

# Productivity and Sustainable Consumption in OECD Countries: 1980-2005

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## ABSTRACT

Productivity growth is the main long-run determinant of living standards. However, there are some distinctions between productivity growth as conventionally measured and the potential of the economy to raise living standards. Specifically, insofar as the share of depreciation in output increases, the rate of productivity growth will exceed the potential growth rate of living standards. The same will be the case if prices for investment goods decline relative to prices for consumption goods. This article adjusts for these factors to develop the concept of “sustainable consumption,” and compares trends in this variable with productivity growth in OECD countries for the 1980-2005 period.

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 Western Europe. The conventional story of U.S. productivity growth in

the post World War II era is that the United States, along with Western Europe and Japan, enjoyed a period of rapid productivity growth from 1947 to 1973. Productivity growth slowed in most countries after 1973, although Western 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.<sup>2</sup>

This article makes a series of adjustments to the conventional measure of productivity to assess the growth in “sustainable consumption.”

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  - 2 In the three years from the second quarter of 2004 through the second quarter of 2007 productivity growth in the United States has again slumped, averaging just 1.2 per cent annually in the non-farm business sector. This would likely translate into growth of 1.0 per cent for the economy as a whole. It remains to be seen whether productivity growth will revert back to its pre-1995 rate or whether this three year period is simply an aberration. The analysis in the paper only goes through 2005 since at the time of writing data were not yet available for most OECD countries for 2006.

To derive sustainable consumption from the standard measure of labour productivity, a first adjustment is made between the growth in gross output per hour of labour input and the growth in net output per hour of labour input.<sup>3</sup> While it is necessary to replace depreciated capital goods to sustain the economy, such replacement investment 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 consumer price index, 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. 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 consumption growth is sustainable. An increase in the current account deficit can allow for a faster rate of consumption 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 productivity growth, but had an increase in its current account deficit equal to five per cent of GDP, it would be able to enjoy an increase in living standards approximately equal to five per cent of its GDP. Of course, this rate of increase is not sustainable since a current account deficit cannot continually increase as a share of GDP.

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 rate of increase in sustainable consumption in the United States appear substantially worse, relative to other wealthy countries, over the period examined. 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 productivity estimates.

More surprisingly, the ability of the United States to increase living standards in the 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 Consumer Price Index (CPI) and the output deflator was also much larger in the United States than in other OECD 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

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<sup>3</sup> This follows an adjustment made in Spant (2003).

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 in other wealthy countries.

After making these four adjustments, the United States actually had a lower sustainable rate of consumption growth in the decade from 1995 to 2005 than the average for other OECD 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 Sustainable Consumption**

This article makes four adjustments to the standard measurement of productivity to derive a measure of consumption that is sustainable through time.

## **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 in the United States grew at almost exactly the same rate, and the share of output devoted to depreciation changed little (Baker, 2007).

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.

## **Output Deflators and Consumer Prices Indices**

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 individuals 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 as productivity.

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.<sup>4</sup> But the largest factor is the difference in coverage. 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 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

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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.

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.<sup>5</sup> In principle, better and/or cheaper investment goods will translate into increased potential consumption, but this will typically involve a time lag. It is only when the gains actually do appear in the form of lower prices for consumption goods and services that the economy has the potential to raise living standards.

### **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 output growth. If the shares of expenditures 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 per cent more than would otherwise be the case.<sup>6</sup> 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 imported materials for labour. This is most obvious in the case of energy, where energy may be substituted for labour, if it 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 labour. Also, if parts and machinery can be replaced at low cost, firms will devote less labour 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 labour productivity growth for a

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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 per cent, but the price of steel fell by 10 per cent 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 per cent is measured against an endpoint that will typically be somewhat larger than starting point. If the economy grew by 10 per cent 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 per cent (5 per cent divided by 90.9 per cent, the ratio of the original year's output to the end year's output.)

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 Consumer Price Index and the output deflator would depend on demand and output elasticities. For simplicity, the calculations in this article assume that the 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.<sup>7</sup>

### 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 the 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 United States 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 consumption 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 sustainable consumption.

