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Weekly Economic Commentary

GDP Perspectives

Summary

- It is not easy to pin down the current state of the economy. On the one hand, data on the labor market and consumer confidence are at readings that are rarely, if ever, seen when the economy is not in recession. On the other hand, measured by real GDP the economy has continued to expand—albeit at a subdued rate.
- This week is likely to bring some perplexing readings on economic activity. By our calculations, real GDP growth could come in around 3%, which would normally be indicative of a solid economic expansion. However, this is likely to be followed by another weak reading on employment for July. In short, we doubt that the economic data will resolve the debate about the current state of the economy.
- In addition to 3% real growth, our bean counting of the monthly data points to no increase in the GDP deflator. Is it a case of solid underlying growth with no inflation, or does our analysis suggest another interpretation? We estimate that the growth in nominal GDP over the last three quarters, at 3¼%, was in line with the anemic pace seen during the last recession and into the first year of sub-par recovery. This is hardly a sign of strength.
- It makes no sense to us that inflation in an underlying sense has gone to zero—it is quite possible that there is a timing mismatch between the import price measures and the domestic price measures or that profit margins were significantly squeezed.
- The release of the first estimate of GDP could cause considerable confusion and could lead to a false impression that underlying growth is better than expected and inflation low. In turn, this could lead some to think that a Fed rate hike might be nearer than they previously expected. This would not be our interpretation and we think any such revised expectations could well be dashed by a weak employment report for July.

GDP Perspectives

It is not easy to pin down the current state of the economy. On the one hand, data on the labor market and consumer confidence are at readings that are rarely, if ever, seen when the economy is not in recession. On the other hand, measured by real GDP the economy has continued to expand—albeit at a subdued rate of 0.8% from the third quarter of 2007 to the first quarter of this year. In addition, signals from financial markets have been mixed. Through late May, the behavior of the equity market (outside of financials) had been indicative more of slowdown than recession. However, recent readings on the equity market have had a more recessionary feel with the 11.9% decline in the Dow Industrials since the end of May, which brought the cumulative decline from its peak in October 2007 to 21.4% (the Dow technically entered bear market territory in mid-July when the decline from peak to trough hit 22.6%). Moreover, the strains in the financial system remain, despite the Treasury's support plan for the mortgage GSEs, as evidenced by the sharp rise in the credit default swaps for many of the non-bank broker dealers since early May to levels not seen since the near-collapse of Bear Stearns (the interested reader with a Bloomberg should check out GCDS on Bloomberg and set the sector to brokers). The free flow of capital and credit is the lifeblood of a modern capitalist economy and it would appear that the U.S. economy's arteries are still clogged.

This week is likely to bring some perplexing readings on economic activity. By our calculations, real GDP growth could come in around 3%, which would normally be indicative of a solid economic expansion (more on that in a minute). However, this is likely to be followed by another weak reading on employment for July. In short, we doubt that the economic data will resolve the debate about the current state of the economy. The optimists will seize on the growth in real GDP (unless the swing factors of trade and inventories result in a surprisingly weak reading despite the likely solid growth in consumer spending and business investment). The pessimists will likely be able to point to the eighth consecutive decline in private payrolls in July. The debate over the state of the economy will continue and the markets will likely be pushed and pulled by these competing views. Our perspective is that these different readings on economic activity are not as irreconcilable as first appears—however, it takes a bit of digging into economic accounting concepts—and that the underlying state of the economy is quite weak.

