Overstatement of U.S. Productivity due to the Inclusion of Markups on Imported Finished Goods as Value-Added in the Production Function

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Thesis Recap:

Productivity in the United States as determined by the Bureau of Labor Statistics is consistently and in all likelihood, materially misstated, due to the methodology used for determining productivity. The methodology improperly classifies markups on imported finished goods as domestic "value added".

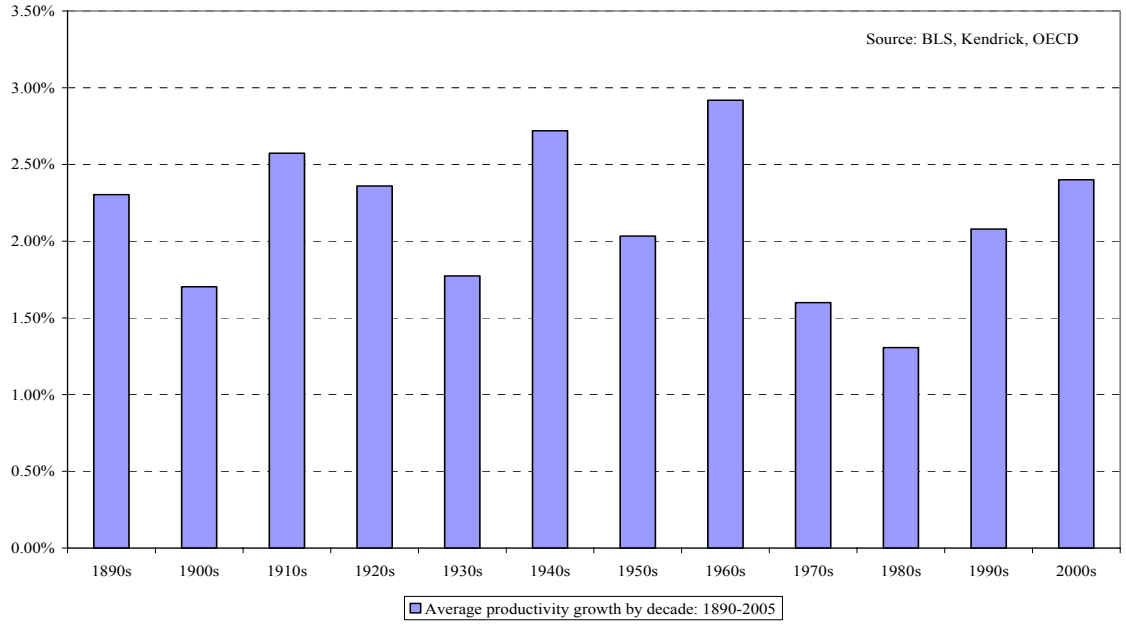
Background:

Productivity in the U.S. has enjoyed a renaissance of late. As recently as the early 1990's intellectuals bemoaned the falloff in U.S. average productivity growth from a decade high of 2.92% per annum in the 1960's to 1.31% in the 1980's.

But something wonderful happened in the mid-1990's. During the five year period ended in December of 1999 average productivity growth surged to 2.08% per annum followed by the first half of the new millennium decade in which average productivity growth has clocked in at 2.40%. A resurgence in U.S. productivity growth, has been attributed by many to technological advances. By the year 2000, the consensus echoed the findings of a year 2000 study by Dale Jorgenson and Kevin Stiroh, "*Raising the Speed Limit: U.S. Economic Growth in the Information Age*". The common view held that the pickup in productivity growth was in large part due to rapid technological progress and the increased investment and utilization of new information and communication technologies during the 1990's. Former Chairman of the Federal Reserve Alan Greenspan often referred to the surge in productivity growth as the "productivity miracle", a phenomenon

that in the early part of this decade allowed for accommodative easing by the Federal Reserve, given the favorable disinflationary effects of increasingly persistent productivity growth. But even as recently as October 23, 2002, in a speech at the U.S. Department of Labor and American Enterprise Institute Conference, Greenspan posed a question, " We would not be particularly as puzzled if the increases in output per hour were occurring during a period of very rapid economic growth, such has often attended recoveries from steep recessions". Greenspan also questioned the disconnect between productive investment and the apparent surge in productivity. "The ability of businesses to boost productivity with what seems to be minimal new capital investment over the past two years suggests that output per hour growth in the later years of the 1990's likely trailed the growth of underlying productivity in those years. If this inference is accurate, part of that earlier growth in underlying productivity is being reflected in today's gains in output per hour".

Average productivity growth by decade: 1890-2005



Why is productivity growth important?

William J. Baumol, author of *Productivity and American Leadership: The Long View,* asks the question "Why does productivity matter?" "The answer, as provided is that in terms of the standard of living of a nation, in the long term, nothing matters as much". According to Baumol, "Above all, productivity growth provides the most obvious benefit – it contributes to the general standard of living of a society. When each worker produces more with a given outlay of effort, that persons family can generally expect to have more real income to spend on behalf of its members. This benefit of productivity growth is so self-evident and well-known that any fuller discussion of the relationship itself would be otiose." The key descriptive in Baumol's statement is "long term". The compounding effect of productivity growth is enormous. The compounding effect is, in fact, civilization changing. Professor Timothy Taylor, in a lecture on the "Great Economists" relayed a story about John Maynard Keynes. Arguably an optimist by nature, Keynes was sanguine about the future of the U.S. economy, even during the Great Depression, because he felt that given a productivity growth rate of 2%, within the next seventy five years or so, excess savings in the U.S. would be so great that no one would have to work and indeed all poverty will by that time have been eliminated. Keynes' point is well made, notwithstanding the fact that the writer of this report is still gainfully employed. To illustrate, assume country A enjoys productivity growth of 2% per annum. Country B has a one percent annual productivity growth rate, or for purposes of this example, a relative drag in the productivity rate of just one percent per annum over a fifty year period. All things being equal, this shortfall in productivity will result in the standard of living in country B to fall by almost 40% relative to its more productive counterpart, country A.

The difference in long term productivity growth and the relative shift in the standards of living of both countries is instructive and should indeed be a reason for concern if the long term productivity growth trend of any nation starts to fade. What may be as disconcerting is when the actual productivity growth rates are overstated by misapplication of productivity measures or misinterpretation of productivity data.

Because productivity is relevant to the ongoing financial health of a society, decisions both fiscal and monetary are impacted by the outlook for current and future productivity. This outlook is captured in reports issued by various agencies and organizations, but the *Productivity and Costs Report*, as provided by the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor, prepared from data compiled by the BLS, the Census Bureau and the Bureau of Economic Analysis (BEA), is accepted as the most recognizable and certainly the most quoted by the financial press. The significance of productivity for a society and the interdependence of the measure in terms of monetary and fiscal policy is why we question the methodology used to calculate productivity in the first place. This is what consequently led to our interest in this subject. As indicated in the opening paragraph, our conclusion is that, to some degree, the "residual methodology" used to calculate productivity growth is deeply flawed and inconsistent with needs of the users of this information.

How is Productivity Calculated?

Productivity is calculated using a "production function" which calculates the level of real output, given the application of labor and capital deployed to attain the production level. One such function is the Cobb-Douglass production function.

