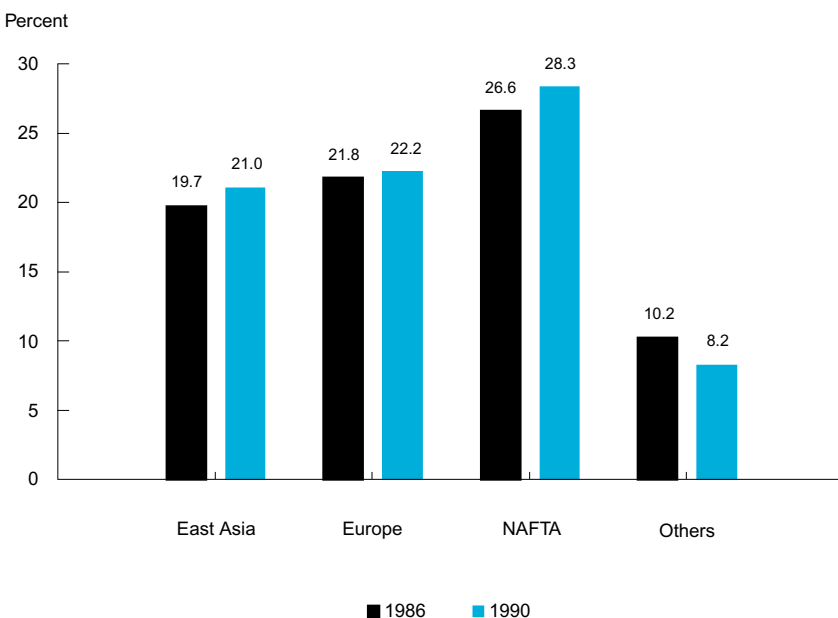
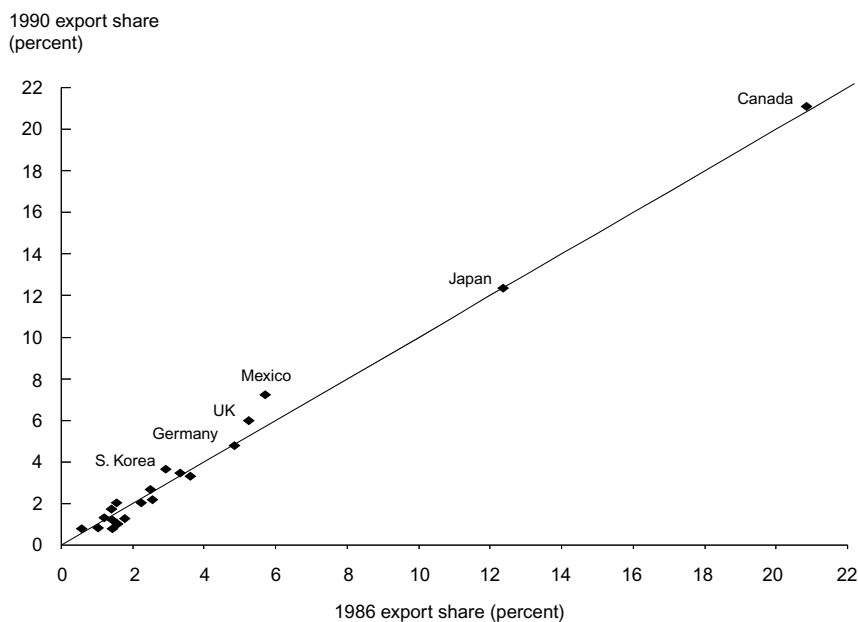


FIGURE 3

Scatter Plot of 1986 and 1990 Top 20 U.S. Export Destinations



We have plotted the share of total U.S. exports by each of the 67 industries in Figure 4. This figure is similar to Figure 3: The horizontal axis gives the share of total U.S. exports by each industry in 1986, and the vertical axis gives the share of total U.S. exports by each industry in 1990. Each industry is captured by one point on the figure. If the shares for a particular industry did not change, its data point should be on the 45-degree line. The figure shows little evidence that the U.S. began exporting in new industries. With the exception of the categories “other transport equipment” (airplanes), “electric machinery,” and “miscellaneous manufactured articles,” export shares increased little.¹²

