

Inflation Measurement and Price Volatility

Remarks Before the Charlotte Economics Club



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Charlotte, N.C.
October 4, 2007

The views expressed are my own and do not necessarily reflect official positions of the Federal Reserve System.

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Thank you for such a warm introduction laced with good old Southern hospitality. It is a special pleasure to address the Charlotte Economics Club. Harvey Rosenblum, the Dallas Fed's director of research, spoke to this group about five years ago and still recalls the experience fondly. Like me, Harvey was hosted by Enrique Sanchez, who has been gracious and kind. Charlotte is clearly a vibrant city, the headquarters now of nine Fortune 500 companies and two of the nation's largest banks. Between Dallas and Charlotte, I would say we about have it wrapped up.

The Fed has been getting a fair amount of attention in the last few months—almost as much as O.J.'s sports memorabilia collection and the New York Mets' spectacular fall from grace. We central bankers are unaccustomed to being in the limelight—let's face it, we are an unexciting lot. Not many people are proud to admit being devotees of the “dismal science.” You know the story of the fellow who goes to his doctor in Dallas to get the report on his latest physical. The doctor looks at him and says, “Look, pal. I am going to tell it to you straight. You are fatally ill. I suggest that you marry an economist and move to East Texas.” “Jeez,” the crestfallen man says, “this is awful. I am astonished. Let me see if I get your drift. Are you telling me that if I marry an economist and move to East Texas I will live longer?” “No,” says the doctor. “But it sure as heck will feel that way.”

With all the hoopla over credit markets, British bank runs, commercial paper, moral hazard, the shriveling housing market and you-know-whose new memoir, I thought it would do us all some good to step away from the hot topics of the day. I'd like instead to reflect upon the less-than-scintillating topic of inflation and price measurement. It is not the stuff of headlines, but it is important. If you indulge me this privilege, I would be happy to take questions on any and all subjects during the Q&A period after my monologue and place my talent for obfuscation on full display.

Before I begin, let me state up front that whenever I speak, it is only to express my personal views. I am not speaking on behalf of the Federal Open Market Committee (FOMC) or the Federal Reserve System.

Most of you are no doubt familiar with the Consumer Price Index (CPI), that broad inflation measure the Bureau of Labor Statistics (BLS) publishes, like clockwork, once a month. We usually refer to that number as “headline inflation” because of the press coverage it gets. The BLS' monthly report includes another inflation measure, called “core inflation,” which excludes food and energy. Once a month, the Bureau of Economic Analysis releases headline and core versions of another closely watched price index—the Personal Consumption Expenditures (PCE) deflator.

It is the core measures that I want to focus on today and, specifically, why food and energy items have been deliberately and systematically ex-ed out when we look at price movements. It boils down to what engineers call a “signal extraction” problem; struggling to eliminate “noise” in our

monthly inflation measures and trying to maximize the amount of “signal.” The question is: Is this still the best way to separate the wheat from the chaff?

Let’s start with a little history: The term *core inflation* was coined in the early 1980s, but the practice of stripping certain components from the basket of consumer prices began much earlier. Contrary to popular belief, it was food, not energy, that first got the “ex” axe. The BLS has produced an “ex food” version of the CPI since the late 1950s, probably because food prices in the 1950s were even more volatile than they are today. The practice of reporting a CPI excluding both food and energy prices began when energy price volatility dramatically increased in the 1970s.

By ignoring items whose price movements display significant short-run volatility, statisticians and policymakers can get a better sense of underlying trends in consumer price inflation. Because the trends change only gradually, measures that give us a better sense of what they are today provide a better sense of where overall inflation will be tomorrow. To make inflation forecasts over the next 12, 18 or 24 months, we are much better off looking at the recent behavior of a core measure—whether ex food and energy or a trimmed mean, which I will define in a moment—than we are looking at the recent behavior of headline inflation.

That is the statistical argument. A theoretical argument offers somewhat more subtle reasoning for using core measures. It goes something like this: Even in the age of the Internet, sellers of goods and services cannot change prices every day. They have menus, they have price tags and they have price-sensitive customers who live on budgets. Adjusting prices is a costly affair and not something that most sellers would do with every change in market conditions.

My local Starbucks, for example, does not slash prices on days or for hours when foot traffic is unusually slow, nor does it raise prices when the place is packed and the line is out the door. It does not change them in response to day-to-day movements in its cost of materials. In fact, it was just nine weeks ago that Starbucks adjusted its beverage prices systemwide, about 10 months after its last price adjustment. It is to this sort of pricing behavior that economists affix the elegant and intellectually snappy designation of “sticky.”

