

Why Net Domestic Product Should Replace Gross Domestic Product as a Measure of Economic Growth

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Given the enormous amount of work that goes into producing statistics on economic growth, it is understandable that those who produce them are prone to defend their quality and to argue that alternative measures only marginally alter the overall picture. That may be true in many cases. But we must keep in mind that statistics are often used to compare countries or periods of time, e.g. the acceleration or deceleration of economic growth between two dates. With that type of comparison, different measurement techniques can have a decisive influence on results and conclusions, and may even affect policy recommendations.

My principal criticism of the growth measures that currently predominate has to do with the almost total fixation on Gross Domestic Product (GDP). In my view, there should be much less emphasis on GDP as the main yardstick of economic growth, and a much greater emphasis on Net Domestic Product (NDP).

The most basic measure of economic output is of course GDP, which includes all expenditures for investment, regardless of whether they are used to add to the capital stock, or simply to replace worn out or obsolete equipment and software. The portion of investment spending that is used to replace worn out and obsolete

equipment — depreciation — while essential for maintaining the level of output, does not increase the economy's capacities in any way. If GDP were to grow simply as a result of the fact that more money was being spent to maintain the capital stock because of increased depreciation, it would not mean that anyone had been made better off. There would be no more resources available for consumption. Nor would there be any more output available in future periods, because the size of the capital stock would not have increased.

In such a scenario, since equipment is wearing out more quickly, it is necessary to run harder just to stay in the same place. The economy must devote more resources every year to replace worn out and obsolete equipment, just to keep the capital stock intact. The additional resources used to replace this equipment are recorded in the national accounts, but it does not imply that anyone is better off.

Take, for example, the December 2002 issue of the OECD *Economic Outlook*. A simple check with my word processor found 531 references to GDP. By comparison, employment was mentioned 218 times, and exports 293 times.

The measure preferred by me and many other economists as the best measure of economic

growth is Net National Product (NNP) and as a second best NDP. The difference between NDP and NNP is insignificant in a country with little foreign ownership but large in a country with high levels of foreign investment such as Ireland. In the OECD *Economic Outlook* there was not a single reference either to NNP or NDP.

The unrecognized importance of NDP does not of course mean that GDP may not still be a better yardstick for certain purposes. For example, GDP may be superior as a measure of overall production as depreciation is part of value added. In addition, aggregate demand is driven by gross investment, not net investment. Thus, for forecasting economic activity, including trends in output and employment, GDP may be the more relevant concept.

NDP as a Measure of Economic Welfare

Why GDP, and not NNP or NDP? The usual answer is that to correctly measure capital depreciation is said to be too problematic. But are we really interested only in GDP? Should economists, and especially economists at the OECD, not try instead to overcome the technical problems and place a greater emphasis on NNP and NDP?

NDP is calculated by deducting capital depreciation from GDP. In recent years, NDP has become a more relevant measure for tracking the variables that are usually associated with “the new economy,” such as potential output and prospects for non-inflationary growth. For the same reason, NDP is a more appropriate measure of general welfare than GDP. NNP is an even better measure of welfare because it captures the level of net income created by and available to the individuals living in a country.¹

One of my duties as chief economist of a Swedish labour federation is to estimate the potential for increases in real wages on the basis

of macro data for my own country and for the world at large. Most of my colleagues in unions and employer organizations around the world face the same problem. Among the most important resources for this task is, of course, information about output and productivity trends. But in today’s new economy, that is not enough. Due to changes in capital intensity and the need to write off capital stock, GDP has become less useful. The most appropriate measure for calculating the potential for increases of real wages and real profits is NNP or NDP, not GDP.

