WORKING PAPER SERIES

Does the United States Invest Too Little?

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Working Paper 1997-020A
http://research.stlouisfed.org/wp/1997/97-020.pdf

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Abstract

The standard measures of nominal capital formation show the United States investing a proportion of GDP much lower than those of other developed countries throughout the last 25 years and falling further behind over time. In contrast, measures we have calculated in real terms across countries and over time indicate that U.S. investment ratios have been rising over time and have been coming closer and closer to those of the other countries.

A broader measure of capital formation, more consonant with economic concepts, shows the United States to have been close to the other countries since 1970 and to have been investing an above average share of total output in the most recent period 1990-1994. Real capital formation per capita and per worker, even conventionally defined, have been consistently between 15 and 25 per cent higher than in the other countries and broadly defined real capital formation per capita and per worker have been 30 to 60 percent higher.

Keywords: capital formation, investment, international comparison, PPPs

JEL Classification: C8, E21, E22

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1. Introduction

In the early 1970s, according to the standard OECD national accounts data, capital formation in the United States was about 19 per cent of its GDP, while in the other main developed countries capital formation was, on average, a quarter of their GDPs, an investment ratio a third higher. In 1990-1994, the ratios were closer, but the other developed countries were still investing at a rate about 23 per cent greater than that of the United States. That apparently low rate of U.S. capital formation, and its presumed effect on U.S. economic growth, were commented on, with alarm, in some of the Economic Reports of the President and in many other projections of U.S. economic prospects. During the first half of the period since 1970 the United States did grow more slowly than other developed countries in real income per capita, but in the second half, despite the higher investment rates in other countries, the United States retained its position of having a per capita income of more than a third above the OECD average and more than a half above the average for OECD-Europe.

In this paper we question the relevance of the usual measures of capital formation and, therefore the implications that have been drawn from them regarding the prospects for future U.S. economic growth and growth relative to other developed countries. What we refer to here as "conventional" measures of investment, those imbedded in national income and product accounts, treat as investment, or capital formation, only physical capital investment, consisting of business and non-military government construction and purchases of plant and equipment, and purchases of owner-occupied housing. That has been the case despite a long tradition of theoretical arguments for broader concepts, going back at least over 100 years to Alfred Marshall's Principles of Economics (1890), and including the development of human capital theory in the work of Friedman and Kuznets (1945), Becker (1964), Mincer (1974),

Schultz (1961), and many others. The use of the conventional measures also ignores the alternative measures, including various elements of human and other intangible capital that have been produced for the United States by Kendrick (1976), Eisner (1989), and others. The most radical of these measures, by Jorgenson and Fraumeni (1989), suggests that the conventionally defined capital formation we give such attention to is almost trivial, accounting for only about 5 per cent of a broadly conceived measure.

We have concentrated on the comparison of ratios of capital formation to GDP rather than saving to GDP. If a country is receiving large inflows of capital from abroad or investing heavily in foreign countries, the two ratios could be quite different. Since the U.S. has been running a substantial current account deficit in the balance of payments for many years, the saving ratio must be lower than the capital formation ratio, although it may not be lower relative to the average of other countries. The conceptual changes in the scope of capital formation used in this paper imply corresponding changes in measures of saving, because items conventionally classified as consumption are removed from that category. These include household and government current expenditures on education, government and business expenditures on R&D, household expenditures on durable equipment, and government expenditures on military capital formation. Their removal from the consumption category would raise levels of saving.

The conventional comparisons of capital formation across countries are not only narrow in scope, but also ignore the implications of large differences in prices of capital goods, and in prices of capital goods relative to prices of goods in general, from one country to another. The effect of these differences is that a given nominal amount of capital formation in one country can yield considerably more real physical or human capital and more relative to real GDP than the same nominal amount in another country. In a similar way, comparisons over time of nominal investment ratios in individual countries ignore trends in relative prices of capital goods and output in general. A stable ratio of nominal capital formation to nominal output could represent a rising or falling trend in the contribution of capital formation to growth. It would be a rising trend if prices of capital goods were falling relative to prices of goods in general; it would be a falling trend if prices of capital goods were rising relatively.

Over the last decade there has been a revival of interest in research that focuses on understanding and explaining the sources of long-term economic growth. Some of the new approaches that seek to

overcome the limitations of the traditional neoclassical growth model emphasize redefining capital as a broader measure that includes not only physical capital, but also other types of reproducible intangible capital, such as human capital and the state of knowledge. Empirical studies employing the broader concepts of capital accumulation to explain economic growth have been carried out by Barro (1991), Mankiw, Romer, and Weil (1992), and Nonneman and Vannhoudt (1996). They indicate that adding nonconventional elements to the measures of capital formation substantially improves the ability to explain rates of growth. These studies necessarily rely on crude proxies for most of the additions to conventional capital formation because they cover large numbers of countries. We hope we can do better for the developed countries studied here.

Following a different line, using data for successive 5-year periods rather than for the whole period since 1960 or 1970, Blomstrom, Lipsey, and Zejan (1996) challenged the assumed exogeneity of conventional capital formation. They found that, to a greater degree than other forms of capital formation, conventional capital formation was more a consequence of previous economic growth than a cause of subsequent growth.

2. The Conventional Comparison of Capital Formation

The conventional story of U.S. investment in comparison with that of other developed countries is shown in Table 1.

Table 1

Nominal Gross Fixed Capital Formation as a Per Cent of Nominal GDP:

U.S. Relative to 12 Other OECD Countries[1]

	Per Cent
1970-1974	75.3
1975-1979	81.6
1980-1984	90.6
1985-1990	87.6
1991-1994	83.2

Source: Appendix B, Table B-1

The United States has persistently invested less of its GDP, in nominal terms, than the average of the other 12 OECD countries we examine here. From the early 1970s to the early 1980s the United States drew closer to the other countries but the ratio then declined relative to the others through the early 1990s.

The changes in the relative investment ratios were not primarily the result of any major shift toward higher investment in the United States. Average nominal investment ratios in the other 12 countries fell from 25 per cent in 1970-1974 to 20 per cent in 1990-1994, a decline of 20 per cent while the U.S. ratio stayed around 19 per cent until it dropped in the latest period to about 16 per cent. At the end of the period, the United States ranked eighth among the 13 countries covered here, below Belgium, Canada, France, Germany, Japan, Netherlands, and Norway. Thus, in terms of the conventional measure of "investment effort" or the sacrifice of current consumption for future growth, the United States appears to have remained somewhat of a spendthrift relative to other developed countries, more of a grasshopper than an ant.

3. The Price of Capital Goods and Real Capital Formation

The ratio of capital formation, however defined, to total output reflects both the country's willingness to sacrifice present consumption for growth and future consumption and the willingness of other countries to invest their capital there. That ratio does not indicate how much capital is being

[1] Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, and the U.K.. The list was determined by the availability of data.

acquired or how much relative to output, because it does not take account of the price of capital goods, relative to the price of other goods and services. That relative price varies over time in any one country, and it varies considerably across countries. In a single country over time, if the price of capital goods is falling relative to other prices, a constant nominal ratio of capital formation to total output would mean a rising real capital formation ratio, possibly producing accelerating growth or offsetting decreasing returns to capital. Similarly, if country A and country B have the same total output and the same ratio of capital formation to total output, but country A has a price of capital goods relative to total output half as high as country B, country A should enjoy twice as great an impact from its capital formation. Whatever influence capital formation has on future growth should be correspondingly greater.

We estimate real capital formation and real capital formation ratios across countries here by making use of estimates of purchasing power parities for capital goods and for output in general from the United Nations' International Comparison Program (ICP) and derivatives from that program calculated for intervening years by the OECD and by Summers and Heston (1991).[2] The purchasing power parities, in combination with market exchange rates, give us prices for capital goods and GDP as a whole.

Real capital formation ratios in the US during the period 1970-1994 were affected by changes over time in the relation of capital formation prices to prices in general. The price of capital formation in the US rose about 7 per cent relative to that of GDP from 1970 through 1981. Then it began to fall in relative terms, until by 1994 it had reached 20 per cent below the 1970 level (See Appendix C, Figure 1). This trend in relative prices implies that after 1981 the capital formation ratio in constant 1970 prices rose relative to that in current prices. The real capital formation ratios for the US calculated using 1970 prices are compared with the ones in current prices in Table 2.

[2] The program and its methods are described, for the earlier years, in Kravis, Kenessey, Heston, and Summers (1975) and Kravis, Heston and Summers (1978) and (1982). For a description of later developments see Kravis and Lipsey (1991).

Table 2

Ratios of Conventional Capital Formation to GDP for the US

	Current prices	1970 prices
1970-1974	18.8	18.6
1975-1979	19.3	18.5
1980-1984	19.3	18.4
1985-1989	18.6	19.1
1990-1994	16.3	19.4

Source: Appendix B, Table B-1

The most striking difference between trends of capital formation ratios in nominal terms and trends in real terms is that the large decline in the nominal ratios between 1980-84 and 1985-89 and the even larger one between 1985-89 and 1990-94 disappear completely when capital formation is measured in constant prices. The US capital formation ratio in real terms shows increases in both periods, adding up to about a five per cent increase in the last decade.

We can compare capital formation ratios in the US with capital formation ratios in other countries by using price level measures based on world prices, so that if two countries had the same level of real GDP, measured at world prices, and the same real ratios of capital formation to GDP, they would have the same real capital formation, that is, the same amounts of additions to their capital stocks in physical terms. Investment goods, conventionally defined, were generally cheaper in the United States than in other countries, as might be expected from the fact that the United States has had a comparative advantage in trade in capital equipment. Therefore, the United States gets more real capital formation per unit of consumption sacrificed than do other developed countries.

Conventional capital goods were cheaper in the US than in the other 12 OECD countries in every period, but the differential has varied over time. The price of capital goods in the other 12 countries has been falling relative to that of GDP throughout the entire period 1970-1994, but not as much as in the US (See Appendix C, Figure 2). The differential between relative prices in the US and relative prices in the other 12 countries has been rising steadily since the beginning of the 1980s. The price of capital goods relative to that for all goods and services has fallen in the US by more than 10 per cent as compared with

relative prices in the other countries, mainly because of the rapid fall in relative prices in the US after 1981.

We calculate real capital formation ratios comparable over time and across countries for the other 12 OECD countries by using constant world prices for capital formation and GDP. The real capital formation ratios for the 12 OECD countries implied by the use of PPPs and constant world prices are compared with the ones in current own-country prices in Table 3.

Table 3

Ratios of Conventional Capital Formation to GDP for 12 OECD countries other than the US

	Current national prices	PPPs and 1970 world prices
1970-1974	25.0	22.7
1975-1979	23.8	22.0
1980-1984	21.3	20.1
1985-1989	21.3	20.6
1990-1994	19.7	20.1

Source: Appendix B, Table B-1

The real capital formation ratios in the other 12 countries have been lower than the nominal capital formation ratios in every period, except for 1990-1994. The decline in real capital formation ratios between 1970-74 and 1975-79 and between 1985-89 and 1990-94 has been much less than the nominal ratios suggest. Since the beginning of the 1980s we do not see much change in the average real capital formation ratios for these countries.

The relation of the United States to the other 12 countries in terms of the real shares of conventional capital formation in GDP, measured using constant world prices, is quite different from that in nominal terms, measured using current own-country prices, as can be seen in Table 4.

Table 4

Real Ratios (Adjusted for Purchasing Power Parities) of Conventional Capital Formation to GDP: US Relative to 12 Other Developed Countries

	Per Cent
1970-1974	82.0
1975-1979	84.3
1980-1984	91.9
1985-1989	92.9
1990-1994	97.5

Source: Appendix B, Table B-1

These figures tell a very different story from that of Table 1. US investment ratios in real terms have been closer to those of the other countries, have been moving toward the average, and, by 1990-1994, were only three per cent below the average of the 12 other countries. The US ratios were even above the average of the others in 1993 and 1994. In real terms, in 1994 the United States ranked third among the 13 countries in the ratio of conventional capital formation to output, below only Canada and Japan.

4. The Measure of Capital Formation

4.1. Gross vs. Net Capital Formation

The capital stock that enters production functions is the net capital stock and additions to the stock are measured by net, rather than gross capital formation. Despite the theoretical advantages of the use of net capital formation, much empirical research, especially that involving comparisons among many countries, has concentrated on gross capital formation, a tradition that goes back to Kuznets. We follow that tradition, confining our attention to gross capital formation. There are several reasons for that choice. One is skepticism regarding available measures of capital consumption, and particularly their comparability among countries (Blades and Sturm, 1982). For example, Hayashi (1986) pointed out that Japanese depreciation had been calculated on the basis of historical cost and that the adjustment to a replacement cost basis amounted to as much as 30 per cent of reported private saving in some years.

Another reason for the use of gross measures is the belief that the introduction of new capital equipment brings new technology into the production process, whether or not the new equipment is nominally a replacement for old equipment embodying past technology. If technology, rather than the "volume", in some sense, of capital equipment, is what drives economic growth, it is the gross rather than the net capital formation that is relevant for explaining growth. A country in which gross capital formation is equal to calculated depreciation, and therefore resulted in no net capital formation, would nevertheless reap economic growth from the substitution of new technology for old technology.

4.2. Broadening the Definition of Capital Formation

The conventional measures of capital formation have remained essentially unchanged since most countries began publishing national accounts. Many expenditures that fit the economic definition of capital expenditures, in that they yield income over a period beyond the current one, are excluded, despite the theoretical reasons for including them. One reason for limiting the measurement is the lack of data on some types of investment, especially for international comparisons. Most of the empirical research on broadening the definition of capital formation has been done only for the United States or, sometimes for a few other countries. That fact limits our country coverage and, in some cases, forces us to depend on rough approximations to the measures we would like to use, even for the 13 countries we have covered.

Most of the empirical studies of economic growth that have included non-conventional elements of capital formation have concentrated on education , as an aspect of human capital investment, and research and development, as an aspect of intangible, non-human capital investment. We have included both of these here, as best we could, and added two others, capital formation in the form of consumer durables, of which motor vehicles are the largest part, and military capital formation, which meets the criterion of usefulness beyond the current period. Ideally, if the determinants of economic growth are the use to be made of these data, the choice among investment concepts should be made empirically.

A. Consumer Durables

The treatment of consumer durables in the conventional national accounts divides expenditures not by the nature of the goods acquired or by the nature of their use, but by the institutional characteristics of the buyers, business or household. The arbitrary nature of this division is avoided for housing by the treatment of house purchases as capital formation and the inclusion of imputed income and output from home ownership. We extend the same treatment to consumer durables, a procedure for which we have the strong endorsement of Alfred Marshall over 100 years ago.[3] These goods produce services over a long period of time and the services are, in many cases, very similar to those yielded by the durables bought by business. Cars, the largest item in consumer durables, give transportation service whether they are owned by businesses or by households. Some of those owned by businesses are leased to households for their own use. Refrigerators, freezers, or laundry machines often provide services to households even if they are owned by businesses. In fact, the distinction between consumer and producer durables in the national accounts rests on ownership rather than on their function. The effort to allocate sales of some durables, especially motor vehicles, between households and businesses has been a difficult and frustrating chore for the BEA for many years.

To treat purchases of consumer durables as capital formation in the same way as purchases of owner-occupied housing, it is necessary to make two adjustments. One is to add to conventional gross fixed capital formation household expenditures on consumer durables (treated as consumption in both the SNA and the U.S. national income accounts). The second is to add to consumption and output a measure of the current services yielded by consumer durables.

The comparison between the shares in GDP of nominal capital formation in consumer durables in the U.S. and in the other 12 countries is described in Table 6.