When inflation picks up, firms that have delayed raising prices even as their costs have risen eventually do increase their prices. When the sticky prices become unstuck, the hike will be significant. Of course, not all sticky-price firms will raise their prices in lockstep with each other. The varied timing of the price increases creates a distortion in consumer spending. To correct for these factors, some economists suggest that central banks should focus on stabilizing an index of a basket of goods whose prices are especially sticky.

Food and energy prices are manifestly not sticky in our economy and, so the theory goes, should not be the focus of our attention. To put it differently, theory suggests that a central bank should pay more attention to the occasional increases in the price of a Starbucks latte than to the daily price swings at the corner Exxon station.

Central banks have good reasons to subtract volatile swings in prices, but routinely excluding food and energy—and only food and energy—is not, in my opinion, the best we can do. For one thing, not all food and energy prices are excessively volatile. Menu prices at restaurants, for example, are sticky, making information about their underlying trends quite valuable. Our

Starbucks coffees are excluded from the usual core measurements, even though American consumers drink many millions of them every day—including the one I had this morning. At the same time, other prices can be extremely volatile. Prices of infants' clothing, for example, are at least as volatile as most food and energy items, but they are included in standard “ex food and energy” versions of the CPI and PCE.

A more discriminating approach would be to exclude the items with the most extreme price changes in a given period of time, regardless of whether those items are food, energy or anything else. This is the rationale behind trimmed mean measures of core inflation. The Federal Reserve Bank of Cleveland produces such a measure for the CPI, and we at the Dallas Fed produce one for the PCE. These measures exclude, or trim out, the extreme highs and lows of price changes each month.

Many of the arguments for excluding food and energy—in particular, the statistical arguments—are based on the notion that an exceptionally large price increase today will be offset, somewhere down the road, by an exceptionally large price decline. But suppose the increases in food and energy prices we've been seeing over the past few years represent longer-lived trends, rather than transitory blips. The arguments made for excluding food and energy prices would be on shaky ground. To put it more succinctly, we risk throwing out the signal along with the noise.

Charlie Bean, the chief economist of the Bank of England who is on the Advisory Board of the Dallas Fed's Globalization and Monetary Policy Institute, posed an interesting question after noting that globalization not only delivers freighters full of inexpensive electronics, toys and apparel to consumers in the U.S. and Europe but also puts upward pressure on the prices of energy and other commodities. What sense does it make, the real Mr. Bean asks, to exclude the food and energy price increases from our inflation gauges while incorporating the price declines on the other goods that we buy?

Charlie was making a point in support of the Bank of England's policy of looking only at headline inflation and explicitly eschewing core measures in its official communications, projections and analyses. The European Central Bank does this as well. Our northern neighbors at the Bank of Canada describe their goals in terms of a headline measure but give an explicit role for a core measure—the CPI excluding the eight most volatile items—as an operational guide.

I prefer to make this an argument in favor of trimmed means: As often as food and energy prices are excluded from the “upper tail” of our Dallas Fed measure, items like toys, electronics and apparel are excluded from the “lower tail.” The trimmed mean meets both requirements of a good inflation gauge. It filters the noise created by excessively volatile prices. At the same time, it hews to Dr. Bean's observation that inflationary impulses can come from any part of the economy, including food and energy.

In practice, monetary policymakers look at a wide range of inflation gauges. Most of the participants on the FOMC prefer the core PCE. In Dallas, we have an official preference for the Trimmed Mean PCE. We have been producing this measure for over two years now. It excludes the items that consumers buy in a given month that have experienced the largest price increases or decreases, regardless of whether they are food or energy or any other consumable good or service. The particular items that get excluded from the top and bottom of the distribution of

price changes will vary from month to month, but the proportions excluded remain the same: about 25 percent off the top and about 19 percent off the bottom, when items are weighted by their shares in spending. We end up with an inflation measure that does a better job of separating the noise from the signal.

In August, the annualized Trimmed Mean PCE came in at 1.6 percent, the same as July. August saw large price decreases for energy items—gasoline in particular—along with large price increases in several food components. Outside of food and energy, some of the more significant noisy items excluded were large price declines in jewelry and watches and men’s and boys’ apparel and large increases in the cost of dental care and bank services. Other items trimmed out in August included guns and ammunition, which fell in price significantly, and funeral expenses, which increased in price. I’ll let you decide for yourself if the two price swings were related, but I will tell you that we have had to trim both of those items before because their prices moved the same way.

Let’s compare that number—1.6 percent—to other inflation measures. The annualized headline PCE rate, which includes all prices, was –0.9 percent for August, with a sharp drop in energy prices contributing to the negative rate. Annualized core PCE, or PCE ex food and energy, came in at 1.1 percent.

