"Usable Productivity" Growth in the United States

An International Comparison, 1980-2005

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Contents

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Executive Summary

Economists attach enormous importance to productivity growth because it is the main long-run determinant of living standards. In an economy with rapidly rising productivity growth, the population can experience rapid increases in income, or leisure time, or some combination of the two. If the benefits of productivity growth are broadly shared, then the whole society can benefit.

By the most commonly used measures of productivity, the U.S. economy has performed better than most other wealthy economies over the last decade. It had a sharp upturn in productivity growth in 1995 associated with the IT revolution, which was not matched in other countries. As a result, the United States gained ground on most countries during the decade from 1995 to 2005.

However, productivity growth cannot be directly translated into improvements in living standards. This paper makes two technical adjustments to measured productivity growth to assess the rate at which the economy is allowing for rises in living standards. It uses a net measure of output (removing changes in the share of output that go to replace depreciated capital) and it uses a consumption deflator instead of an output deflator to assess the rate at which the economy can provide for increases in living standards.

When these two adjustments are made to measured productivity growth in the United States and other wealthy countries, the performance of the United States looks relatively worse in both the period from 1980 to 1995 and also in the period from 1995 to 2005. In fact, these adjustments make the rate of "usable productivity" growth slightly slower in the United States than in other wealthy countries over the period from 1995 to 2005.

The paper also attempts to assess the extent to which productivity gains during these periods are sustainable. The sharp rise in the U.S. current account deficit over the years from 1995 to 2005 allowed both consumers and producers to take advantage of lower cost imports. This can have the effect of increasing "usable productivity" both by lowering consumer prices and also by making low-cost materials and equipment available to producers, which can be substituted for labor. However, the current account deficit cannot grow indefinitely as a share of GDP. This paper adjusts for the effect of the growth of the current account deficit on usable productivity, to come up with a measure of sustainable usable productivity – the rate of usable productivity growth that would have been possible if the current account deficit had stayed constant as a share of GDP. It makes a similar adjustment for changes in net investment.

With these adjustments, the U.S. economy had a sustainable rate of usable productivity growth over the period from 1995 to 2005 that was 0.4 percentage points lower than in the average of other OECD countries. These calculations suggest that even with the 1995 productivity upturn, the United States is still not able to sustain the same rate of increase in living standards as other wealthy countries. This fact has been partly concealed by the large rise in the current account deficit and decline in net investment over the last decade. However, when the current account deficit stabilizes or shrinks in the years ahead, the rate of increase in living standards in the United States is likely to be slower than in other wealthy countries, as was clearly the case between 1980 and 1995.

Introduction

Economists generally view productivity growth as the main long-run determinant of living standards. At a point in time, cyclical factors may affect the economy's output, but productivity growth is the factor that restricts the economy's potential output over the long-term, and therefore the potential increase in average living standards. For this reason, economists tend to place considerable importance on productivity growth.

The United States consistently is shown to rank at or near the top of the world in living standards primarily because it ranks near the top in its level of productivity, although not above some countries in West Europe. The conventional story of U.S. productivity growth in the post World War II era is that the United States, along with West Europe and Japan, enjoyed a period of rapid productivity growth from 1947 to 1973. Productivity growth slowed in most countries after 1973, although West Europe and Japan continued to outpace the United States, in a process of technological catch-up. After 1995, the pace of productivity growth surged in the United States, propelled by the information technology revolution. Most other countries did not share in this new boom, as the United States gained ground against West Europe and Japan.

This paper makes a series of adjustments to the conventional measure of productivity to assess the growth in "usable productivity," the productivity that can actually be used to raise living standards. To derive usable productivity from the standard measure, the paper first distinguishes between the growth in gross output per hour of work and the growth in net output per hour of work.[1] While it is necessary to replace depreciated capital goods to sustain the economy, this does not directly increase output. Insofar as an increasing portion of output is devoted to depreciation, these resources are not available to increase living standards.

The second adjustment is for the differences between the output deflator, which is used to measure the growth in real output, and the consumption deflator, which is used to measure the inflation in consumer goods and services. If output prices rise less rapidly than the price of consumer goods and services, then consumption growth will not be able to increase as rapidly as productivity growth.[2] A reduction in the relative price of investment goods is obviously beneficial in that it reduces the cost of replacing or adding to the capital stock, but it does not directly raise living standards.