It was when we came across the Cobb-Douglass production function in the text "Macroeconomics by Abel and Bernanke" that we realized that the product of the equation was entirely dependent upon Gross Domestic Output (GDP) data as compiled by the BEA. Our bias has been that GDP ascribes the efforts of foreign production, in part, to domestic output. It was only logical that given a "residual methodology" where real GDP is a factor in the equation, that productivity may be overstated.

The Cobb-Douglass production function is as follows:

$Y = AK^{a}N^{1-a}$

Where:

Y = Real output (GDP)
A = Productivity
K = Capital
N = Labor

The properties in the exponents must sum up to one. The fractional exponents indicate a diminishing return on investment in Capital and Labor as the investment increases.

Please see table 3.1, below from the Abel and Bernanke text. Rearranging the equation and solving for A, it is apparent that the productivity measure is dependent, and directly related to the Real GDP value. An overstated or understated real GDP number will result in a defective productivity measure. In fact, from page 65 of the Abel and Bernanke text it is stated, "Output, capital and labor in table 3.1 are measured directly, but there is no way to measure productivity directly. Instead, the productivity index, A, shown in

column (4) is measured indirectly by assigning to A, the value necessary to satisfy (the equation)."

TABLE 3.1

The Production Function of the United States. 1980-2001

Year	(1) Real GDP, Y (billions of 1996 dollars)	(2) Capital Stock, K (billions of 1996 dollars)	(3) Labor, N (millions of workers)	(4) A[a]	(5) Growth in A (% change in A)
1980	4901	5569	99.3	14.75	
1981	5021	5783	100.4	14.82	0.50
1982	4919	5948	99.5	14.49	-2.30
1983	5132	6091	100.8	14.87	2.60
1984	5505	6309	105.0	15.34	3.20
1985	5717	6545	107.2	15.54	1.30
1986	5912	6735	109.6	15.68	0.90
1987	6113	6899	112.4	15.81	0.80
1988	6368	7071	115.0	16.10	1.80
1989	6592	7249	117.3	16.30	1.30
1990	6708	7419	118.8	16.34	0.20
1991	6676	7538	117.7	16.28	-0.30
1992	6880	7649	118.5	16.63	2.10
1993	7063	7798	120.3	16.80	1.00
1994	7348	7973	123.1	17.08	1.70
1995	7544	8191	124.9	17.22	0.80
1996	7813	8448	126.7	17.49	1.60
1997	8160	8749	129.6	17.80	1.70
1998	8509	9100	131.5	18.16	2.00
1999	8859	9457	133.5	18.49	1.80
2000	9191	9849	135.2	18.78	1.60
2001	9215	10115	135.1	18.69	-0.50

[a]. Total factor productivity is calculated by the formula $A = Y/(K^{0.3}N^{0.7})$

Sources:

Y is real GDP in billions of 1996 chained dollars from the St. Lous FRED database http://research.stlouisfed.org/fred2/series/gdpca

K is real net stock of fixed private nonresidential capital in billions of 1996 dollars from the Bureau of Economic Analysis, http://www.bea.gov/bea/dn/faweb/AllFATables.asp

N is civilian employment in millions of workers from the Bureau of Labor Statistics, ftp://ftp.bls.gov/pub/special.requests/lf/aat1.txt

The Bureau of Economic Analysis distinguishes GDP from domestic "value added", the numerator in our productivity equation. "Gross output represents the market value of an industry's production and differs from value added, which represents the contribution of the industry's labor and capital to its gross output and to overall GDP".

According to the BLS, the definition of productivity is, "…A measure of economic efficiency that shows how effectively economic inputs are converted into output. Productivity is measured by comparing the amount of goods and services produced with the inputs that were used in production." The question we ask is: what if the inputs increasingly are marginalized by the shift in the manufacture of finished goods overseas? Won't this shift corrupt the measure of "domestic" efficiency?

The GDP accounting identity is as follows:

$$Y_t = C_t + I_t + G_t + NE_t$$

Where:
Y_t = GDP
C_t = Domestic Private Consumption
I_t = Net domestic Investment
G_t = Government Expenditures
NE_t = Net Exports (Net Exports are Exports minus Imports)

It is only logical then that if the BLS through their collaboration with the BEA in this exercise use the GDP data provided by the BEA, and if in fact, for purposes of the productivity equation, imported finished goods cause an overstatement of total output, then productivity must be overstated as well. Bearing in mind that the reduction of GDP output by the adjusted wholesale cost of imports, may not prima facia lead to productivity overstatement, we offer the following excerpt from an article in the highly regarded *Grants Interest Rate Observer*:

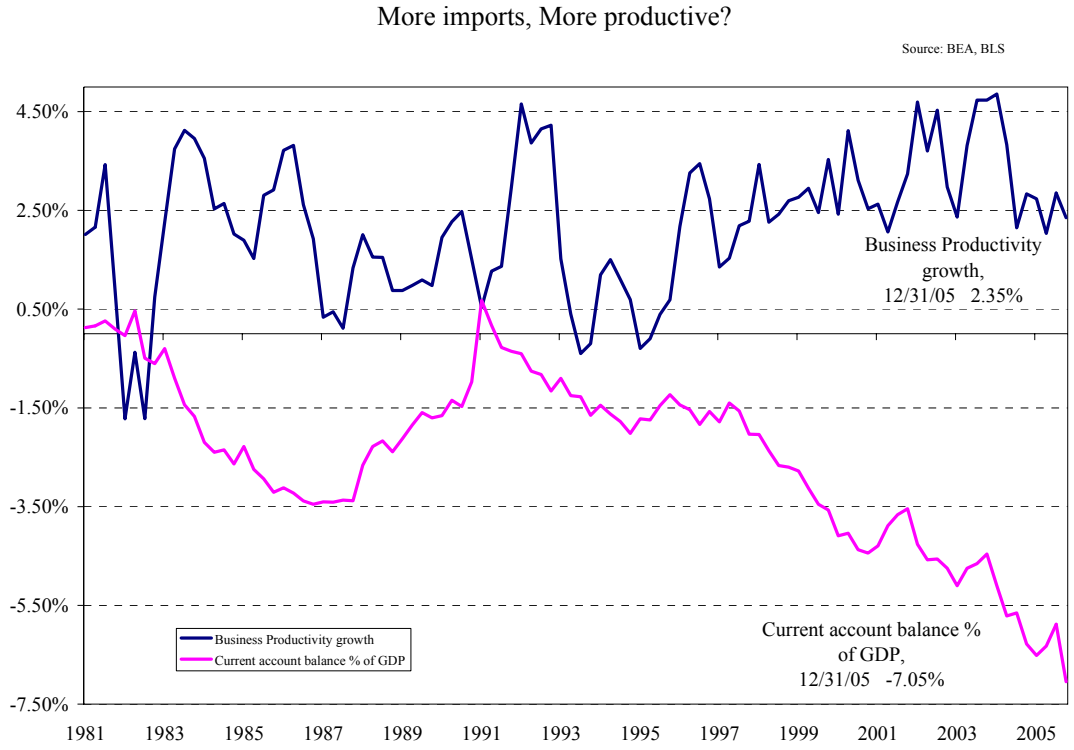
"The money manager, John Hughes, president of Quantum Capital Management, also has a theory. Like Hatzius, (Goldman Sachs economist Jan Hatzius) he believes that measured U.S. productivity growth is overstated. To show how, he offers up an illustrative thought experiment.

