Extended Measures of Investment and Saving

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EXECUTIVE SUMMARY

National accountants treat as consumption all expenditure incurred in purchasing consumer durables and in forming intangible assets such as knowledge, education and good health. The case is made in this paper that the national accounts measures of saving and investment understate both the extent to which we save and the extent of the resources that we allocate to investment. Moreover, the national accounts data do not allow us to monitor substitution between tangible and intangible assets.

These features have prompted much international discussion, particularly in the United States, of ways of improving the international 'System of National Accounts', which guides national accountants in the preparation of national accounts. We survey the literature describing the work done and follow the methodology used to produce extended measures of investment and saving for Australia.

Our extended measures provide a different picture of Australia's saving record to that provided by the national accounts. In particular, our extended measure of saving suggests that the decline in our saving performance has been much smaller than suggested by national accounts data. For example, the national accounts measure of gross saving, averaged over the period 1959 to 1973, is 4.3 per cent of GDP higher than the average for 1974 to 1991: using an extended measure of saving closes the gap to about 2 per cent of GDP.

Over this period there was a marked shift in the pattern of Australia's investment away from tangible assets towards intangible assets. National accountants treat expenditure on intangible assets as consumption; thus the change in the composition of our investment expenditure could explain much of the trend decline in the national accounts measures of gross saving.

When interpreting our estimates and the policy implications of this paper it is important to bear the following points in mind.

- We measure saving in terms of the opportunity cost of deferred consumption and for a range of reasons this may differ from the expected discounted value of the stream of future returns. Put more directly, some of the investments made with those savings may offer poor returns to the nation. Thus our extended measure of saving is not intended to indicate the extent to which the nation's wealth has increased.

- When we re-define consumer durables, education and part of health expenditure as investment we are not claiming that those expenditures necessarily make major contributions to the nation's productive capacity. Rather we are making the distinction because those expenditures are expected to provide some future benefits. This distinction is important in getting our analysis right because the expected stream of future benefits will influence future behaviour. For example, the stock of consumer durables and the benefits it provides influences current and future consumption and saving choices.

- The methodology we use in producing our extended measures leaves unchanged the estimate of Australia's saving-investment imbalance. Thus we have nothing new to say on the issue of how to measure Australia's saving-investment imbalance. Rather, this paper focuses on how to measure the levels of saving and investment. Such analysis is a first step towards improving our understanding of these concepts.

We use the extended measures of investment and saving to make international comparisons. Again a different picture emerges to that painted by comparisons based on the national accounts.

Specifically, we find that the extended measure of saving increases for all countries. Of the OECD countries surveyed the greatest increase in measured saving occurs for the United States and Australia and the least increase for Japan. The changes in the relative saving performance that emerge using the extended measures reflect the similar investment paths of the US and Australia. Both invest relatively heavily in intangible assets such as human capital in the form of health and formal education while Japan invests relatively lightly in this area (though perhaps more in workplace training).

The findings of our paper suggest that a key issue for future research may not only be how to raise national saving, but also how to allocate this saving between tangible and intangible assets so as to promote economic growth and higher living standards. Specifically, does the path to higher living standards for Australia require us to emulate countries that invest relatively lightly in human capital and heavily in physical capital? Alternatively, are we on the right path by investing heavily in human capital? A related question for future research is whether we have the right mix of health, education and training for our investment in human capital.

1. INTRODUCTION

We use statistical measures to help us understand the economy and to design policy. Their suitability, therefore, depends on our analytical framework, the relevant policy questions and the available data. Thus, statistical measures that are satisfactory for one purpose may be unsatisfactory for another.

The history of national accounting illustrates well the interrelationships between policy relevance, analytical framework and data availability. In the seventeenth century, England's Sir William Petty and Gregory King and France's Boisguillebert and Vauban conducted early work in estimating national income for England and France respectively. Their main objective was to assess their nation's revenue raising and war potential.

In the 1920s the focus turned to the link between the standard of living and national income. In this period, welfare economists led by Pigou undertook some of the first effective measurements of national income.

With the Great Depression of the 1930s and the subsequent rise of Keynesian economics, the intellectual focus shifted from welfare measures to general measures of economic activity and the link between activity and employment. This shift, along with governments taking a greater role in managing and coordinating the domestic and international economies, gave much of the impetus for the development of modern national income accounting in the post-war era.

Recent developments in economic theory, changes in policy focus and improvement in data have initiated further developments in national accounting overseas.[1]

We have four objectives in this paper.

- First, to define wealth, income, consumption, investment and saving. By discussing their linkages with living standards, we lay the basis for extended measures of investment and saving.

- Second, to summarise the overseas literature on extended measures of investment and saving.

- Third, to explain how we have obtained our own extended measures of investment and saving for Australia and comparable countries.

- Fourth, to discuss the domestic and international trends that emerge using these extended measures.

Our work is not intended to be definitive. Rather, we have attempted to take a small step in constructing extended measures of investment and saving for Australia. Our main objective is to stimulate constructive debate in an area that we consider to be neglected. We are not suggesting that the national accounts should necessarily be changed to reflect our extended measures.

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[1] Key developments include the shift away from the version of Keynesian economics that focuses on broad aggregates towards new classical, new Keynesian and real business cycle theories, each of which places much greater emphasis on microeconomic foundations and therefore requires data more in accord with microeconomic theory than that provided by the national accounts. Other important developments which may influence national accounts data in the future include Amartya Sen's work on the standard of living and the recent revival of interest among academics in growth theory. Governments in many countries have seemingly placed greater emphasis on polices meant to achieve higher long-term growth rates. This is demonstrated most clearly in the emphasis placed on microeconomic reform and taxation reform over the last decade.