The third adjustment incorporates changes in the current account deficit to determine the extent to which a rate of usable productivity growth is sustainable. An increase in the current account deficit can allow for a faster rate of usable productivity growth either by allowing for a faster rate of productivity growth than would be possible with a stable current account deficit and/or by reducing the price of consumption goods relative to output. To take a simple example, if a country had zero productive growth, but had an increase in its current account deficit equal to five percent of GDP, it would be able to enjoy an increase in living standards approximately equal to five percent of its GDP. Of course, this rate of increase is not sustainable since a current account deficit cannot continually increase as a share of its GDP.

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[1] This follows an adjustment made in Spant, R. 2003, "Why Net Domestic Product Should Replace Gross Domestic Product as a Measure of Economic Growth," *International Productivity Monitor*, #7, 39-43

[2] Some of the difference between output indexes and consumer price indexes is due to the fact that latter usually are fixed-weight indexes, while the former are chained-weight indexes.

The fourth and final adjustment is for changes in the net investment share of GDP. The logic here is analogous to the logic of the adjustment for the change in the current account deficit. If net investment declines as a share of GDP, this should in principle allow for a diversion of resources from investment to consumption. The reduction in the net investment share of output would allow for a lower rate of increase in the price of consumer goods and services than in a scenario in which the net investment share remained constant. As is the case with the current account deficit, it is not possible for the net investment share to continually decline, so any increase in living standards associated with a decline in investment shares can be seen as a one-time gain that cannot be sustained indefinitely.

It turns out that these four adjustments make the productivity performance of the United States appear substantially worse, relative to other wealthy countries, over the period examined in this paper. The conventional measure of productivity already showed productivity growth in the United States lagging other wealthy countries in the period from 1980-1995. However, the gap becomes substantially larger with these adjustments to the data.

More surprisingly, the impressive productivity performance of the United States in decade following 1995 is considerably less impressive after incorporating these adjustments. The growth in the share of output going to depreciation was considerably larger in the United States than in other wealthy countries. The gap between the rate of inflation shown by the consumption deflator and the output deflator was also much larger in the United States than in other wealthy countries. And the United States stands out in having an extraordinary increase in the size of its current account deficit over this period. This increase in the current account deficit has allowed for a more rapid rate of increase in living standards than is sustainable given the underlying rate of productivity growth in the United States. Similarly, the net investment share of GDP declined slightly in the United States over this period while it rose on average for other wealthy countries.

After making these four adjustments, the United States actually had a lower sustainable rate of usable productivity growth in the decade from 1995 to 2005 than the average for other wealthy countries. With the size of the U.S. current account deficit likely to level off, if not actually shrink, in the near future, the prospects for growth in living standards in the United States do not look very bright. If productivity growth slows from its 1995-2005 pace, as recent data indicate may be the case, then the prospects for substantial growth in living standards look even worse.

Deriving "Usable" Productivity

This paper makes four adjustments to the standard measurement of productivity to derive a measure of "usable" productivity that is sustainable through time.

1. Gross and Net Productivity

In the United States and most other wealthy countries, the portion of output devoted to replacing worn out or obsolete capital goods has increased substantially over the last quarter century. The main reason for this increase is that an increasing share of investment is devoted to software, computers and other relatively short-lived capital equipment. The rising share of depreciation implies a divergence between gross and net output. This divergence is a relatively new phenomenon; in the period from 1947 to 1973, gross and net output grew at almost exactly the same rate, as the share of output devoted to depreciation changed little.[3]

Computers, software, and the other short-lived capital goods that account for a growing share of investment have had a substantial impact on productivity growth and living standards in the last quarter century. However, the increasing share of output that goes to depreciation does not directly increase living standards. The effects of this investment should be seen in an increase in net output.

2. Output and Consumption Deflators

Productivity growth is measured using a deflator for GDP. However, the extent to which living standards can increase will depend on the extent to which workers can buy more consumption goods and services. If there are gaps between the rate of inflation as measured by consumer price indices and the rate of inflation as measured by output price indices, then living standards will not be able to increase at the same rate of productivity growth.

This has been the case in the United States over the last quarter century, as the consumer price index has consistently shown a rate of inflation that was 0.4 to 0.6 percentage points higher than the GDP deflator. There are some methodological issues that account for part of this gap, but the largest factor is the difference in coverage.[4] Computers and software, which have been falling in price, are a much larger share of domestic output than they are of the basket of items included in the consumer price index. Rents, which account for almost a third of the CPI in the United States, have increased in price somewhat more rapidly than the overall GDP price deflator for most of the last quarter century.