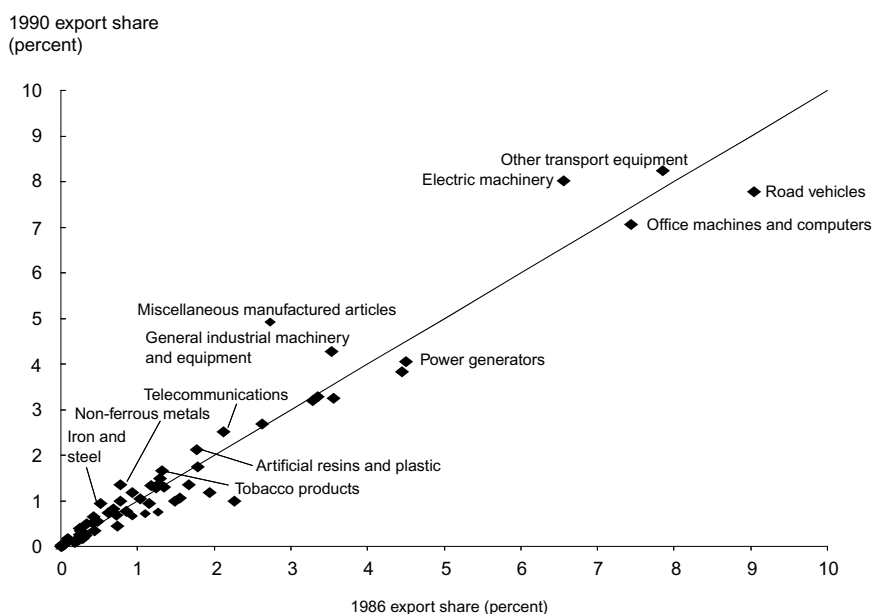
Showing a scatter plot of 635 industries is cumbersome. In Figure 5, the data are presented somewhat differently, following the method used by Timothy Kehoe and Kim Ruhl: Rank all industries by exports in 1986 starting with the industry that exports the least and ending with the industry that exports the most. Starting from the lowest industry, add industries until the group comprises 10 percent of total U.S. (merchandise) exports. This represents the first bin of industries. Continuing from this point, add up the next group of industries until they comprise another 10 percent of U.S. exports. At the end of this process there are 10 bins, each accounting for 10 percent of exports. This is what the black bars in Figure 5 represent. Because the first bin includes relatively small exporters, it takes 415.1 industries to fill it with the first 10 percent. Analogously, it requires only 1.7 industries to fill the final bin with the last 10 percent.

The blue bars in that figure indicate the share of total U.S. mer-

¹² The share of exports accounted for by road vehicles declined by a not unsubstantial amount.

FIGURE 4

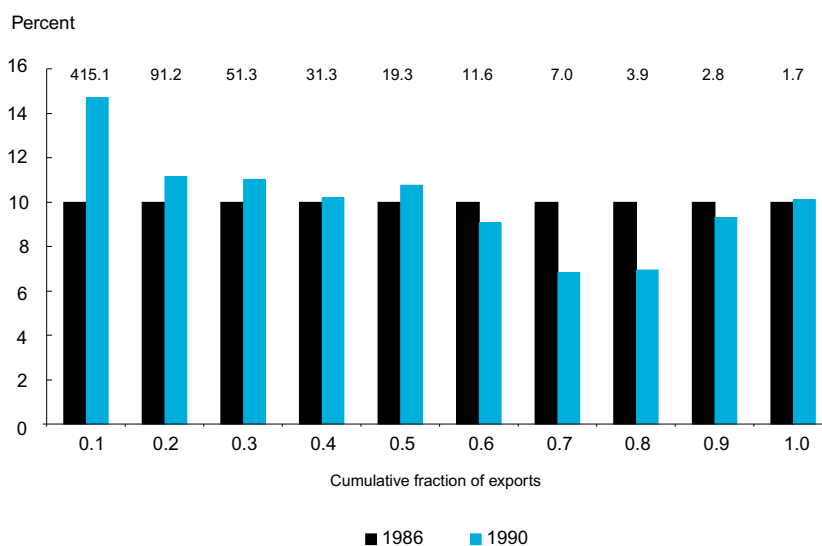
Scatter Plot of 1986 and 1990 Top U.S. Export Categories*