Assume, he says, that "Wal-Mart is the only company in the United States. It has sales in Year 1 of $10 trillion. All goods were produced in the United States and all value added was provided in the United States. Nominal GDP is therefore $10 trillion." So is real GDP; assume no inflation.

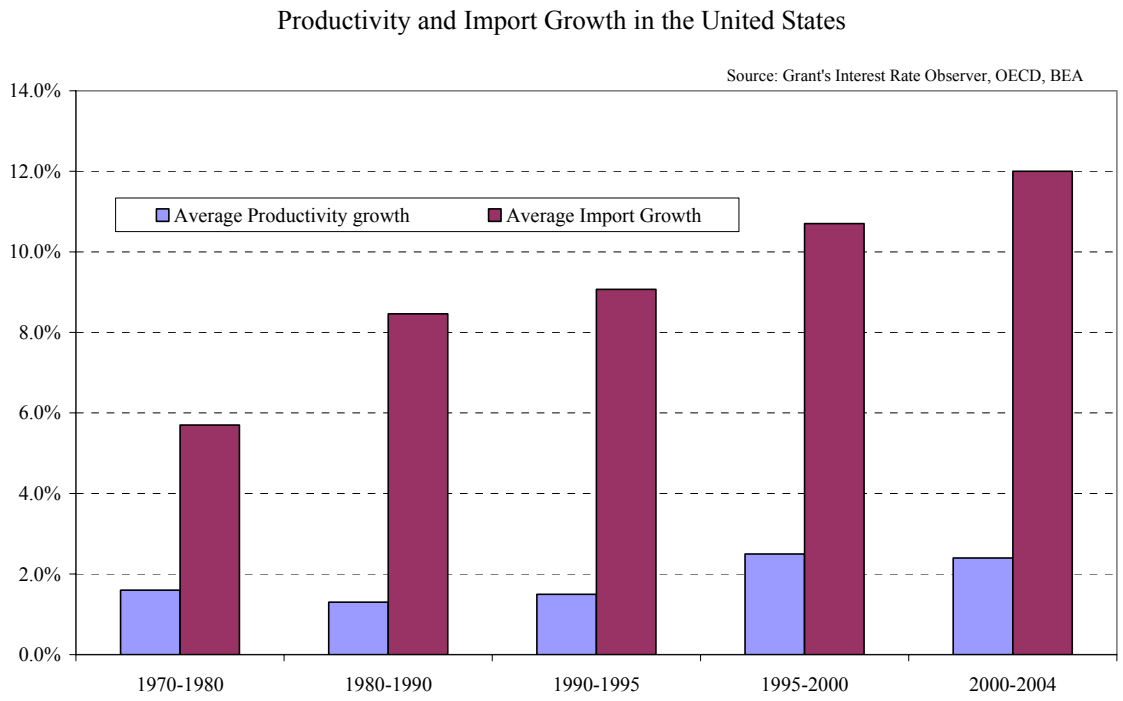
In Year 2, Hughes continues, "Wal-Mart is on track to sell $10 trillion in domestically produced goods again. But lo and behold, a deal! China can produce sneakers at such a low cost that it increases demand for sneakers in the U.S. – so much, in fact, that people are driven to borrow against their homes to own a pair of these fabulously cheap sneakers. Wal-Mart imports $1 trillion worth of sneakers….They cost Wal-Mart $20 a pair. Wal-Mart marks them up to $40 and sells them out. Sales at gross are $2 trillion.

Observe, Hughes pushes on, that Wal-Mart's sales total $12 trillion but GDP amounts to only $11 trillion – ($12 trillion minus that $1 trillion in imports). Which means that, other things being the same, productivity growth in Year 2 was 10%. The sources of this miracle are four: Wal-Mart's success in importing; Wal-Mart's success in pricing; the willingness of American consumers to go into debt to finance current consumption; and the willingness of foreign creditors to lend them the money. Hughes makes an important point that, like so many ideas of its kind, it only seems obvious after you hear it. The point is that, in the United States, productivity growth is credit-assisted, if not credit-induced."

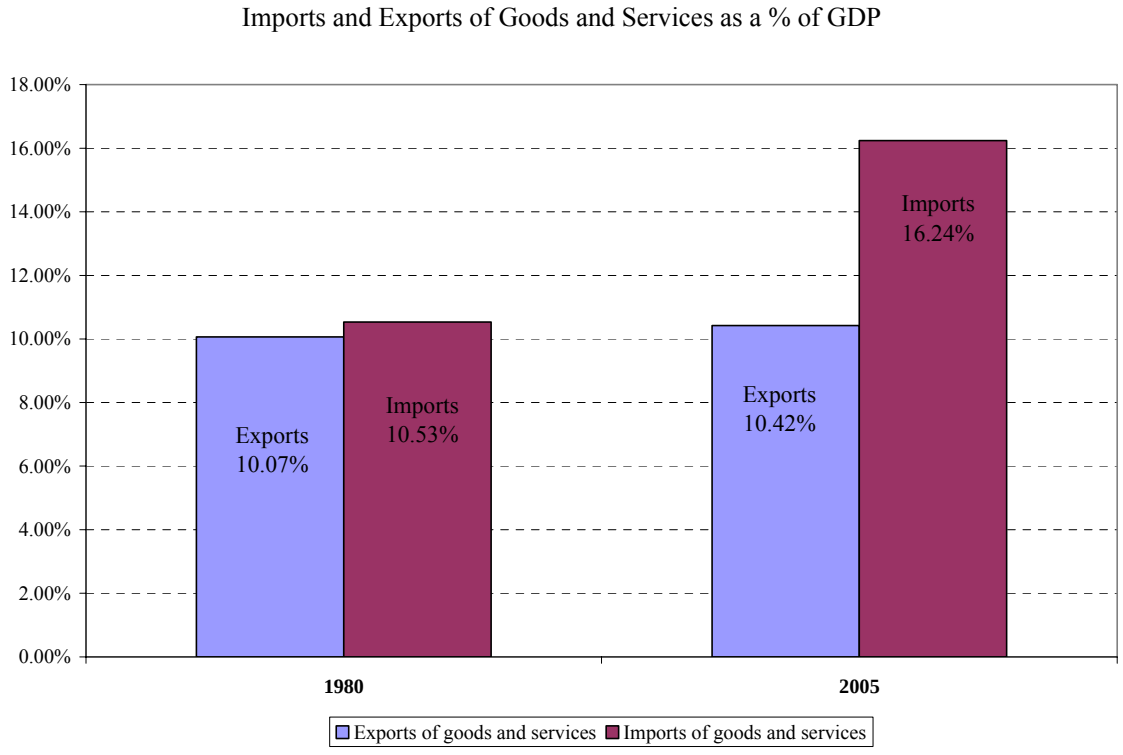
There has been a remarkable inverse correlation between the current account and the growth of productivity in the United States in the last twenty years…..