Rather we suggest that there are strong arguments for adjusting the data contained in the national accounts to analyse some economic issues. For example, in this paper, we seek to measure the proportion of expenditure that produces future benefits. We call such expenditure 'investment'. After taking into account net lending to overseas, we obtain a measure of the extent to which people defer consumption, that is, save. We stress that this measure does not imply that the investments are worthwhile. Future extension of our work could attempt to measure the expected discounted value of the future benefits of these investments. Comparing that measure with our measure would yield a measure of how well we use our saving.

Finally, we ask readers to focus on the issues that we raise and the insights we gain by using the extended measures rather than the fine detail of our methodology.

1.1 What is Wealth, Consumption, Investment, Saving?

Income, consumption, investment, saving and wealth are not primary economic concepts. Rather, they are all concepts that must be defined in terms of the primary economic objectives of the individual or community that we intend to analyse.

We assume that improved domestic living standards is a primary economic objective pursued by people and their governments. Consequently, we define wealth as the stock of assets that have the capacity to produce the present and future living standards of the nation's citizens either directly by increasing their well-being or indirectly by producing goods and services for their benefit. Thus it encompasses a range of forms including physical, natural, knowledge, human and social (Figure 1.1).

National accountants do not produce a measure of wealth for the nation but seemingly use an implicit notion of wealth in defining other concepts. National accountants generally act as if wealth comprised three types of tangible assets - assets that produce goods and services for the market, public infrastructure and dwellings. National accountants do not usually collect extensive data on a number of assets that are important in influencing economic growth and living standards. These can include natural capital such as land, mineral deposits, livestock, climate and the environment. The national accounts, moreover, exclude virtually all intangible capital such as knowledge, human capital and social capital.[2] A more comprehensive categorisation of capital is shown in Figure 1.1, with the components treated as capital by national accountants shaded. Currently, national accountants treat expenditure on all of these items as either final or intermediate consumption. In this paper, we define consumption as expenditure on goods and services that yield today's living standards but which do not confer any benefits in the future. Similarly, we define

Figure 1.1 Forms of Capital

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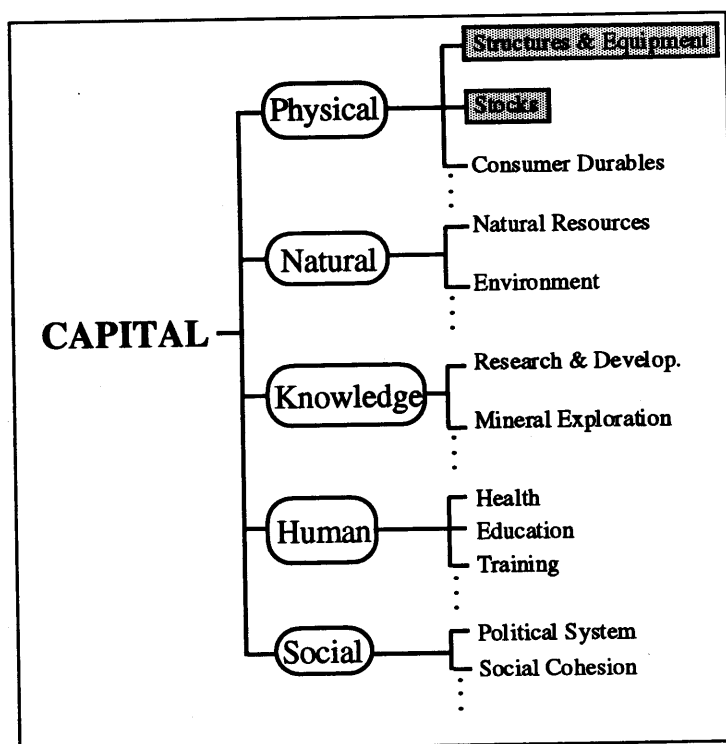
[2]   See Appendix A.

investment as the flow of goods and services that produce assets that will underpin future living standards.[3] Applying this definition we treat as investment that expenditure incurred in accumulating intangible assets such as health, education and knowledge. This reassessment of expenditures between consumption and investment provides us with an extended measure of investment in tangible and intangible assets, and later an extended measure of saving.

Many of the tangible and intangible assets that have influenced Australia's economic growth and living standards are difficult to measure. Moreover, this is particularly so for those assets - such as knowledge and human capital - that are the focus of the new academic theories of economic growth. Nonetheless, it is important for Australia to have some measures, albeit imperfect, of the extent to which we are allocating saving to intangible assets rather than to tangible assets.

1.2 Research Overseas

Work in producing extended measures of income, consumption, investment and saving is concentrated in the United States.[4] The extent of US research reflects among other things the perceived inadequacy of the official Bureau of Economic Analysis (BEA) National Accounts.[5]

The measures of these researchers increase the BEA's measures of national income, consumption and investment (Table 1.1). Kendrick and Eisner employ similar methodologies and produce similar results for investment, but different for consumption and national income (see Boxes 1.1 & 1.2 for their treatment of investment). Jorgenson and Fraumeni, employing a radically different method that incorporates demographic factors, produce a measure of intangible investment much greater than the others (Box 1.3).