From the standpoint of living standards, productivity is only beneficial insofar as it increases potential consumption per hour worked. If the United States produces many more or better computers per hour worked, but this does not lead to an increase in its potential to have more and/or better consumer goods and services, then this gain in productivity does not have an effect on living standards.[5]

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[3] See Baker, D. 2007. "The Productivity to Paycheck Gap: What the Data Show," Center for Economic Research, Washington, D.C.: [http://www.cepr.net/documents/publications/growth_failure_2007_04.pdf].

[4] The consumer price index is a fixed weight Laspeyres index. This will generally show a higher rate of inflation than a chain-weighted index like the GDP deflator.

[5] An extreme example may make this point more clearly. Suppose a country produces steel and exports all its output in exchange for consumer goods. If productivity in the steel sector increased by 10 percent, but the price of steel fell by

3. Changes in the Current Account Deficit

In principle, an increase in the current account deficit will allow for the rate of consumption growth to exceed the rate of income growth. If the shares of output did not change, then an increase in the size of the current account deficit would translate almost one to one into an increase in consumption. In other words, if the current account deficit increased by an amount equal to 5 percentage points of GDP, then this would allow consumption to increase by 5 percent more than would otherwise be the case.[6] The increase in consumption would result from the fact that consumer goods prices rise less rapidly than in a scenario in which the current account deficit remained constant, due to the availability of low-cost imported goods and services.

An increase in the current account deficit could also lead to more rapid productivity growth than would otherwise take place. This can occur at both the level of producers and consumers. At the level of producers, the availability of lower cost imports can cause firms to substitute materials for labor. This is most obvious in the case of energy, where energy may be substituted for labor, if is available at low cost, but such substitution can occur in other contexts as well. For example, if various materials used in production are available at low cost, then firms will devote fewer resources to monitoring their use and will opt to be wasteful of material rather than labor. Also, if parts and machinery can be replaced at low cost, firms will devote less labor to repairing and maintaining equipment.

In the case of consumers, the availability of low-cost imports may cause shifts in consumption away from the least productive sectors. For example, if new shoes can be purchased cheaply, then fewer consumers will have their old shoes repaired. By reducing demand and employment in a relatively unproductive sector, average productivity in the economy will rise. For these reasons, a rising current account deficit can be expected to provide a boost to productivity growth, while a falling current account deficit will be a drag on productivity growth.

The United States experienced a substantial increase in its current account deficit over this twenty-five year period, with most of the rise taking place over the decade from 1995 to 2005. This allowed for a one-time gain in consumption. Most economists believe that the U.S. current account deficit will have to shrink from its current levels, which will mean that consumption growth will have to trail GDP growth for a period of time (assuming shares of domestic demand are held constant). However, even if the current account deficit remained constant as a share of GDP, consumption growth would have to be lower relative to productivity growth than it was during this decade of a rapidly increasing current account deficit, since the price of consumption goods and services would not be held down by lower cost imports.

The precise size of the effect of a rising current account deficit on productivity growth and the gap between the inflation rate shown by the consumption deflator and the output deflator would depend on demand and output elasticities. For simplicity, the calculations in this paper assume that the

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10 percent against the price of imported consumer goods, then the country would not benefit from the increase in productivity in its steel sector.

[6] This is not exactly true, since the 5 percent is measured against an endpoint that will typically be somewhat larger than starting point. If the economy grew by 10 percent over a period in which the current account deficit increased by 5 percentage points of GDP, then the increase in potential consumption growth (assuming output shares stayed constant) would be 5.5 percent (5% divided by 90.9 percent, the ratio of the original year's output to the end year's output.)

effect is equal to half of the change in the current account deficit, so that an increase in the current account deficit equal to 1 percentage point of GDP implies that that actual productivity growth over the period was 0.5 percentage points higher than the sustainable rate of productivity growth.

4. Changes in the Net Investment Share of Output

The impact of changes in net investment shares of GDP on potential consumption is very similar to impact of changes in the current account deficit as a share of GDP. If the share of demand devoted to net investment declines, other things equal, then this would allow for an increase in consumption beyond what would otherwise be allowed by a particular rate of productivity growth. This is also a one-time benefit in the sense that the net investment share of GDP cannot continually decline. This gain would in principle be realized by a decline in the price of consumer goods and services compared to investment goods, relative to a situation in which there was no drop in net investment. (While consumer prices did rise more rapidly than investment prices over the period in the U.S. and most other countries, the implication is that consumer prices would have risen more rapidly relative to investment good prices, if there had not been a decline in the net investment share of output over the last quarter century.) The adjustment for calculating a sustainable rate for productivity growth from the actual rate of productivity growth is the same as is used for the current account deficit: the analysis assumes that half of the change in the net investment share of GDP contributes to an increase in a consumption-based measure of productivity.