The pioneer of growth accounting, Edward Denison, used net product or income measures in his many studies of the sources of economic growth (e.g. Denison, 1985). Charles Hulten (1992) has demonstrated that net measures are appropriate for welfare-related approaches while gross measures are appropriate for production analysis. And recently Steven Landefeld and Barbara Fraumeni, senior officials at the U.S. Department of Commerce’s Bureau of Economic Analysis (BEA), are among those who have highlighted the issue of greater depreciation and role of NDP as a measure of sustainable growth. They write:

An interesting and related issue is the impact of the increasingly short-lived equipment and software on real GDP growth versus net domestic product (NDP) growth. NDP is often used as a measure of sustainable growth, in the sense that it subtracts depreciation from GDP to indicate the amount of current product/income that should be set aside for the using up of capital stock in production during the current period (Landefeld and Fraumeni, 2001:31).

In recent years, growing investment in, and the increasingly efficient use of, information and communications technologies (ICT) has made a major contribution to higher potential growth. The increasing significance of new technologies, along with the rapid rate of depreciation for

both hardware and software because of short service lives, should be reflected in measures of economic growth.

Empirical Differences

ICT investment has come to represent a growing portion of total investment. Consequently, capital depreciation has grown much faster than GDP. For example, in the United States there has been a large increase in ICT investment as a proportion of total investment, and depreciation as a share of GDP, leading to a widening gap between economic growth rates as measured by GDP and NDP. The share of ICT investment in total non-residential investment in the United States in 2000 was 30 per cent, compared to 27 per cent in Finland and around 15 per cent in France, Japan, the United Kingdom, Germany and Italy (OECD, 2002). ICT accounts for an increasing share of investment in all sectors. During the 1990s investment growth has increasingly been driven by ICT investment, but to different degrees in different countries.

This growing importance of ICT is a result of many factors, including the rapid price declines for ICT and growing demand for ICT applications. This has created challenges for national accountants. One example is provided by the altered definition of investment that the U.S. BEA adopted in 1999. The previous practice had been to treat purchases of software by both the private and public sectors as intermediate inputs. But starting in 1999 such purchases were classified as investments. This had the effect of increasing total nominal investment in current dollars in 1999 by an estimated 95 billion dollars in the private sector and by 20 billion dollars in the public sector. Taken together, it increased recorded nominal and real GDP by around 1.5 per cent. But because of the corresponding increase in depreciation, this change increased

NDP only marginally. As a result the gap between GDP and NDP is widening, and the value of GDP as a measure of general welfare is declining.

The U.S. BEA does produce an estimate of NDP. During the 1960s and 1970s, the difference between the average annual growth rates of GDP and NDP in the United States was only 0.1 percentage points according to BEA estimates (Baker, 2001). This marginal difference was explained by the fact that the service lives for capital stock were relatively long at that time, and stable. During the 1980s and continuing into the mid-1990s, the difference between GDP and NDP growth rates increased to an average of 0.2 percentage points per year. In the second half of the 1990s the difference between the two measures of economic growth increased significantly to around half a percentage point per year.

Estimates of GDP and NDP for OECD countries are available from the national accounts data maintained by the OECD. Unfortunately, estimates of capital depreciation are not available for a number of OECD countries, especially for earlier years. For the period 1995-2001, estimates for both real GDP and real NDP growth are available for 16 countries, including all G-7 countries except Japan (Table 1).

In the post-1995 period, a period when the new economy has flourished, NDP growth has been lower than GDP growth in 14 of the 16 countries for which estimates are available (Finland and the United Kingdom were the exceptions), with an annual (unweighted) average gap of 0.15 percentage points. This reflected the rise in the average (unweighted) depreciation share of real GDP by 0.75 points from 13.86 per cent in 1995 to 14.60 per cent in 2001. The difference in growth rates was especially large in Iceland (0.52 points) and the United States (0.48 points).