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[3] Alfred Marshall (1890) wrote, in discussing a narrow concept of investment, "... it compels us to regard as capital the yachts, but not the carriage, belonging to a yacht builder. If therefore he had been hiring a carriage by the year, and instead of continuing to do so, sold a yacht to a carriage builder who had been hiring it, and bought a carriage for his own use, the result would be diminished by a yacht and a carriage. ... though nothing had been destroyed, and though there remained the same products of saving ... productive of as great benefits to the individuals concerned and to the community as before...".

Table 6

Share in Nominal GDP[4] of Nominal Capital Formation in Consumer Durables

	Per cent	
	U.S.	12 Other Countries
1970-1974	6.3	5.6
1975-1979	6.4	6.0
1980-1984	5.5	5.4
1985-1989	6.5	5.9
1990-1994	6.0	5.4

Source: Appendix B, Table B-2

The share in GDP of investment in consumer durables has been higher in the U.S. than in the other 12 countries in every period. The U.S. has invested on average 6.1% of its total income in consumer durables, while the other 12 OECD countries have invested on average 5.6%. The country with a particularly low investment in consumer durables was Japan with an average of 3.6% of total income invested in durables, while Belgium was the leader (7.9%), followed by Canada (7.6%) and the United States (6.1%). During the 1970s the real stock of consumer durables per capita in the United States was about four times as large as in Japan. Within consumer durables, the main differences between the United States and other countries were in spending for motor vehicles. Over the period 1970-94 consumers in the United States allocated on average half of all durables goods expenditures for purchases of personal transport equipment. Similar patterns of allocation of consumer durables expenditures are observed in the United Kingdom, where 48% of all durables spending was on motor vehicles, Finland (46%), and Denmark (45%). The share of motor vehicles spending in all durables goods expenditures was much lower in Belgium (29%), Japan (32% in 1975), Canada (35%) and Italy (35%).

B. Education

Many forms of human capital formation would, ideally, be included in a broad measure. However, for practical reasons of data availability, empirical measures have been confined to education in

[4] Here GDP is adjusted to include the estimated value of services yielded by consumer durables.

studies dealing with comparisons among countries. Some studies of economic growth have used data on enrollments at various schooling levels or measures of educational attainment, derived from Census data or estimated from past enrollment data. Others use expenditures on education, as we do.

Expenditures on education, whether by governments, employers, or households, are expected to yield returns over long periods of time. Some of the returns are in the form of higher earnings in the labor market. We do not confine the investment concept to those entering the labor force; there is plenty of evidence that returns to education are important in the non-market economy as well. Many of these have been studied empirically, including effects on the educational attainment of children and their educational performance. Education also affects individual behavior with respect to smoking and other health-related decisions. It should be added however, that some have argued that both these health decisions and education decisions are reflections of differences among individuals in time horizons and time preferences.

There are two large elements of human capital accumulation that we are missing. One is on-the-job training, particularly if it is "general" training, in Becker's sense (Becker, 1964), that is paid for by the worker in the form of temporarily low wages. The other is the earnings foregone by students in the course of their education. In both cases, estimates have been made for individual countries but not, by the same methods, for any substantial group of countries. It is clear from individual country estimates that the missing portions are large compared with those we include.[5]

Education is what is described in the International Comparison Program (ICP) as a "comparison-resistant service." Deflators (purchasing power parities) are provided for use in calculating real consumption, but it is difficult to compare either the quantity of educational output, that is, learning, or even the quantities of inputs, since the qualifications of teachers at given levels of school may differ greatly among countries. International test comparisons may provide some clue to quality of schooling but these so far cover a very narrow slice of what schools are supposed to be teaching.

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[5] Mincer (1989) presents estimates of the annual costs of training in the United States for 1976 and 1982 which suggest that job training costs in the United States amount to 80-90% of public and private expenditures on education. Kendrick (1976) estimates that for the United States in 1969 total gross investment on education and training was $192.3 bln, of which $92.3 bln were earnings foregone by students.

The comparison between the shares in GDP of nominal expenditures on education in the U.S. and in the other 12 countries is described in Table 7.

Table 7

Share in Nominal GDP of Nominal Expenditures on Education

	Per cent	
	U.S.	12 Other Countries
1970-1974	7.1	5.1
1975-1979	6.7	5.6
1980-1984	6.2	5.6
1985-1989	6.0	5.4
1990-1994	6.6	5.6

Source: Appendix B, Table B-3

Over the period that we cover the U.S. has spent on average 6.5% of its total income on education, while the other 12 countries have spent on average 5.5%. As was the case for consumer durables, the gap between the United States and the other countries was largest in 1970-1974 and smallest during the 1980s. Canada was the leader in educational spending with an average of 6.8% of GDP invested in education, followed by the United States (6.5%) and Denmark (6.3%). Japan and Germany were the outliers in this respect, spending much less on education than other countries did (4.1% and 4.4%, respectively).

C. Research and Development

R&D is an activity that is probably more forward-looking than most investment in equipment. While the private depreciation rate may be high, as imitators rush to catch up with innovators, the social rate of depreciation may be low, because the usefulness of new knowledge endures. Whatever the speed of imitation, high rates of R&D seem to promote rapid economic growth.

Incorporating R&D expenditures into the measures of capital formation involves, in some cases, an addition to the measure of total output as well. The shift of government and private non-profit R&D

does not require any adjustment to GNP or GDP, since they are treated in the SNA and the U.S. NIPA as government and household sector consumption, and therefore as final product. However, business enterprise expenditures on R&D are treated in these accounts as costs of current production. The shift to treatment of these as capital formation and their removal from current expenditures on inputs raises the level of business enterprise income and gross output.

The comparison between the shares in GDP of nominal expenditures on research and development in the U.S. and in the other 12 countries is described in Table 8.

Table 8

Share in Nominal GDP[6] of Nominal Expenditures on R&D

	Per cent	
	U.S.	12 Other Countries
1970-1974	2.4	1.5
1975-1979	2.2	1.5
1980-1984	2.5	1.7
1985-1989	2.8	2.0
1990-1994	2.7	2.1

Source: Appendix B, Table B-4

The U.S. has consistently invested more of its total income in research and development activities than the average of the other 12 countries. Over the period 1970-1994, R&D expenditures in the U.S. accounted for 2.5% of GDP on average, compared to 1.8% in the other 12 countries. The trend seems to be for the other countries to catch up somewhat to the United States. In this item Germany and Japan have been relatively high among the other countries and very close to the United States with an average of 2.4% of GDP invested in R&D, as have been Sweden and the United Kingdom (2.3% and 2.2%, respectively), while Canada, close to the United States in many respects, has been a relatively small investor, with an average of 1.3% of GDP invested in R&D.

[6] Here GDP is adjusted to include business enterprise expenditures on R&D.

D. Military Capital Formation

It is conventional, and part of both the UN's System of National Accounts and the U.S. National Income and Product Accounts, to treat expenditures on construction and equipment for defense as current government consumption rather than capital formation. Yet, whatever their other faults and virtues, and whatever their effects or lack of contribution to the growth of non-military output, these expenditures are intended to yield output over a long period of time. If we are interested in the extent to which a country sacrifices present consumption for future gains, these expenditures are as relevant as those for civilian capital formation. A more radical view would argue that almost all military expenditures are a form of investment, since they provide not only current protection but protection extending into the future. If high levels of U.S. spending on military personnel, ammunition, fuel, and other non-equipment items forced an end to the Cold War, they could be thought of as having very long-lasting impacts on U.S. (and perhaps worldwide) welfare.

The comparison between military capital formation ratios of the U.S. and the other 12 countries is described in Table 9.

Table 9

Share in Nominal GDP of Nominal Military Capital Formation

	Per cent	
	U.S.	12 Other Countries
1970-1974	1.5	0.5
1975-1979	1.0	0.5
1980-1984	1.4	0.6
1985-1989	1.7	0.6
1990-1994	1.3	0.5

Source: Appendix B, Table B-5

It is no surprise that in this relatively small item, spending by the United States has been much larger than the average relative to GDP, ranging between two and three times as great. Again, Japan's spending has been at a particularly low level (0.2% of GDP on average), partly because of the restrictions imposed in

the Peace Treaty after World War II. The United Kingdom, on the other hand, has spent a relatively large part of its low aggregate investment on this item (1.2% of GDP on average).

4.3. Comparisons of the Broader Measure of Capital Formation

The reason that the choice of types of investment to be included is important to our comparisons is that the composition of investment differs among countries. One of the reasons for the large gap between capital formation ratios in the United States and in the other 12 countries in conventional comparisons is that conventionally defined capital formation is a much smaller part of the broadly defined capital formation in the US than in the other countries.

The changes in capital formation ratios in the United States and in the other 12 OECD countries generated by the adjustments of the ratios to include non-conventional forms of investment and to account for price differences across countries and over time are given in Table 10.

Table 10
Change in the Ratio of Capital Formation to GDP
Generated by Each Adjustment
Per cent
U.S.

	Consumer Durables	Education Expenditure	R&D	Military Capital Formation	Constant World Prices	All Adj.
1970-1974	+ 4.4	+ 7.1	+ 2.1	+ 1.5	- 0.2	+ 13.4
1975-1979	+ 4.4	+ 6.7	+ 2.0	+ 1.0	- 0.8	+ 11.6
1980-1984	+ 3.6	+ 6.2	+ 2.2	+ 1.4	- 0.9	+ 10.7
1985-1989	+ 4.6	+ 6.0	+ 2.4	+ 1.7	+ 0.5	+ 14.4
1990-1994	+ 4.2	+ 6.6	+ 2.4	+ 1.3	+ 3.1	+ 18.8

12 Other Countries

	Consumer Durables	Education Expenditure	R&D	Military CF	Constant World Prices	All Adj.
1970-1974	+ 4.0	+ 5.1	+ 1.3	+ 0.5	- 2.3	+ 7.6
1975-1979	+ 4.5	+ 5.6	+ 1.3	+ 0.5	- 1.8	+ 9.1
1980-1984	+ 4.1	+ 5.5	+ 1.5	+ 0.6	- 1.2	+ 9.3
1985-1989	+ 4.4	+ 5.4	+ 1.7	+ 0.6	- 0.7	+ 10.9
1990-1994	+ 3.8	+ 5.5	+ 1.8	+ 0.5	+ 0.4	+ 13.0

Source: Appendix A, Tables

With a very few exceptions, every one of the unconventional forms of investment was more important in the United States in every period of our study. Furthermore, the unconventional forms of capital formation as a group were more important in the United States than in other countries in every period. Including the non-conventional types of capital formation in the comparison clearly brings the United States closer to the other countries.

Table 11 gives the comparison of investment shares including non-conventional forms of investment and taking account of price differences across countries.

Table 11

Share of Real Capital Formation in Real GDP

U.S. Relative to 12 Other Countries

Per cent

	Including Only Consumer Durables	Including Only Education Expenditure	Including Only R&D Expenditure	Including Only Military Cap. Formation	Including All Non-conv. Forms
1970-1974	86.8	92.6	86.4	86.8	98.9
1975-1979	86.8	91.3	87.8	86.8	94.2
1980-1984	91.4	95.8	95.4	95.8	100.0
1985-1989	95.7	96.8	96.6	98.7	102.4
1990-1994	101.6	102.2	100.5	102.6	107.4

Source: Appendix A, Tables

By the broadly defined real capital formation measure, the ratio of capital formation to GDP in the United States was equal to that in the other 12 countries over the period since 1970 as a whole. In the last period the U.S. ratio was 7 per cent above average, as compared with the 17 per cent below average in the nominal, conventionally defined, figures of Table 1.

The indications here are that broadly defined capital formation in the United States has not at any time since the early 1970s been much below that of other developed countries relative to total output. Over the last ten years U.S. capital formation ratios have been above the average for the group. Even for believers in the role of capital formation rates as determinants of future growth, there is nothing in these data that suggests any tendency for the other countries to soon catch up to the U.S. in per capita output.

4.4. Comparisons of Capital Formation per Capita and per Worker

In most calculations of resource abundance, the United States is found to be a relatively capital-abundant country, with a high ratio of capital per worker and per individual in the population. The comparisons for both capital formation per worker and capital formation per capita, even in terms of conventionally defined capital, as given in Table 12, suggest that this high capital abundance will continue.

Table 12

Real Capital Formation, Conventionally Defined, per Capita and per Worker: U.S. as Per Cent of Average of 12 Other Countries

	Per Capita	Per Worker
1970-1974	118.7	125.4
1975-1979	117.6	118.1
1980-1984	121.3	119.7
1985-1989	121.0	116.6
1990-1994	124.3	117.7

Source: Appendix B, Table B-1

The United States has been investing more per person in the population and more per worker than the other countries for the whole quarter century in our data. In the early years, the margin was higher in investment per worker because the ratio of employment to population was lower in the United States, but with rising unemployment in Europe and rising labor force participation in the United States, the differential in the per capita ratio was higher at the end of the period.

The ratios for broadly defined capital formation (Table 13) show a considerably larger margin in favor of the United States.

Table 13

Real Capital Formation, Broadly Defined, per Capita and per Worker:
U.S. as Per Cent of Average of 12 Other Countries

	Per Capita	Per Worker
1970-1974	149.7	157.6
1975-1979	137.3	137.5
1980-1984	135.4	132.9
1985-1989	139.6	133.8
1990-1994	144.6	136.6

Source: Appendix B, Table B-6

The use of the broader definition of capital formation enlarges the gap in favor of the United States, especially in the early 1970s, when the other countries' non-conventional capital formation was particularly low. Since then, for two decades, the United States has been adding, in gross capital formation, about thirty per cent more than the average developed country to the capital provided for each worker and for each resident of the country. It would appear that U.S. industry will continue to be relatively capital intensive in the future.

5. Conclusions

Conventional measures of nominal capital formation give a misleading picture of the level of U.S. capital formation, changes in it over time, and the way it compares with shares of capital formation

in GDP in other developed countries. Measures of capital formation in real terms, taking account of price changes and price differences across countries for capital goods and other goods and services, paint a very different picture of the last quarter-century. That picture is even more different from the conventional one when a broader concept of capital formation is used, one that is at least as appropriate as the conventional one in national accounts and in fact, we argue, is more consonant with the economic definition of capital formation.

Conventional measures show a ratio of capital formation to GDP in the United States fluctuating between 10 and 25 per cent below the average of the other countries, with the United States falling further behind the other countries since the beginning of the 1980s. In contrast, when we take account of the changes in prices of capital goods relative to other prices over time and differences in the prices of capital goods across countries, the US investment ratios in real terms are shown to have been increasing over time and moving toward the average of other developed countries, with the differential falling to less than 5 per cent in 1990-94.

When the concept of capital formation is broadened, as we argue it should be, to include household purchases of consumer durables and expenditures on education, R&D, and military capital formation, and account is also taken of international price differences, the United States is shown to have never been, since 1970, far below the other countries in the share of GDP devoted to capital formation. By 1990-94, the share of real broadly defined capital formation in real GDP in the United States was more than 5 per cent higher than the average in other developed countries.

Real capital formation per capita and per worker in the United States, even conventionally defined, was between 15 and 25 per cent higher than in the other developed countries over the period 1970-94. This margin in favor of the United States is considerably higher when we compare the adjusted broadly defined capital formation per capita and per worker. In terms of broadly defined capital, the United States has been investing between 30 and 60 per cent more per worker and per resident than other developed countries. This suggests that the United States will continue to be a relatively capital-abundant country in the future.

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Appendix A: Adjustments and Data

I. Consumer Durables Adjustment

Treating purchases of consumer goods as capital expenditures rather than as consumption requires estimates of the amount of these expenditures and of the value of services, presumably equivalent to what would be charged for them if they were provided by the business sector. The consumer goods expenditures are added to the conventional capital formation, and the value of services provided by them is added to the conventional GDP.