Productivity Growth in the OECD 1980-1995

In the period from 1980 to 1995 the United States was still mired in its post-1973 productivity slump while most of the rest of the OECD was in a period of catch-up. The first column of **Table 1** shows the average annual rate of productivity growth in 13 OECD countries in addition to the United States. The last row shows the un-weighted average annual rate for these countries. The United States ranked near the bottom in its rate of productivity growth over this period, beating out only Canada, Iceland, and Switzerland. Its 1.37 percent average annual rate of productivity growth was more than 0.6 percentage points less than the average for the other 13 countries.

TABLE 1
Productivity Growth in the OECD 1980-1995 (average annual rates)

	Productivity	Gross Domestic Product	Net Domestic Product	Difference	Net Productivity
Australia	1.53%	3.06%	2.88%	0.18%	1.35%
Belgium	2.29%	1.87%	1.78%	0.09%	2.21%
Canada	1.15%	2.45%	2.24%	0.20%	0.95%
Denmark	2.55%	2.15%	2.75%	-0.60%	3.15%
Finland	2.96%	1.75%	1.64%	0.11%	2.85%
France	2.76%	2.15%	1.96%	0.19%	2.57%
Germany	2.53%	2.28%	2.14%	0.14%	2.39%
Iceland	0.05%	1.91%	2.07%	-0.16%	0.21%
Italy	2.21%	2.03%	1.79%	0.23%	1.97%
Netherlands	2.22%	2.27%	2.10%	0.17%	2.05%
Sweden	1.46%	1.69%	1.83%	-0.14%	1.60%
Switzerland	0.38%	0.03%	0.09%	-0.06%	0.44%
United Kingdom	2.24%	2.29%	2.31%	-0.01%	2.25%
United States	1.37%	2.99%	2.86%	0.12%	1.24%
Non-U.S. (un-weighted)	1.87%	1.99%	1.97%	0.03%	1.85%

Source: IMF, OECD and authors' calculations, see appendix.

The picture is somewhat worse using a net measure rather than a gross measure of productivity growth, although the size of the gap between productivity growth in the other OECD countries and the United States does not change.

The relative performance of the United States does look worse when a consumption deflator is used instead of an output deflator, as shown in Table 2. The average size of the gap between inflation measured with a consumption deflator and with an output deflator in the United States was 0.6 percentage points over this period. This reduces the potential average annual increase in consumption per hour to just 0.68 percent in the United States. By comparison, the average annual gap between inflation measured with a consumption deflator and inflation measured with an output deflator was just 0.04 percentage points in the other OECD countries. This makes the gap between the annual rate of productivity growth (measured with a consumption deflator) in the other OECD countries and the United States slightly more than 1.0 percentage point over this period.

TABLE 2
Productivity Growth in the OECD 1980-1995: Output and Consumption Deflators (average annual rates)

	Net Productivity	GDP Deflator	CPI	Difference	Usable Productivity
Australia	1.35%	5.41%	6.20%	0.80%	0.56%
Belgium	2.21%	3.74%	3.84%	0.10%	2.10%
Canada	0.95%	3.97%	4.69%	0.71%	0.23%
Denmark	3.15%	4.32%	4.58%	0.26%	2.89%
Finland	2.85%	5.46%	5.14%	-0.32%	3.17%
France	2.57%	4.58%	4.91%	0.34%	2.24%
Germany	2.39%	2.93%	2.94%	0.01%	2.37%
Iceland	0.21%	22.66%	22.84%	0.18%	0.02%
Italy	1.97%	8.60%	8.10%	-0.50%	2.47%
Netherlands	2.05%	2.03%	2.53%	0.51%	1.54%
Sweden	1.60%	6.34%	6.44%	0.10%	1.51%
Switzerland	0.44%	4.70%	3.31%	-1.39%	1.83%
United Kingdom	2.25%	5.46%	5.23%	-0.24%	2.49%
United States	1.24%	3.62%	4.18%	0.56%	0.68%
Non-US (un-weighted)	1.85%	6.17%	6.21%	0.04%	1.80%

Source: Source: IMF, OECD and authors' calculations, see appendix.