7 The impact of an increase in the current account deficit on the Consumer Price Index will depend on the change in the price of domestically produced goods as a result of the competition from lower priced imports, and the import share of consumption, and the change in the import share as a result of lower priced imports being substituted for domestically produced items. This can be written as:

$$1) \Delta CPI \approx \Delta P_d (P_i) * S(D_0) + \Delta P_i * S(I_0) + (\Delta S(I) * \Delta P_i) / 2,$$

where the term  $\Delta P_d (P_i)$  is the change in the prices of domestically produced consumption goods and services due to competition with lower (or higher) priced imports,  $S(D_0)$  is the initial domestically produced share of consumption goods,  $\Delta P_i$  is the change in import prices,  $S(I_0)$  is the initial imported share of consumption goods, and  $\Delta S(I)$  is the change in the import share due to a change in relative import prices. This last term is divided by two, assuming a linear approximation of the price impact of the change in import shares.

In the case of a large country with a relatively small import share, like the United States, the first term is likely to be small, since the price of domestically produced goods will not be very responsive to changes in import prices. Most of the impact of lower import prices will be felt through the second and third terms. Assuming an import elasticity of -2, the roughly 5 percentage point or 50 per cent increase in import shares that the United States has seen over the decade from 1995 to 2005 (from 10 per cent to 15 per cent) would correspond to a 20 per cent decline in import prices. This would then imply that the  $\Delta CPI \approx -0.2 * 0.1$  (the original import share) +  $(0.05(\text{the change in import shares}) * -0.2) / 2 = 0.025$ , or the change in CPI due to the fall in import prices was roughly equal to half of the change in import shares.

As a practical matter, the relationship between the impact of a change in the current account deficit and the change in the CPI will differ substantially across countries, but assuming that on average that the ratio is 2:1 seems a reasonable approximation for purposes of this analysis. The same assumption is applied to changes in the net investment share of output.

**Table 1****Labour Productivity Growth in Selected OECD Countries with Adjustment for Changes in Depreciation, 1980-1995 (average annual rates of change)**

	Gross Labour Productivity (1)	Gross Domestic Product (2)	Net Domestic Product (3)	Difference (4)=(2)-(3)	Net Labour Productivity (5)=(1)-(4)
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. average (unweighted)	1.87	1.99	1.97	0.03	1.85

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

### Productivity Growth in OECD Countries, 1980-1995

In the period from 1980 to 1995 the United States was still mired in its post-1973 productivity slump while most other OECD countries were in a period of catch-up. The first column of Table 1 shows the average annual rate of labour productivity growth in 14 OECD countries including the United States. The table presents the OECD's measure of output per work hour for the economy as a whole. The last row shows the unweighted average annual rate for 13 OECD countries excluding the United States. The United States ranked near the bottom in its rate of gross productivity growth over this period, beating out only Canada, Iceland, and Switzerland. Its 1.37 per cent average annual rate of productivity growth was 0.50 percentage points less than the average for the other 13 countries.

The picture is slightly worse for the United States when a net measure rather than a gross

measure of labour productivity growth is used. The size of the gap between net productivity growth in the other OECD countries and the United States grows to 0.61 percentage points, as shown in column 5 of Table 1.

When inflation is measured with consumer price indices instead of an output deflator, the potential average annual increase in consumption per hour falls to just 0.68 per cent in the United States for the 1980-1995 period (Table 2). This is because of the 0.56 percentage point faster growth in the CPI relative to the GDP deflator. By comparison, the average annual gap between inflation measured with consumer price indices and inflation measured with an output deflator averaged just 0.04 percentage points in the other OECD countries. This makes the gap between the average annual rate of sustainable consumption growth (using national consumer prices indices as deflators) in the other OECD countries and the United States 1.12 percentage point over this period.

**Table 2****Sustainable Consumption Growth in Selected OECD Countries with Adjustment for Differences in Output and Consumer Price Indices, 1980-1995 (average annual rate of change)**

	Net Labour Productivity (1)	GDP Deflator (2)	CPI (3)	Difference (4)=(3)-(2)	Sustainable Consumption (5)=(1)-(4)
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	8.69	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 average (unweighted)	1.85	6.17	6.21	0.04	1.80

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

Table 3 shows the annual rate of sustainable consumption growth, using consumer price indices, adjusted for changes in the current account's share of GDP.<sup>8</sup> The United States experienced a modest increase in the size of its current account deficit over this period, from a surplus of 0.1 per cent of GDP in 1980 to a deficit of 1.5 per cent of GDP in 1995, an average annual change of -0.11 per cent. The adjustment for changes on the current account balance has the effect of slightly lowering the sustainable rate of consumption growth for the United States over this period, reducing it 0.05 percentage points per year (one half of -0.11 percentage points) from an average annual rate of 0.68 per cent to 0.63 per cent.