Over the past 12 months, the trimmed mean moved down slightly to 2.1 percent, while both core and headline PCE came in at 1.8 percent. If the monthly trimmed mean numbers continue their downward drift of the past few months, the 12-month trimmed mean inflation rate could fall below 2 percent as well.

The argument about core-versus-headline measures in monetary policy is distinct from a more common and commonsensical complaint about excluding food and energy prices from inflation gauges. You saw it articulated in the latest edition of *Newsweek*.¹ People, including economists living in married bliss in East Texas, do not stop eating or air-conditioning their homes when food and energy prices jump. Excluding them suggests a disregard for the impact on real people. I empathize and sympathize. Keep in mind, however, that the price indexes a central banker uses to frame, craft and evaluate monetary policy need not be the same as the ideal index used for measuring the cost of living. Indeed, there are macroeconomic models suggesting that if wages are stickier than prices, a central bank would do well to focus on an index of wages rather than prices. I just can’t imagine central bankers lasting very long in their jobs if they continually announced to the public their desire to hold down wage growth.

Let me turn now to the factors driving the recent behavior of food and energy prices—with a particular eye to the question of whether those factors are likely to be transitory or persistent.

Many factors impact the process of getting food and energy products to consumers, many of which are beyond anyone’s control. A growing season in one part of the country or the world that is unusually wet or dry, hot or cold—like the drought Australia is having, for example—can lead to variations in crop production, leaving too much or too little to go around and large price changes from season to season or year to year at the checkout counter. Large swings in prices will follow. Shutting down just one major refinery—or several, as occurred along the Gulf Coast two years ago—can lead to declines in gasoline supplies and sharp rises in pump prices.

In economist-speak, supply and demand for both food and energy are inelastic, so even small changes in supply or small changes in demand translate into large changes in prices.

That is what economists have in mind when designing inflation measures that exclude food and energy—a paradigm in which the shocks are primarily transitory and have large but fleeting impacts on prices. But is that what’s going on now? We have just enjoyed a fine lunch, so let’s start with food.

Over the short run, the supply of food depends primarily on the weather, but the decisions of individual farmers and ranchers also play a role in pricing. Farmers decide how much of their fields to plant in corn versus soybeans, and chicken producers, hog farmers and ranchers determine the size of their flocks or herds based on forecasts of the prices expected to prevail at harvest or market time. We usually think of demand as relatively fixed in the short run, but it is not so stable that farmers and ranchers do not sometimes err in their predictions. When Mother Nature runs amok or demand forecasts prove mistaken, or both, we end up with either gluts or shortages that require large price movements to clear markets.

Even over several years, weather can still play a role in prices—witness the persistent drought conditions in the Upper Midwest or, as previously mentioned, Australia. But over the long haul, the main drivers of food supply are technological advances and the agricultural sector investment that fosters mechanization, higher yielding crop varieties and the like. On the demand side, long-term trends are primarily driven by growth in population and wealth. Changes in preferences can result from recognition of the health benefits or detriments of certain types of food, but the largest driver is surely growth in per capita income. Richer societies consume more calories, and a greater share of those calories is accounted for by animal proteins.

In the Industrial Age and the present post-Industrial Knowledge Age, agricultural innovation and investment have enabled the supply of food to grow at a faster pace than demand, confounding the gloomy forecasts of Parson Malthus. Look back in time and you’ll see food becoming less and less expensive relative to other goods and services, even as the number of mouths to feed around the globe has increased and consumption per capita has grown. The price of corn, for example, may have increased noticeably over the past year, but it remains a bargain from a historical perspective: In 1860, the price of a bushel of corn was about 50 cents; translated into today’s dollars, that is about \$12 a bushel. The current price is a bit over \$3.

It is true that the long decline in relative food prices has been punctuated by occasional reversals as the pace of technological advance has fluctuated or as demographics have changed. I remain optimistic about the very long-run trend of declining food prices, but I do recognize that we may be in the midst of one of those reversals as the world economy adjusts to recent changes in demand. Biofuels production may be playing a part in today’s rising agricultural prices, but I believe this is minor in comparison to the evolving eating habits of billions of Chinese and Indians, the Vietnamese and former captives of the Soviet Union, Brazilians and Mexicans and others who are becoming increasingly wealthy. This reversal may take several years to play out before technology and investment can respond with sufficient supplies to put food prices back on their long-run course. In the meantime, we are subject to “agri-flation” that may be more sustained than we would like.

On the energy front, prices are shaped by demand and supply, just like most everything else we buy and sell. Demand is determined by improvements in energy-use technology and the world economy's growth rate, including the breakneck pace set of late by the so-called BRIC countries of Brazil, Russia, India and China. Because energy consumption is not very responsive to prices in the short run and little excess capacity currently exists in the world's energy-supply chains, small changes in the real or perceived balance between supply and demand can result in very sharp price swings.

