Remarks at the Brookings Institution conference on productivity

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The decline in productivity growth is a major and important puzzle. Thanks to the work of Chad Syverson and of David Byrne and their co-authors, I think we know that we can't explain it just by the omission of Google and a few other things. I haven't been focusing on the issue of what's been happening in recent years. Rather, I have been studying the broader problem of measuring changes in real GDP, in real incomes, in real output and productivity over time. I think it's useful to put the recent slowdown in officially measured growth in that longer-term context.

Let me remind you that the official figures tell us that real GDP grew at an average rate of 2.3 percent during the past 20 years. On a per capita basis that was 1.4 percent. These figures, which are widely reported in the press and referred to by politicians of both parties, shape the public's perception of the economy's performance.

I'm struck by the difference between how people judge their own economic improvements and their view of the economy as a whole. In a recent survey of U.S. households, a substantial majority reported that relative to five years ago they were either “living comfortably” or “doing okay”. But when asked how the U.S. economy as a whole is doing, a majority of respondents say that the U.S. economy is doing badly. Well, of course they know something about their personal experience, but they depend on the reported official statistics to judge how the economy as a whole is doing. And while the government is careful to say that GDP doesn’t measure how well we’re doing, there is the temptation on the part of the press, the

politicians, and the public to think that it measures changes in the real standard of living.

So I've been studying the methods used by Bureau of Labor Statistics and the Bureau of Economic Analysis. I've concluded that the official statistics substantially underestimate the real growth of output, which translates of course into lower growth of productivity and of GDP. I don't mean just recently. I mean over a much longer time. And that underestimation and the resulting public perception is important -- not just to us as economists trying to understand exactly where the economy is moving, but it is important for a variety of reasons. I think the sense that real incomes, especially middle-quintile real incomes, are not rising very much reduces people's faith in the political and economic system. I think it creates a pessimism that contributes to political attitudes, including anti-globalization, anti-free trade, and a general distrust of government policies. And I think it reinforces concerns about economic mobility. If people think their incomes aren't rising, they worry that their children are going to be stuck and won't be able to enjoy upward mobility. I think it's important to understand this.

So why do I think the official methods underestimate real growth of output and incomes? It's not because of omissions in nominal GDP. The government collects the value of nominal output, the market value of sales of goods and services. But then comes the difficult part. It has to convert that to annual changes in real output by constructing a price index. So it needs to have a price index to go from nominal output to the real value to consumers and other final users. The problem is in creating that price index.

There are two problems involved in that. One is the change in quality of existing products and services, and the other is the value created by new products. In the case where there are identical products in successive years, we simply have to know how much is being spent on those additional products. Then the so-called match-model index works. But

what if there is a perception of a quality change or a potential quality change, what if there are wholly new products? I knew these are difficult problems, but I must say, after studying the procedures in detail, I'm convinced that the results are really even worse than I had anticipated.

The official changes in real output and real income, and therefore the changes in prices, just don't capture what has been happening, don't capture adequately what has been happening to changes in quality and changes in the introduction of new products. The official methods tell us more about the increase in inputs, in other words in the cost of production, and not much about the increased value to consumer when there are changes in products or the introduction of new products. And this is true for goods as well as for services, although doing it for services is even more difficult than it is for goods.

Let me explain by looking at how the government statisticians deal with quality change for goods. That's about 25 percent of GDP. Now for a small fraction of these goods in GDP the government uses hedonic regression.[1] I would emphasize that for GDP as a whole this is a small fraction of goods. The BLS says that the most common procedure for evaluating quality change is what they call the resource cost method. The BLS follows a very large number of product categories, and for each it asks the manufacturer or the producer the following question: Has the product changed since last year? And if there's been no change then there's no issue about having to deal with quality change. Any change in price is correctly regarded as inflation and there's no quality change to be accounted for. But -- and here's the key part -- if the manufacturer says this year's model is different from last year's, the BLS then asks the following question: What is the marginal cost of the new input requirements that are directly tied to changes in product quality? Let me say that again: What is the marginal cost of the new input

[1] Hedonic regression is a method of valuing a good or serve by breaking the item into its constituent parts and estimating the contributions of each part.

requirements that are directly tied to changes in product quality?