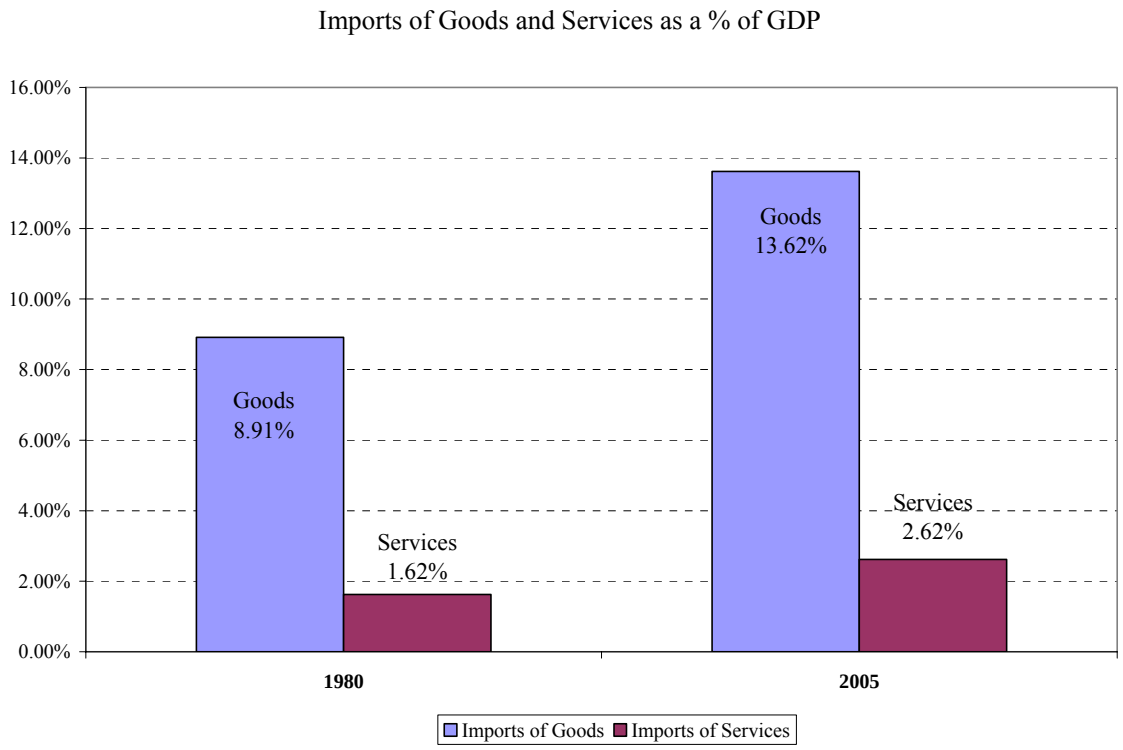
As gross imports have surged so has productivity…..



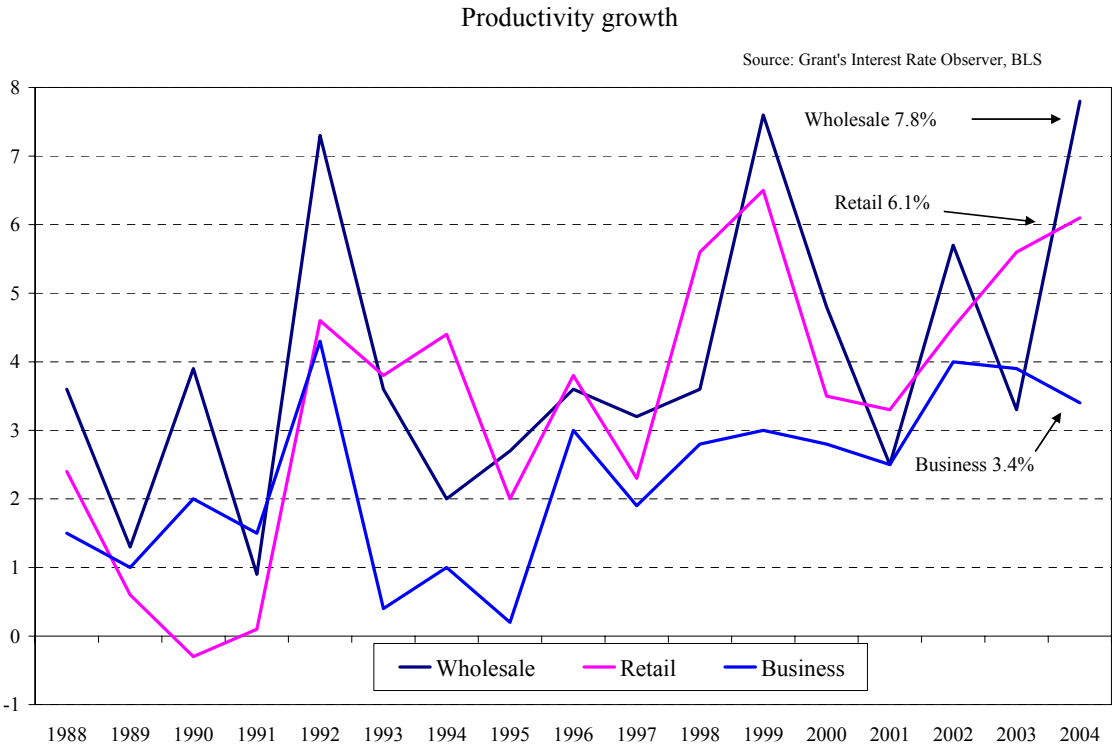
As imports have grown at a faster rate than exports…..



And the imports of goods has grown at a much faster rate than the import of services…..



Productivity has surged in wholesale and retail at a faster rate than business productivity taken as a whole….



Ian McCulley of *Grant's* observed the following:

"The average gross margin in the U.S. retail sector in 2003 was 28.7%, colleague Ian McCulley reports. In that year, on final sales of $3.3 trillion, retailers kept $938 billion and contributed $770 billion to the GDP (the difference going to the government in the form of corporate taxes). Retailing outgrew the overall economy from 1998 through 2003; so did wholesale trade, which, like retailing, is a facilitator (and beneficiary of) the mammoth growth in U.S. imports. The two together contributed $1.4 trillion, or 13%, to the 2003 GDP.

Their contribution to the productivity data looms even larger than that because of many sectors excluded from the output number that go into the productivity calculation (e.g., government and rental housing). All in all, just 78% of the GDP figures in the Bureau of Labor Statistics' measure output. "Retail and wholesale's share of the output measures is 16.7%," McCulley observes. "Retail and wholesale productivity is growing faster than overall productivity. In 2004, retail productivity grew by 6.1% and wholesale productivity by 7.8%. Overall, business productivity grew by only 3.4%. Take out retail and wholesale from the sample and business productivity grew by only 2.7%."

Notwithstanding the fact that sneakers or any imported finished goods, cannot leap, unaided, off of incoming cargo ships and into the shopping carts of American consumers, there does seem to be some level of exposure to an equation that treats all gross profits earned on the sale of imported goods as value added output for purposes of the productivity equation, may possibly overstate the efficiency and productivity of domestic workers. Phyllis Otto , an economist at the BLS seems prepared to dispute this fact later in this report.

The Other Conundrum

Current Federal Reserve Chairman Benjamin S. Bernanke, in a speech given on January 19, 2005 on the topic of Productivity, explored the conundrum of productivity growth in the face of factors that would indicate that the persistence and strength in productivity growth is puzzling.