Table 1.1: Consumption and Gross Investment
(percentage of BEA GNP for year 1966)

Account	Consumption	Gross Investment		
		Tangible	*Intangible*	*Total*
BEA	61.5	16.6	0.0	16.6
Kendrick	63.8	39.8 [a]	26.3	65.8
Eisner	98.1	37.6	26.7	64.3
Jorgenson-Fraumeni	65.7 [b]	27.8 [c]	262.3 [d]	290.1

[a] Human and non-human.   [b] Excluding value of time spent in non-market household production and leisure.
[c] Non-human investment.   [d] Human investment, tangible and intangible.
Note that the accounts also re-define the GNP to be much greater than BEA GNP.
Source: Eisner (1989) p.122.

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[3]   This definition highlights the importance of defining the 'current period' when determining what constitutes investment or consumption. The shorter the period, the more likely that an asset will deliver benefits in future periods and therefore constitute investment. When a longer time period is used, the converse applies. We use a time period of one year to conform with the convention adopted by most statistical organisations.

[4]   Christensen & Jorgenson (1969, 1973), Nordhause and Tobin (1973), Kendrick (1976), Eisner (1980, 1988, 1989, 1991, 1993), Goldsmith (1982, 1985), Ruggles & Ruggles (1982), Ruggles (1993), Jorgenson & Panchon (1983), Jorgenson & Fraumeni (1987) and Lipsey & Kravis (1987a, 1987b) have all made substantial contributions.

[5]   In the BEA accounts, gross investment is limited to gross private domestic investment - defined as expenditures on structures, equipment and inventories by private businesses and non-profit institutions - and net foreign investment. It excludes other important items, such as public investment.

Box 1.1 Kendrick

Kendrick (1976) defines gross investment as being the outlays by all sectors that yield a flow of services extending over more than one annual accounting period. He divided gross investment into *tangible* and *intangible* investments: tangible investment encompasses investments in 'material' capital; intangible investment encompasses investments made primarily to improve the quality or productivity of the tangible human and non-human factors in which they are embodied.

Tangible investment was then subdivided into *non-human* and *human* investment. Tangible *non-human* investment includes new construction, equipment and inventory accumulation, while tangible *human* investment includes the costs of rearing children to working age.

In turn, *intangible* investment was subdivided into *non-human* and *human* investment. Intangible *non-human* investment includes expenditure on research and development while intangible *human* investment includes expenditure on education and training, half of the expenditure of health, and mobility costs. Mobility costs included the costs of job search and hiring, frictional unemployment and migration.

Box 1.2 Eisner

Eisner suggests a range of potential extensions to the national accounts measures of investment. These include investment acquisitions of durable goods of all kinds by households and government as well as additions to inventories in all sectors of the economy. In addition, they might include, by way of tangible capital, additions to the value of land as it is developed as well as expenditures that look to the discovery or development of natural resources. They might count changes in inventories of oil and coal below the ground as well as above it. Further, extended accounts would include intangible investment in research and development by both business and government. They would include intangible investment in health, education and training, and information.

Eisner (1989) extends the BEA measure of gross investment by including: all expenditure on structures and equipment; changes in inventories for all sectors; and investment in research & development, education and training, and health. Moreover, he includes the effect of net capital asset revaluation as a component of gross investment.

Box 1.3 Jorgenson et al

Jorgenson with Christensen, Fraumeni and Panchon have produced extended measures of consumption and investment, with their major innovations in the area of human capital. Jorgenson and Panchon (1983) argue that human capital is accumulated through births, immigration and investment in education, and decumulated through deaths, emigration and ageing. Non-human capital is accumulated through the acquisition of investment goods and decumulated through the deterioration and retirement of investment goods.

Hence, for Jorgenson et al, gross human investment in any year is the sum of the present values of lifetime incomes for all individuals born in that year and all of that year's new immigrants plus the imputed labour compensation for formal schooling for all individuals enrolled in school.

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2. CONSUMPTION OR INVESTMENT

In allocating expenditures between consumption and investment we follow the basic methodology of Kendrick (1976) and Eisner (1989).

Four important points arise from our methodology. First, the list of items under analysis is not exhaustive. For example, we have not attempted to measure investment in social 'assets', such as political stability and cultural institutions. Such a task is simply too difficult. Further, because of limited space and data, we have not dealt with natural capital.[6] We have limited our study to selected components of physical capital, human capital and knowledge.

Second, we have concentrated on *gross* rather than *net* measures of investment and saving. That is, we do not take capital consumption into account.[7]

Third, just as national accountants do not deal with the returns to tangible investment we do not deal with the returns to intangible investment. We give investment expenditure on education and health the same weight as investment expenditure on structures or equipment. That is, we value investments at their cost of production rather than at the expected discounted present value of flow of future private and public benefits. This approach is appropriate for our purposes because it gives a measure of the extent to which a nation defers consumption and a measure of its investment in a range of capital assets. The latter measure helps us to understand the broad trends in our allocation of investment. We make no claims that our measures say anything about the efficiency or quality of these investments.

Appendix A has a more detailed discussion of the conceptual issues that arise in measuring saving and investment.

Fourth, because of data limitations, we have not included in our measure of investment the effect of changes in the value of existing assets. Eisner suggests that changes in the value of assets change wealth and therefore represent investment or disinvestment. Such revaluations can stem from alterations in income flows, relative prices of inputs and outputs, technology, discount rates and risk. Operating through these relative price effects, changes in international terms of trade may affect the aggregate value of a nation's capital.

2.1 Physical Capital

Physical capital assets are tangible, durable and reproducible assets that produce benefits into the future. They therefore include the national accountants' measures of investment in equipment and structures and increase in stocks.