GDP Primer

GDP, or Gross Domestic Product, is a measure of the value of goods and services produced in the United States. In principle, it can be measured in three ways and conceptually the three give identical results. The first way, which is not used in the U.S., is the output measure, which sums the value added of each sector. The farmer grows wheat and sells it for \$1,000, which is his value added (assuming he paid nothing for seed, fertilizer, and water). The miller buys the wheat and turns it into flour and sells it for \$2,000. His value added is also \$1,000 (the \$2,000 of revenues less the \$1,000 he paid for the wheat). The baker buys the wheat and turns it into bread and sells it to the consumer for \$4,000. His value added is \$2,000 (\$4,000 in sales less the \$2,000 he paid for the wheat). The GDP from the output side of this economy is \$4,000 (\$2,000 value added by the baker and \$1,000 value added by each of the miller and the farmer). Another way to come at GDP is from the income side. The incomes of the farmer, miller, and baker (which conceptually is a mixture of wage and profit income) also sum to

\$4,000. However, we are used to looking at GDP from the expenditure estimate, which is measured by final expenditures. Note that total sales in this economy sum to \$7,000 (\$4,000 by the consumer, \$2,000 by the baker, and \$1,000 by the miller). However, this double counts the sale of flour and triple counts the sale of wheat. Hence, GDP measures sales to final consumers and ignores intermediate sales (or business to business sales). Therefore, although GDP is traditionally measured from the expenditure side (as consumer spending plus investment plus government spending plus net exports or $C + I + G + X - M$), what we are really trying to get at is the net output of the economy. Note that if goods are produced and not sold, they are still counted as net output and measured in investment spending as inventory accumulation.

So far, our discussion of GDP was a monetary concept—dollars of spending. We have not introduced the concept of adjusting for price changes and this is likely going to be a very important factor in the second-quarter GDP report. If the price of every good and service rose at the same rate, then measuring inflation and real GDP would be trivial. However, prices rise at different rates (some, like the price of computing power fall) and these different price changes have to be weighted together. Thus inflation adjusting GDP to derive real GDP is a very tricky exercise.

What are we really trying to measure with real GDP? The answer is the amount of physical output produced in the economy. However, when more than one good is produced, how do we add the different outputs together? How can we add 1,000,000 haircuts to 2,000 cars and add these to 2,000,000 loaves of bread and 3,000,000 pints of milk and so forth? What the GDP calculation does is to say that we value products according to their relative price. Thus, if the price of a loaf of bread is \$5 and the price of a pint of milk is \$1, the relative price of bread is five times of milk and one extra loaf would raise GDP by the same amount as five extra pints of milk. However, since relative prices change over time, the question is which period's relative price should we use to calculate GDP (or equivalently how do we weight together different price changes—if prices all rose at the same rate, relative prices would never change). Real GDP used to be calculated by the relative prices in a base period, but because of large changes in the relative price of computing, this gave a huge weight to this sector of the economy as time moved forward from the base period. Now, the Commerce Department uses chain weights, which essentially means that we use rolling weights comparing the average relative prices between two quarters, evaluating the change in real output using these weights and then chaining the percentage change onto the previous period's output index.

Consider this simple example: Suppose we only have a milk and bread economy and the average relative price of bread to milk between period 1 and period 2 is five. Suppose in period 1 we produce 100 loaves and 500 pints of milk, then we have 200 units of bread equivalent (500 pints of milk divided by 5). Now in period 2, suppose the production of milk rises to 600 units and the amount of bread produced increases to 112 loaves. We now have a GDP of 232 (112 loaves plus $600/5$ loaf equivalents of milk) and the increase in real GDP would be 16% ($=232/200$). If the index of GDP in period 1 is set at 100, the real GDP index in period 2 is 116. Now suppose the average relative price of bread to milk in period 2 and period 3 falls to 4 (i.e. milk becomes more valuable relative to bread). GDP in period 2 using this relative price is 112 loaves of bread plus $600/4$ or 150 loaf-equivalents of milk, which equals 262 loaf equivalents. Suppose in period 3 this economy produces 120 loaves of bread and 720 pints of milk. GDP in period 3 measured by the average relative price in period 2 and period 3 is 120 loaves of bread plus $720/4=180$ loaf-equivalents of milk, which equals 300 loaf-equivalents. The percentage increase in GDP from period 2 to period 3 is 14.59% ($=300/262$) and we chain this

percentage onto period 2's GDP index (116×1.145) and find that the GDP index in period 3 is 132.8.