So if the manufacturer says, "Well, no, there wasn't any increased cost," then the BLS concludes there's been no quality change. If and only if there is an increase in the cost of making the product does the BLS conclude that there has been a quality improvement. That's a very narrow, and in my judgment, incorrect way to measure quality change. "If it doesn't cost more to make the new product there's no quality improvement." In reality, of course, producers improve products in ways that don't cost more to produce or may even cost less. And that's what we as economists think of as true technical progress. But the official government method, the resource cost method, focuses on the increased cost of inputs. The government doesn't really measure output changes in connection with quality improvements or the value to consumers, but just the increased volume of inputs. The official method misses the increased real GDP and the increase in productivity due to changes in product quality.

And the measurement of output changes for services, which are three times as large or about 75 percent of GDP, is also based on the cost of inputs. The change in the market value of sales is divided by the change in the price of inputs, which is generally wages. So there's no attempt to measure the value of the service to the consumers or the increased value to consumers of the service. That's of course true for health care where we've seen enormous improvement in the effect of treatment over the years. So it's perhaps not surprising that if you break down the productivity numbers by industry we see -- and this has been true for a long time and not just in the U.S. -- we see that in the health care industry productivity is declining.

Let me be clear, measuring the value to consumers of quality change is a very hard problem. So I'm not being critical of the efforts of the BLS and the BEA. My point is that their estimates are in a sense mislabeled and misinterpreted. When it comes to quality change, what is

called the growth of real output is really the growth of real inputs. The result is a major, I think, underestimation of the increase in real output and in real GDP growth.

The other source of underestimation of real growth and productivity change is the failure to capture the benefit of new goods and services. So here's how the current procedure works. A new product is developed and sold to the public. Its market value enters into nominal GDP and into the nominal value of industrial production. These nominal values of GDP are converted to real values using price indices that don't reflect the new product at all. Why? Because the new product is too small in the beginning to be worth changing the weights in the GDP price index. But over time, if the new product represents a large enough amount of spending, the BLS includes the changes in its price explicitly in the price index. Well, after that the BLS tracks increases and decreases in the price of the product like any other existing product. But the process that I've described never tries to take into account the value created by the new product per se. And that's true for smart phones, it's true for tablets, it's true for new pharmaceutical products, it's true for many, many other products.

Think about statins, the remarkable drug that lowers cholesterol and reduces deaths from heart attacks. By 2003, statins were the best-selling pharmaceutical product in history. By then it was in the price index. And when patents expired and generic forms of the statins became available, the prices fell and the BLS recorded that, implying a rise in real incomes. But it never estimated anything for the improvement in health that came about as a result of the introduction of statins.

Well, how big a deal was that? Here's a quick history to give you a sense of the importance of this single ignored health effect. In 1994 researchers published a five-year study of 4000-plus patients. They found that taking a statin caused a 35 percent reduction in cholesterol

and a 42 percent reduction in the probability of dying of a heart attack. Well, it didn't take long for statins then to become a best-selling product with dramatic effects on cholesterol and on heart attacks. Between 2000 and 2007 the percentage of men 65 and older taking a statin doubled to about 50 percent of men over age 65. High cholesterol levels declined by more than half among men and women over age 75, and the death rate from heart disease among those over 65 fell by one third. Pretty impressive!

This was a remarkable contribution to the public's well-being over a relatively short number of years, and yet this part of the contribution of the new product is not reflected in real output or real growth of GDP. And this of course is just one example of a myriad of new goods and services that get introduced year after year.

Despite their value to consumers that value is not part of the official statistics of real growth. So, in short, when I look at all of this I think the official data on real growth substantially underestimates the rate of growth of real GDP and of real output. Unfortunately, I don't know by how much, but I can certainly imagine it being an understatement of two percent or more a year. But I have no hard evidence to demonstrate that. I think it's important that we as a profession can do more to understand where this understated growth comes from and how large it is because even that small amount, even two percent a year, would dramatically change our perception of what's been happening to the growth of real incomes, more than doubling the growth of real per capita income.

So I'm convinced that improving the measurement of output growth, including trying to get a better handle on the contribution of changes in quality and the contribution of new products really deserves serious attention. And doing so may help to explain the recent slowdown, but it would be worth doing even if it didn't.