"Undoubtedly, the ICT (information and communication technologies) revolution and the productivity resurgence in the United States after 1995 were closely connected, but several puzzles have arisen that challenge the view that ICT investment leads mechanically to higher productivity. First, the United States was not the only country to see a rapid expansion in ICT investment, as other industrial countries also invested heavily in these technologies in the 1980s and 1990s. Yet, with a few exceptions, productivity growth in other advanced countries has not increased recently to the extent seen in the United States. The comparison with the member states of the European Union is particularly interesting. Throughout most of the post-World War II period, labor productivity growth in Europe exceeded that in the United States, reflecting, first, rapid gains during the postwar reconstruction and then a gradual convergence of European technology and business practices to American standards. By one estimate, on average, European productivity increased from 44 percent of the U.S. level in 1950 to 94 percent in 1995 (Gordon, 2004). However, since about 1995, productivity growth in Europe has slowed, in contrast to the U.S. experience, and productivity levels in the United States and Europe have begun to diverge.

Researchers have made the important point that U.S.-European differences in productivity growth do not appear to have been particularly large in the ICT-producing sectors, where U.S. strengths in the development of information technologies have been offset by European leadership in communications. Rather, the U.S. advantage has been most evident in the ICT-using sectors, which have performed better in the United States than elsewhere. What accounts for the apparent U.S. advantage in applying ICT to a wide range of industries?

One popular hypothesis, put forth by Alan Greenspan (2000) and Martin Feldstein (2001), holds that European economies have been less successful in applying new technologies because of a relatively heavy regulatory burden that inhibits flexibility. For example, taking full advantage of new information and communication technologies may require extensive reorganization of work practices and the reallocation of workers among firms and industries. Regulations that raise the cost of hiring and firing workers and reduce employers' ability to change work assignments, as exist in a number of

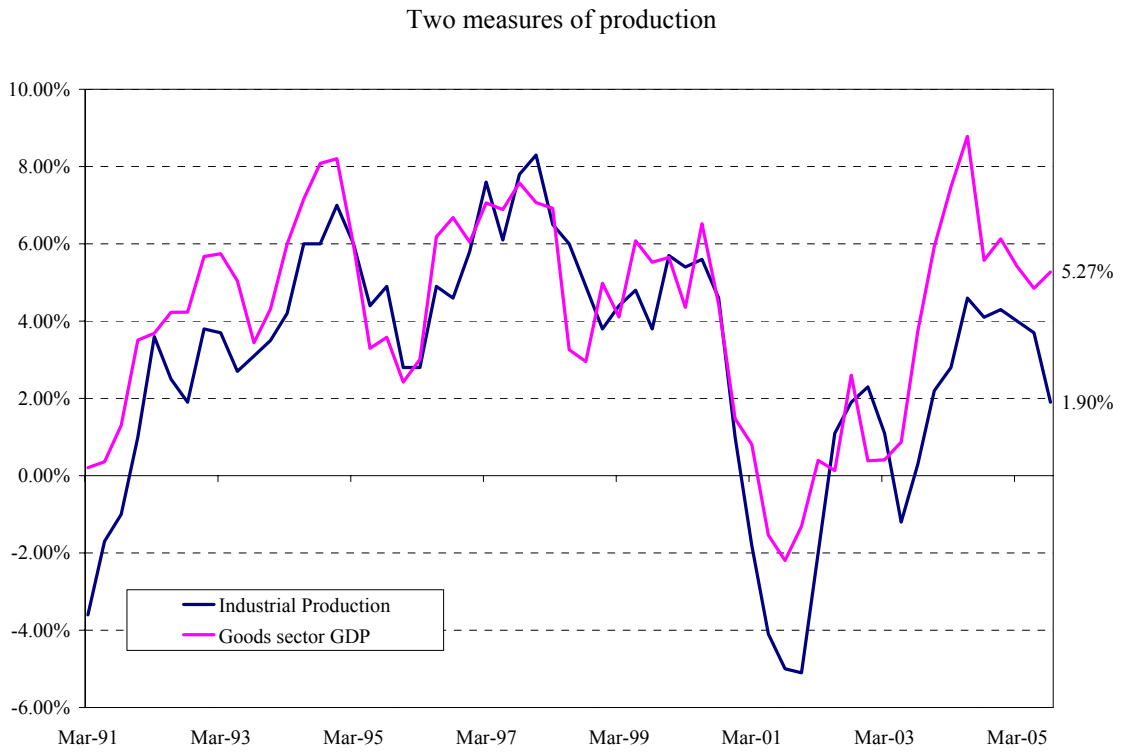
European countries, may make such changes difficult to achieve. Likewise, the presence of government-owned firms with a degree of monopoly power, together with restrictions on the entry of new firms, may diminish competitive pressures that often foster innovation and greater efficiency (Nicoletti and Scarpetta, 2003). Recent empirical research has generally found that economies with highly regulated labor and product markets are indeed less able to make productive use of new technologies (Gust and Marquez, 2004). Industry-specific regulations may also be an important barrier to productivity improvement; for example, some writers have argued that restrictions on land use and on shopping hours in Europe have impeded the development of "big box" retail outlets, denying European firms the economies of scale that have been important for productivity growth in the U.S. retail sector (Gordon, 2004)."

It is entirely possible that Bernanke, through his citation of Robert J. Gordon, directly above, recognizes the association but fails to identify the elephant in the living room.

Inconsistencies

Jan Hatzius, a Goldman Sachs economist, relayed to Grant's that he "has noticed the widening gap between industrial production and the subcomponent of GDP that tracks industrial production (i.e., goods-sector GDP). The two series ought to shadow one another and did until about 2003. Then the GDP measure of physical output raced ahead of industrial production. The benefit of the doubt properly goes to the latter, because it's compiled from reports from the field. Goods-sector GDP, in contrast, is derived by combining final sales, changes in inventories and net exports. Hatzius has a hypothesis: the industrial production data, much more than the GDP statistics, are picking up the growing substitution of imported components and services for higher-cost domestic ones. Significantly – and, for the bond bulls, happily – the GDP data are the ones used in the

numerator of the productivity growth calculation. By underestimating the outsourcing phenomenon, they exaggerate productivity growth."



Dr. Gurprit Chhatwal, an economist and Professor of Accounting at The Richard Stockton College of New Jersey, at our request, provided an additional twist regarding inconsistencies in the determination of output.

"The Bureau of Labor Statistics (BLS) publishes indexes of labor and multifactor productivity. Labor productivity indicates output per labor hour. Multifactor productivity measures indicate value-added output per combined unit of labor, and capital input in private business and private nonfarm businesses [*BLS Handbook of Methods*, U.S. Department of Labor, Bureau of Labor Statistics, April 1997, pp. 89-97].

Real gross domestic product in the business and nonfarm business sector is the "basis of the output components" of the labor and multifactor productivity [p 90]. This publication further states that these output components are based on and are consistent with the gross domestic product (GDP) measure, prepared by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce. The "primary" source of hours of employment data is the BLS Current Employment Statistics (CES) program [p. 91].

For both of the measures and in reality all productivity measures in some form or another have the output numbers in the numerator and the input(s) numbers in the denominator. Quite clearly if the numerator is overstated and/or denominator is understated the resulting productivity number will overestimate the productivity index.