Suppose the actual relative prices were 5.5 in period 1, 4.5 in period 2, and 3.5 in period 3. If we had used period 1's relative price of 5.5 pints of milk to 1 loaf of bread, then real GDP in period 3 would be 131.4 versus 100 in the base period (we are calculating all indexes in terms of period 1 GDP equal to 100). If we used period 3's relative price of 3.5 pints to a loaf, then GDP in period 3 would be 134.1. The chain weighted measure of GDP came in between these two estimates at 132.8. Thus, we see immediately that real GDP is a very slippery statistical concept and very dependent on the choice and measurement of relative prices. Now imagine the difficulty when we try to weight together millions of different goods and services as the Commerce Department has to do when trying to measure real GDP for the U.S, especially when the relative price of energy is increasing rapidly.

Deflator Difficulties and Trade

Relative prices are clearly central to measuring real GDP. Note that we did not 'deflate' nominal spending by a price index to calculate real GDP. The statistical calculation is actually the other way round: the GDP price deflator is found by dividing nominal spending by real GDP. If the period 1's nominal spending was \$1,000, period 2's was \$1,300, and period 3's was \$1,600, then the index of nominal GDP in period 1 is 100, period 2 130, and period 3 160. Period 1's deflator is also 100, period 2's price deflator is 112.1 ($=100 \times 130 / 116$) and period 3's deflator is 120.5 ($=100 \times 160 / 132.8$) and the total rise in prices from period 1 to period 3 is 20.5%, the total increase in output (using chained relative prices) is 32.8%, while nominal GDP from period 1 to period 3 rose 60%.

While this seems arcane stuff, it is very important to think about because we talk about real GDP as if it is a meaningful and observable quantity. The only thing that the statisticians observe directly (and then measure with potentially significant errors) is nominal spending. Real GDP and the price deflator are then two derived numbers which, when multiplied together, equal nominal GDP. If real output is overstated, then the price deflator will be understated. If real output is understated, then the price deflator will be overstated.

This brings us to the problems of measuring real GDP when there are big shifts in relative prices—especially energy—and to the problems of an open economy. Remember GDP is trying to measure the net output of the U.S. but is derived from adding together spending from final sources (consumer, capital spending, government, and net trade). This means that the value of what we import is subtracted from the calculation of GDP and we import a lot of energy. In 2007, the U.S. imported 4.8 billion barrels of oil equivalent of energy products (including 3.7 billion barrels of crude oil). The trade deficit in petroleum products in 2007 was \$293 billion. At 2007 consumption levels, each \$10 on the price of a barrel of oil made the U.S. as a whole worse off by \$48 billion (or roughly one-third of one percent of GDP) in the sense that we would have to export (or give up) \$48 billion of output to pay for the same amount of oil (or allow foreigners' claims on the U.S. to rise by that amount). Now note that over the last year (measured from the second quarter of 2007 to the second quarter of this year), the average price of crude oil rose by \$59 a barrel and it increased by \$26 a barrel in the second quarter from the first quarter. These

are the largest absolute increases in the price of oil from year-to-year or from quarter-to-quarter on record. In response, the U.S. is importing less energy. Over the first five months of 2008, the U.S. imported 1.913 billion barrels of oil equivalent versus 2.004 billion over the same period of 2007—a decline of 4.5%. However, on the same comparison, we produced 1.8% more gas and electric output according to the Fed’s data on the output of utilities and U.S. mining output was up 2.6% and the output of energy materials was up 3.4%. Thus the U.S. is substituting domestically produced energy (including coal) for imported oil in response to the high price of oil.

Consider what this means for the calculation of GDP. Real GDP will rise as a result of the increase in the output of domestic energy versus imported oil and this will be captured in the expenditure data by the fall in oil import volumes. In real terms (expressed in 2000 prices), the annualized petroleum trade gap narrowed from \$121.1 billion in the first quarter to \$106.5 billion in first two months of the second quarter. However, in terms of actual dollars spent, the petroleum trade gap widened from an annualized \$390.5 billion in the first quarter to \$407.6 billion in the second quarter. Thus the subtraction of a larger nominal petroleum trade gap in the second quarter will tend to lower nominal GDP, while the subtraction of a smaller real petroleum trade gap will tend to boost real GDP. In turn, this will have the effect of lowering the price deflator (a smaller nominal magnitude divided by a larger real magnitude). In addition to this theoretical point, there is the practical point that there is no guarantee that the energy prices captured in CPI and other components of domestic prices fully capture the higher price of energy imports (either because they were not fully passed along and margins were squeezed or because of inconsistencies and errors in the data collection process).