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[6] Natural capital includes assets such as land, mineral deposits, livestock and the environment. Usher (1980) observes that excluding subsoil assets from capital would create the odd situation of having to treat Saudi Arabia, despite its oil reserves, as a capital-poor country. Environmental assets, such as the Great Barrier Reef, also produce a range of benefits into the future and thus should, in principle, be included in measures of the capital stock. Because meaningful data are not available, we have not estimated Australia's investment in natural capital. In Section 2.3, however, we have treated expenditure on mineral exploration as investment in the acquisition of knowledge.

[7] See Appendix A.

However, we have argued that fixed capital expenditure by all sectors, including the household sector, represent investment. One question, discussed in overseas research, is whether expenditure on consumer durables should be treated as investment.

Both Kendrick and Eisner believe they should. Kendrick writes:

> ... if households lease equipment or buy equipment services from private firms (eg., laundromats), the capital outlays of those firms show up as investment, and the depreciation and net return on the investments are part of income and product. But if households buy the equipment, the purchases do not appear as investment (although they are part of consumer outlays), and the implicit interest and depreciation portions of the rental values are not included in income and product. (Kendrick (1976), p.5)

Eisner makes the same case:

> If Hertz, Avis, or any other private company buys an automobile, that constitutes investment... [However,] automobiles purchased by households are part of personal consumption expenditures. Yet, in terms of economic theory and analysis, the automobile in each case, like any other durable good, is investment in that it will provide future services. (Eisner (1989), p.5)

Following Kendrick and Eisner we include expenditure on consumer durables as part of investment. Thus our extended measure of physical investment adds expenditure on consumer durables to the national accountants' measure of gross fixed capital expenditure.

2.2 Human Capital

> Once one leaves the *terra firma* of material capital and branches out into
> the upper aether of human capital there is endless difficulty in finding a
> resting place. Bauer & Yamey (1957), p.27

A considerable literature, beginning with Schultz (1961) and Becker (1975), has argued that investment in human beings is analogous to investment in physical capital since they both generate a future stream of benefits. In particular, endogenous growth theories link human capital investment with economic growth.[8] In this paper, we focus on human capital investments in education and health, which, unlike other forms, have data readily available.

Expenditures on health and education have both consumption and investment components. The period over which the benefits accrue determines the relative weight of these components. We classify expenditures as investment if they result in the formation of assets that are expected to yield benefits beyond one year. We classify expenditures as consumption if the benefits accrue solely in the current year. These benefits may be improved individual well-being or increased productive capacity.

Education and health, more so than other forms of capital, comprise highly diverse components, with the balance between consumption and investment different for each specific health and education program. For example, inoculating an individual against typhoid has most of the benefits accruing beyond the current year. Alleviating the symptoms of a cold, in contrast, has the great majority of the

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[8]   Investment in human capital (in particular education) is at the centre of 'new growth' models presented by Lucas (1988), Buiter & Kletzer (1991), Azariadis & Drazen (1990) and Romer (1989, 1990a,b).

benefits restricted to the current year. Therefore, though both are health expenditures, typhoid inoculation would be mostly investment, cold alleviation would be mostly consumption.

2.2.1 Education

Education forms intangible assets that raise future living standards.[9] There are two sources of expenditure on education: direct outlays, and the opportunity cost to the individual of the lost earnings during the period of education. Different parts of education expenditure comprise varying mixtures of consumption and investment, with their separation extremely difficult. We assume here that *all* private and public sector outlays are investment. However, we neglect the opportunity cost of lost earnings. Lipsey & Kravis (1987a) also adopt this approach, justifying it by suggesting that overestimating on one roughly compensates for underestimating on the other. Clearly, this is unsatisfactory, but it represents the best that can be done with available data.

Thus, our extended component of investment in education is that which the national accountant currently refers to as final consumption expenditure on education.

2.2.2 Health

The national accountant currently defines all current expenditures on health as final consumption expenditure. Part of these expenditures should be re-defined as investment in human capital because they generate intangible assets that raise future living standards. The assets are in the form of a healthy population, and the benefits these provide are in terms of the impact this has on individual well-being and economic growth. These benefits can be classified into four types:

- reduced death rates;

- reduced disability;

- reduced debility; and

- increased well-being.

Reduced death rates, disability and debility are benefits that directly affect the productive capacity of the economy. Investment in improved health also yields considerable intangible benefits in terms of increased well-being.

With health expenditures, there is a particular difficulty involved with measuring the amount of current health expenditures that are *true* consumption, and the amount that more accurately represents investment. In the literature there have been several attempts at measuring this. These attempts can be classified into two groups.

Arbitrary Allocation: As the distinction between consumption and investment in health is difficult to determine, some authors have made an arbitrary assumption about these relative proportions. For example, Kendrick (1976), in looking at the US, has assumed a 50-50 split between investment and

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[9] Although there has been a considerable amount of work estimating the future benefits from expenditures on education, the results are mixed and inconclusive. Maglen's (1993) survey of the evidence suggests that economic returns do exist, but their extent is uncertain. Evidence on the returns to the individual from education are considerable, though evidence on the returns to the economy from education is mixed.

consumption while Eisner (1989) has assumed a 60-40 split. These proportions are not justified on any persuasive theoretical or empirical basis. Rather, they represent an arbitrary allocation based on (as Kendrick (1980) puts it) "the least objectionable and convenient assumption" (p.173).

Program-by-Program Analysis: Gates (1984) argues that a small-pox vaccination provides benefits over an extended time and represents an investment on that basis. An insulin injection - like diet and exercise and the provision of sanitation and clean water - must be constantly reapplied to provide benefits and represents consumption (or maintenance, to use his analogy of a machine) on that basis. Gates estimates health investment and consumption by separating total health care costs into those incurred on programs associated with producing long-term benefits (investment) and those producing only short-term benefits (consumption). He concludes that over the period 1952 to 1978, between 36.1 and 39.8 per cent of US health expenditures are investment.