* Based on 2-digit SITC codes.

FIGURE 5

Change in Composition of U.S. Exports between 1986 and 1990*



*Based on 3- and 4-digit SITC codes.

chandise exports in 1990 by each bin's industries. If all industries' exports grew at the same rate (or, less restrictively, if each bin of industries' exports grew at the same rate), the black bars would be the same height as the blue bars. Each bin of industries would have the same 10 percent share of total U.S. exports that they did in 1986. For the most part, the figure shows little change. However, the first bin did show an increase. Specifically, those lowest exporting industries that collectively accounted for 10 percent of U.S. exports in 1986 accounted for 14.7 percent of U.S. exports in 1990. This suggests some, but not much, development of new markets at the industry level. In other words, more industries were exporting goods in 1990 than in 1986.

A closer look at the exporting industries in the bottom 10 percent indicates that they tend to be industries that produce intermediate goods, that is, goods that will themselves be used in producing a final good. For example, the industries include producers of parts made of iron, steel, and aluminum, as well as materials made from glass, wool, and cotton. However, the machinery and transport equipment industries are not heavily represented.

DID THE U.S. DEVELOP NEW MARKETS (GOODS)?

Having examined two levels of the data, we now turn to a slice of the U.S. trade data that is broken down into very fine detail. Andrew Bernard and Bradford Jensen's article examines the U.S. export boom in the late 1980s using data that draw from the 1987 and 1992 Census of Manufactures. This census covers almost the entire population of plants that produce manufactured goods.¹³ So the level of

detail is much greater than what we examined above.

In the following discussion, we will assume that each plant makes a different good. With this assumption, Bernard and Jensen's results can shed light on whether new markets were developed during the last export boom. This may not be completely accurate because part of the export boom may have included an expansion in the number of plants that, for example, make a particular type of ball bearing for sale abroad. This would not be a

The numbers suggest that new markets — even at the level of goods, or more accurately, plants — were not really developed.

new market per se. A better interpretation might be that Bernard and Jensen's results can provide an upper bound, or ceiling, on the number of new markets developed during this period.

Bernard and Jensen find that existing plants (those that operated in both periods) accounted for 87 percent of the \$80.9 billion increase in U.S. manufacturing export growth in their sample between 1987 and 1992. Plant turnover (new plants and plants that failed) accounted, on net, for 13 percent of export growth. (See the left panel of Figure 6.) The top right panel of Figure 6 shows that new plants alone accounted for 29 percent of export growth, but this was offset by a decline in exports equal to 16 percent of total growth by plants that failed.

The numbers above suggest that new markets — even at the level of goods, or more accurately, plants — were not really developed. However, plants that operated in both periods (those plants that accounted for 87 percent of total export growth) can

be further differentiated: those that exported in each year; those that exported in 1987 but not in 1992; and those that did not export in 1987 but exported in 1992. The bottom right panel of Figure 6 shows that plants that exported in both years accounted for 61 percent of total manufacturing export growth. Plants that were in operation in both years but exported only in 1992 accounted for 38 percent of total export growth. This number must be balanced against the export behavior of plants that were in operation in

both years and that exported in 1987 but not in 1992. These plants accounted for a decline in exports equal to 12 percent of total export growth. On net, then, existing plants that exported in only one of the years accounted for 26 percent (38-12) of export growth.