Since other countries had on average a 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 average annual rate of sustainable consumption adjusted for the current account growth is 0.12 percentage points higher than their actual rate of sustainable consumption growth not adjusted for the current account over this period. This adjustment makes the gap between the average annual rate of sustainable consumption growth adjusted for the current account in the other OECD countries and the United States 1.29 percentage points.

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 13 other OECD countries 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 1.68 percentage points in the United States (-0.11 per

<sup>8</sup> The calculations that the change in the size of the current account deficit measured as a 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 consumer price index and an output deflator.

**Table 3****Sustainable Consumption Growth in Selected OECD Countries: The Impact of Changes in the Current Account Deficit, 1980-1995 (average annual rate of change)**

	Sustainable Consumption (1)	Current Account Share of GDP, 1980 (2)	Current Account Share of GDP, 1995 (3)	Average Annual Change in Current Account Share of GDP (4)	Sustainable Consumption (Current Account adjusted) (5)=(1)-[(4)/2]
Australia	0.56	-2.8	-5.2	-0.16	0.48
Belgium	2.10	-4.1	5.6	0.65	2.43
Canada	0.23	-2.3	-0.8	0.10	0.28
Denmark	2.89	-1.6	0.7	0.15	2.97
Finland	3.17	-2.7	4.1	0.45	3.39
France	2.24	-0.6	1.1	0.11	2.29
Germany	2.37	-1.9	-1.2	0.05	2.40
Iceland	0.02	-2.1	0.7	0.19	0.12
Italy	2.47	-1.7	2.2	0.26	2.60
Netherlands	1.54	-1.0	6.1	0.47	1.78
Sweden	1.51	-3.3	3.4	0.45	1.73
Switzerland	1.83	0.2	6.8	0.44	2.05
United Kingdom	2.49	0.8	-1.2	-0.13	2.42
United States	0.68	0.1	-1.5	-0.11	0.63
Non-US average (unweighted)	1.80	-1.78	1.72	0.23	1.92

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

**Table 4****Sustainable Consumption Growth in Selected OECD Countries: Impact of Changes in Net Investment, 1980-1995 (average annual rate of change)**

	Sustainable Consumption (Current Account adjusted) (1)	Net Invest. Share of GDP, 1980 (2)	Net Invest. Share of GDP, 1995 (3)	Average Annual Change in Net Invest. Share (4)	Sustainable Consumption (Current Account and Net Investment Adjusted) (5)=(1)-[(4)/2]
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 average (unweighted)	1.92	10.94	5.28	-0.38	1.73

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



cent per year) was actually considerably less than the 5.66 percentage point average decline (-0.38 per cent per year).

The fall in the net investment share in both the United States and OECD countries reduced sustainable consumption growth. In the United States, sustainable consumption growth adjusted for changes in net investment now became 0.58 per cent per year, down 0.05 percentage points (-0.11/2) from 0.63 per cent for sustainable consumption not adjusted for net investment growth. The fall was even larger for the other 13 OECD countries, down on average 0.19 percentage points (-0.38/2) from 1.92 per cent per year to 1.73 per cent. 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 0.58 per cent over this period is still 1.15 percentage points below the 1.73 per cent rate average rate for the other OECD countries.

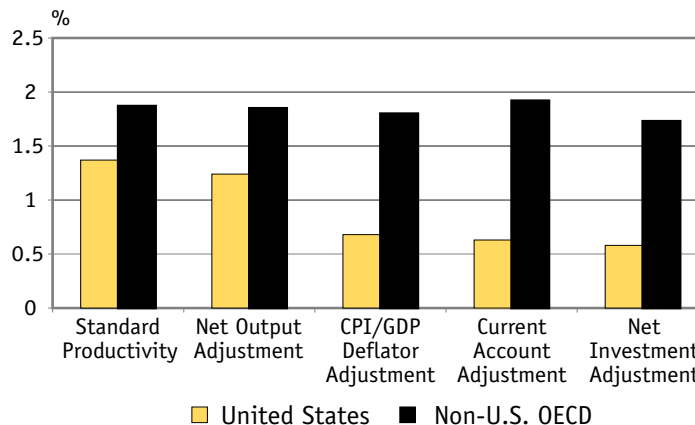
Chart 1 compares productivity and sustainable consumption growth in the United States over 1980-1995 with the average in the other OECD countries.

### Labour Productivity Growth in OECD Countries, 1995-2005

The United States experienced a sharp upturn in its rate of labour productivity growth over the years 1995 to 2005, which was not matched in most other OECD countries (Table 5, column 1). Its 2.35 per cent average annual rate of productivity growth was faster than all but three (Iceland, Finland, and Sweden) of the 14 other OECD countries for which data were (Austria, not included in the 1980-1995 period, is now

**Chart 1**

**Labour Productivity and Sustainable Consumption Growth in the United States and OECD Countries, 1980-1995**  
(average annual rate of change)



Source: Tables 1-4.

included). This growth rate was 0.61 percentage points faster than the average for the 14 other OECD countries.