The United States experienced a modest increase in the size of its current account deficit over this period, as it went from a surplus of 0.1 percent of GDP in 1980 to a deficit of 1.5 percent of GDP in 1995, as shown in Table 3. Column 2 shows the 1980 current account deficit, measured as a share of GDP. Column 3 shows the deficit in 1995. By contrast, most of the other OECD countries included in this set had a modest reduction in the size of their current deficits over this period.

Table 3 shows the annual rate of net productivity growth, using a consumption deflator, adjusted for changes in the current account's share of GDP.[7] This has the effect of slightly lowering the sustainable rate of productivity growth for the United States over this period, dropping it from an average annual rate of 0.68 percent to 0.63 percent.

[7] The calculations that the change in the size of the current account deficit measured as share of GDP is equal to twice the combined impact of the rise in the current account deficit on productivity growth and the gap between the inflation rate as measured with a consumption deflator and output deflator.

TABLE 3
Productivity Growth in the OECD 1980-1995: The Impact of Changes in the Current Account Deficit (average annual rates)

	Usable Productivity	CA 1980	CA 1995	Average Annual Change	Usable Productivity (CA adjusted)
Australia	0.56%	-2.80%	-5.20%	-0.16%	0.48%
Belgium	2.10%	-4.10%	5.60%	0.65%	2.43%
Canada	0.23%	-2.30%	-0.80%	0.10%	0.28%
Denmark	2.89%	-1.60%	0.70%	0.15%	2.97%
Finland	3.17%	-2.70%	4.10%	0.45%	3.39%
France	2.24%	-0.60%	1.10%	0.11%	2.29%
Germany	2.37%	-1.90%	-1.20%	0.05%	2.40%
Iceland	0.02%	-2.10%	0.70%	0.19%	0.12%
Italy	2.47%	-1.70%	2.20%	0.26%	2.60%
Netherlands	1.54%	-1.00%	6.10%	0.47%	1.78%
Sweden	1.51%	-3.30%	3.40%	0.45%	1.73%
Switzerland	1.83%	0.20%	6.80%	0.44%	2.05%
United Kingdom	2.49%	0.80%	-1.20%	-0.13%	2.42%
United States	0.68%	0.10%	-1.50%	-0.11%	0.63%
Non-US (un-weighted)	1.80%	-1.78%	1.72%	0.23%	1.92%

Source: Source: IMF, OECD and authors' calculations, see appendix.

Since most other countries had a modest reduction in the size of their current account deficit over this period (implying that consumer prices rose more rapidly than would otherwise be the case), their sustainable average annual rate of productivity growth is approximately 0.1 percentage points higher than their actual rate of productivity growth over this period. This adjustment makes the gap between the average annual rate of sustainable productivity growth in the other OECD countries and the United States 1.3 percentage points.

TABLE 4
Productivity Growth in the OECD 1980-1995: The Impact of Changes in the Net Investment (average annual rates)

	Usable Productivity (CA adjusted)	NI 1980	NI 1995	Average Annual Change	Sustainable Usable Productivity
Australia	0.48%	12.77%	7.10%	-0.38%	0.29%
Belgium	2.43%	10.42%	5.88%	-0.30%	2.28%
Canada	0.28%	11.15%	5.80%	-0.36%	0.10%
Denmark	2.97%	6.09%	4.01%	-0.14%	2.90%
Finland	3.39%	13.88%	0.30%	-0.91%	2.94%
France	2.29%	12.61%	6.49%	-0.41%	2.09%
Germany	2.40%	12.23%	7.59%	-0.31%	2.24%
Iceland	0.12%	8.65%	2.22%	-0.43%	-0.10%
Italy	2.60%	13.27%	5.46%	-0.52%	2.34%
Netherlands	1.78%	10.40%	6.21%	-0.28%	1.64%
Sweden	1.73%	11.11%	5.86%	-0.35%	1.56%
Switzerland	2.05%	15.31%	6.65%	-0.58%	1.76%
United Kingdom	2.42%	4.38%	5.04%	0.04%	2.44%
United States	0.63%	8.62%	6.94%	-0.11%	0.58%
Non-US (un-weighted)	1.92%	10.94%	5.28%	-0.38%	1.73%

Source: Source: IMF, OECD and authors' calculations, see appendix.