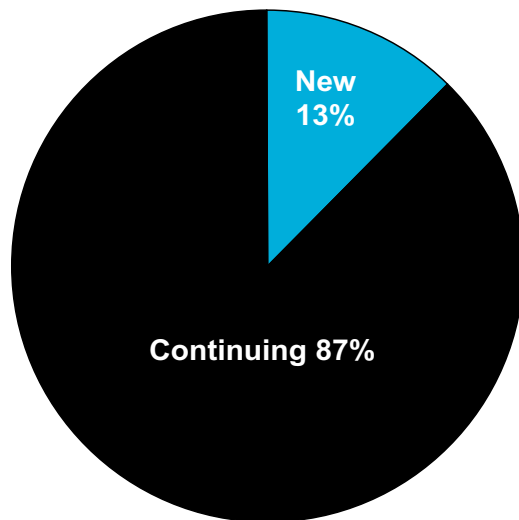
Another way to interpret these numbers is to view export growth as coming from two sources: existing exporters and new exporters. New exporters can be new plants that exported or existing plants that began exporting. From this perspective, 61 percent of export growth is due to existing exporters, and the remaining 39 percent is due to new exporters. This number is significantly larger than suggested by the preceding discussion. Of the export growth due to new exporters, 13 percentage points are due to net new plants that began exporting, and 26 percentage points are due to existing plants that (on net) began exporting. Nevertheless, it is still the case that the majority of export growth is in existing goods or markets; moreover, the 39 percent number should be

¹³ Over 220,000 plants are surveyed. But in their analysis, Bernard and Jensen exclude plants that have fewer than 20 employees.

FIGURE 6

U.S. Manufactured Export Growth: 1987 to 1992

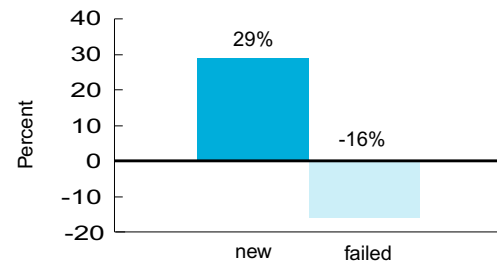
Share of export growth by plant type



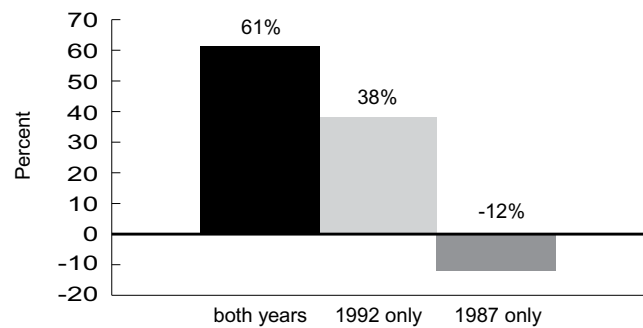
All percentages are of total change in exports by plants covered in Census of Manufactures from 1987 to 1992 = \$80.9 billion

Source: Bernard and Jensen

Share of export growth from plant **turnover**



Share of export growth by **continuing** plants
(by exporting year)



thought of as a ceiling on the amount of exports that involved new markets.

That the majority of export growth is in existing goods or markets should not be surprising when we remember that it is costly to develop new markets. Depending on whether the plant already exports, these costs include establishing business relationships, setting up distribution channels, and marketing. Many of these costs are often sunk costs and not easily recouped. Hence, when exchange rates change, potential exporters will want to know if the change is temporary or permanent before they enter a new market. Unless the change is perceived to be permanent, it is natural to expect

that existing exporters would stick with their existing markets. Relative to these existing exporters, an exporter deciding on whether to enter a new market would face additional costs. It is likely that a firm or plant that is not exporting at all will bear even greater costs.