Data on total durable goods expenditures for the period 1970-1994 are available from the OECD National Accounts, Vol. II, Table 2 for 10 of the countries we cover: Canada, Denmark, Finland, France, Japan, Netherlands, Norway, Sweden, the U.K., and the U.S.. For Belgium and Italy durable goods expenditures were approximated by the sum of expenditures on furniture, furnishings, household equipment, and personal transportation equipment, from the same source.

For Italy, although measures of total durables expenditures were reported, we approximated durables expenditures with the spending on furniture, furnishings, household equipment and personal transportation, because the reported total durables expenditures seemed unreasonably high. Both the implied share of durables expenditures in final household consumption expenditures and the level relative to the two subgroups were far out of line with those of other countries.

Durable goods expenditures for Germany were approximated using actual expenditures on personal transportation equipment and expenditures, estimated by us, on furniture, furnishings and household equipment. We estimated these expenditures using data for total expenditures on the broader group, furniture, furnishings, household equipment and operation, and an average share of the expenditures on the durable items, furniture, furnishings and household equipment in the total expenditures on the broader group. The average share was calculated using ICP data for 1970, 1975, 1985, 1990, 1993.

The value of services provided by durable goods is estimated on the basis of stocks of capital goods, as in an earlier BEA study. Data on the net current stock of consumer durables are available only for Canada and for the U.S. from the national balance sheets. For Japan data are available on the stock of the major consumer durables from the National Accounts of Japan. Following Horioka (1995) we used the average ratio of expenditures on all consumer durables to those on the major consumer durables to estimate the stock of all consumer durables in Japan. For all other countries we made a rough estimate of the stock of consumer durables in 1970, assuming that it equals four times the expenditures on durables during the year, an approximation that has been used before by Goldsmith (1985). Then we used the perpetual inventory method, assuming a 20% rate of depreciation, to estimate the net stock of consumer durables for the period 1971-1994. The value of services provided by consumer durables was estimated to equal 34% of the previous year's net stock of consumer durables (20% depreciation cost, 11% net return, 3% operating costs), following a methodology suggested by Katz (1982) in the BEA study.

Appendix Table A-1: Consumer Durables Expenditures and Estimated Service Value of Durables

in millions of national currency, current prices

(Source: OECD National Accounts, Vol. II, unless indicated otherwise)

	BELGIUM		CANADA	
	Durables goods expenditures[7]	Estimated service value	Durables goods expenditures	Estimated service value
1970	102,054.0	127,537.5	7,025.0	9,299.0
1971	114,749.0	138,793.4	8,035.0	10,140.2
1972	133,069.0	150,049.4	9,560.0	10,981.3
1973	160,898.0	165,283.0	11,537.0	12,165.2
1974	188,909.0	186,931.7	13,543.0	14,215.4
1975	201,636.0	213,774.4	15,737.0	17,769.8
1976	238,665.0	239,575.8	17,542.0	20,583.9
1977	257,490.0	272,806.7	18,813.0	23,524.9
1978	269,255.0	305,792.0	20,581.0	26,673.3
1979	284,894.0	336,180.3	23,428.0	30,361.3
1980	307,062.0	365,808.2	25,466.0	34,987.0
1981	304,976.0	397,047.6	28,116.0	40,027.9
1982	324,072.0	421,329.9	26,021.0	44,572.0
1983	344,887.0	447,248.4	30,032.0	46,085.6
1984	365,373.0	475,060.3	34,699.0	48,312.6
1985	387,479.0	504,275.1	40,278.0	50,898.7
1986	422,328.0	535,162.9	44,628.0	54,766.9
1987	450,309.0	571,721.9	49,430.0	61,117.0
1988	492,055.0	610,482.5	54,570.0	66,497.2
1989	527,604.0	655,684.7	57,533.0	73,617.1
1990	581,801.0	703,933.2	56,267.0	79,643.3
1991	613,457.0	760,958.9	53,662.0	82,268.8
1992	639,304.0	817,342.5	54,000.0	83,716.5
1993	605,719.0	871,237.3	56,376.0	84,659.3
1994	631,374.0	902,934.3	60,591.0	87,135.9

[7] Approximated by expenditures on furniture, furnishings, household equipment and personal transport equipment.

	DENMARK		FINLAND	
	Durables goods expenditures	Estimated service value	Durables goods expenditures	Estimated service value
1970	8,159.0	10,427.9	2,436.0	3,150.7
1971	8,493.0	11,096.2	2,426.0	3,313.0
1972	9,810.0	11,764.6	3,350.0	3,475.2
1973	12,342.0	12,747.1	4,326.0	3,919.2
1974	11,525.0	14,394.0	4,871.0	4,606.2
1975	14,871.0	15,433.7	6,812.0	5,341.1
1976	19,849.0	17,403.1	7,038.0	6,588.9
1977	21,089.0	20,671.1	7,347.0	7,664.1
1978	21,918.0	23,707.2	8,079.0	8,629.2
1979	23,131.0	26,417.8	10,101.0	9,650.3
1980	19,153.0	28,998.8	11,332.0	11,154.5
1981	20,641.0	29,711.1	12,629.0	12,776.5
1982	23,822.0	30,786.8	15,052.0	14,515.1
1983	29,842.0	32,728.9	16,749.0	16,729.7
1984	35,657.0	36,329.4	18,621.0	19,078.4
1985	42,042.0	41,186.9	21,234.0	21,593.9
1986	46,492.0	47,243.8	23,232.0	24,494.7
1987	41,351.0	53,602.3	26,258.0	27,494.6
1988	37,251.0	56,941.2	31,115.0	30,923.4
1989	36,785.0	58,218.3	33,922.0	35,317.8
1990	37,737.0	59,081.5	31,366.0	39,787.7
1991	40,046.0	60,095.8	25,135.0	42,494.6
1992	40,739.0	61,692.3	20,527.0	42,541.6
1993	41,454.0	63,205.1	19,048.0	41,012.5
1994	56,031.0	64,658.4	21,836.0	39,286.3

	FRANCE		GERMANY	
	Durables goods expenditures	Estimated service value	Durables goods expenditures[8]	Estimated service value
1970	33,266.0	40,909.8	44,206.6	56,577.3
1971	39,354.0	45,241.8	45,788.0	60,121.0
1972	46,495.0	49,573.8	50,218.0	63,664.7
1973	54,129.0	55,467.3	52,392.0	68,005.9
1974	60,477.0	62,777.7	52,897.0	72,218.0
1975	70,846.0	70,784.3	57,351.2	75,759.4
1976	90,240.0	80,715.1	68,394.0	80,106.9
1977	100,355.0	95,253.7	77,903.0	87,339.5
1978	114,026.0	110,323.7	83,043.0	96,358.6
1979	130,890.0	127,027.8	86,723.0	105,321.5
1980	147,062.0	146,124.8	87,968.0	113,743.0
1981	166,014.0	166,900.9	89,545.0	120,903.5
1982	201,186.0	189,965.5	90,125.0	127,168.1
1983	211,432.0	220,375.6	99,068.0	132,377.0
1984	209,656.0	248,187.4	102,130.0	139,584.7
1985	219,514.0	269,833.0	105,510.0	146,392.0
1986	250,825.0	290,501.1	121,069.0	152,987.0
1987	274,648.0	317,681.4	130,854.0	163,553.0
1988	295,255.0	347,525.4	135,878.0	175,332.8
1989	315,919.0	378,407.1	143,400.0	186,464.8
1990	325,584.0	410,138.1	148,754.0	197,927.8
1991	309,818.0	438,809.0	182,402.0	208,918.6
1992	315,094.0	456,385.4	187,550.0	229,151.6
1993	293,458.0	472,240.2	183,410.0	247,088.3
1994	-	477,567.9	182,932.0	260,030.0

[8] Approximated by the sum of personal transport equipment and estimated expenditures on furniture, furnishings and household equipment.

	ITALY		JAPAN	
	Durables goods expenditures[9]	Estimated service value	Durables goods expenditures	Estimated service value
1970	3,353,000.0	4,178,736.0	2,349,900.0	3,256,193.5
1971	3,804,000.0	4,560,080.0	2,590,200.0	3,585,616.1
1972	4,210,000.0	4,941,424.0	3,169,400.0	3,915,038.6
1973	5,192,000.0	5,384,539.2	3,978,400.0	4,413,465.2
1974	6,332,000.0	6,072,911.4	4,454,900.0	5,810,304.9
1975	7,099,000.0	7,011,209.1	4,936,700.0	7,516,270.9
1976	9,534,000.0	8,022,627.3	5,629,600.0	8,095,477.5
1977	12,292,000.0	9,659,661.8	6,337,300.0	8,902,826.1
1978	14,221,000.0	11,907,009.5	6,984,700.0	9,813,379.4
1979	18,878,000.0	14,360,747.6	8,065,800.0	10,825,729.2
1980	25,289,000.0	17,907,118.0	8,184,400.0	12,152,478.1
1981	29,826,000.0	22,923,954.4	8,519,100.0	13,459,307.4
1982	34,701,000.0	28,480,003.6	9,367,700.0	14,537,095.9
1983	38,953,000.0	34,582,342.8	10,106,100.0	15,460,505.0
1984	44,261,000.0	40,909,894.3	10,846,400.0	16,587,886.3
1985	51,635,000.0	47,776,655.4	11,442,900.0	17,907,534.1
1986	58,073,000.0	55,777,224.3	12,755,100.0	19,160,906.9
1987	65,471,000.0	64,366,599.5	14,532,100.0	20,445,029.8
1988	74,773,000.0	73,753,419.6	17,202,900.0	21,931,302.6
1989	85,183,000.0	84,425,555.7	19,335,800.0	24,105,317.1
1990	91,107,000.0	96,502,664.5	21,873,200.0	26,339,437.7
1991	99,069,000.0	108,178,511.6	22,985,100.0	29,676,704.2
1992	103,973,000.0	120,226,269.3	22,468,600.0	33,127,551.1
1993	95,674,000.0	131,531,835.4	22,393,800.0	35,730,908.0
1994	103,199,000.0	137,754,628.4	22,462,400.0	37,610,775.6

[9] Approximated by expenditures on furniture, furnishings, household equipment and personal transport equipment.

	NETHERLANDS		NORWAY	
	Durables goods expenditures	Estimated service value	Durables goods expenditures	Estimated service value
1970	9,568.8[10]	12,304.7	4,526.0	5,543.0
1971	9,740.0[11]	13,013.6	5,422.0	6,155.4
1972	10,240.0[11]	13,722.5	6,008.0	6,767.8
1973	11,540.0[11]	14,459.6	6,739.0	7,456.9
1974	13,040.0[11]	15,491.3	7,874.0	8,256.8
1975	17,663.9[10]	16,826.6	9,444.0	9,282.6
1976	16,240.0[11]	19,467.0	12,057.0	10,637.0
1977	23,160.0	21,095.2	14,810.0	12,609.0
1978	24,830.0	24,750.6	13,422.0	15,122.6
1979	24,670.0	28,242.6	15,270.0	16,661.6
1980	23,270.0	30,981.9	16,932.0	18,521.1
1981	21,950.0	32,697.3	18,851.0	20,573.7
1982	21,750.0	33,620.9	20,809.0	22,868.3
1983	22,740.0	34,291.7	22,127.0	25,369.7
1984	22,250.0	35,165.0	24,495.0	27,819.0
1985	25,300.0	35,697.0	33,817.0	30,583.5
1986	27,510.0	37,159.6	39,934.0	35,964.5
1987	28,580.0	39,081.1	36,374.0	42,349.2
1988	27,780.0	40,982.0	31,325.0	46,246.5
1989	28,810.0	42,230.8	28,788.0	47,647.7
1990	31,240.0	43,580.1	29,996.0	47,906.1
1991	32,420.0	45,485.7	28,628.0	48,523.5
1992	33,500.0	47,411.3	30,314.4[12]	48,552.3
1993	32,450.0	49,319.1	32,000.8[10]	49,148.8
1994	33,410.0	50,488.2	-	

[10] ICP data.

[11] Approximated by expenditures on furniture, furnishings, household equipment and personal transport equipment.

[12] Interpolated on a straight line.

	SWEDEN		UNITED KINGDOM	
	Durables goods expenditures	Estimated service value	Durables goods expenditures	Estimated service value
1970	9,175.0	11,707.6	2,607.0	3,122.1
1971	9,606.0	12,478.0	3,331.0	3,545.5
1972	11,038.0	13,248.4	4,186.0	3,969.0
1973	12,585.0	14,351.7	4,597.0	4,598.4
1974	15,431.0	15,760.2	4,658.0	5,241.7
1975	18,091.0	17,854.7	5,872.0	5,777.1
1976	21,337.0	20,434.7	6,986.0	6,618.1
1977	21,129.0	23,602.4	7,754.0	7,669.8
1978	22,274.0	26,065.7	10,168.0	8,772.2
1979	24,681.0	28,425.8	13,087.0	10,474.9
1980	25,712.0	31,132.1	13,495.0	12,829.5
1981	27,269.0	33,647.8	13,942.0	14,851.9
1982	31,298.0	36,189.7	15,439.0	16,621.8
1983	32,566.0	39,593.1	18,250.0	18,546.7
1984	35,197.0	42,746.9	18,638.0	21,042.3
1985	38,599.0	46,164.5	20,166.0	23,170.8
1986	46,980.0	50,055.3	22,972.0	25,393.1
1987	58,764.0	56,017.4	26,423.0	28,124.9
1988	67,025.0	64,793.7	32,388.0	31,483.8
1989	68,978.0	74,623.4	35,414.0	36,198.9
1990	65,148.0	83,151.3	34,676.0	40,999.9
1991	66,797.0	88,671.3	32,340.0	44,589.8
1992	57,838.0	93,648.1	32,718.0	46,667.4
1993	55,339.0	94,583.4	36,102.0	48,458.1
1994	61,223.0	94,482.0	40,437.0	51,041.1

UNITED STATES

	Durables goods expenditures	Estimated service value
1970	66,774.0	119,374.0
1971	77,140.0	126,616.0
1972	88,770.0	133,858.0
1973	99,292.0	144,398.0
1974	96,002.0	159,970.0
1975	105,316.0	185,028.0
1976	127,950.0	202,538.0
1977	146,283.0	221,952.0
1978	161,548.0	246,670.0
1979	169,342.0	277,168.0
1980	164,377.0	314,296.0
1981	176,647.0	344,862.0
1982	182,264.0	369,308.0
1983	215,618.0	385,458.0
1984	253,728.0	405,892.0
1985	286,291.0	435,710.0
1986	318,568.0	472,974.0
1987	327,892.0	519,350.0
1988	353,286.0	564,230.0
1989	369,800.0	614,856.0
1990	373,400.0	656,676.0
1991	360,200.0	696,014.0
1992	389,600.0	727,226.0
1993	428,900.0	755,548.0
1994	580,900.0[13]	794,342.0

[13] Expenditures on furniture and household equipment, motor vehicles and parts, Source: BEA, US National Accounts, Personal Income and Outlays.

II. Educational Expenditures Adjustment

The main source of data on education expenditures is the OECD National Accounts. In countries that provide complete data on both government and household consumption expenditures, the total of government and household expenditures on education was used. For countries in which government expenditures are not reported by the OECD, data on current expenditures for public education, collected by UNESCO and published in the UN Statistical Yearbook were used instead. In some cases, depending on the availability of data, public or public and private expenditures reported in the OECD Education Statistics 1985-92 were used.