Following a similar methodology to Gates (see Appendix B), we estimate that in 1989-90 approximately 53 per cent of health expenditure currently defined by the national accountant as consumption, should be re-defined as investment. Disaggregating, around 71 per cent of institutional consumption expenditure (mainly hospitals), and around 33 per cent of non-institutional consumption expenditure (such as medical and dental) is more appropriately treated as investment in human capital.

In reclassifying some health expenditure as investment we are not claiming that such expenditures necessarily promote higher economic growth (as currently defined). Rather we are focusing on the future benefits that these expenditures provide. In making health expenditure decisions, people are likely to focus on these future benefits: thus their behaviour may well differ from the case where all benefits are received in the current period.

2.3 Knowledge

There are two elements of the accumulation of knowledge that we have examined when looking at extended measures of saving. These are expenditures on research and development (R&D) and natural resource exploration.[10]

2.3.1 Research and development

R&D is defined by the national accountant and the Organisation for Economic Co-operation and Development (OECD) as:

> . . . creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. ABS (8104.0), OECD (1981)

Although this complies with our definition of investment, national accountants classify outlays on R&D as intermediate consumption on the basis that the accrual nature of the future benefits from R&D are uncertain. This argument seems unconvincing, however, since the accrual nature of future benefits

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[10]   Although data on R&D (ABS 8104.0, 8109.0) and mineral exploration (ABS 8407.0) are not measured on the same basis as the National Accounts, they are the only data available. In using these, we have assumed that capital expenditures on R&D and mineral exploration *are* included in investment in physical capital, while other 'current' expenditures are treated as intermediate consumption.

from all investments is uncertain. Lattimore (1991) has emphasised the importance of R&D expenditures in determining competitive advantage and sees R&D as 'hidden' investments.

There is, moreover, a growing literature that views R&D as directly contributing to the stock of technical innovations and therefore economic growth. Some of the more noteworthy studies of this so-called new (or endogenous) growth theory that emphasises the returns to the stock of knowledge generated by R&D include Romer (1989, 1990a,b), Grossman & Helpman (1991) and Segerstrom (1991).

Therefore, we have reclassified current expenditures on R&D as an extended component of investment. As GDP includes all *final* (and no *intermediate*) expenditures, we have also had to re-defined GDP to include R&D expenditure.

2.3.2   Natural resource exploration

Just as R&D is an investment through the accumulation of scientific and technical knowledge, natural resource exploration is also an investment through the accumulation of knowledge of the location, or absence, of natural resource deposits. Outlays on mineral exploration exhibit strong investment characteristics. Thus, their current classification by national accountants as intermediate consumption is questionable.

Accordingly, in this paper, we have included current costs of private mineral exploration[11] as an extended component of investment. As for R&D, we have had to re-define GDP.

2.3.3   Other sources of knowledge

A small country such as Australia can obtain productive knowledge from overseas through avenues such as:

- importing new products;

- observing new production processes;

- encouraging direct investment that embodies new technology;

- accessing overseas research results; and

- observing the experience of other countries.

Thus knowledge accumulation can come about indirectly through the openness of an economy to foreign trade and investment as well as through the quality of our communications with the rest of the world.

Exporting also requires and can result in the accumulation of knowledge about foreign markets and particularly about the products and services that will succeed in those markets.

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[11]   Petroleum and oil shale exploration have been excluded due to lack of data. Further, capital expenditures are excluded as they are already included in the national accountant's measure of investment.

3. RESULTS

In Section 3.1, we progress our discussion of Section 2 by applying this methodology to Australian data. In Section 3.2 we aggregate the results to form, first, an extended measure of investment, and, second, an extended measure of saving for Australia. In Section 3.3 we report international comparisons of savings and investment using both our extended measures and the national accounts measures of saving and investment.

3.1 Components of the Extended Measure of Investment for Australia

3.1.1 Physical investment

Our extended measure of physical investment comprises expenditure on equipment and structures, consumer durables[12] and stocks. Gross investment in physical capital as a proportion of GDP has declined over the past three decades (Chart 3.1).

Until the late 1980s, the bulk of the decline in physical capital occurred in consumer durables with expenditure on equipment and structures relatively stable. However the recession brought with it a sharp decline in investment in equipment and structures.

The average level of stock holding and the variability of stocks has also declined over the last three decades possibly reflecting improved inventory control.
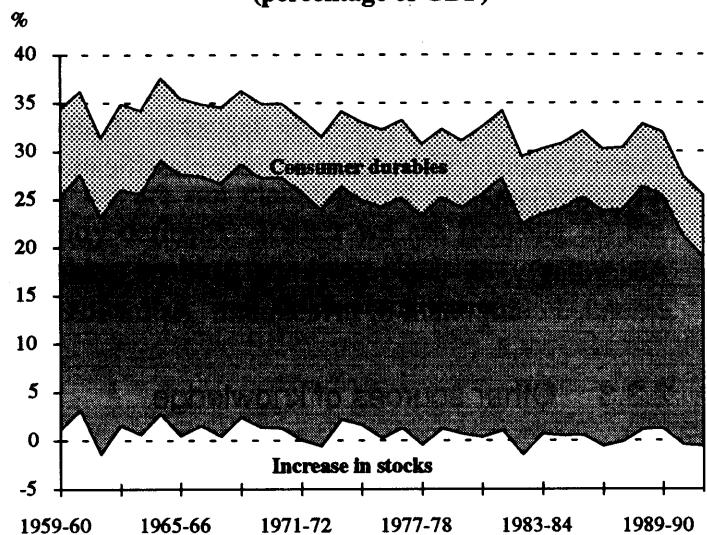
Chart 3.1: Investment in Physical Capital (percentage of GDP)