The numerator (GDP) is calculated using the general formula found on page 7.

BEA provides the numbers for imports and exports. In its most recent news release dated April 12, 2006 [U.S. Census Bureau, U.S. Bureau of Economic Analysis, News Aril 12, 2006, p. 27] it states:

"…For imports, the value reported is the U.S. customs border and protection appraised value of merchandise; generally the price paid for merchandise for export to the United States. Import duties, freight, insurance, and other charges incurred in bringing merchandise to the U.S. are excluded …"

This measurement in and of itself would cause an overstatement of GDP because the same goods are then sold for domestic consumption after the markups by all intermediaries in the U.S. Further, the exclusion of import duties, freight, insurance and

other charges in bringing merchandise to the U.S. additionally understates the value of imports as illustrated below:

> Let us say that Nordstrom purchases 10 shirts from a manufacturer in Hong Kong and the details of the transaction are:
>
> | | |
> |---|---|
> | 10 Shirts @ $10 per shirt | $100 |
> | Inland shipping charges (including shipping within HK) $2 per shirt | $20 |
> | Overseas shipping charges & Insurance $3 per shirt | $30 |
> | Total Cost | $150 |
>
> Markup by the retailer 25%, GDP consumption amount (150x125%) $187.50

BEA records these imports at $100 (p. 27 U.S. Census Bureau, U.S. Bureau of Economic Analysis News, 4/12/2006). When these shirts are sold the contribution to GDP is $187.50 with little or no value added. The net effect is an overstatement of GDP by $87.50.

Further, BEA computes numbers for exports as follows [U.S. Census Bureau, U.S. Bureau of Economic Analysis, News Aril 12, 2006, p. 27]:

"Further, the exports are valued at the f.a.s. – free alongside ship- value of merchandise at the U.S. port of export, based on the transaction price <u>including</u> inland freight, insurance, and other charges incurred in placing the merchandise along side the carrier at the U.S. post of exportation…"

Inclusion of inland freight on exports and exclusion of the same item in imports further distorts the net export number that would cause an additional overstatement of GDP as illustrated below:

> Mark and Spencer buys 10 shirts from manufacturer in Georgia at $10 per shirt. The details of the transaction are the same as above:
>
> | | |
> |---|---|
> | 10 Shirts @ $10 per shirt | $100 |
> | Inland shipping charges (including shipping within US) $2 per shirt | $20 |
> | Overseas shipping charges & Insurance $3 per shirt | $30 |
> | Total Cost | $150 |
>
> Markup by the retailer 25%, GDP consumption amount (150x125%) $187.50

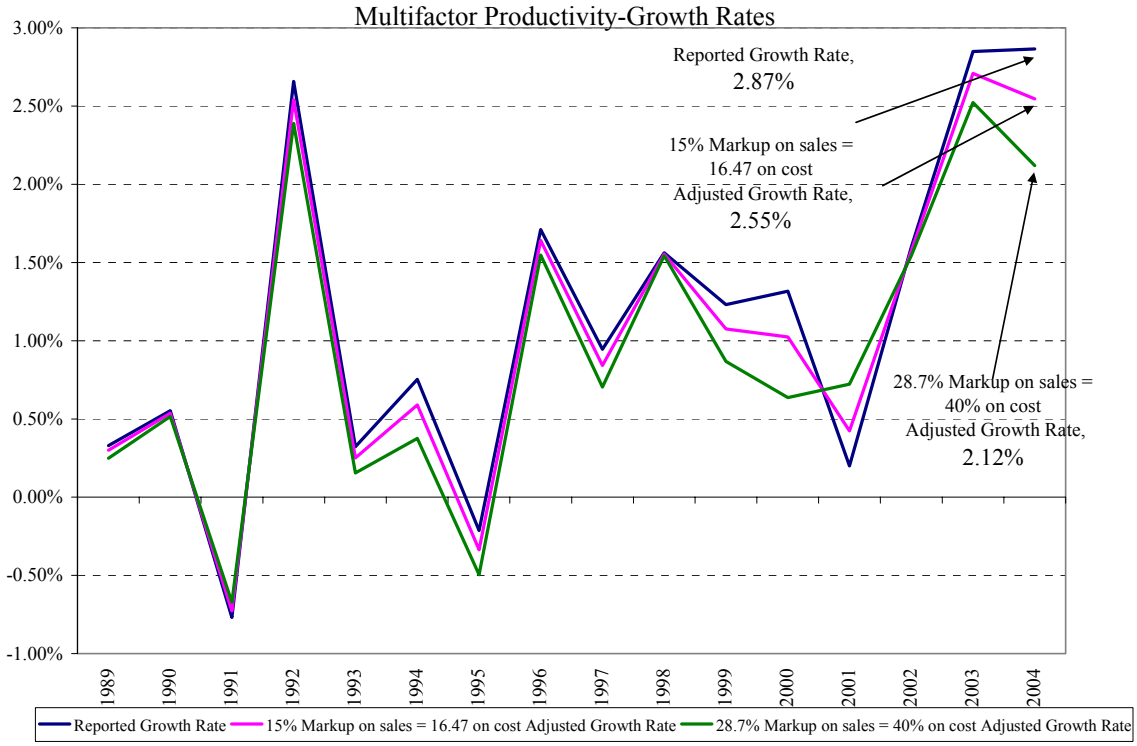
BEA will report these exports at $120 (p. 27 U.S. Census Bureau, U.S. Bureau of Economic Analysis News, 4/12/2006).

In reality there is no increase in the production of the U.S. However, because of the way imports and exports are computed there is an increase in the U.S. GDP in the amount of $107.5 using equation (1). Assuming no change in the denominator, this methodology when employed to measure imports and exports, would cause significant overstatement of labor productivity and multifactor productivity measures. It is recognized that significant distortion if any, does not exist in the import/export numbers for services. Please see table 1, Appendix A, for recalculation of multifactor productivity for the U.S. for the years 1989 – 2004."

The inconsistencies are many but we have verified the reconciliation of the BEA GDP data to the BLS output data (with differences ascribed to the netherworld of "statistical discrepancies"). What should be noted is that the BEA measures GDP for the total economy, while the largest subset of the economy for which the BLS measures Multi-Factor Productivity (MFP) is the private business sector. From the BLS handbook, "Private business output excludes the following activities from GDP: general government, government enterprises, private households, nonprofit institutions and the rental value of owner occupied dwellings". BLS excludes these activities from productivity measures because in most cases inadequate data exists to construct output estimates independently of input costs. BEA includes these activities in GDP because its goal is to measure all current production in the United States. Please see the reconciliation from "An Integrated BEA/BLS Production Account" below:

Aggregate Production Account, 1996 (Billions of dollars)	
1. Gross Domestic Product (NIPA Table 1.7, line 1)	**7813.2**
2. -Households and Institutions (NIPA Table 1.7, line 7)	348.6
2a Private Households (NIPA Table 1.7, line 8)	12.0
2b. + Nonprofit Institutions Serving Individuals (NIPA Table 1.7, line 9)	336.5
3. -General Government (NIPA Table 1.7, line 10)	908.7
4. = Gross Domestic Business Product (NIPA Table 1.7, line 2)	**6556.0**
5. -Owner-occupied Housing (NIPA Table 8.21, line 172)	487.1
6. -Rental Value of Nonresidential Assets Owned and Used by Nonprofit Institutions Serving Individuals (NIPA Table 8.21, line 173)	49.8
7. = BEA/BLS Business Sector Output	**6019.0**
8. -Government Enterprises	111.8
8a. Federal (BEA GDP by Industry Table, line 80)	54.9
8b. State and Local (BEA GDP by Industry Table, line 83)	56.9
9. = BEA/BLS Private Business Sector Output	**5907.2**
9a. Statistical and Other Discrepancies	32.7
9b. + BLS Total Factor Costs plus Taxes (MFP Table PB1a, Current Dollar Output)	5874.5
9b-i. BLS Cost of Capital Services (MFP Table PB1a, Capital Income)	1839.8
9b-ii. BLS Labor Compensation (MFP Table PB1a)	3600.7
9b-iii. Indirect Business Taxes, Less Portion Assigned to Capital Services, Plus Subsidies	434.0
10. -Farms (NIPA Table 1.7, line 6)	92.2
11. + Farm Space Rent for Owner-occupied Housing (NIPA Table 8.21, line 114)	5.8
12. – Farm Intermediate Inputs for Owner-occupied Housing (NIPA Table 8.21, line 117)	1.0
13. = BEA/BLS Private Nonfarm Business Sector Output	**5819.8**
13a. Statistical and Other Discrepancies	32.7
13b. + BLS Total Factor Costs plus Taxes (MFP Table NFB1a, Current Dollar Output)	5787.1
13b-i. BLS Cost of Capital Services (MFP Table NFB1a, Capital Income)	1776.1
13b-ii. BLS Labor Compensation (MFP Table NFB1a, Labor Compensation)	3570.8
13b-iii. Indirect Business Taxes, Less Portion Assigned to Capital Services, Plus Subsidies	440.2

Professor Chhatwal prepared a reconstruction of the production function after eliminating from real GDP output the mark-up on imported goods at the fifteen and forty percent levels. It should be noted that as per McCulley in 2003 the retail gross margin as determined by the BLS was 28.7%. This conveniently works out to a "mark-up" of 40%.



The Multifactor Productivity Table in the Appendix shows data for the years 1989 through 2004. The multifactor productivity index (2000=100) is obtained from the Bureau of Labor Statistics. The reported growth rate for each year is then computed from this data. Real GDP numbers (2000=100) are obtained from the Bureau of Economic Analysis website. The deflator function is computed as the relationship between the Real GDP and multifactor productivity for each year. This table computes the effect on the multifactor productivity growth rates per year after the overstated GDP is adjusted for the

markup on imported goods (import of services and overstatement of all exports is excluded in this analysis). Two mark-up rates are assumed to be 15% and 28.7% of sales.

As would be expected we find that the adjusted multifactor productivity growth rates were lower than the reported rates in 14 out of the 16 years studied at the 28.7% markup level. In 1991 reported growth rate was -0.77% while the adjusted rate was -0.67%. Again in the year 2001 the reported rate was 0.20% while the adjusted rate was 0.72%. We observed that the growth rate in productivity was over stated on an average by 0.21% during the period of study. This is a very significant overstatement (18.18%) as the average reported growth rate during this period is 1.10%.

Productivity Calculation Methodology and Challenges

This project has been referred to, early and often, as "the bane of our existence". The reason is in the challenges we face in the reconciliation of government data with the outputs and inputs used to calculate productivity measures.

The approach seems easy enough. Verify that output is at retail, that imported inputs reduce output at wholesale, and apply a Cobb-Douglass type function to real output data, that although prepared by the Bureau of Labor Statistics (BLS) corresponds to the real GDP data provided by the Bureau of Economic Analysis. We found, after exhaustive "bottom up" analysis, that proving our thesis at the industry group or sub-sector level would be a difficult if not fruitless exercise. This is due to the differences in BLS methodology in arriving at gross output. *"BEA and BLS output measures are often used by economic analysts in studies of economic growth, productivity, and structural change.*

In recent years, it has been noted that differences in the BEA and BLS output measures can lead to conflicting findings in these studies. For this reason, it is useful to identify the magnitude and scope of differences in the BEA and BLS NAICS-based output measures, to determine the sources of these differences, and to work towards eliminating unnecessary inconsistencies between the BEA and BLS output measures." From the report, "Comparison of BEA and BLS NAIC-Based Output Measures".

We are nothing if not pragmatic, so we took a top-down approach. After twenty years of practice as a forensic CPA, one gets a sense of which road will lead to a journey of no return. Notwithstanding the aforementioned qualification, we will support our findings based on a top-down methodology. We believe that our approach supports our theory. However, a reconciliation of the BLS bottom-up industry group approach to actual aggregate productivity measures is at a minimum, required before we would submit our findings to a scholarly journal for publication. We look at this paper as the second incarnation of this thesis. The first being the aptly named "thought experiment" that was published November 18th 2005, in the *Grant's Interest Rate Observer*. We presume that the third incarnation of this thesis will be rigorous in terms of reconciliation of the BLS and BEA output by NAICS industry group classification. Reliable data series will also lend itself to additional regression analysis. Given the fact that the work of a joint task force of government economists from the BEA and the BLS has resulted in two papers, "Comparison of BEA and BLS NAICS-Based Output Measures" and "An Integrated BEA/BLS Production Account: A First Step and Theoretical Considerations", our sense is that there is quite a bit of work to be done at the government agency level before we proceed.

To the source

We spoke with Phyllis F. Otto, an economist in the Office of Productivity and Technology, Bureau of Labor Statistics and author of numerous papers on labor productivity.

Mrs. Otto confirmed one of the fundamental assumptions in our thesis in that the value of gross output (sector output), the numerator in the labor and multifactor productivity calculation, is reduced by the inbound cost of imports (see more detailed analysis contained in this report). Our question was to seek clarification of a statement made in a report co-authored by the BLS economist Susan G. Powers, "An Integrated BEA/BLS Production Account: A First Step and Theoretical Considerations". On page 11 section II.a.3, *Imports in the Nominal Production Account, "Imported final commodities should be excluded from sector output, since they are not made inside the sector".* Mrs. Otto confirmed that "the exclusion applies to the inbound costs only, the margins earned are value added, and are included in sector output".

Mrs. Otto seemed adamant that the markup on imported goods was indeed testimony to our ability to process and distribute and was therefore correctly included in the numerator of the productivity determination. I offered her a hypothetical economy, where only one sneaker receiving clerk processes imports and resells the marked-up goods to the rest of the nation. I further presupposed that due to the labor productivity calculation methodology, the labor department would determine that he alone was the most productive receiving clerk in the history of mankind. The economist replied, "If no one

else is working, who would buy the sneakers?", to which I replied "In this hypothetical economy, the population is encouraged by Federal Reserve intermediation to borrow against the equity in their homes and run annual $800 billion current account deficits, to in fact buy these sneakers". She replied that my statement had nothing to do with productivity.