For Germany, which does not report household expenditures on education, data on education fees paid by households from the ICP for 1980, 1985, 1990, and 1993 were used to obtain ratios of private to public expenditures. We then used the average of these ratios to interpolate and extrapolate household education expenditures in Germany.

The OECD figures for household expenditures seem to match the figures given by "fees" in the ICP reports. It thus appears that the OECD data understate non-government education expenses by omitting that part paid for from sources other than fees.

Appendix Table A-2: Current Education Expenditures

in millions of national currency, current prices

	BELGIUM[14]	CANADA[15]	DENMARK[16]
1970	54,166.0	6,428.0	6,133.0
1971	66,021.0	6,761.0	7,366.0
1972	77,876.0	7,538.0	8,519.0
1973	89,731.0	8,315.0	9,575.0
1974	110,818.0	9,575.0	11,912.0
1975	131,906.0	11,527.0	14,069.0
1976	151,103.0	13,222.0	15,355.0
1977	170,776.0	15,818.0	17,102.0
1978	178,578.0	17,099.0	19,187.0
1979	192,402.0	18,300.0	21,860.0
1980	206,227.0	20,451.0	25,261.0
1981	221,427.0	23,667.0	28,891.0
1982	271,380.0	26,265.0	33,254.0
1983	278,389.0	27,509.0	35,473.0
1984	290,001.0	28,753.0	36,975.0
1985	299,181.0	29,998.0	38,765.0
1986	305,935.0	31,926.0	39,896.0
1987	302,239.0	35,385.0	43,866.0
1988	304,774.0	38,065.0	47,063.0
1989	325,457.0	41,271.0	48,996.0
1990	328,224.0	43,105.0	52,529.0
1991	338,707.0	46,079.0	55,224.0
1992	358,648.0	49,640.0	57,364.0
1993	403,466.0	50,615.0	59,539.0
1994	423,302.5	51,182.0	62,129.0

[14] 1970, 1973, 1975-81: Public expenditure, Source: UN Statistical Yearbook.
1971, 1972, 1974: Public expenditure interpolated on a straight line.
1982-84: Government expenditure, Source: OECD National Accounts, Vol.II.
1985-90: Public expenditure, Source: OECD Education Statistics.
1991-92: Public expenditure, Source: UN Statistical Yearbook.
1993: Public expenditure calculated using the share of public expenditure in GDP, Source: OECD, Education at a Glance.
1994: Public expenditure estimated using the same share of public expenditure in GDP as in 1993.
[15] 1970, 1971, 1973-82: Public and private expenditure, Source: UN Statistical Yearbook.
1972, 1983-84: Public and private expenditure interpolated on a straight line.
1985-92: Public and private expenditure, Source: OECD Education Statistics 1985-92.
1993-94: Public and private expenditure estimated using the same share of household expenditure in public and private expenditure as in 1992, Source: OECD National Accounts, Vol.II.
[16] 1970-94: Public and private expenditure estimated by the sum of household and government expenditure, Source: OECD National Accounts, Vol.II.

	FINLAND[17]	FRANCE[18]	GERMANY[19]
1970	2,405.0	35,806.0	20,335.6
1971	2,694.0	40,176.0	28,720.0
1972	3,168.0	45,202.0	30,589.1
1973	3,641.0	51,695.0	32,459.3
1974	4,375.0	63,496.0	38,396.0
1975	5,731.4	74,734.0	47,891.5
1976	6,967.4	86,593.0	51,192.0
1977	7,809.3	99,730.0	54,492.6
1978	8,544.2	113,490.0	57,793.1
1979	9,544.2	127,285.0	63,505.3
1980	10,884.9	137,556.0	69,906.0
1981	12,536.0	161,975.0	71,695.7
1982	14,098.8	186,204.0	75,081.9
1983	15,975.6	213,192.0	78,468.2
1984	17,395.3	233,707.0	81,854.4
1985	19,640.0	246,869.0	83,284.0
1986	21,672.0	263,846.0	87,686.2
1987	23,526.0	272,896.0	90,134.0
1988	26,382.0	284,955.0	93,364.6
1989	28,972.0	301,345.0	96,595.2
1990	31,983.0	321,885.0	99,648.0
1991	36,289.0	345,727.0	109,703.6
1992	37,369.0	370,078.0	125,357.2
1993	35,358.8	390,594.0	141,145.5
1994	36,170.0	414,000.0	147,307.5

[17] 1970, 1971, 1973, 74: Public expenditure, Source: UN Statistical Yearbook.
1972: Public expenditure interpolated on a straight line.
1975-84: Public and private expenditure estimated using the same share of government expenditure in public and private expenditure as in 1985, Source: OECD National Accounts, Vol.II.
1985-92: Public and private expenditure, Source: OECD Education Statistics 1985-92.
1993-94: Public and private expenditure estimated using the same share of government expenditure in public and private expenditure as in 1992, Source: OECD National Accounts, Vol.II.

[18] 1970-82: Public and private expenditure estimated using the sum of household expenditure (Source: OECD National Accounts, Vol.II) and public expenditures (Source: UN Statistical Yearbook).
1983-92: Sum of household expenditure and government expenditure, Source: OECD National Accounts, Vol.II.
1993-94: Sum of household expenditure and government expenditure, estimated using the same ratio of household to government expenditures as in 1992, Source: OECD National Accounts, Vol.II.

[19] 1970, 1971, 1973-75, 1977-80, 1985, 1987, 1990, 1991: Sum of public expenditure (Source: UN Statistical Yearbook) and private expenditure, estimated using the average ratio of private to public expenditure for 1980,1985, 1990, and 1993 (Source: ICP).
1972, 1976, 1977, 1981-84, 1986, 1988-89, 1992: Sum of public expenditure interpolated on a straight line and estimated private expenditure.
1993: Sum of public expenditure calculated using the share of public expenditure in GDP (Source: OECD Education at a Glance) and private expenditure, estimated using the average ratio of private to public expenditure for 1980,1985, 1990, and 1993 (Source: ICP).
1994: Sum of public expenditure estimated using the same share of public expenditure in GDP as in 1993 (Source: OECD Education at a Glance) and private expenditure, estimated using the average ratio of private to public expenditure for 1980,1985, 1990, and 1993 (Source: ICP).

	ITALY[20]	JAPAN[21]	NETHERLANDS[22]
1970	2,638,000.0	2,473,690.5	7,069.0
1971	3,110,000.0	2,885,357.1	8,200.0
1972	3,641,000.0	3,394,285.7	9,410.0
1973	4,206,000.0	4,170,952.4	10,490.0
1974	4,901,000.0	5,768,095.2	12,686.0
1975	5,446,000.0	6,838,690.5	14,881.0
1976	6,901,000.0	7,601,309.5	16,774.0
1977	8,325,500.0	8,349,285.7	18,666.0
1978	9,780,000.0	9,102,023.8	20,345.0
1979	12,611,000.0	9,847,381.0	21,974.0
1980	17,434,000.0	10,703,333.3	23,079.0
1981	23,118,000.0	11,538,571.4	23,968.0
1982	27,622,000.0	11,886,190.5	24,035.0
1983	32,021,000.0	12,341,309.5	24,102.0
1984	36,449,000.0	12,910,357.1	24,168.0
1985	40,825,000.0	13,406,904.8	24,235.6
1986	45,585,000.0	13,827,746.4	25,739.1
1987	50,241,000.0	14,195,566.0	26,655.2
1988	56,445,000.0	14,685,011.9	26,847.3
1989	61,649,000.0	15,503,822.7	26,965.4
1990	70,498,000.0	16,276,106.7	27,580.7
1991	74,345,000.0	17,884,877.6	28,728.4
1992	79,418,000.0	17,341,522.4	25,878.8
1993	80,259,000.0	17,737,619.0	32,062.0
1994	89,443,553.4	18,174,642.9	33,686.0

[20] 1970-79, 1994: Sum of household expenditure (Source: OECD National Accounts, Vol.II) and public expenditure (Source: UN Statistical Yearbook).

1980-93: Sum of household expenditure and government expenditure, Source: OECD National Accounts, Vol.II.

[21] 1970-85: Public and private expenditure estimated using the same share of government expenditure in public and private expenditure as in 1986, Source: OECD National Accounts, Vol.II and OECD Education Statistics 1985-92.

1986-92: Public and private expenditure, Source: OECD Education Statistics 1985-92.

1993-94: Public and private expenditure estimated using the same share of government expenditure in public and private expenditure as in 1992, Source: OECD National Accounts, Vol.II and OECD Education Statistics 1985-92.

[22] 1970-73, 1975, 1977-81, 1984: Public expenditure, Source: UN Statistical Yearbook.

1974, 1976, 1982, 1983: Public expenditure interpolated on a straight line.

1985-92: Public and private expenditures, Source: OECD Education Statistics 1985-92.

1993: Sum of public expenditure, calculated using their share in GDP (Source: Education at a Glance), and household expenditure (Source: OECD National Accounts, Vol.II).

1994: Sum of public expenditure, estimated using the same share in GDP as in 1993 (Source: Education at a Glance), and household expenditure (Source: OECD National Accounts, Vol.II).

	NORWAY[23]	SWEDEN[24]	UNITED KINGDOM[25]
1970	5,825.0	10,785.0	2,137.5
1971	6,200.0	12,344.0	2,375.0
1972	6,175.0	13,612.0	2,625.0
1973	6,675.0	14,879.0	3,037.5
1974	8,175.0	16,477.0	3,450.0
1975	10,375.0	19,281.0	4,675.0
1976	11,625.0	22,440.0	6,325.0
1977	13,050.0	26,441.0	7,661.0
1978	13,200.0	31,326.0	8,561.0
1979	13,925.0	31,719.0	9,671.0
1980	16,175.0	32,113.0	12,030.0
1981	15,450.0	35,173.0	13,597.0
1982	17,375.0	38,725.0	14,746.0
1983	19,375.0	42,034.0	15,666.0
1984	21,250.0	44,522.0	16,194.0
1985	27,266.0	50,312.0	16,634.0
1986	29,846.0	53,610.0	18,540.0
1987	33,390.0	55,780.0	20,142.0
1988	36,071.0	58,523.0	22,022.0
1989	38,978.0	63,133.0	24,195.0
1990	41,319.0	73,222.0	26,397.0
1991	45,424.0	75,620.0	29,030.0
1992	49,529.0	77,801.0	31,684.0
1993	53,634.0	78,643.0	33,222.0
1994	57,739.0	86,500.0	35,442.0

[23] 1970-84: Public and private expenditures interpolated using the same share of household expenditure in household and public expenditure as in 1985, Source: OECD National Accounts, Vol.II and OECD Education Statistics 1985-92.

1985-91: Sum of public expenditure (Source: OECD Education Statistics 1985-92) and household expenditure (Source: OECD National Accounts, Vol.II).

1992-94: Extrapolated on a straight line.

[24] 1970, 1971, 1973-78: Public expenditure, Source: UN Statistical Yearbook.

1972, 1979: Interpolated on a straight line.

1980-93: Sum of household expenditure and government expenditures, Source: OECD National Accounts, Vol.II.

1994: Public and private expenditure estimated using the same share of household expenditure in household and government expenditure as in 1993, Source: OECD National Accounts, Vol.II.

[25] 1970-76: Public and private expenditure interpolated using the same share of household expenditure in household and government expenditure as in 1977, Source: OECD National Accounts, Vol.II.

1977-94: Sum of household and government expenditure, Source: OECD National Accounts, Vol.II.

UNITED STATES[26]

1970	68,464.0
1971	75,915.0
1972	94,138.0
1973	97,529.0
1974	101,033.0
1975	111,266.0
1976	122,715.0
1977	133,484.0
1978	145,330.0
1979	157,609.0
1980	170,614.0
1981	184,053.0
1982	197,093.0
1983	210,334.0
1984	223,465.0
1985	237,345.0
1986	243,036.0
1987	270,002.0
1988	293,657.0
1989	315,126.0
1990	356,207.0
1991	383,301.0
1992	393,048.0
1993	402,695.0
1994	427,781.5

[26] 1970-72, 1974-76, 1985: Sum of household expenditure (Source: OECD National Accounts, Vol.II) and public expenditure (Source: UN Statistical Yearbook).

1973, 1977-84, 1992: Sum of household expenditure (Source: OECD National Accounts, Vol.II) and public expenditure, interpolated on a straight line.

1986-91: Sum of household expenditure (Source: OECD National Accounts, Vol.II) and public expenditure (Source: OECD Education Statistics 1985-92).

1993: Sum of household expenditure (Source: OECD National Accounts, Vol.II) and public expenditure, calculated using their share in GDP (Source: OECD Education at a Glance).

1994: Sum of household expenditure (Source: OECD National Accounts, Vol.II) and public expenditure, estimated using the same share in GDP as in 1993.

III. R&D Expenditures Adjustment

The adjustment for R&D requires not only the addition of total R&D expenditures to capital formation, but the addition of business R&D expenditures to GDP, since the standard accounts treat them as an expense of production rather than as a product. R&D performed by government and the non-profit sector are already in GDP, but as consumption rather than as capital formation.

Most of the R&D data were taken from various issues of OECD Science and Technology Indicators, Basic Statistical Series and from the OECD Basic Science and Technology Statistics 1981-1994. Data for missing years were interpolated on a straight line.

Appendix Table A-3: Expenditures for Research and Development
in millions of national currency, current prices
(Source: OECD Basic Science and Technology Statistics)

	BELGIUM		CANADA	
	Funded or performed by business enterprises (BE)	Total	Funded or performed by BE	Total
1969	7,423.0	14,468.0		
1970	8,722.0[5]	17,008.0[5]	415.0	1,205.0[13]
1971	10,021.0[3]	19,549.0	467.0	1,317.0
1972	11,916.0[5]	22,290.0[5]	465.0	1,353.0
1973	13,810.0	25,031.0	507.0	1,450.0
1974	16,630.0[5]	27,596.0[5]	617.0	1,696.0
1975	19,451.0[4]	30,160.0	705.0	1,911.0
1976	22,658.0[5]	34,062.0[5]	762.0	2,082.0
1977	25,864.0[4]	37,964.0	866.0	2,328.0
1978	28,453.0[5]	41,074.0[5]	1,014.0	2,633.0
1979	31,042.0	44,453.0	1,278.0	2,992.0
1980	33,770.0[5]	48,476.0[5]	1,586.0	3,543.0
1981	38,606.9[5]	54,231.5[5]	2,185.0	4,358.0
1982	43,427.5	60,440.5	2,547.0	5,128.0
1983	48,307.4	66,708.8	2,668.0	5,441.0
1984	52,855.3	72,645.1	3,095.0	6,118.0
1985	58,390.1	79,831.7	3,720.0	6,815.0
1986	61,949.4	83,728.2	4,111.0	7,373.0
1987	65,409.1	87,788.6	4,460.0	7,775.0
1988	68,787.1	91,265.1	4,768.0	8,266.0
1989	71,989.1	102,438.1	5,003.0	8,837.0
1990	75,550.3[5]	107,251.5[5]	5,444.0	9,650.0
1991	79,111.5	112,065.0	5,729.0	10,091.0
1992	82,672.7[14]	116,878.5[14]	5,938.0	10,319.0
1993	86,233.9[14]	121,691.9[14]	6,131.0	10,579.0
1994	89,795.1[14]	126,505.4[14]	6,387.0	10,882.0