However, the difference becomes somewhat smaller using a net measure of productivity growth. The gap between the growth of GDP and NDP averaged 0.33 percentage points in the United States over this period, compared to an average of 0.11 percentage points in the other OECD countries. This reduces the gap in the measure of net productivity growth to 0.39 percentage points as shown in column 5 of Table 5.<sup>9</sup>

Table 6 calculates sustainable consumption growth rates using consumer prices indices rather than an output deflator. In the United States there was a 0.47 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 third largest, behind Germany and Austria, among the countries for which data are avail-

<sup>9</sup> It is worth noting that the productivity data for Italy are somewhat distorted for this period by the inclusion of workers in the labor force who previously had been working in gray market activities. Italy's output had previously been adjusted upward for its large underground economy. However, as a result of changes in tax rules and labour market regulation, many workers who had not previously been counted in official statistics were counted for the first time, leading to increases in reported hours with no corresponding increase in output and hence lower productivity growth.

**Table 5****Labour Productivity Growth in Selected OECD Countries, with Adjustment for Changes in Depreciation, 1995-2005 (average annual rates of change)**

	Gross Labour Productivity (1)	GDP (2)	NDP (3)	Difference (4)=(2)-(3)	Net Labour Productivity (5)=(1)-(3)
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	2.7
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 average (unweighted)	1.74	2.57	2.45	0.11	1.63

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

**Table 6****Sustainable Consumption Growth in Selected OECD Countries: Output and Consumer Price Indices, 1995-2005 (average annual rate of change)**

	Net Labour Productivity (1)	GDP Deflator (2)	CPI (3)	Difference (4)=(3)-(2)	Sustainable Consumption (5)=(1)-(4)
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 average (unweighted)	1.63	1.89	1.86	-0.03	1.66

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

**Table 7****Sustainable Consumption Growth in Selected OECD Countries: The Impact of Changes in the Current Account Deficit, 1995-2005 (average annual rate of change)**

	Sustainable Consumption (1)	Current Account Share of GDP, 1995 (2)	Current Account Share of GDP, 2005 (3)	Average Annual Change in Current Account (4)	Sustainable Consumption (Current Account adjusted) (5)=[(1)-[(4)/2]]
Australia	2.18	5.2	5.8	-0.06	2.15
Austria	0.93	-2.6	1.2	0.38	1.12
Belgium	0.73	5.6	2.5	-0.31	0.58
Canada	1.52	-0.8	2.3	0.31	1.67
Denmark	0.94	0.7	3.6	0.29	1.08
Finland	2.74	4.1	4.9	0.08	2.78
France	1.56	1.1	-1.6	-0.27	1.43
Germany	0.61	-1.2	4.6	0.58	0.90
Iceland	3.76	0.7	-16.3	-1.70	2.91
Italy	0.86	2.2	-1.6	-0.38	0.67
Netherlands	1.03	6.1	6.3	0.02	1.04
Sweden	2.64	3.4	7.0	0.36	2.82
Switzerland	0.61	6.8	16.8	1.00	1.11
United Kingdom	3.09	-1.2	-2.4	-0.12	3.03
Non-US average (unweighted)	1.66	1.4	1.5	0.01	1.66
United States	1.55	-1.5	-6.4	-0.49	1.30

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

able. On average, the other countries had virtually no gap (0.03 percentage points) between these two measures of inflation, with the Consumer Price Index in eight countries actually showing a lower measured rate of inflation than the GDP deflator.<sup>10</sup>

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 United States than in other OECD countries, the gap in sustainable consumption growth rates is reversed when the CPI is used as a basis for measuring consumption growth. The average annual rate of sustainable consumption growth for the United States by this measure is just 1.55 per cent,

slightly lower than the 1.66 per cent average growth rate for the other OECD countries.

Table 7 shows a measure of sustainable consumption growth that adjusts for the changes in the current account deficit over the period. As noted already, this can be viewed as a sustainable rate of consumption 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 unweighted average of the current account deficits in the other OECD countries

10 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. Inclusion of owner occupied housing 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 than the index excluding owner occupied housing.