Source: ABS (5204.0)

3.1.2 Human capital

As we discussed earlier, we have defined human capital investment to be made up of investment in formal education and health. Workplace training is neglected because of inadequate data. Even so, the increase in investment in human capital has risen dramatically since the early 1970s.
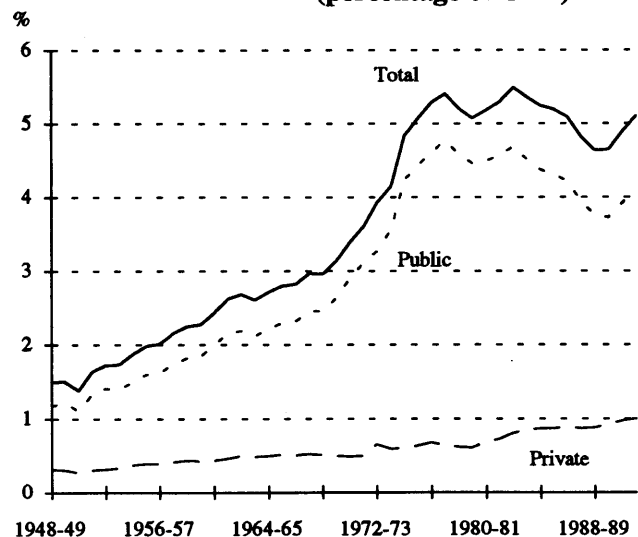
Education

The share of GDP going to investment in education increased at an average rate of 0.1 per cent of GDP per year until 1973 (Chart 3.2). Education's share then jumped to over 5 per cent

Chart 3.2: Investment in Education (percentage of GDP)

Source: ABS (5204.0)

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12 Including automobiles.

10

of GDP. Education's share of GDP then stabilised and remains at about 5 per cent of GDP today.

The dramatic changes in education expenditures occurred primarily in the public sector. Private expenditures increased at a constant rate throughout the period. Private expenditure on education currently stands at about 1 per cent of GDP.

Health

We applied the methodology discussed in Section 2.2.2 to estimate the component of expenditure[13] on health that represents investment. Our estimates suggest that investment in health has doubled over the last four decades and currently stands at about 4 per cent of GDP (Chart 3.3).

As with education, in the early to mid 1970s there was a dramatic rise in the share of GDP allocated to health.
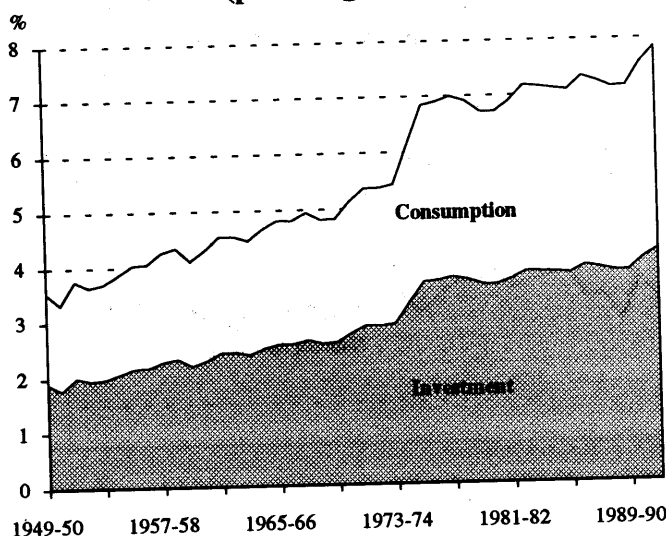
Chart 3.3: Consumption & Investment in Health
(percentage of GDP)

Source: ABS (5204.0)

3.1.3 Knowledge

Our estimates suggest that investment in gaining knowledge accounts for less than one per cent of GDP. However, as discussed in section 2.3.3, a small country such as Australia may obtain much of its knowledge from indirect sources. Thus Australia's investment in the accumulation of knowledge may be under represented.

Data on current expenditures on R&D is extremely patchy (particularly for the early periods), and the level has been relatively constant at around 0.7 - 0.8 per cent of GDP during the 1980s (see data appendix).

Current expenditures on exploration of mineral reserves have generally not been large - about one per cent of GDP since the late 1960s. However, they have fluctuated considerably - increasing rapidly during the mineral booms of the early 1970s and 1980s (see data appendix).


13   Capital expenditures (as defined by national accountants) are excluded as they are already included in investment.
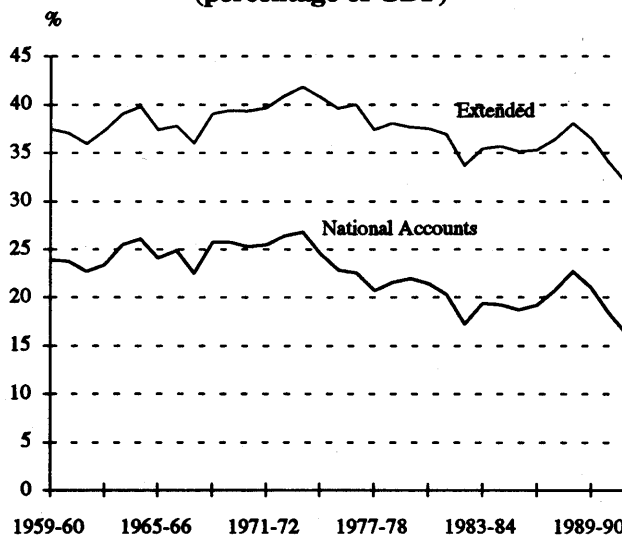
3.2 Extended Measures of Investment and Saving for Australia

Charts 3.4a and 3.4b show the different pictures of our investment and saving behaviour provided by extended and national accounts measures.