To show the full impact of this, we need a little tedious algebra (you can skip this and trust our math!). As we pointed out earlier, the deflator is the nominal value of a series divided by its real value. Let us define nominal GDP as the sum of final demands ($D = C + I + G + X$) less the amount of this demand met by imports (M) and use the symbol $\$$ after a variable to indicate a nominal quantity and P before a variable to indicate that it is a price deflator. Thus, by definition, the GDP deflator $PGDP$ is given by:

$$PGDP = GDP\$/GDP$$

and since $GDP = D - M$, we have:

$$PGDP = (D\$ - M\$)/GDP$$

$$PGDP = (D\$/D)(D/GDP) - (M\$/M)(M/GDP)$$

$$PGDP = PD.SD - PM.SM$$

Thus we have our basic result, the GDP deflator equals the price deflator for final expenditures ($C + I + G + X$) times the ratio of this magnitude in real terms to real GDP (SD) minus the price deflator for imports times the ratio of real imports to real GDP (SM). Now in the second quarter (based on CPI for the quarter and the chained price index for PCE for April and May), we estimate that the price deflator for consumer spending will rise by about 4.3% at an annual rate and contribute about 3.1% points to the increase in the GDP price deflator given the 0.715 ratio of real PCE to real GDP. However, the price of imports in the second quarter (from the monthly trade data) increased by 35.1% and we estimate that the monthly price deflator for imports rose about 30.5% in the quarter. With the ratio of real imports to real GDP at 16.8% we get

the astonishing result that the rise in the import price deflator will subtract around 5% points from the GDP deflator. Thus, allowing for errors in our estimation of the June price data and so forth, it seems that the rise in import prices will subtract more from the deflator than PCE prices add. If we factor in price increases for government spending and capital equipment, we estimate that the GDP price deflator was about flat in the quarter even though the CPI advanced at an annualized rate of 5.0%!

Bottom Line: The Meaning of These Results

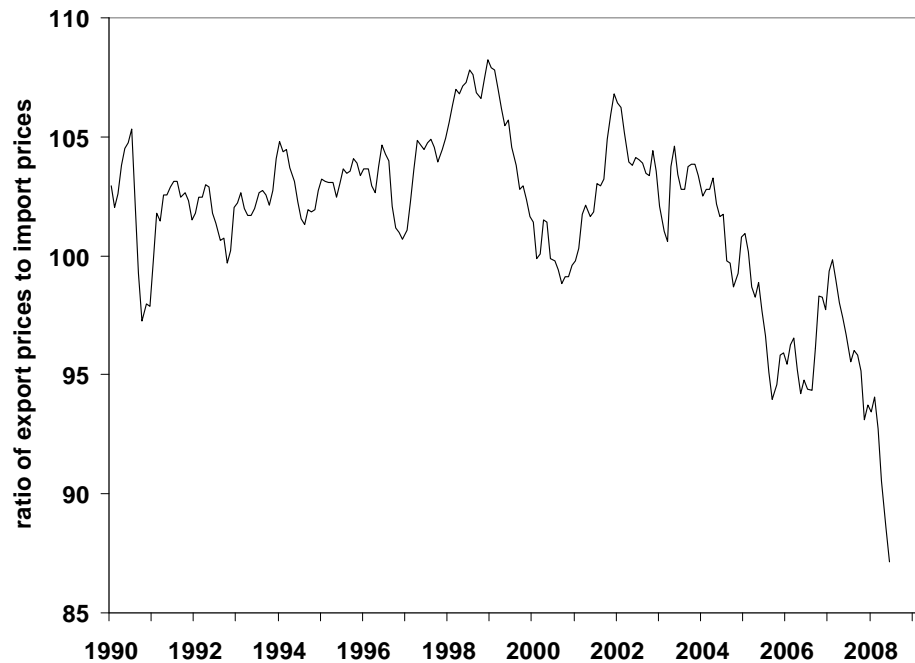
When we estimate quarterly GDP, we add together our estimates of real consumer spending from the monthly data (if June's real spending is flat, we still get real PCE up 2.2% at an annual rate in the quarter), investment spending (durable goods orders and construction spending point to about a 5% rise in nonresidential fixed investment but another sizable drag from residential investment), government spending, and net trade (from the monthly trade data). This points to a gain in real GDP of around 3%. On the other hand, the deflator model outlined above suggests no increase in the GDP deflator, which points, therefore, to an increase in nominal GDP of only around 3%. So, how are we to interpret this week's GDP data, assuming they fall out somewhere in line with our expectations? Is it a case of solid underlying growth with no inflation, or does our analysis suggest another interpretation?