	DENMARK		FINLAND	
	Funded or performed by BE	Total	Funded or performed by BE	Total
1969			148.2	298.6
1970	538.6	1,140.0	195.4[5]	367.1[5]
1971	622.1[5]	1,319.0[11]	242.6	435.6
1972	695.9[5]	1,497.0[5]	291.4[5]	529.9[5]
1973	759.6	1,676.0	340.1	624.2
1974	880.3[5]	1,927.0[10]	422.6[5]	789.1[5]
1975	990.8	2,179.0[10]	505.2	953.9
1976	1,154.0[5]	2,479.0[10]	603.2[5]	1,126.4[5]
1977	1,317.3[6]	2,751.0[10]	701.4	1,298.8
1978	1,497.2[5]	3,037.0[10]	848.5[5]	1,523.4[5]
1979	1,686.5	3,324.0	995.7	1,748.1
1980	1,960.0[5]	3,704.0	1,235.0[5]	2,181.0[11]
1981	2,245.1	4,468.4	1,487.3	2,594.7
1982	2,777.4	5,292.6	1,828.9[5]	3,145.6[5]
1983	3,292.0	6,097.0	2,170.6	3,696.6
1984	3,795.0	6,896.0	2,770.0[15]	4,550.0
1985	4,301.0	7,692.0	3,236.4[15]	5,248.4
1986	4,953.0	8,813.0	3,688.1[15]	5,961.0
1987	5,605.0	9,933.0	4,200.3	6,791.9
1988	6,130.0	10,913.0	4,922.8[15]	7,834.7
1989	6,655.0	11,892.0	5,764.3	8,925.6
1990	7,528.0	12,996.0	6,448.7[15]	9,843.0
1991	8,402.0	14,100.0	6,113.7	10,171.0
1992	8,858.0	14,898.0	6,198.6[15]	10,388.0
1993	9,310.0	15,695.0	6,523.3	10,677.1
1994	9,765.0[14]	16,492.0[14]	6,848.0[14]	10,966.2[14]

	FRANCE		GERMANY	
	Funded or performed by BE	Total	Funded or performed by BE	Total
1970	8,477.0	14,956.0	9,034.0[6]	13,903.0
1971	9,543.0	16,621.0	10,666.0	16,527.0
1972	10,770.0	18,277.0	11,285.0[6]	18,212.0
1973	11,790.0	19,789.0	11,846.0	19,232.0
1974	13,724.0	23,031.0	12,834.0[6]	20,990.0
1975	15,885.0	26,203.0	14,586.0	22,968.0
1976	18,298.0	29,774.0	15,434.0[6]	24,150.0
1977	20,328.0	33,185.0	16,867.0	25,733.0
1978	22,820.0[6]	37,671.0	18,880.0	28,900.0
1979	26,570.0	44,123.0	23,311.0	33,457.0
1980	31,136.0[4]	51,014.0	24,982.0[5]	36,427.0[11]
1981	37,267.3	62,471.3	26,380.0	37,303.0
1982	43,736.7	74,835.7	28,895.0	40,060.0
1983	48,515.6	84,671.6	30,487.6	42,102.9
1984	55,444.8	96,197.8	32,095.0	44,015.0
1985	62,805.1	105,917.1	36,728.5	49,519.3
1986	67,210.7	113,259.7	39,023.0	52,535.0
1987	72,954.8	121,364.0	41,994.2	57,240.2
1988	79,906.6	130,631.0	44,130.0	59,980.0
1989	89,146.6	143,552.9	46,872.8	63,871.3
1990	97,714.8	157,162.3	48,912.0	66,880.0
1991	103,261.1	163,092.3	52,658.6	74,517.3
1992	109,097.0	168,276.9	53,345.0	76,755.0
1993	109,603.4[14]	170,724.0	53,530.0	78,345.0
1994	110,109.8[14]	173,171.1[14]	53,715.0[14]	79,935.0[14]

	ITALY		JAPAN	
	Funded or performed by BE	Total	Funded or performed by BE	Total
1970	304,800.0	554,700.0	841,600.0[2]	1,356,000.0
1971	351,500.0	622,800.0	914,900.0	1,532,000.0
1972	387,900.0	685,200.0	1,078,400.0	1,792,000.0
1973	419,800.0	788,200.0	1,346,700.0	2,216,000.0
1974	513,200.0	916,900.0	1,650,800.0	2,716,000.0
1975	657,700.0	1,168,000.0	1,745,900.0	2,975,000.0
1976	749,500.0	1,353,000.0	1,955,400.0	3,320,000.0
1977	914,100.0	1,684,000.0	2,180,700.0	3,651,000.0
1978	1,036,200.0[4]	1,867,000.0	2,365,300.0	4,046,000.0
1979	1,356,000.0	2,288,000.0	2,738,000.0	4,584,000.0
1980	1,737,000.0	2,897,000.0	3,258,000.0	5,246,000.0
1981	2,329,759.0	4,055,335.0	3,801,130.0	5,982,356.0
1982	2,842,908.0	4,915,678.0	4,237,416.0	6,528,700.0
1983	3,485,083.0	6,027,005.0	4,765,120.0	7,180,782.0
1984	4,179,327.0	7,322,951.0	5,379,919.0	7,893,931.0
1985	5,270,922.0	9,132,902.0	6,239,733.0	8,890,299.0
1986	6,013,994.0	10,189,139.0	6,441,328.0	9,192,932.0
1987	6,770,779.0	11,696,035.0	6,868,868.0	9,836,640.0
1988	7,788,872.0	13,281,284.0	7,616,439.0	10,627,572.0
1989	8,847,665.0	14,800,669.0	8,655,882.0	11,815,482.0
1990	10,074,958.0	17,001,221.0	9,697,780.0	13,078,315.0
1991	11,265,529.0	18,880,779.0	10,160,768.0	13,771,524.0
1992	11,895,736.0	19,660,694.0	10,006,069.0	13,909,492.0
1993	12,019,397.0	20,268,561.0	9,493,694.0	13,709,139.0
1994	11,761,292.0	19,939,175.0	8,981,319.0[14]	13,508,786.0[14]

	NETHERLANDS		NORWAY	
	Funded or performed by BE	Total	Funded or performed by BE	Total
1970	1,406.0	2,440.0	411.9	878.0
1971	1,608.0	2,818.0	481.2[5]	1,051.0[5]
1972	1,792.0	3,164.0	550.4	1,224.0
1973	1,887.0	3,384.0	647.2[5]	1,420.0[5]
1974	2,199.0	3,892.0	743.9	1,617.0
1975	2,448.0	4,440.0	973.0	1,993.0
1976	2,701.0	4,964.0	1,129.1[5]	2,334.0[5]
1977	2,774.0	5,194.0	1,285.2	2,675.0
1978	2,953.0	5,546.0	1,425.0	2,973.0
1979	3,151.0	5,936.0	1,628.0	3,227.0
1980	3,371.0	6,348.0	1,898.0	3,630.0
1981	3,634.0	6,643.0	2,290.4	4,213.8
1982	3,863.0	7,284.0	2,797.7[5]	4,952.5
1983	4,239.0	7,699.0	3,305.1	5,690.8
1984	4,596.0	7,852.0	4,288.6[5]	6,826.4
1985	5,324.0	8,748.0	5,272.1	8,109.9
1986	5,950.0	9,533.0	5,905.5[5]	9,156.3[5]
1987	6,264.0	10,040.0	6,539.0	10,202.7
1988	6,421.0	10,163.0	6,655.4[5]	10,867.7[5]
1989	6,395.0	10,273.0	6,771.8	11,532.7
1990	6,212.0	10,450.0	6,997.1[5]	12,067.9[5]
1991	5,892.0	10,381.0	7,222.5	12,603.1
1992	5,852.0	10,503.0	7,667.7[5]	13,432.8[5]
1993	5,812.0[14]	10,625.0[14]	8,113.0	14,262.6
1994	5,772.0[14]	10,747.0[14]	8,558.3[14]	15,092.3[14]

	SWEDEN		UNITED KINGDOM	
	Funded or performed by BE	Total	Funded or performed by BE	Total
1969	1,357.0	2,008.0	701.6	
1970	1,624.0[5]	2,441.0[5]	768.6[5]	1,129.0[12]
1971	1,891.0[7]	2,874.0[7]	835.6[5]	1,235.0[12]
1972	2,166.0[5]	3,328.0	902.6	1,322.0
1973	2,440.0	3,781.0	1,060.3[5]	1,547.0[12]
1974	3,012.0[5]	4,595.0[5]	1,217.9[5]	1,831.0[12]
1975	3,585.0	5,409.0	1,375.6	2,165.0
1976	4,238.0[5]	6,286.0[5]	1,723.0[5]	2,622.0[12]
1977	4,890.0[8]	7,162.0[8]	2,070.0[5]	3,075.0[12]
1978	5,486.0[5]	8,118.0	2,418.0	3,526.0
1979	6,081.0[8]	9,074.0[8]	2,944.0[5]	4,395.0[5]
1980	7,372.0[5]	11,250.0[5]	3,471.0[5]	5,265.0[5]
1981	8,615.7	13,320.3	4,001.3	6,023.5
1982	10,309.4[5]	15,754.6[5]	4,207.8[5]	6,342.7[5]
1983	12,003.0	18,189.0	4,414.3	6,661.9
1984	14,720.5[5]	21,590.0[5]	4,965.6[5]	7,377.4[5]
1985	17,438.0	24,991.0	5,517.0	8,093.0
1986	19,217.5[5]	27,772.0[5]	6,318.0	8,768.0
1987	20,997.0	30,553.0	6,670.0	9,383.0
1988	22,853.5[5]	33,412.5[5]	7,339.0	10,227.0
1989	24,710.0	36,272.0	8,124.0	11,288.0
1990	26,787.5[5]	38,812.0[5]	8,836.0	12,238.0
1991	28,865.0	41,352.0	8,736.0	12,406.0
1992	30,942.5[14]	43,176.0[5]	9,107.0	12,981.0
1993	33,020.0[14]	45,000.0	9,688.0	13,752.0
1994	35,097.5[14]	46,824.0	10,269.0[14]	14,523.0[14]

UNITED STATES

	Funded or performed by BE	Total
1970	18,223.0	27,415.0
1971	18,482.0[1]	27,822.0[9]
1972	19,728.0	29,762.0
1973	21,438.0	32,000.0
1974	23,098.0	34,129.0
1975	24,425.0	36,726.0
1976	27,256.0	40,543.0
1977	30,114.0	44,642.0
1978	33,640.0	49,731.0
1979	38,600.0	56,497.0
1980	44,942.0	64,189.0
1981	52,328.0	73,693.0
1982	59,237.0	81,710.0
1983	65,932.0	90,934.0
1984	75,600.0	103,287.0
1985	85,174.0	116,049.0
1986	88,948.0	121,654.0
1987	93,397.0	127,878.0
1988	98,388.6	135,505.6
1989	103,602.0	143,820.6
1990	111,507.3	154,618.8
1991	118,858.7	160,750.0
1992	123,357.0	167,122.5
1993	124,126.0	169,964.3
1994	126,052.0	173,016.8

[1] Interpolated between 1970 and 1972 by R&D performed by business enterprises (BE).
[2] Estimated assuming same ratio to R&D performed by BE as in 1971.
[3] Estimated assuming same ratio to R&D performed by BE as in 1973.
[4] Interpolated by R&D performed by BE.
[5] Interpolated on a straight line.
[6] Difference between funded and performed and performed interpolated on a straight line.
[7] Estimated assuming same ratio to R&D in natural sciences and engineering as in 1973.
[8] Estimated assuming same ratio to R&D in natural sciences and engineering as in 1975.
[9] Interpolated between 1970 and 1972 by R&D performed by BE, private nonprofit, and government.
[10] Sum of R&D performed by BE and performed by all others.
[11] Interpolated between 1979 and 1981 by government funded R&D.
[12] Sum of R&D performed by government and higher education and R&D performed by others.
[13] Estimated assuming same ratio to R&D in natural sciences and engineering as in 1971.
[14] Extrapolated on a straight line assuming same increase as in previous year.
[15] Interpolated by R&D funded by BE performed by others.

IV. Military Spending Adjustment

Data on total military expenditures were obtained from the U.S. Arms Control and Disarmament Agency, Report on World Military Expenditures and Arm Transfers. For NATO member countries we used the share of equipment and infrastructure expenditures, reported in the NATO Review, to calculate military capital expenditures. For the other OECD countries we used the average NATO member countries' share of equipment and infrastructure expenditures in total military expenditures to obtain an estimate of their military capital expenditures.

Appendix Table A-4: Military Expenditures

in millions of national currency, current prices

(Sources: US Arms Control and Disarmament Agency[27]; NATO Review[28])

	BELGIUM	CANADA	DENMARK
	Military capital formation	Military capital formation	Military capital formation
1970	6,056.9	201.9	584.5
1971	6,585.9	215.3	629.4
1972	7,319.6	226.0	667.0
1973	8,186.3	242.9	693.4
1974	9,353.7	289.1	879.0
1975	12,903.6	386.4	1,113.8
1976	14,822.8	412.7	1,188.5
1977	16,285.4	474.3	1,327.5
1978	18,150.1	536.1	1,517.2
1979	19,377.9	554.9	1,673.4
1980	22,340.5	1,163.4	1,796.0
1981	24,258.0	1,264.1	2,029.3
1982	25,500.5	1,538.7	2,298.8
1983	26,366.7	1,625.3	2,477.1
1984	26,848.8	1,873.3	2,569.9
1985	23,213.5	2,324.7	2,321.9
1986	24,484.7	2,468.3	2,319.9
1987	27,509.7	2,811.6	2,592.5
1988	23,952.9	2,837.3	2,780.4
1989	19,726.3	2,840.7	2,729.7
1990	18,159.0	2,815.9	3,001.0
1991	17,371.1	2,758.5	3,435.3
1992	17,797.7	2,845.1	3682.7
1993	12,830.6	2,964.3	2,973.7
1994	13,723.3	2,588.6	3,216.5

[27] Data on total military expenditures.

[28] Data on shares of equipment and infrastructure expenditures in total military expenditures of NATO member countries.