However, the magnitude of the change in the exchange rate matters, as well. Even temporary changes in the exchange rate may induce firms to make costly sunk investments in new production and markets if the change is large enough. The data for the late 1980s support the view that a sizable share of exports did indeed involve firms making such investments.


CONCLUSION

Although the value of the U.S. dollar has declined recently and U.S. exports have risen, they have not yet boomed. If they do boom, we can get a sense of what might happen by examining the last great U.S. export boom in the late 1980s and early 1990s. In that period, exports did not boom right away; at least two years passed before the boom began to kick in. In terms of destinations and industries, we find very little development of new markets. Rather, the United States continued to export heavily to its top trading partners, and it continued to ship goods in industries in which it already had a large export presence.

However, research by Bernard and Jensen, who examined plant-level data for the manufacturing sector, finds that 39 percent of export growth between 1987 and 1992 can be accounted for by plants that (on net) had not previously exported.

The overall pattern of results is not too surprising when we remember that it is costly to develop new markets

and that many of the costs are sunk costs. In the absence of permanent or large temporary changes in the exchange rate, it is natural to expect existing exporters to stick with their existing markets. The fact that the value of the dollar dropped 30 percent in the mid 1980s is apparently a key reason behind the large share of export growth due to newly exporting plants.

During the most recent depreciation, between February 2002 and the present, the dollar has fallen 15 percent, about two-fifths of what it fell by in the late 1980s. Unless the dollar depreciates further, exporters are unlikely to respond to the current depreciation by developing new markets, suggesting that the overall export response this time will be considerably smaller. 

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THE LINK BETWEEN EMPLOYMENT DENSITY AND PATENT INTENSITY

Economists, beginning with Alfred Marshall, have studied the significance of cities in the production and exploitation of information externalities that, today, we call knowledge spillovers. This paper presents robust evidence of those effects. The authors show that patent intensity — the per capita invention rate — is positively related to the density of employment in the highly urbanized portion of metropolitan areas. All else equal, a city with twice the employment density (jobs per square mile) of another city will exhibit a patent intensity (patents per capita) that is 20 percent higher. Patent intensity is maximized at an employment density of about 2,200 jobs per square mile. A city with a more competitive market structure or one that is not too large (a population less than 1 million) will also have a higher patent intensity. These findings confirm the widely held view that the nation's densest locations play an important role in creating the flow of ideas that generate innovation and growth.

Working Paper 06-14, "Urban Density and the Rate of Invention," Gerald Carlino, Satyajit Chatterjee, and Robert Hunt, Federal Reserve Bank of Philadelphia

TEST SCORES, SCHOOL QUALITY, AND HOUSE PRICES

The expansion of state-mandated tests in the 1990s and the testing requirements of the No Child Left Behind Act have supplied researchers with an abundance of data on test scores that can be used as measures of school quality. This paper uses the state-

mandated test scores for 5th grade and 11th grade in Montgomery County, Pennsylvania, to examine three issues about the capitalization of school quality into house prices: (1) At what level do prospective home buyers evaluate the quality of local public education — at the district level or the level of the neighborhood school? (2) After accounting for student achievement as reflected in test scores, are other aspects of the local public school system, such as class size or expenditures, capitalized into the value of a house? (3) Are the positive results the author gets for the capitalization of school quality into house prices due simply to the correlation between high test scores and other desirable neighborhood characteristics? The results of the author's investigation suggest that to home buyers, some test-score averages are significantly better indicators of the quality of the local public school system than others. In particular, home buyers seem to evaluate the quality of public education at the district level rather than at the level of the local school. Class size at the high-school level has some independent effect on house prices, but not class size at the elementary school level. And once student achievement is accounted for, expenditures per pupil have no further effect on house prices. Finally, restricting the sample to similar neighborhoods along school district boundaries confirms earlier results for high school test scores but not for elementary school scores.