Chart 3.4a: Extended Gross Investment
(percentage of GDP)
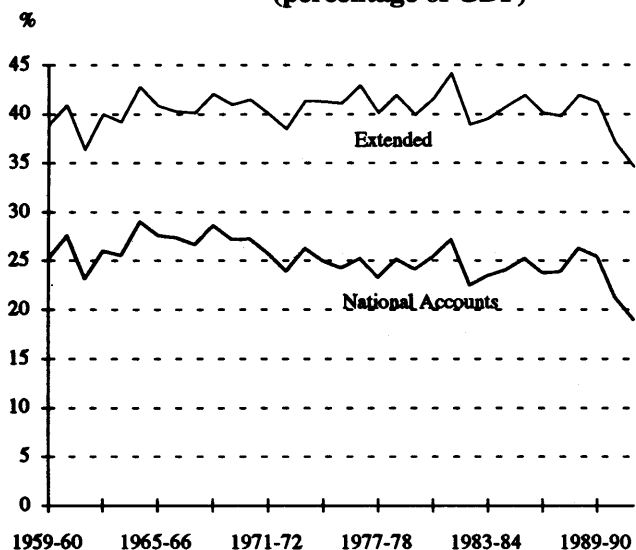
Chart 3.4b: Extended Gross Saving
(percentage of GDP)

3.2.1 Broad trends in investment

We find that our extended measures change the picture regarding investment in two ways.

First, as a nation, we have been investing more heavily than is suggested by the national accountants' measure. In particular, whereas the national accounts measure of investment has shown a slight trend decline our extended measure of investment shows no such trend (Chart 3.4a).

Second, as a nation, we have been investing relatively less in physical assets and relatively more in intangible assets (Chart 3.5a & b).[14]

Thus our paper suggests that future research may need to focus on the reasons for the shift from investment in physical capital towards investment in intangibles. In particular, the extent to which this substitution has resulted from:

- market generated changes in private rates of return to physical capital, human capital and knowledge accumulation;

- government actions directed at remedying socially sub-optimal levels of investment; and

- government actions that go beyond remedying socially sub-optimal levels of investment in intangibles.

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[14] Intangibles here are defined as the national accountant's consumption component of education, (53.4 per cent of) health, R&D and mineral exploration. Tangibles are defined as the sum of physical capital investment (including capital expenditure on health, education, R&D and mineral exploration), increase in stocks and consumer durables.

12

Answers to these questions would form the basis for an assessment of whether the observed changes in the mix of investment promoted growth in living standards to the maximum degree possible.

Chart 3.5a: Tangibles
(percentage of GDP)
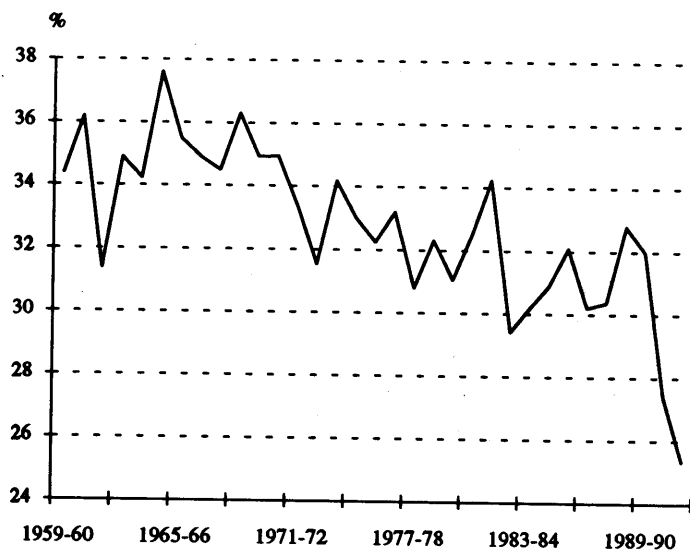
Chart 3.5b: Intangibles
(percentage of GDP)
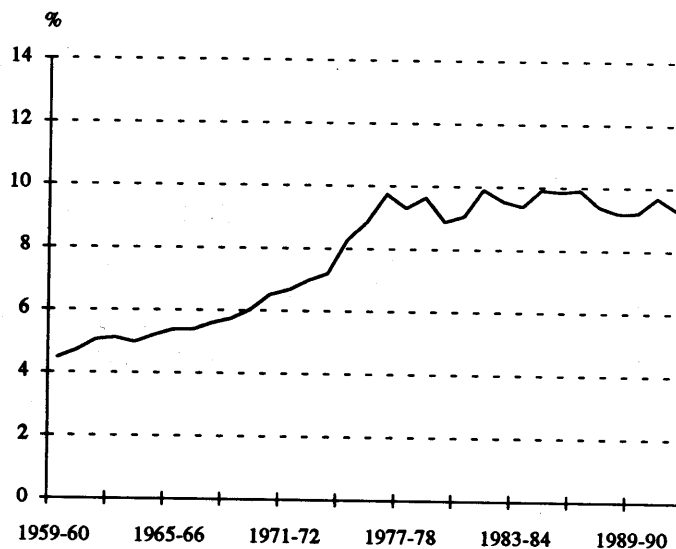
3.2.2 Broad trends in saving

We can form an extended measure of saving by using the *ex post* identity[15]:

extended measure of saving ≡ extended measure of investment + net lending to overseas

Comparing our extended measures of saving with those produced by the national accountant confirms that there has been some decline in our saving over the past three decades (Chart 3.4b). This decline, however, is less pronounced in our extended measures of saving than in the national accountant's measure. For example, the national accounts suggest that the average national saving rate for 1974 to 1991 is 4.3 per cent of GDP lower than the average for 1959 to 1973. However, our extended measures suggest that the average extended saving rate for 1974 to 1991 is only about 2 per cent of GDP lower than the average for 1959 to 1973 (Table 3.1).