	FINLAND	FRANCE	GERMANY
	Military capital formation[i]	Military capital formation[i]	Military capital formation
1970	104.4	5,241.1	5,124.1
1971	119.0	5,599.7	5,777.2
1972	137.0	6,094.6	6,519.4
1973	158.2	6,783.1	7,243.1
1974	174.5	7,680.4	8,091.2
1975	260.2	9,763.6	8,683.1
1976	262.5	11,166.4	8,991.0
1977	303.0	12,892.9	9,282.5
1978	339.9	14,884.3	9,937.4
1979	407.3	16,852.7	10,490.9
1980	629.1	23,162.6	12,323.6
1981	708.5	26,903.6	13,257.0
1982	885.3	30,702.0	13,775.4
1983	990.2	34,229.8	14,350.0
1984	1,078.2	36,637.7	14,547.6
1985	1,195.8	40,034.8	14,955.8
1986	1,366.7	42,257.2	15,333.2
1987	1,365.6	44,925.7	15,890.7
1988	1,514.0	46,115.2	15,347.9
1989	1,664.7	48,879.5	15,668.1
1990	1,651.2	46,899.5	16,136.7
1991	2,030.0	49,280.7	13,443.7
1992	1,954.4	46,304.8	11,665.4
1993	1,860.2	45,939.1	9,513.6
1994	2,048.1	49,142.1	9,194.0

	ITALY	JAPAN	NETHERLANDS
	Military capital formation	Military capital formation[i]	Military capital formation
1970	263,978.0	91,357.3	609.8
1971	312,988.0	107,623.5	685.5
1972	365,378.0	128,365.4	762.2
1973	404,248.0	150,069.8	836.2
1974	481,988.0	175,335.4	958.5
1975	512,160.0	231,945.7	1,509.2
1976	595,320.0	264,291.9	1,624.3
1977	747,945.0	295,432.4	1,927.5
1978	874,665.0	332,199.8	1,939.0
1979	1,067,220.0	366,013.9	2,142.5
1980	1,505,671.0	462,580.7	2,535.2
1981	1,943,996.0	497,800.0	2,733.6
1982	2,421,918.0	536,411.2	2,884.9
1983	2,836,800.0	571,274.0	2,940.1
1984	3,237,301.0	608,685.0	3,088.4
1985	3,962,041.0	672,646.5	3,225.3
1986	4,475,833.0	716,902.1	3,277.5
1987	5,471,240.0	754,189.2	2,982.2
1988	5,873,970.0	793,406.0	3,404.8
1989	6,233,976.0	850,295.1	3,284.2
1990	5,685,421.0	841,138.4	3,216.1
1991	5,615,526.0	897,111.8	2,953.5
1992	5,453,901.0	882,348.9	2,780.0
1993	6,375,708.0	883,741.5	2,437.2
1994	5,713,290.0	933,817.8	2,714.9

	NORWAY	SWEDEN	UNITED KINGDOM
	Military capital formation	Military capital formation[i]	Military capital formation
1970	543.7	986.6	495.3
1971	592.3	1,077.0	534.9
1972	634.8	1,172.0	619.0
1973	687.0	1,254.9	667.3
1974	771.8	1,390.2	790.4
1975	968.5	1,709.2	1,298.0
1976	1,082.6	1,881.7	1,428.8
1977	1,204.6	1,978.2	1,586.7
1978	1,391.4	2,275.2	1,774.5
1979	1,494.5	2,537.4	2,103.8
1980	2,011.0	3,341.5	3,350.4
1981	2,310.2	3,714.8	3,509.6
1982	2,673.3	4,158.7	4,002.4
1983	3,024.4	4,592.2	4,610.1
1984	3,095.9	4,866.0	4,890.7
1985	4,618.4	5,386.1	5,252.4
1986	4,793.9	5,686.3	5,349.4
1987	5,583.9	6,027.3	5,472.4
1988	5,093.6	6,535.4	5,690.6
1989	6,783.1	6,813.6	5,446.5
1990	6,885.3	7,126.6	5,126.0
1991	6,713.6	7,956.5	5,802.4
1992	8,084.2	7,057.9	4,798.5
1993	8,208.6	7,549.9	7,441.0
1994	8,902.8	8,170.8	7,498.3

	USA
	Military capital formation
1970	17,750.5
1971	17,143.4
1972	17,779.3
1973	17,944.0
1974	19,672.5
1975	17,734.9
1976	17,747.5
1977	19,680.4
1978	21,303.2
1979	23,844.4
1980	33,835.5
1981	39,923.7
1982	46,151.7
1983	51,226.2
1984	55,707.2
1985	70,737.2
1986	76,969.6
1987	82,124.5
1988	78,548.9
1989	82,103.0
1990	81,135.1
1991	79,883.2
1992	74,149.3
1993	70,540.0
1994	89,016.4

[i] Approximated using the average share of military capital formation expenditures in total military expenditures of NATO member countries.

V. Cross-country comparison in international prices

To account for the difference in the prices of investment goods relative to the prices of other goods and services across countries we converted the nominal measures of capital formation and GDP at national prices in national currency to real measures at international prices. The calculations are all in each year's current prices, with the U.S. purchasing power parities always set at 1.00.

To make the conversion we use data on purchasing power parities (PPPs) for gross fixed capital formation and for GDP from the Penn World Table (Mark 5.6), which are provided until 1992. We extrapolated 1993 and 1994 PPPs for gross fixed capital formation and for GDP by data on price indices of GDP and of gross fixed capital formation reported in the OECD National Accounts, Vol. I.

The Penn World Table does not provide purchasing power parity estimates for a detailed breakdown of GDP. In order to make our calculations for the non-conventional elements in our broad measure of capital formation, we make use of price and quantity data from the OECD. These are a component of the ICP but there are some differences in the method. Some of these data have been published by Eurostat (1988) and OECD (1985a), (1987), and (1992), but we made use of more detailed data on diskettes provided by the OECD covering the years 1985, 1990, and 1993. The weighting systems and the index number formulas used by the Penn World Table and the OECD are different, but it was not possible for us to obtain exactly comparable measures.

For consumer durables, PPPs were available from the OECD data mentioned above and, for earlier years, from Kravis, Kenessey, Heston, and Summers (1975) and from Kravis, Heston, and Summers (1978) and (1982). Since it was clear from these earlier studies that PPPs for consumer durables were more strongly correlated with those for gross fixed capital formation than with those for consumption, we used the annual PPPs for gross fixed capital formation to convert the nominal measures of capital formation in consumer durables to real measures. For the conversion of the nominal measures of educational expenditures and expenditures on R&D we used the PPPs for GDP as deflators. We deflated military capital formation expenditures using PPPs for gross fixed capital formation.

Appendix B: Summary Tables

Table B-1: Conventional Measures of Gross Fixed Capital Formation and GDP

	1970-74	1975-79	1980-84	1985-89	1990-94	1970-94
US						
GFCF/GDP (nominal, %)	18.82	19.34	19.32	18.60	16.29	18.47
GFCF/GDP (real, 1970 prices, %)	18.57	18.53	18.45	19.14	19.38	18.81
GFCF per capita (nominal, $)	1,101.00	1,779.43	2,660.36	3,465.39	3,826.68	2,566.57
GFCF per capita (real, 1970 prices, $)	1,086.00	1,702.32	2,543.27	3,572.91	4,561.74	2,693.25
GFCF per worker (nominal, $)	2,733.00	4,149.51	6,020.18	7,410.94	8,149.67	5,692.66
GFCF per worker (real, 1970 prices, $)	2,695.88	3,971.20	5,754.98	7,637.48	9,717.09	5,955.33
AVERAGE (12 countries)						
GFCF/GDP (nominal, %)	24.98	23.78	21.33	21.28	19.70	22.21
GFCF/GDP (real, PPPs and current p,%)	22.96	22.97	21.04	20.04	16.94	20.79
GFCF/GDP (real, PPPs and 1970 p, %)	22.66	22.03	20.08	20.65	20.06	21.09
GFCF per capita (real, PPPs and current p, $)	927.37	1,495.14	2,190.51	2,882.72	3,111.02	2,121.35
GFCF per capita (real, PPPs and 1970 p, $)	914.93	1,431.84	2,093.20	2,976.58	3,689.60	2,221.23
GFCF per worker (real, PPPs and current p, $)	2,183.43	3,486.78	5,023.46	6,398.73	6,976.56	4,813.79
GFCF per worker (real, PPPs and 1970 p, $)	2,154.14	3,339.38	4,800.46	6,605.17	8,279.45	5,035.72
BELGIUM						
GFCF/GDP (nominal, %)	22.04	21.72	17.71	16.82	18.82	19.42
GFCF/GDP (real, PPPs and current p,%)	19.80	20.92	17.79	16.39	16.37	18.26
GFCF/GDP (real, PPPs and 1970 p, %)	19.55	20.06	16.98	16.91	19.41	18.58
GFCF per capita (real, PPPs and current p, $)	781.26	1,335.32	1,718.69	2,166.10	2,903.72	1,781.02
GFCF per capita (real, PPPs and 1970 p, $)	770.95	1,278.69	1,641.54	2,239.72	3,446.21	1,875.42
GFCF per worker (real, PPPs and current p, $)	2,026.78	3,513.49	4,642.67	5,824.97	7,710.43	4,743.67
GFCF per worker (real, PPPs and 1970 p, $)	1,999.96	3,364.44	4,435.08	6,021.16	9,156.18	4,995.36

CANADA						
GFCF/GDP (nominal, %)	22.50	23.51	21.82	21.24	19.38	21.69
GFCF/GDP (real, PPPs and current p,%)	18.47	20.06	21.53	21.06	19.18	20.06
GFCF/GDP (real, PPPs and 1970 p, %)	18.23	19.24	20.54	21.71	22.75	20.49
GFCF per capita (real, PPPs and current p, $)	854.51	1,599.55	2,740.23	3,764.91	4,021.55	2,596.15
GFCF per capita (real, PPPs and 1970 p, $)	843.08	1,531.28	2,616.39	3,890.17	4,774.28	2,731.04
GFCF per worker (real, PPPs and current p, $)	2,176.49	3,770.03	6,193.49	8,068.59	8,797.61	5,801.24
GFCF per worker (real, PPPs and 1970 p, $)	2,147.45	3,610.09	5,914.86	8,332.49	10,450.13	6,091.01
DENMARK						
GFCF/GDP (nominal, %)	24.44	21.74	16.75	19.08	15.89	19.58
GFCF/GDP (real, PPPs and current p,%)	23.56	22.44	17.47	18.61	13.35	19.08
GFCF/GDP (real, PPPs and 1970 p, %)	23.25	21.52	16.68	19.15	15.81	19.28
GFCF per capita (real, PPPs and current p, $)	1,044.83	1,522.02	1,795.93	2,697.39	2,464.66	1,904.97
GFCF per capita (real, PPPs and 1970 p, $)	1,030.54	1,457.34	1,717.55	2,779.81	2,923.26	1,981.70
GFCF per worker (real, PPPs and current p, $)	2,179.52	3,252.75	3,763.98	5,220.45	4,858.93	3,855.12
GFCF per worker (real, PPPs and 1970 p, $)	2,149.80	3,114.92	3,599.17	5,379.14	5,767.42	4,002.09
FINLAND						
GFCF/GDP (nominal, %)	28.06	26.83	25.12	24.87	19.45	24.86
GFCF/GDP (real, PPPs and current p,%)	29.96	29.09	27.95	25.19	17.87	26.01
GFCF/GDP (real, PPPs and 1970 p, %)	29.57	27.92	26.69	25.95	21.05	26.24
GFCF per capita (real, PPPs and current p, $)	1,113.45	1,696.05	2,720.32	3,514.35	2,931.70	2,395.17
GFCF per capita (real, PPPs and 1970 p, $)	1,098.52	1,625.65	2,600.58	3,631.51	3,453.03	2,481.86
GFCF per worker (real, PPPs and current p, $)	2,365.28	3,541.83	5,466.30	7,029.99	6,521.31	4,984.94
GFCF per worker (real, PPPs and 1970 p, $)	2,333.41	3,394.62	5,225.52	7,264.32	7,704.50	5,184.47

FRANCE						
GFCF/GDP (nominal, %)	24.96	23.15	21.19	20.07	19.87	21.85
GFCF/GDP (real, PPPs and current p,%)	23.37	22.85	21.90	20.10	17.99	21.24
GFCF/GDP (real, PPPs and 1970 p, %)	23.07	21.92	20.89	20.71	21.32	21.58
GFCF per capita (real, PPPs and current p, $)	997.25	1,556.95	2,280.59	2,810.46	3,232.39	2,175.53
GFCF per capita (real, PPPs and 1970 p, $)	983.80	1,490.87	2,178.19	2,902.21	3,835.31	2,278.07
GFCF per worker (real, PPPs and current p, $)	2,426.81	3,810.12	5,708.18	7,224.67	8,262.05	5,486.37
GFCF per worker (real, PPPs and 1970 p, $)	2,394.03	3,648.44	5,452.68	7,460.29	9,809.66	5,753.02
GERMANY						
GFCF/GDP (nominal, %)	24.51	20.63	20.99	19.60	20.07	21.16
GFCF/GDP (real, PPPs and current p,%)	23.67	21.88	21.95	18.87	16.69	20.61
GFCF/GDP (real, PPPs and 1970 p, %)	23.36	20.98	20.95	19.42	19.78	20.90
GFCF per capita (real, PPPs and current p, $)	1,007.23	1,522.32	2,321.49	2,748.39	3,253.89	2,170.66
GFCF per capita (real, PPPs and 1970 p, $)	993.61	1,457.11	2,218.16	2,836.06	3,860.52	2,273.09
GFCF per worker (real, PPPs and current p, $)	2,308.18	3,567.53	5,346.46	6,204.28	7,239.30	4,933.15
GFCF per worker (real, PPPs and 1970 p, $)	2,276.96	3,415.11	5,109.13	6,400.88	8,589.64	5,158.35
ITALY						
GFCF/GDP (nominal, %)	24.49	23.58	22.55	20.08	18.48	21.84
GFCF/GDP (real, PPPs and current p,%)	22.68	21.34	20.56	18.37	15.95	19.78
GFCF/GDP (real, PPPs and 1970 p, %)	22.38	20.47	19.62	18.91	18.89	20.05
GFCF per capita (real, PPPs and current p, $)	764.94	1,172.46	1,857.68	2,293.48	2,625.96	1,742.90
GFCF per capita (real, PPPs and 1970 p, $)	754.80	1,122.65	1,774.63	2,367.32	3,113.59	1,826.60
GFCF per worker (real, PPPs and current p, $)	2,115.80	3,229.24	5,033.29	6,184.14	6,985.07	4,709.51
GFCF per worker (real, PPPs and 1970 p, $)	2,087.52	3,092.20	4,808.42	6,382.92	8,285.71	4,931.35

JAPAN						
GFCF/GDP (nominal, %)	35.01	31.17	29.46	28.66	30.35	30.93
GFCF/GDP (real, PPPs and current p,%)	29.64	29.46	28.37	26.82	26.00	28.06
GFCF/GDP (real, PPPs and 1970 p, %)	29.25	28.25	27.07	27.64	30.85	28.61
GFCF per capita (real, PPPs and current p, $)	1,031.46	1,678.11	2,660.83	3,751.63	5,113.00	2,847.01
GFCF per capita (real, PPPs and 1970 p, $)	1,017.28	1,606.20	2,542.56	3,878.06	6,075.85	3,023.99
GFCF per worker (real, PPPs and current p, $)	2,139.29	3,572.56	5,575.71	7,690.49	9,879.17	5,771.44
GFCF per worker (real, PPPs and 1970 p, $)	2,109.84	3,419.64	5,327.39	7,947.12	11,733.30	6,107.46
NETHERLANDS						
GFCF/GDP (nominal, %)	24.54	21.25	19.45	20.72	19.97	21.19
GFCF/GDP (real, PPPs and current p,%)	22.17	20.44	18.14	17.61	14.78	18.63
GFCF/GDP (real, PPPs and 1970 p, %)	21.88	19.60	17.32	18.13	17.53	18.89
GFCF per capita (real, PPPs and current p, $)	927.33	1,381.10	1,804.14	2,303.25	2,558.57	1,794.88
GFCF per capita (real, PPPs and 1970 p, $)	915.05	1,322.35	1,723.77	2,376.29	3,039.49	1,875.39
GFCF per worker (real, PPPs and current p, $)	2,580.98	3,969.99	5,057.11	5,930.71	5,941.18	4,695.99
GFCF per worker (real, PPPs and 1970 p, $)	2,546.61	3,801.31	4,832.79	6,110.11	7,057.67	4,869.70
NORWAY						
GFCF/GDP (nominal, %)	27.93	32.46	25.26	26.03	20.46	26.43
GFCF/GDP (real, PPPs and current p,%)	26.57	31.99	24.23	24.17	17.09	24.81
GFCF/GDP (real, PPPs and 1970 p, %)	26.22	30.70	23.14	24.91	20.25	25.04
GFCF per capita (real, PPPs and current p, $)	1,058.67	2,106.88	3,025.94	3,762.46	3,342.84	2,659.36
GFCF per capita (real, PPPs and 1970 p, $)	1,044.55	2,018.80	2,892.39	3,879.18	3,971.98	2,761.38
GFCF per worker (real, PPPs and current p, $)	2,549.34	4,636.35	6,414.74	7,579.60	7,106.37	5,657.28
GFCF per worker (real, PPPs and 1970 p, $)	2,515.88	4,443.62	6,131.44	7,815.53	8,446.23	5,870.54