Finland, although a leader in the ICT field, actually experienced considerably stronger NDP

Table 1
GDP Growth versus NDP Growth and Changes in the Importance
of Depreciation in 16 OECD Countries

	Compound Average		Difference: GDP growth- NDP growth	Real Depreciation		Difference: 2001- 1995
	Annual Growth Rates for 1995-2001 Real GDP	Real NDP		as a percentage of Real GDP	1995 2001	
Australia	3.87	3.59	0.27	15.63	16.95	1.33
Austria	2.40	2.26	0.15	14.05	14.78	0.73
Belgium	2.41	2.22	0.19	14.22	15.17	0.95
Canada	3.56	3.41	0.15	13.16	13.90	0.74
Denmark	2.48	2.05	0.43	15.98	18.07	2.09
Finland	4.11	4.67	-0.56	18.17	15.48	-2.69
France	2.48*	2.42*	0.06	13.74	13.98**	0.24
Germany	1.60	1.38	0.21	14.79	15.87	1.07
Greece	3.54	3.50	0.04	9.07	9.28	0.22
Iceland	4.60	4.09	0.52	14.69	17.18	2.49
Italy	1.92	1.80	0.12	13.10	13.69	0.59
Netherlands	3.29	3.20	0.10	15.12	15.60	0.48
Spain	3.64	3.52	0.12	13.00	13.61	0.60
Sweden	2.90	2.68	0.22	13.34	14.44	1.10
United Kingdom	2.76	2.85	-0.09	12.09	11.65	-0.45
United States	3.42	2.93	0.48	11.58	14.03	2.45
Unweighted 16-country average	3.06	2.91	0.15	13.86	14.60	0.75

* 1995-2000 for France.

** 2000 for France.

Note: A complete set of tables providing the underlying data on GDP, depreciation, NDP and the share of depreciation in GDP, expressed in both nominal and real prices, is available as an appendix to this paper. It is posted at www.csls.ca under *International Productivity Monitor*.

Source: OECD National Accounts, available at http://www.oecd.org/document/28/0,2340,en_2825_495684_2750044_1_1_1_1,00.html.

growth than GDP growth. However, these numbers should be treated with great caution as it seems unlikely that depreciation as a percentage of GDP fell strongly in the 1990s, as the official data indicate. Given the dominant role of GDP and low interest in NDP, it is very possible that the current estimates of depreciation for certain countries are not based on up-to-date estimates of the service lives of capital assets and hence may not be capturing true changes in depreciation patterns. Therefore, we must be very careful in interpreting OECD estimates for NDP. The Finnish and UK cases are warning examples. Is it really possible that the relative importance of depreciation can be falling in economies undergoing enormous structural changes and where the role of long-term

infrastructure investments is reduced and the growth in investment shifting to ICT assets?

In the United States, it has become fairly common for economists to monitor the NDP trend as an indicator of the economy's long term growth potential. This has been made possible by the availability of NDP figures from as far back as the 1930s.

The rapid development during recent years of software and equipment with short life cycles (e.g. computers and accessories), and the increasing share of the total capital stock which they represent, suggests that depreciation assumptions and rules should be continually reviewed and updated in order to provide a more solid basis for measuring NDP, among other things.

Assuming that it is possible to assess capital stock within various sectors of the economy on a continual basis, while at the same time making necessary adjustments to write off periods, NDP could become a useful measure of the moderately long term potential for output growth.

Conclusion

GDP was an acceptable measure of economic growth as long as capital depreciation as a share of GDP was fairly constant over time. Under this condition, GDP and NDP developed in tandem with each other. But under current conditions where the composition of investment is shifting toward shorter-lived assets, the implications of placing almost all emphasis on GDP and neglecting NDP is to overestimate:

- the real rate of economic growth;
- productivity increases;
- the potential for increasing wages without inflationary risks to the labour market;
- gross business profits, thus increasing the risk of stock market bubbles; and
- differences in growth rates between countries (e.g. between the United States and Europe).

The OECD should play a leading role in producing reliable estimates of depreciation and NDP on a regular basis for all OECD countries and incorporating these estimates into projections in the *Economic Outlook*. My recommendation to the OECD is to start with estimates of income per capita based on Purchasing Power Parities (PPP). At present per capita volume

indices based on PPPs reflect only differences in the gross volume of goods and services produced. No consideration is given to depreciation, which has implications for living standards comparisons.

Notes

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- 1 If for example a large part of the capital stock is owned by foreigners, both GDP and NDP can dramatically overstate the living standard of the individuals living in a country. Extreme cases here are Ireland and Luxembourg, two European tax heavens for American and European citizens and companies.

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