The final adjustment is for changes in the net investment share of GDP. Column 4 of Table 4 shows the changes in the net investment share of GDP for the United States and nine other OECD countries in the years from 1980 to 1995. All of the countries except the United Kingdom experienced substantial declines in the net investment share of GDP over this period. The decline of 1.7 percentage points in the United States was actually considerably less than the 5.7 percentage point average for the other OECD countries. As a result, adjusting for the change in net investment raises the sustainable rate of productivity growth in the United States relative to the other OECD countries, although its average annual rate of 0.6 percent over this period is still 1.2 percentage points below the 1.7 percent rate average rate for the other OECD countries.

Productivity Growth in the OECD 1995-2005

The United States experienced a sharp upturn in its rate of productivity growth over the years 1995 to 2005, which was not matched in most other OECD countries. Its 2.35 percent average annual rate of productive growth was faster than all but three (Iceland, Finland, and Sweden) of the 14 other OECD countries for which data was available, as shown in column 1 of Table 5. This growth rate was approximately 0.6 percentage points faster than the average for the other 14 countries.

However, the difference becomes somewhat smaller using a net measure of productivity growth. The gap between the growth of GDP and the growth of NDP averaged 0.33 percentage points in the United States over this period, compared to an average of just 0.11 percentage points in the other OECD countries. This reduces the gap in the measure of net productivity growth to just under 0.4 percentage points as shown in column 5 of Table 5.

TABLE 5
Productivity Growth in the OECD 1995-2005 (average annual rates)

	Productivity	GDP	NDP	Difference	Net Productivity
Australia	2.12%	3.59%	3.39%	0.20%	1.92%
Austria	1.53%	2.19%	2.13%	0.06%	1.47%
Belgium	1.32%	2.06%	1.78%	0.29%	1.03%
Canada	1.69%	3.34%	3.20%	0.14%	1.55%
Denmark	1.20%	2.10%	1.82%	0.28%	0.93%
Finland	2.40%	3.65%	3.95%	-0.30%	2.70%
France	1.81%	2.14%	1.98%	0.17%	1.64%
Germany	1.65%	1.32%	1.10%	0.22%	1.43%
Iceland	3.21%	4.49%	4.83%	-0.34%	3.55%
Italy	0.68%	1.30%	1.09%	0.21%	0.47%
Netherlands	1.02%	2.59%	2.40%	0.19%	0.83%
Sweden	2.44%	2.79%	2.68%	0.11%	2.33%
Switzerland	1.25%	1.55%	1.22%	0.33%	0.92%
United Kingdom	2.09%	2.81%	2.77%	0.05%	2.04%
United States	2.35%	3.27%	2.94%	0.33%	2.02%
Non-US (un-weighted)	1.74%	2.57%	2.45%	0.11%	1.63%

Source: Source: IMF, OECD and authors' calculations, see appendix.

Table 6 calculates productivity levels using a consumption deflator rather than an output deflator. In the United States there was a 0.5 percentage point gap between inflation as measured by the consumer price index and inflation as measured by the GDP deflator. The gap in the United States is the second largest (along with Austria), behind Germany, among the countries for which data is available. On average, the other countries had no gap between these two measures of inflation, with the consumer price index in several countries actually showing a lower measured rate of inflation than the GDP deflator.[8]

[8] The consumer price index for the European Union countries used in Table 6 is the EU's harmonized price index. This index does not include a component for owner occupied housing. This would make a substantial difference for several of the countries listed here. For example, the UK's consumer price index, which does include a component for owner occupied housing, shows a rate of inflation that averages approximately 1.0 percentage point more on average over this ten year period.

As a result of the fact that the gap between the inflation rate shown by the CPI and the GDP deflator is so much greater in the U.S. than in other OECD countries, the gap in productivity growth rates is reversed when the CPI deflator is used as a basis for measuring growth. The average annual rate of productivity growth for the United States by this measure is just 1.55 percent, slightly lower than the 1.66 percent average growth rate for the other OECD countries.