Working Paper 06-15, "Capitalization of the Quality of Local Public Schools: What Do Home Buyers Value?," Theodore M. Crone, Federal Reserve Bank of Philadelphia

DIVERGENT INCOME PERFORMANCE IN TWO INDIAN STATES

In this paper the authors study the economic evolution between 1960 and 1995 of two states in India: Maharashtra and West Bengal. In 1960, West Bengal's per capita income exceeded that of Maharashtra. By 1995, it had fallen to just 69 percent of Maharashtra's per capita income. The authors employ a "wedge" methodology based on the first-order conditions of a multi-sector neoclassical growth model to ascertain the sources of the divergent economic performances. Their diagnostic analysis reveals that a large part of West Bengal's development woes can be attributed to: (a) low sectoral productivity, especially in manufacturing and services; and (b) sectoral misallocation in labor markets. These patterns, together with additional evidence on developments in the labor market, the manufacturing sector, and voting behavior, suggest a systematic worsening of the business environment in manufacturing in West Bengal during this period.

Working Paper 06-16, "A Tale of Two States: Maharashtra and West Bengal," Amartya Lahiri, University of British Columbia, and Kei-Mu Yi, Federal Reserve Bank of Philadelphia

THE CYCLICALITY OF JOB LOSS AND HIRING

In this paper the authors study the cyclical behavior of job loss and hiring using CPS worker flow data, adjusted for margin error and time aggregation error. The band pass filter is used to isolate cyclical components. The authors consider both total worker flows and transition hazard rates within a unified framework. Their results provide overwhelming support for a "separation-driven" view of employment adjustment, whereby total job loss and hiring rise sharply during economic downturns, initiated by increases in the job loss hazard rate. Worker flows and transition hazard rates are highly volatile at business cycle frequencies. These patterns are especially strong among prime-age workers. For young workers, job loss and hiring adjust procyclically due to movements into and out of the labor force.

Working Paper 06-17, "The Cyclicalities of Job Loss and Hiring," Shigeru Fujita, Federal Reserve Bank of Philadelphia, and Garey Ramey, University of California, San Diego

CALCULATING THE BENEFITS OF STABILIZATION POLICIES

The authors calculate the potential benefit of policies that eliminate a small likelihood of economic crises. An economic crisis is defined as an increase in unemployment of the magnitude observed during the Great Depression. For the U.S., the maximum-likelihood estimate of entering a depression is found to be about once every 83 years. The welfare gain from setting this small probability to zero can range between 1 and 7 percent of annual consumption in perpetuity. For most estimates, more than half of these large gains result from a reduction in individual consumption volatility.

Working Paper 06-18, "On the Aggregate Welfare Cost of Great Depression Unemployment," Satyajit Chatterjee, Federal Reserve Bank of Philadelphia, and Dean Corbae, University of Texas, Austin

REAL-TIME DATA AND INFLATION FORECASTS

This paper carries out the task of evaluating inflation forecasts from the Livingston Survey and the Survey of Professional Forecasters, using the real-time data set for macroeconomists as a source of real-time data. The author examines the magnitude and patterns of revisions to the inflation rate based on the output price index and describes what data to use as "actuals" in evaluating forecasts. The author then runs tests on the forecasts from the surveys to see how good they are, using a variety of actuals. The author finds that much of the empirical work from 20 years ago was a misleading guide to the quality of forecasts because of unique events during the earlier sample period. Repeating that empirical work over a longer sample period shows no bias or other problems in the forecasts. The use of real-time data also matters for some key tests on some variables. If a forecaster had used the empirical results from the late 1970s and early 1980s to adjust survey forecasts of inflation, forecast errors would have increased substantially.

Working Paper 06-19, "An Evaluation of Inflation Forecasts from Surveys Using Real-Time Data," Dean Croushore, University of Richmond, and Visiting Scholar, Federal Reserve Bank of Philadelphia