- First, nominal GDP ought to be a better measured variable than real GDP (since people spend actual dollars and this is what the Commerce Department records). Nominal GDP grew by 3.0% at an annual rate in the fourth quarter of 2007 and by 3.7% in the first quarter of 2008. If we are roughly correct in our estimate of nominal GDP for the second quarter, this would mean that nominal GDP growth has averaged about 3¼% for the last three quarters. This is the same growth rate of nominal GDP that the economy averaged from the fourth quarter of 2000 through the fourth quarter of 2002, which was a period that encompassed a recession and an extremely sub-par first year of economic recovery.
- Second, it makes no sense that inflation in an underlying sense has gone to zero—it is quite possible that there is a timing mismatch between the import price measures and the domestic price measures (or profit margins were significantly squeezed, which should weigh on capital spending and growth going forward if this is a real and sustained economic phenomenon).
- Third, the U.S. is meaningfully worse off in a real income sense as import prices rise more than export prices. What this amounts to is a deterioration in the terms of trade (we have to export more to pay for the same amount of imports) and based on the monthly trade price data, the terms of trade fell 5.0% (or 18.6% at an annual rate) in the second quarter. The fact that we do not pay in a strict sense for our imports with more exports does not alter this conclusion (if your hourly income is fixed and your cost of living rises you can either work longer hours to buy the same amount of stuff or borrow more to sustain your lifestyle—either way you are still worse off).
- Fourth, to the extent that GDP is boosted by import substitution (domestic energy for foreign oil or through demand substitution—fewer trips by car or plane), this is likely to be something of a one-off effect rather than the beginning of a sustainable trend. Moreover, since it was a choice that was always available at

lower energy prices (except for technologies that were uneconomical at a lower energy price), it must represent a welfare loss to the U.S. economy. (If the price of steak rises massively and you substitute chicken instead, you are worse off because you clearly prefer steak at the margin to chicken but can no longer afford it).

- Fifth, we said that GDP conceptually should be the same regardless of which approach is used to measure it (income, expenditure, or output) but may be quite different in practice. The income estimate of real GDP has increased at only a 0.1% pace over the two quarters ending the first quarter of this year and by only 1.1% over the last four quarters. In contrast, the expenditure estimate of real GDP rose by 2.5% over the last four quarters. The income estimate of GDP shows an economy at the borderline of a technical recession and accords much better with the labor-market data.

Figure 1: Terms of Trade



Source: Labor Department.

In short, the release of the first estimate of GDP could cause considerable confusion and could lead to a false impression that underlying growth is better than expected and inflation low. In turn, this could lead some to think that a Fed rate hike might be nearer than they previously expected. This would not be our interpretation and we think any such revised expectations could well be dashed by a weak employment report for July on Friday. We think that the employment data provide a better reading on underlying economic conditions and the likely direction of Fed policy. We await this week's data with great interest and hope that we have better positioned you to understand its ramifications.