"Nothing to do with productivity"

To editorialize a bit, as a student of Austrian Business Cycle Theory, it seems to me that it has everything to do with productivity. Prices send signals. Naturally equilibrated prices, I would argue, in free market economies, send on balance, the correct signals. When the price of money (the interest rate) is high, it signals that there is a dearth of savings. Not only is there a higher cost of investment in productive capacity but the signal indicates inadequate reserves on the part of the consuming public to support such an enterprise. Conversely, when the cost of money is low, it sends the signal that savings are high (or interest rate sensitive asset values are high) and higher consumption is the natural by-product of such a condition. If a consumptive binge on foreign goods was financed with earned income, then perhaps the productivity measures would not seem as corrupted. This could be interpreted as Schumpeterian creative-destruction; displaced domestic workers have moved on to other productive industries. The presumably accompanying low rates would be indicative of adequate savings to finance additional productive investment. But this credit inspired consumption, obscures the fact that output is overstated by other than market induced debt creation and ascribes the efficiency and low cost wage structure of our trading partners to the domestic labor pool. Productivity gains have ebbed and flowed throughout history. Rarely does productivity growth persist

in a consumption driven economy. The ephemeral nature of low interest rates and easy credit may lead to unexpected pressure on productivity, as calculated currently, in the next decade.

Note: One of the great benefits of authoring a paper such as this is that one is "typically" guaranteed to have the last word. BLS economist Susan Powers, the co-author referred to above, returned our call not long before this paper was issued. Ms. Powers confirmed our interpretation of the treatment of marked up imports for purposes of the BLS productivity calculation. Ms. Powers generously allowed that although the idea was plausible, she probably did not agree with its premise. She went so far as to pledge to study the matter further and if we would be so kind as to submit the thesis in writing, she would pass it around the BLS for comments and criticism. We have. We look forward to further comments from the BLS.

In Conclusion

From the "wish we had said it first department" comes a distinctively humorous insight from Jim Grant, *"Something tells us that "business productivity ex-the industries that feed on the U.S. current account deficit" will not take its place alongside, for instance, "CPI less food and energy." But the analytically provocative concept deserves a place in the back of the mind of every thoughtful investor. Whatever else they might be, the productivity data are not what they seem."*

Grant qualifies his reporting of our idea as a highly regarded journalist would and should under the circumstances. We however, venture a bit further out on the limb. There is an

observable association in the growth of imported finished goods relative to GDP and a rise in the rate of productivity in the United States. The problem, in our view, is not so much the irreconcilable differences between BLS and BEA output measures, as much as a misinterpretation of what constitutes domestic production. A production function measures outputs. It fails to interpret them. It enjoys no ability to evaluate the quality of inputs or its own suitability in measuring changing variables in a changing economy. We can no more ascribe the efforts of others to our own productivity than we could accept a medal for winning a contest in which we did not participate. Should the mark-up on imported goods continue to grow as a percentage of GDP, under the current methodology, at least statistically, we will grow more productive. This will be the case whether we have chronic unemployment and continue to borrow to consume imported finished goods or should a significant percentage of the population retire and spend down their savings to acquire the finished imports. Neither condition argues substantively that a worker in the U.S. can produce one more unit of output from one year to the next. To quote Jorgenson and Stiroh , "It is sustainable labor productivity gains, after all, that ultimately drive long-run growth and living standards."

APPENDIX A

Table 1. Recalculation of Multifactor Productivity 1989-2004

Year	Reported Multi-factor productivity[1] 2000=100	Reported Growth Rate	Real GDP[2] 2000=100	Deflator Function	15% Markup on sales = 16.47 on cost				28.7% Markup on sales = 40% on cost			
					$ markup on gds Imported[3]	Adjusted GDP	Adjusted Productivity	Adjusted Growth Rate	$ markup on gds Imported[3]	Adjusted GDP	Adjusted Productivity	Adjusted Growth Rate
1989	90.5	0.33%	6,742.7	0.0134	85.55	6657.15	0.89	0.30%	193.92	6548.78	0.88	0.25%
1990	91.0	0.55%	6,981.4	0.0130	89.66	6891.74	0.90	0.54%	203.24	6778.16	0.88	0.52%
1991	90.3	-0.77%	7,112.5	0.0127	88.36	7024.14	0.89	-0.73%	200.28	6912.22	0.88	-0.67%
1992	92.7	2.66%	7,100.5	0.0131	96.16	7004.34	0.91	2.54%	217.96	6882.54	0.90	2.39%
1993	93.0	0.32%	7,336.6	0.0127	104.61	7231.99	0.92	0.25%	237.12	7099.48	0.90	0.16%
1994	93.7	0.75%	7,532.7	0.0124	119.43	7413.27	0.92	0.59%	270.72	7261.98	0.90	0.38%
1995	93.5	-0.21%	7,835.5	0.0119	133.66	7701.84	0.92	-0.34%	302.96	7532.54	0.90	-0.50%
1996	95.1	1.71%	8,031.7	0.0118	142.48	7889.22	0.93	1.64%	322.96	7708.74	0.91	1.55%
1997	96.0	0.95%	8,328.9	0.0115	156.23	8172.67	0.94	0.84%	354.12	7974.78	0.92	0.70%
1998	97.5	1.56%	8,703.5	0.0112	163.94	8539.56	0.96	1.55%	371.60	8331.90	0.93	1.54%
1999	98.7	1.23%	9,066.9	0.0109	184.50	8882.40	0.97	1.07%	418.20	8648.70	0.94	0.87%
2000	100.0	1.32%	9,470.3	0.0106	219.44	9250.86	0.98	1.03%	497.40	8972.90	0.95	0.64%
2001	100.2	0.20%	9,817.0	0.0102	206.10	9610.90	0.98	0.42%	467.16	9349.84	0.95	0.72%
2002	101.8	1.60%	9,890.7	0.0103	209.88	9680.82	1.00	1.57%	475.72	9414.98	0.97	1.54%
2003	104.7	2.85%	10,048.8	0.0104	226.57	9822.23	1.02	2.71%	513.56	9535.24	0.99	2.52%
2004	107.7	2.87%	10,320.6	0.0104	263.98	10056.62	1.05	2.55%	598.36	9722.24	1.01	2.12%

1 Multifactor Productivity Index Private Business (2000=100), Bureau of Labor Statistics

2 Bureau of Economic Analysis

3 Markup computed on Imported Goods only from BEA

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Table: "*The Production Function of the United States*". 1980-2001 Bernanke, Ben S. and Andrew B. Abel. (2005) "Macroeconomics".5th edition, p.65

Chart: "*More Imports, More Productive?"*—Bureau of Economic Analysis (BEA), BLS

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Chart: "*Imports and Exports of Goods and Services as a % of GDP"*—BEA, National Income and Product Accounts (NIPA) Tables

Chart: "*Imports of Goods and Services as a % of GDP*"—BEA, NIPA Tables

Chart: "*Productivity Growth*"—Grant's Interest Rate Observer, BLS

Chart: "*Two Measures of Production"*—Goldman Sachs

Table: *Aggregate Production Account, 1996*— Fraumeni, Barbara M., Michael J. Harper, Susan E. Powers, and Robert E. Yuskavage(2005), "An Integrated BEA/BLS Production Account: A First Step and Theoretical Considerations", p.25

Chart: "*Multifactor Productivity- Growth Rates"*—Appendix A

Appendix A Multifactor Productivity Table
Data from BLS, BEA