**Table 8****Sustainable Consumption Growth in Selected OECD Countries: The Impact of Changes in Net Investment, 1995-2005 (average annual rate of change)**

	Sustainable Consumption (Current Account adjusted) (1)	Net Invest. Share of GDP, 1995 (2)	Net Invest. Share of GDP, 2005 (3)	Average Annual Change In Net Invest. Share (4)	Sustainable Consumption (Current Account Net Investment Adjusted) (5)=(1)+[(4)/2]
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 average (unweighted)	1.66	5.58	6.68	0.11	1.72

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

was essentially unchanged over this period. The effect of this adjustment is to depress the rate of sustainable consumption growth in the United States below the average for other OECD countries. The rate of sustainable consumption growth in the United States over this period averaged just 1.30 per cent. By contrast, the average rate of sustainable consumption growth adjusted for the current account for the other countries was 1.66 per cent, 0.36 percentage points faster.

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 more accurate rate of sustainable consumption 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 very slight decline in the net investment share of GDP over this decade. By contrast, the net investment shares for the other 14 OECD countries rose on average rose by 0.11 percentage point per year. As a result, the adjustment for the change in net investment shares of GDP had virtually no effect on sustainable consumption in the United States, but reduced it by 0.06 points in other OECD countries. The sustainable rate of consumption growth for the United States over this period, after this net investment adjustment, becomes more than 0.42 percentage points below the 1.72 per cent average rate for the other countries.

Chart 2 compares the productivity and sustainable consumption growth in the United States over this period with the average in the other 14 OECD countries. As can be seen, while the United States had an average annual rate of pro-

ductivity growth that was 0.61 percentage points higher than the other OECD countries using the standard measure of economy-wide productivity, its growth actually trailed the average for other OECD countries by 0.42 percentage points after making the adjustments discussed above.

## Conclusion

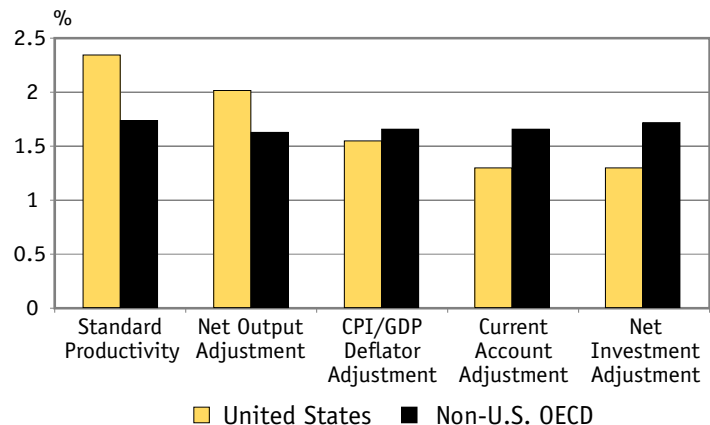
This article has made a series of adjustments to conventional labour productivity growth estimates to better measure the extent to which the labour productivity growth in the United States and other OECD countries can be translated into sustainable increases in living standards. The first two adjustments 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 consumer price indices as deflators 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 in 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 rate of sustainable consumption growth of the United States looks substantially worse relative to other OECD countries than what the conventional productivity 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

**Chart 2**

### Labour Productivity and Sustainable Consumption Growth in the United States and OECD Countries, 1995-2005 (average annual rate of change)



Source: Tables 5-8.

in productivity growth to one of the laggards, with an average annual rate of sustainable consumption growth that is a half percentage point below the average of the 14 other OECD countries.

Clearly these measures can be better refined to more accurately measure both “productivity” and sustainable consumption 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 article represent a step toward making such calculations.

## References

- Baker, Dean (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](http://www.cepr.net/documents/publications/growth_failure_2007_04.pdf)
- Spant, Roland (2003) “Why Net Domestic Product Should Replace Gross Domestic Product as a Measure of Economic Growth,” *International Productivity Monitor*, Number 7, Fall, pp. 39-43.

## Appendix 1: Sources for Productivity Accounts Data

All data are from OECD Statistics (<http://stats.oecd.org/wbos/default.aspx>) except productivity and current account data. Productivity data are from OECD Productivity (<http://www.oecd.org/dataoecd/28/18/36396770.xls>) and Current Account Balance (per cent 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 Price Indices (CPI) were computed from all items, base year 2000. For the EU countries, the harmonized CPI was used, otherwise national CPIs were used.

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 sustainable consumption.

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

Finally, half the average percentage point change in the NI share of GDP is then added to sustainable consumption (CA adjusted) to produce sustainable consumption (CA adjusted and net investment adjusted).