TABLE 6
Productivity Growth in the OECD 1995-2005: Output and Consumption Deflators (average annual rates)

	Net Productivity	GDP Deflator	CPI	Difference	Usable Productivity
Australia	1.92%	2.74%	2.47%	-0.26%	2.18%
Austria	1.47%	1.18%	1.72%	0.54%	0.93%
Belgium	1.03%	1.58%	1.89%	0.30%	0.73%
Canada	1.55%	1.99%	2.03%	0.03%	1.52%
Denmark	0.93%	2.15%	2.14%	-0.01%	0.94%
Finland	2.70%	1.36%	1.32%	-0.04%	2.74%
France	1.64%	1.47%	1.56%	0.08%	1.56%
Germany	1.43%	0.61%	1.43%	0.82%	0.61%
Iceland	3.55%	3.69%	3.48%	-0.21%	3.76%
Italy	0.47%	2.82%	2.43%	-0.39%	0.86%
Netherlands	0.83%	2.52%	2.32%	-0.20%	1.03%
Sweden	2.33%	1.27%	0.96%	-0.31%	2.64%
Switzerland	0.92%	0.48%	0.80%	0.31%	0.61%
United Kingdom	2.04%	2.57%	1.52%	-1.05%	3.09%
United States	2.02%	2.04%	2.51%	0.47%	1.55%
Non-US (un-weighted)	1.63%	1.89%	1.86%	-0.03%	1.66%

Source: Source: IMF, OECD and authors' calculations, see appendix.

Table 7 shows a measure of productivity growth that adjusts for the changes in the current account deficit over the period. As noted before, this can be viewed as a sustainable rate of productivity growth, since the current account deficit cannot expand indefinitely as a share of GDP.

The United States had an increase in the size of its current account deficit equal to 4.9 percentage points of GDP, the largest increase for any OECD country among this group except Iceland. An un-weighted average of the current account deficits in the other OECD countries was essentially unchanged over this period. The effect of this adjustment is to depress the sustainable rate of productivity growth in the United States below the average for other OECD countries. The sustainable rate of productivity growth in the United States over this period averaged just 1.3 percent. By contrast, the average sustainable rate of productivity growth for the other countries on this list was 1.66 percent, more than a 0.3 percentage points faster.

TABLE 7
Productivity Growth in the OECD 1995-2005: The Impact of Changes in the Current Account Deficit (average annual rates)

	Usable Productivity	CA 1995	CA 2005	Average Annual Change	Usable Productivity (CA adjusted)
Australia	2.18%	-5.20%	-5.80%	-0.06%	2.15%
Austria	0.93%	-2.60%	1.20%	0.38%	1.12%
Belgium	0.73%	5.60%	2.50%	-0.31%	0.58%
Canada	1.52%	-0.80%	2.30%	0.31%	1.67%
Denmark	0.94%	0.70%	3.60%	0.29%	1.08%
Finland	2.74%	4.10%	4.90%	0.08%	2.78%
France	1.56%	1.10%	-1.60%	-0.27%	1.43%
Germany	0.61%	-1.20%	4.60%	0.58%	0.90%
Iceland	3.76%	0.70%	-16.30%	-1.70%	2.91%
Italy	0.86%	2.20%	-1.60%	-0.38%	0.67%
Netherlands	1.03%	6.10%	6.30%	0.02%	1.04%
Sweden	2.64%	3.40%	7.00%	0.36%	2.82%
Switzerland	0.61%	6.80%	16.80%	1.00%	1.11%
United Kingdom	3.09%	-1.20%	-2.40%	-0.12%	3.03%
United States	1.55%	-1.50%	-6.40%	-0.49%	1.30%
Non-US (un-weighted)	1.66%	1.41%	1.54%	0.01%	1.66%

Source: Source: IMF, OECD and authors' calculations, see appendix.

The final adjustment is for the change in net investment over the period. This adjustment is analogous to the adjustment for the changes in the current account deficit. It is intended to calculate a sustainable rate of productivity growth. Just as the current account deficit cannot increase indefinitely as a share of GDP, the net investment share of GDP cannot decline indefinitely.

The United States had a slight decline in the net investment share of GDP over this decade. By contrast, the net investment shares for the other countries included in this sample was on average rose by 0.11 percentage point. As a result, the adjustment for the change in net investment shares of GDP further reduces the sustainable rate of productivity growth for the United States relative to rest of the sample. The sustainable rate of productivity growth for the United States over this period, after this net investment adjustment, is just 1.3 percent annually, more than 0.4 percentage points below the 1.72 percent average rate for the other countries in the sample.