SWEDEN						
GFCF/GDP (nominal, %)	21.85	20.34	18.93	19.86	17.13	19.62
GFCF/GDP (real, PPPs and current p,%)	19.65	19.43	18.38	18.39	14.99	18.17
GFCF/GDP (real, PPPs and 1970 p, %)	19.40	18.63	17.55	18.95	17.69	18.45
GFCF per capita (real, PPPs and current p, $)	949.51	1,441.41	2,047.74	2,823.18	2,750.71	2,002.51
GFCF per capita (real, PPPs and 1970 p, $)	936.88	1,381.11	1,957.36	2,915.79	3,249.02	2,088.03
GFCF per worker (real, PPPs and current p, $)	1,982.65	2,891.92	4,028.73	5,448.24	5,654.54	4,001.21
GFCF per worker (real, PPPs and 1970 p, $)	1,956.17	2,771.07	3,850.87	5,625.59	6,693.49	4,179.44
UNITED KINGDOM						
GFCF/GDP (nominal, %)	19.42	19.04	16.67	18.36	16.49	18.00
GFCF/GDP (real, PPPs and current p,%)	15.95	15.78	14.16	14.90	12.97	14.75
GFCF/GDP (real, PPPs and 1970 p, %)	15.74	15.13	13.53	15.36	15.37	15.03
GFCF per capita (real, PPPs and current p, $)	598.05	929.53	1,312.50	1,957.06	2,133.25	1,386.08
GFCF per capita (real, PPPs and 1970 p, $)	590.10	890.08	1,255.27	2,022.82	2,532.66	1,458.19
GFCF per worker (real, PPPs and current p, $)	1,350.07	2,085.53	3,050.80	4,378.62	4,762.77	3,125.56
GFCF per worker (real, PPPs and 1970 p, $)	1,332.07	1,997.13	2,918.20	4,522.54	5,659.50	3,285.89

Table B-2: Measures of Investment in Consumer Durables and Corresponding Adjustments to GDP:
Shares in Nominal GDP (Adjusted for Durables Service Value) of Nominal Investment in Consumer Durables (%)

	1970-74	1975-79	1980-84	1985-89	1990-94	1970-94
US	6.28	6.35	5.53	6.52	6.01	6.14
AVERAGE (12 countries)	5.59	5.98	5.44	5.86	5.35	5.65
Belgium	7.91	8.25	7.64	7.73	7.86	7.88
Canada	7.86	7.95	6.92	8.00	7.24	7.59
Denmark	6.10	6.72	5.14	5.52	4.68	5.63
Finland	5.16	5.70	5.70	6.33	4.39	5.46
France	4.34	4.93	4.96	4.73	4.28	4.65
Germany	5.54	5.76	5.42	5.84	5.96	5.70
Italy	4.92	5.35	6.00	6.28	6.16	5.74
Japan	3.20	3.28	3.30	3.96	4.53	3.65
Netherlands	6.30	7.14	5.53	5.65	5.36	6.00
Norway	5.15	5.82	4.89	5.31	3.69	4.97
Sweden	5.11	5.36	4.44	5.07	4.00	4.79
United Kingdom	5.48	5.53	5.40	5.94	5.43	5.56

Table B-3: Measures of Investment in Education:
Shares in Nominal GDP of Nominal Expenditures on Education (%)

	1970-74	1975-79	1980-84	1985-89	1990-94	1970-94
US	7.12	6.71	6.15	5.95	6.55	6.50
AVERAGE (12 countries)	5.10	5.64	5.60	5.39	5.59	5.46
Belgium	4.92	5.96	6.48	5.82	5.26	5.69
Canada	6.84	6.93	6.75	6.38	6.94	6.77
Denmark	5.63	6.24	6.89	6.27	6.69	6.34
Finland	5.20	5.87	5.77	6.03	7.17	6.01
France	4.62	5.14	5.17	5.09	5.29	5.06
Germany	3.60	4.57	4.71	4.49	4.52	4.38
Italy	4.22	3.94	4.92	5.11	5.30	4.70
Japan	3.73	4.51	4.40	4.03	3.78	4.09
Netherlands	5.96	6.71	6.41	5.81	5.26	6.03
Norway	5.98	5.95	4.50	5.41	6.23	5.62
Sweden	6.44	6.84	5.93	5.46	5.42	6.02
United Kingdom	4.11	4.95	5.20	4.73	5.16	4.83

Table B-4: Measures of Investment in R&D and Corresponding Adjustments to GDP: Shares in Nominal GDP (Adjusted for Business R&D) of Nominal R&D Expenditures (%)

	1970-74	1975-79	1980-84	1985-89	1990-94	1970-94
US	2.44	2.24	2.52	2.78	2.70	2.54
AVERAGE (12 countries)	1.49	1.51	1.73	2.00	2.06	1.76
Belgium	1.38	1.34	1.53	1.66	1.64	1.51
Canada	1.24	1.09	1.29	1.40	1.47	1.30
Denmark	0.98	0.98	1.12	1.40	1.71	1.24
Finland	0.86	1.00	1.29	1.71	2.08	1.39
France	1.81	1.74	2.01	2.24	2.36	2.03
Germany	2.11	2.21	2.45	2.75	2.70	2.44
Italy	0.82	0.77	0.89	1.17	1.28	0.99
Japan	1.91	1.98	2.38	2.77	2.88	2.38
Netherlands	1.95	1.88	1.90	2.14	1.86	1.95
Norway	1.10	1.24	1.24	1.61	1.68	1.38
Sweden	1.58	1.86	2.39	2.89	2.92	2.33
United Kingdom	2.10	2.09	2.24	2.20	2.15	2.16

Table B-5: Measures of Investment in Military Capital:
Shares in Nominal GDP of Nominal Military Capital Expenditures (%)

	1970-74	1975-79	1980-84	1985-89	1990-94	1970-94
US	1.49	1.01	1.40	1.72	1.32	1.39
AVERAGE (12 countries)	0.49	0.53	0.64	0.62	0.51	0.56
Belgium	0.47	0.59	0.64	0.45	0.23	0.48
Canada	0.21	0.22	0.40	0.48	0.40	0.34
Denmark	0.45	0.49	0.48	0.37	0.38	0.43
Finland	0.22	0.24	0.35	0.36	0.39	0.31
France	0.62	0.67	0.84	0.82	0.68	0.73
Germany	0.79	0.79	0.85	0.77	0.45	0.73
Italy	0.42	0.35	0.43	0.52	0.39	0.42
Japan	0.13	0.16	0.20	0.21	0.19	0.18
Netherlands	0.48	0.66	0.76	0.72	0.51	0.63
Norway	0.58	0.58	0.65	0.88	0.98	0.74
Sweden	0.56	0.55	0.64	0.59	0.52	0.57
United Kingdom	0.94	1.12	1.46	1.29	1.01	1.16

Table B-6: Expanded Measures of Investment and GDP

	1970-74	1975-79	1980-84	1985-89	1990-94	1970-94
US						
GFCF/GDP (nominal, %)	32.69	32.26	31.44	32.06	29.49	31.59
GFCF/GDP (real, 1970 prices, %)	32.26	30.92	30.03	33.00	35.07	32.26
GFCF per capita (nominal, $)	2,154.74	3,327.81	4,909.86	6,783.82	7,902.07	5,015.66
GFCF per capita (real, 1970 prices, $)	2,125.31	3,185.12	4,695.49	6,996.48	9,417.07	5,283.89
GFCF per worker (nominal, $)	5,350.47	7,771.86	11,111.41	14,503.75	16,830.58	11,113.62
GFCF per worker (real, 1970 prices, $)	5,277.64	7,441.45	10,625.82	14,951.75	20,061.35	11,671.60
AVERAGE (12 countries)						
GFCF/GDP (nominal, %)	35.31	35.20	32.51	32.74	30.67	33.29
GFCF/GDP (real, PPPs and current p,%)	33.10	34.28	32.16	31.34	27.63	31.70
GFCF/GDP (real, PPPs and 1970 p, %)	32.66	32.87	30.70	32.28	32.78	32.26
GFCF per capita (real, PPPs and current p, $)	1,443.45	2,413.96	3,624.89	4,883.94	5,492.23	3,571.70
GFCF per capita (real, PPPs and 1970 p, $)	1,424.04	2,311.56	3,464.75	5,041.56	6,522.88	3,752.96
GFCF per worker (real, PPPs and current p, $)	3,411.28	5,650.52	8,360.25	10,894.11	12,361.35	8,135.50
GFCF per worker (real, PPPs and 1970 p, $)	3,365.41	5,411.19	7,991.25	11,242.36	14,690.38	8,540.12
BELGIUM						
GFCF/GDP (nominal, %)	33.96	34.93	31.14	29.75	30.82	32.12
GFCF/GDP (real, PPPs and current p,%)	31.38	33.99	31.24	29.25	27.99	30.77
GFCF/GDP (real, PPPs and 1970 p, %)	30.97	32.60	29.83	30.14	33.21	31.35
GFCF per capita (real, PPPs and current p, $)	1,358.74	2,398.97	3,392.33	4,302.47	5,524.06	3,395.31
GFCF per capita (real, PPPs and 1970 p, $)	1,340.54	2,297.04	3,241.75	4,444.21	6,563.54	3,577.42
GFCF per worker (real, PPPs and current p, $)	3,524.77	6,312.26	9,171.62	11,575.82	14,675.47	9,051.99
GFCF per worker (real, PPPs and 1970 p, $)	3,477.45	6,044.00	8,766.11	11,953.67	17,447.11	9,537.67

CANADA						
GFCF/GDP (nominal, %)	35.70	36.46	33.90	34.33	32.17	34.51
GFCF/GDP (real, PPPs and current p,%)	31.11	32.63	33.58	34.13	31.94	32.68
GFCF/GDP (real, PPPs and 1970 p, %)	30.71	31.29	32.05	35.16	37.94	33.43
GFCF per capita (real, PPPs and current p, $)	1,561.55	2,850.99	4,793.25	6,807.76	7,558.12	4,714.33
GFCF per capita (real, PPPs and 1970 p, $)	1,540.58	2,729.43	4,579.33	7,031.16	8,981.67	4,972.43
GFCF per worker (real, PPPs and current p, $)	3,979.25	6,720.70	10,837.56	14,595.60	16,543.08	10,535.24
GFCF per worker (real, PPPs and 1970 p, $)	3,925.99	6,435.83	10,356.07	15,066.37	19,669.60	11,090.77
DENMARK						
GFCF/GDP (nominal, %)	35.14	34.00	28.60	30.56	27.45	31.15
GFCF/GDP (real, PPPs and current p,%)	34.18	34.80	29.41	30.03	24.54	30.59
GFCF/GDP (real, PPPs and 1970 p, %)	33.73	33.37	28.09	30.90	29.12	31.04
GFCF per capita (real, PPPs and current p, $)	1,639.38	2,547.87	3,269.63	4,697.29	4,866.80	3,404.20
GFCF per capita (real, PPPs and 1970 p, $)	1,616.98	2,439.79	3,127.57	4,840.47	5,786.07	3,562.18
GFCF per worker (real, PPPs and current p, $)	3,419.77	5,445.31	6,854.98	9,092.97	9,607.18	6,884.04
GFCF per worker (real, PPPs and 1970 p, $)	3,373.19	5,214.99	6,556.15	9,368.64	11,430.65	7,188.73
FINLAND						
GFCF/GDP (nominal, %)	37.40	37.62	36.13	36.79	30.90	35.77
GFCF/GDP (real, PPPs and current p,%)	39.39	40.07	39.21	37.15	29.24	37.01
GFCF/GDP (real, PPPs and 1970 p, %)	38.87	38.45	37.44	38.27	34.58	37.52
GFCF per capita (real, PPPs and current p, $)	1,562.66	2,503.21	4,104.97	5,601.29	5,222.51	3,798.93
GFCF per capita (real, PPPs and 1970 p, $)	1,541.59	2,398.55	3,925.03	5,786.85	6,174.50	3,965.30
GFCF per worker (real, PPPs and current p, $)	3,320.12	5,227.88	8,248.27	11,205.58	11,717.18	7,943.81
GFCF per worker (real, PPPs and 1970 p, $)	3,275.12	5,009.00	7,886.43	11,576.77	13,895.85	8,328.64

FRANCE						
GFCF/GDP (nominal, %)	34.48	33.86	32.33	31.00	30.70	32.48
GFCF/GDP (real, PPPs and current p,%)	32.78	33.53	33.13	31.04	28.80	31.85
GFCF/GDP (real, PPPs and 1970 p, %)	32.35	32.15	31.62	31.97	33.78	32.37
GFCF per capita (real, PPPs and current p, $)	1,478.43	2,423.77	3,692.58	4,652.16	5,497.28	3,548.84
GFCF per capita (real, PPPs and 1970 p, $)	1,458.48	2,320.64	3,528.20	4,802.71	6,452.09	3,712.42
GFCF per worker (real, PPPs and current p, $)	3,597.81	5,931.24	9,245.39	11,959.30	13,978.20	8,942.39
GFCF per worker (real, PPPs and 1970 p, $)	3,549.18	5,678.94	8,835.14	12,345.89	16,414.06	9,364.64
GERMANY						
GFCF/GDP (nominal, %)	33.91	31.62	31.81	30.83	31.07	31.85
GFCF/GDP (real, PPPs and current p,%)	33.01	33.02	32.85	30.00	27.29	31.23
GFCF/GDP (real, PPPs and 1970 p, %)	32.57	31.66	31.37	30.89	32.39	31.78
GFCF per capita (real, PPPs and current p, $)	1,531.59	2,510.58	3,829.37	4,807.79	5,794.26	3,694.72
GFCF per capita (real, PPPs and 1970 p, $)	1,510.92	2,403.11	3,659.85	4,961.54	6,883.99	3,883.88
GFCF per worker (real, PPPs and current p, $)	3,510.11	5,883.93	8,820.50	10,852.45	12,891.84	8,391.77
GFCF per worker (real, PPPs and 1970 p, $)	3,462.72	5,632.69	8,431.12	11,197.25	15,317.66	8,808.29
ITALY						
GFCF/GDP (nominal, %)	33.08	32.57	33.23	31.34	29.54	31.95
GFCF/GDP (real, PPPs and current p,%)	31.10	30.04	30.91	29.31	26.59	29.59
GFCF/GDP (real, PPPs and 1970 p, %)	30.70	28.80	29.51	30.19	31.52	30.14
GFCF per capita (real, PPPs and current p, $)	1,110.28	1,732.08	2,945.61	3,907.72	4,715.12	2,882.16
GFCF per capita (real, PPPs and 1970 p, $)	1,095.41	1,658.21	2,814.82	4,034.70	5,597.92	3,040.21
GFCF per worker (real, PPPs and current p, $)	3,071.28	4,770.21	7,981.35	10,536.50	12,549.47	7,781.76
GFCF per worker (real, PPPs and 1970 p, $)	3,029.81	4,566.98	7,627.18	10,878.35	14,905.80	8,201.63