Long-term energy supply is determined by the development of fuel resources—both conventional and alternative. Short-run production disruptions, actual or potential, can greatly affect energy prices. Geopolitical events buffet energy markets every day, whether it is civil unrest in Nigeria, nationalization in Venezuela, fighting in the Middle East, disputes between the West and Iran, or a strong-arming government in Moscow. Perceived changes in supply, including real or anticipated changes to OPEC production levels, can also add volatility to energy prices.

Oil prices have been on a steady climb in recent years, tripling since early 2003 and breaching \$80 per barrel last month. This worries many people who remember the energy crises of the 1970s and the ensuing recessions. In fact, nine of the 10 post-World War II recessions were preceded by sharply rising oil prices. I will remind you, however, we have had several episodes of sharply rising oil prices in the past 15 years without recessions.

Rather than ignoring energy prices because they are dropped from core inflation, I am constantly picking apart energy prices to understand the cause of their recent climb. Here is what I see:

First, it is useful to understand whether the run-up in prices is driven by increased demand or reduced supply. If it is reduced supply, like most of the oil price shocks prior to the mid-1990s, slowing economic activity and higher overall prices are likely. If the oil price increase is the result of a demand shock arising from productivity gains, however, we could see expanding economic activity and reduced inflationary pressures.

Recently, the U.S. economy has responded to rising oil prices in a way inconsistent with a classic energy supply shock. Despite rising oil prices over the past four years, gross domestic product continued to grow, unemployment continued to fall and overall price pressures remained relatively moderate. Consumer spending and consumer confidence have remained strong compared with the 1970s or early 1980s. Business investment activity has also stayed on an expansionary course.

Economic growth in other countries has not been derailed, which has kept demand for our exports at healthy levels. A weakening dollar has not hurt other countries' demand for our products, or their appetite for oil, which is priced in dollars. And inflation has been kept at bay in most countries around the world, thanks in no small part to well-managed monetary policy here and overseas.

All of these positive signs are not what history teaches us to expect in a rising oil price environment. What gives? Economic research points to a number of factors—including a lower energy-to-GDP ratio, more flexible labor markets, more experience with oil price shocks, better monetary policy and less-rigid regulatory hurdles on energy-producing firms and such energy-

using industries as airlines and trucking. In addition, the development and maturity of futures markets and derivatives have reduced the need for physical inventories, while securities markets have provided sources of investment capital.

These factors all seem quite reasonable, but I believe there is more to this story, and I am convinced that the economic resilience we have seen lately is the result of an entirely different phenomenon.

For a few years now, some economists have suggested that the U.S. economy ought to respond differently to rising oil prices if the increase is the result of stronger demand for oil needed to fuel an expanding U.S. economy rather than a result of diminished supplies. Indeed, several Dallas Fed economists are carefully studying this issue from a global perspective as I speak.

So far, they have shown that higher oil prices caused by productivity gains have a much different effect on the economy than oil supply shocks. A productivity shock originating in the U.S. will boost our economic output, and the expansion will pull up the price of oil. If monetary policy holds the growth of nominal GDP constant, this will result in a reduction of inflationary pressures. If China or India or some other country is expanding rapidly and it is the country's oil consumption that is increasing, driving up prices, that surge in productivity can yield spillovers for the U.S. in the form of lower import prices and technological gains. As long as this continues, we can expect to see an expansion of output and lower overall prices, even as the world price of oil rises. A vicious cycle is, in a sense, almost transformed into a virtuous cycle.

With each uptick in energy prices, I ask whether it is supply or demand that is making prices rise. Supply disruptions are cause for concern, but growth in demand is not as worrisome. Most likely, energy prices will continue to be volatile; it is the nature of the beast. The same goes for food prices.

Those of us responsible for crafting U.S. monetary policy cannot afford to be distracted by the flux of short-term price changes that are destined to be unwound. Our eye should be focused on underlying inflationary pressures, some of which may indeed be coming from food and energy markets. Routinely excluding food and oil price movements from our inflation gauges may have made sense in the 1970s, the 1980s and even the 1990s—but not now, nor in the next few years. The conceptual beauty of trimmed mean inflation measures lies in their ability to capture steady increases in food and energy prices, which may be germane to the pursuit of price stability, while excluding the temporary spikes and dips that do not presage changes in the underlying inflation rate.

Speaking of beauty, conceptual or otherwise, I need to wrap up and get home to my wife in East Texas. By the way, she is not an economist.

May you all lead long lives.

Thank you.

Note

¹“There's No Inflation (If You Ignore the Facts),” by Daniel Gross, *Newsweek*, Oct. 8, 2007.