TABLE 8
Productivity Growth in the OECD 1995-2005: The Impact of Changes in the Net Investment (average annual rates)

	Usable Productivity (CA adjusted)	NI 1995	NI 2005	Average Annual Change	Sustainable Usable Productivity
Australia	2.15%	7.10%	11.62%	0.45%	2.38%
Austria	1.12%	9.56%	6.47%	-0.31%	0.96%
Belgium	0.58%	5.88%	5.84%	0.00%	0.57%
Canada	1.67%	5.80%	8.60%	0.28%	1.81%
Denmark	1.08%	4.01%	4.86%	0.09%	1.12%
Finland	2.78%	0.30%	5.45%	0.51%	3.04%
France	1.43%	6.49%	7.26%	0.08%	1.46%
Germany	0.90%	7.59%	2.23%	-0.54%	0.64%
Iceland	2.91%	2.22%	16.77%	1.45%	3.64%
Italy	0.67%	5.46%	5.03%	-0.04%	0.65%
Netherlands	1.04%	6.21%	4.42%	-0.18%	0.95%
Sweden	2.82%	5.86%	4.90%	-0.10%	2.77%
Switzerland	1.11%	6.65%	3.65%	-0.30%	0.96%
United Kingdom	3.03%	5.04%	6.37%	0.13%	3.10%
United States	1.30%	6.94%	6.84%	-0.01%	1.30%
Non-US (un-weighted)	1.66%	5.58%	6.68%	0.11%	1.72%

Source: Source: IMF, OECD and authors' calculations, see appendix.

Conclusion

This paper has made a series of adjustments to conventional productivity growth data to better measure the extent to which the productivity growth in the United States and other OECD countries can be translated into sustainable increases in living standards. The first two adjustments focused on converting productivity growth into a measure that directly translates into living standards. This meant first using a net measure of output rather than a gross measure of output and using a consumption deflator rather than an output deflator.

The second set of adjustments was intended to pull out the impact of one-time factors that allowed for gains for living standards. Specifically, a rise in the current account deficit allows a country to increase its consumption relative to its production. Similarly, a decline in net investment has the same effect. Since the current account deficit cannot increase indefinitely as a share of GDP and net investment cannot fall indefinitely, whatever gains in living standards are attributable to these changes in output shares are not sustainable.

After making these adjustments, the productivity performance of the United States look substantially worse relative to other OECD countries than what the conventional data indicate in both the period 1980-1995 and in the period 1995-2005. While productivity growth in the United States lagged behind the OECD average in the first period even by the conventional measures, the gap is considerably larger once these adjustments are made. In the more recent period, the United States goes from being one of the leaders in productivity growth to one of the laggards, with an average annual rate of sustainable productivity growth that is almost a full percentage point below the other countries in the sample.

Clearly these measures can be better refined to more accurately measure both "usable productivity" and sustainable rates of productivity growth. However, the conventional measures of productivity growth often diverge quite far from the rate at which the economy is able to raise living standards. Furthermore, insofar as this rate is affected by unsustainable changes in output shares, the conventional measures will not provide accurate information about the extent to which rate of improvements in living standards can be sustained. The adjustments in this paper are a step toward making such calculations.

Appendix

Sources for Productivity/Accounts Data

All data is from OECD Statistics (http://stats.oecd.org/wbos/default.aspx) *except* productivity and current account data. Productivity data is from OECD Productivity (http://www.oecd.org/dataoecd/28/18/36396770.xls) and Current Account Balance (percent of GDP) is from IMF World Economic Outlook Database (http://www.imf.org/external/pubs/ft/weo/2007/01/data/index.aspx)

Gross Domestic Product (GDP) is computed in national currency, constant prices of OECD base year.

Net Domestic Product (NDP) is computed as GDP, less Consumption of Fixed Capital (CFC), in national currency, constant prices of OECD base year.

The GDP Deflator is computed as GDP in national currency, current prices, divided by GDP in national currency, constant prices OECD base year.

Consumer Prices (CPI) were computed from all items, base year 2000.

Net Investment (NI) (as a share of GDP) is computed as Gross Fixed Capital Formation, less CFC, divided by GDP (expenditure approach) all in national currency, current prices.

Methods for Computing Measures of Net Productivity

For each time period, the average annual growth rate in productivity is computed.

The average annual growth in GDP, less the average annual growth in NDP, is then subtracted from the average growth rate in productivity to produce Net Productivity (unadjusted).

The average annual growth in the GDP Deflator, less the average annual growth in the CPI, is then subtracted from Net Productivity to produce Usable Productivity.

Half the average annual percentage point change in the Current Account Balance share of GDP is then added to Usable Productivity to produce Usable Productivity (CA adjusted).

Finally, half the average percentage point change in the NI share of GDP is then added to Productivity (CA adjusted) to produce Sustainable Usable Productivity.