JAPAN						
GFCF/GDP (nominal, %)	41.86	38.93	37.38	37.03	38.61	38.76
GFCF/GDP (real, PPPs and current p,%)	36.49	37.22	36.29	35.17	34.28	35.89
GFCF/GDP (real, PPPs and 1970 p, %)	36.01	35.69	34.64	36.25	40.68	36.65
GFCF per capita (real, PPPs and current p, $)	1,332.26	2,242.70	3,639.19	5,287.01	7,286.04	3,957.44
GFCF per capita (real, PPPs and 1970 p, $)	1,313.95	2,146.63	3,478.50	5,465.04	8,661.27	4,213.08
GFCF per worker (real, PPPs and current p, $)	2,763.44	4,774.56	7,624.95	10,838.06	14,075.69	8,015.34
GFCF per worker (real, PPPs and 1970 p, $)	2,725.41	4,570.27	7,287.56	11,199.42	16,723.54	8,501.24
NETHERLANDS						
GFCF/GDP (nominal, %)	36.22	35.08	31.42	32.32	30.53	33.11
GFCF/GDP (real, PPPs and current p,%)	33.67	34.14	29.98	28.90	24.79	30.30
GFCF/GDP (real, PPPs and 1970 p, %)	33.24	32.74	28.62	29.76	29.42	30.75
GFCF per capita (real, PPPs and current p, $)	1,539.16	2,507.14	3,263.45	4,108.57	4,606.14	3,204.89
GFCF per capita (real, PPPs and 1970 p, $)	1,518.81	2,400.49	3,118.06	4,237.93	5,475.83	3,350.22
GFCF per worker (real, PPPs and current p, $)	4,284.65	7,206.80	9,147.80	10,582.47	10,697.22	8,383.79
GFCF per worker (real, PPPs and 1970 p, $)	4,227.71	6,900.62	8,742.02	10,900.30	12,716.54	8,697.44
NORWAY						
GFCF/GDP (nominal, %)	38.50	43.53	34.60	36.78	30.97	36.88
GFCF/GDP (real, PPPs and current p,%)	37.05	43.03	33.49	34.79	27.82	35.23
GFCF/GDP (real, PPPs and 1970 p, %)	36.56	41.30	31.97	35.83	32.63	35.66
GFCF per capita (real, PPPs and current p, $)	1,565.95	3,027.96	4,436.96	5,803.28	5,637.09	4,094.25
GFCF per capita (real, PPPs and 1970 p, $)	1,545.15	2,900.86	4,241.49	5,979.84	6,623.22	4,258.11
GFCF per worker (real, PPPs and current p, $)	3,772.37	6,661.30	9,406.95	11,694.67	11,980.49	8,703.16
GFCF per worker (real, PPPs and 1970 p, $)	3,723.06	6,383.30	8,992.23	12,051.60	14,080.87	9,046.21

SWEDEN						
GFCF/GDP (nominal, %)	33.38	32.87	30.41	31.79	27.95	31.28
GFCF/GDP (real, PPPs and current p,%)	30.96	31.84	29.80	30.12	25.61	29.67
GFCF/GDP (real, PPPs and 1970 p, %)	30.56	30.54	28.46	31.03	30.33	30.18
GFCF per capita (real, PPPs and current p, $)	1,601.09	2,531.77	3,558.68	4,954.06	5,062.49	3,541.62
GFCF per capita (real, PPPs and 1970 p, $)	1,579.74	2,425.58	3,401.83	5,114.77	5,997.93	3,703.97
GFCF per worker (real, PPPs and current p, $)	3,342.89	5,079.52	7,001.58	9,562.09	10,458.40	7,088.90
GFCF per worker (real, PPPs and 1970 p, $)	3,298.16	4,866.73	6,692.88	9,869.87	12,418.49	7,429.23
UNITED KINGDOM						
GFCF/GDP (nominal, %)	30.13	30.97	29.14	30.43	28.10	29.75
GFCF/GDP (real, PPPs and current p,%)	26.05	27.03	26.03	26.22	23.90	25.84
GFCF/GDP (real, PPPs and 1970 p, %)	25.71	25.91	24.86	27.02	28.38	26.38
GFCF per capita (real, PPPs and current p, $)	1,040.34	1,690.52	2,572.69	3,677.90	4,238.98	2,644.09
GFCF per capita (real, PPPs and 1970 p, $)	1,026.33	1,618.36	2,460.53	3,799.55	5,042.19	2,789.39
GFCF per worker (real, PPPs and current p, $)	2,348.87	3,792.52	5,982.03	8,233.84	9,475.90	5,966.63
GFCF per worker (real, PPPs and 1970 p, $)	2,317.14	3,630.86	5,722.08	8,500.18	11,281.07	6,290.27

Appendix C: Figures

Figure 1: Price of Capital Formation to Price of GDP Ratios in the U.S. (1970=1.00)

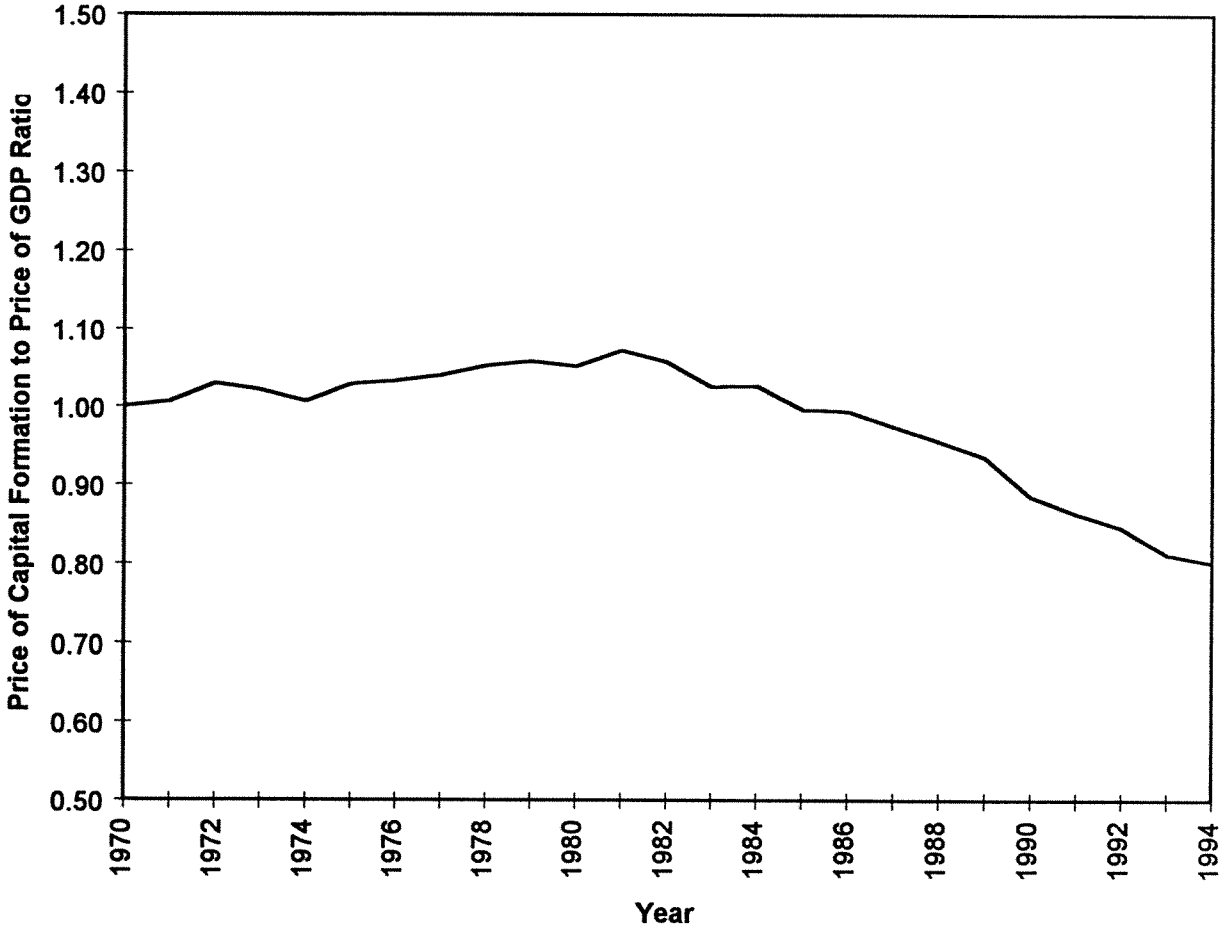

Figure 2: Price of Capital Formation to Price of GDP Ratios

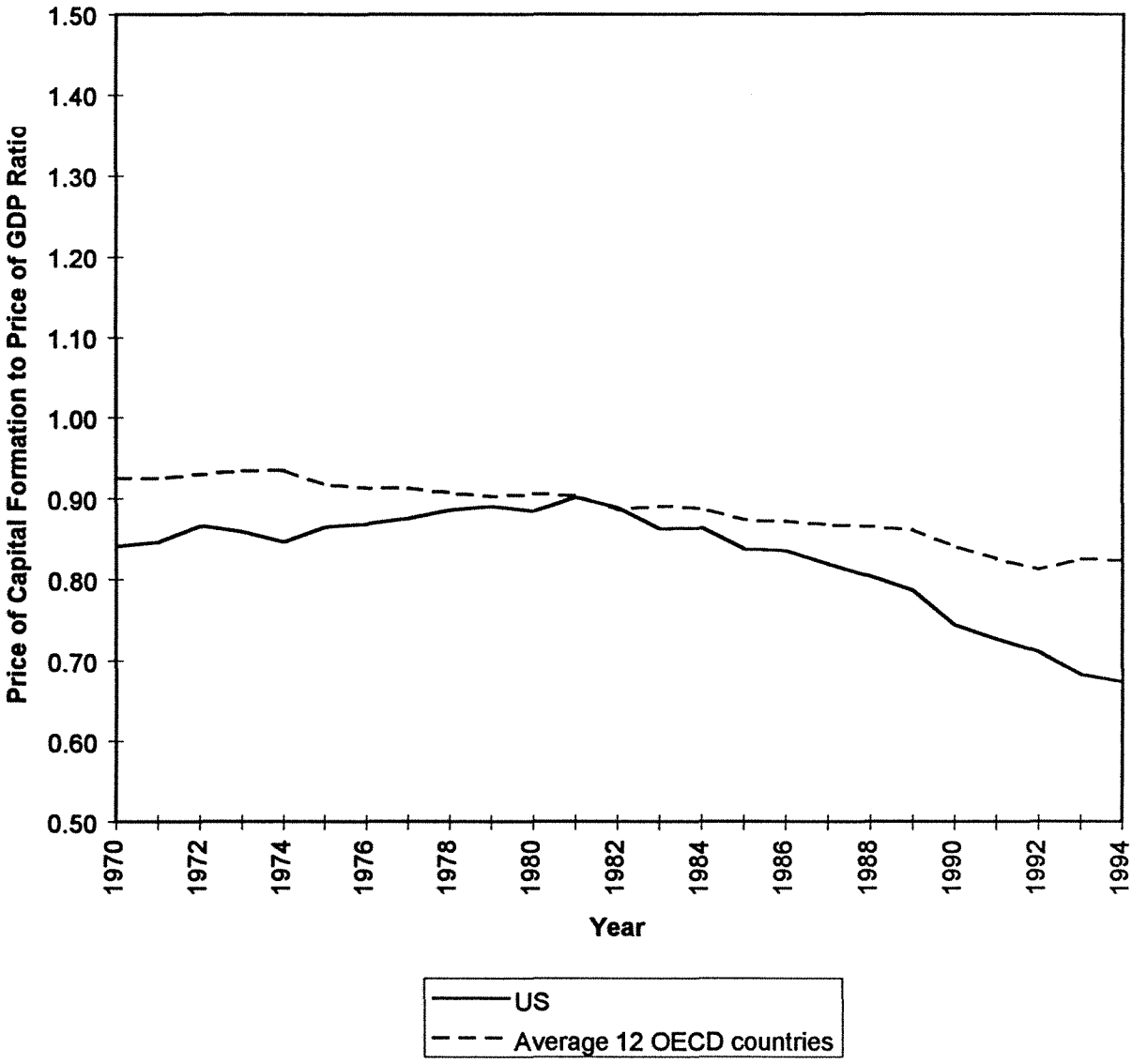

Figure 3: Conventional Nominal vs. Conventional Real Capital Formation Ratios

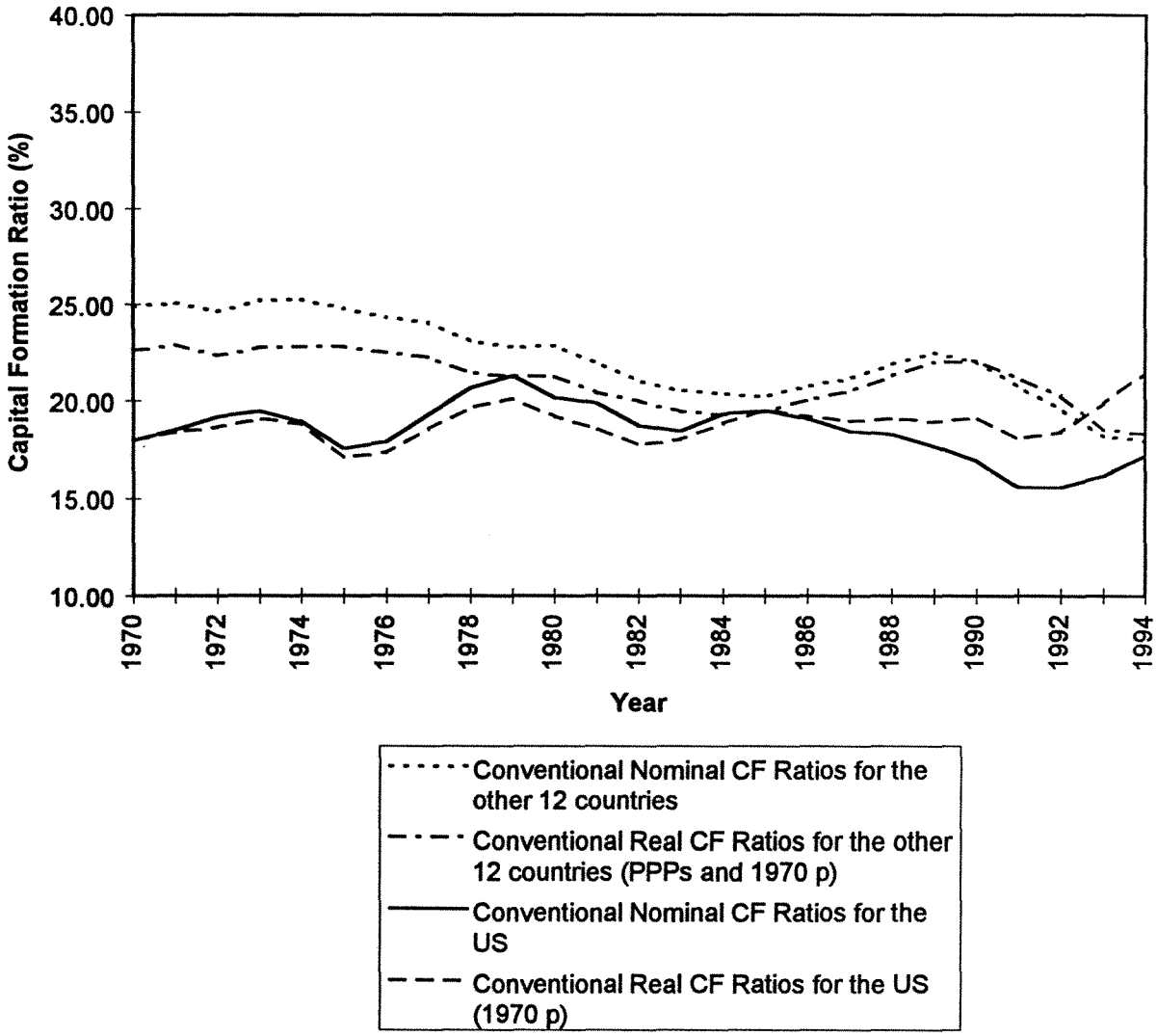

Figure 4: Conventional Real vs. Broad Real Capital Formation Ratios