The difference between the national accountants' measure and our measure reflects the major change in the composition of investment over the last three decades. Because of the residual way in

Table 3.1: Measures of Gross Saving
(percentage of GDP)

Measure of Saving	Average 1959-60 to 1973-74	Average 1974-75 to 1991-92	Percentage point change
National Accounts	24.8	20.5	-4.3
Extended[a]	38.5 (38.4)	36.6 (36.3)	-1.9 (-2.2)

[a]The bracketed figures exclude R&D and mineral exploration, which are patchy and are unavailable for earlier periods.

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15   Refer to Appendix A for more detail of this relationship.

which saving is measured, this change in the composition of saving means that the national accounts underestimates our willingness to forgo current consumption.

Our extended measure of saving should not be interpreted as promoting complacency about Australia's saving task. The reasons that FitzGerald (1993) and Byrne (1993) give for being concerned about the decline in the national accountant's measure of saving also suggest that as a nation we should be concerned about the decline, albeit smaller, in our extended measure of saving. Moreover, international investors and lenders focus on the national account's measures in assessing Australia's creditworthiness.

3.3 International Comparisons of Investment and Saving

International comparisons are fraught with difficulty, even when using national accounts data. Each country produces its national accounts using its own conventions that often differ substantially between countries. However, various organisations, such as the OECD, reorganise their members' national accounts on a comparable basis. Because these accounts are derived directly from those of each member nation, substantial differences remain, making comparisons only indicative rather than precise.[16]

3.3.1 Investment

Australia spends relatively heavily on investment when compared to other countries.[17] This trait is evident using both the national accountants' measure and our extended measure. Moreover, like the United States we invest relatively heavily in consumer durables, education and health. Thus extended measures increase our investment rates relative to countries such as Japan that invest comparatively lightly in human capital[18] and consumer durables (Chart 3.6).

Chart 3.6: International Extended Investment (1978 to 1990)[a]
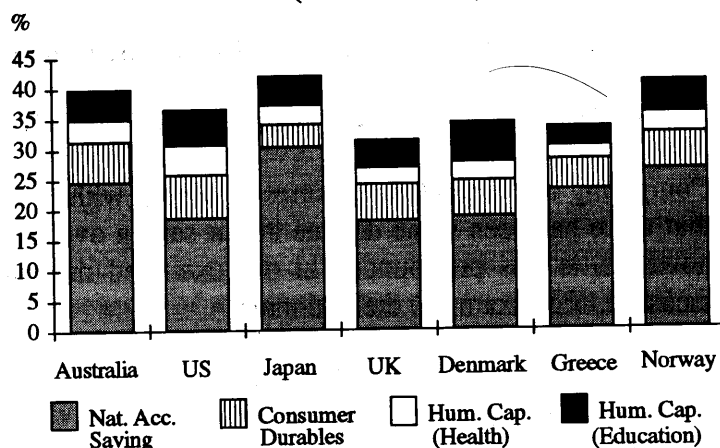
a US and Denmark: 1978 to 1989, Greece: 1978 to 1988.

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16 To aid in our comparisons we have excluded measures of R&D and natural resource exploration because they are patchy and inconsistent. Moreover, for consistency, we will include 50 per cent of health consumption expenditures as investment for all countries, including Australia. Thus, for these international comparisons, we derive the extended measure of saving by summing each national accountant's measure of saving with their estimate of consumption expenditure on consumer durables, education and 50 per cent of health. We have also adopted the OECD practice of referring to fiscal years by the year in which it begins.

17 We repeat that these results make no suggestion as to the return of the investments into which these savings have been placed - the rates of return in conventional forms of saving may or may not be higher than the extended forms. As a corollary, price differentials may also be a factor - Australia may spend more on (and thus save more in the form of) consumer durables than Japan because their relative price is higher in Australia.

18 Our definition of human capital includes only expenditures in health and formal education. It therefore excludes workplace training, which may be significant in Japan's case.

Earlier, in Section 3.1, we reported the composition shift in Australian investment from physical capital to intangibles over the period 1959-60 to 1991-92. Investment in physical capital decreased by 9.7 percentage points, while investment in intangibles increased by 4.8 percentage points - a ratio of about 2:1. Because of data limitations, it is difficult to assess whether this is part of a worldwide trend. However, focusing on US, Japan and UK during the 1980s, we can make several observations.

Although the results are sensitive to the period chosen, the US has experienced a similar shift from investment in tangibles to intangibles as has Australia (Charts 3.7a and 3.7b). Over the period 1978 to 1989, US investment in tangibles decreased by 4.5 per cent, while investment in intangibles increased by 2 per cent.

However, this phenomenon does not appear to have occurred in Japan or the UK (Chart 3.7c and 3.7d). In both cases, investment in intangibles remains relatively constant during the 1980s, while investment in physical capital fell during the early part of the decade before rising again in the latter part.

Chart 3.7: International Composition Shift in Investment

(percentage of GDP)
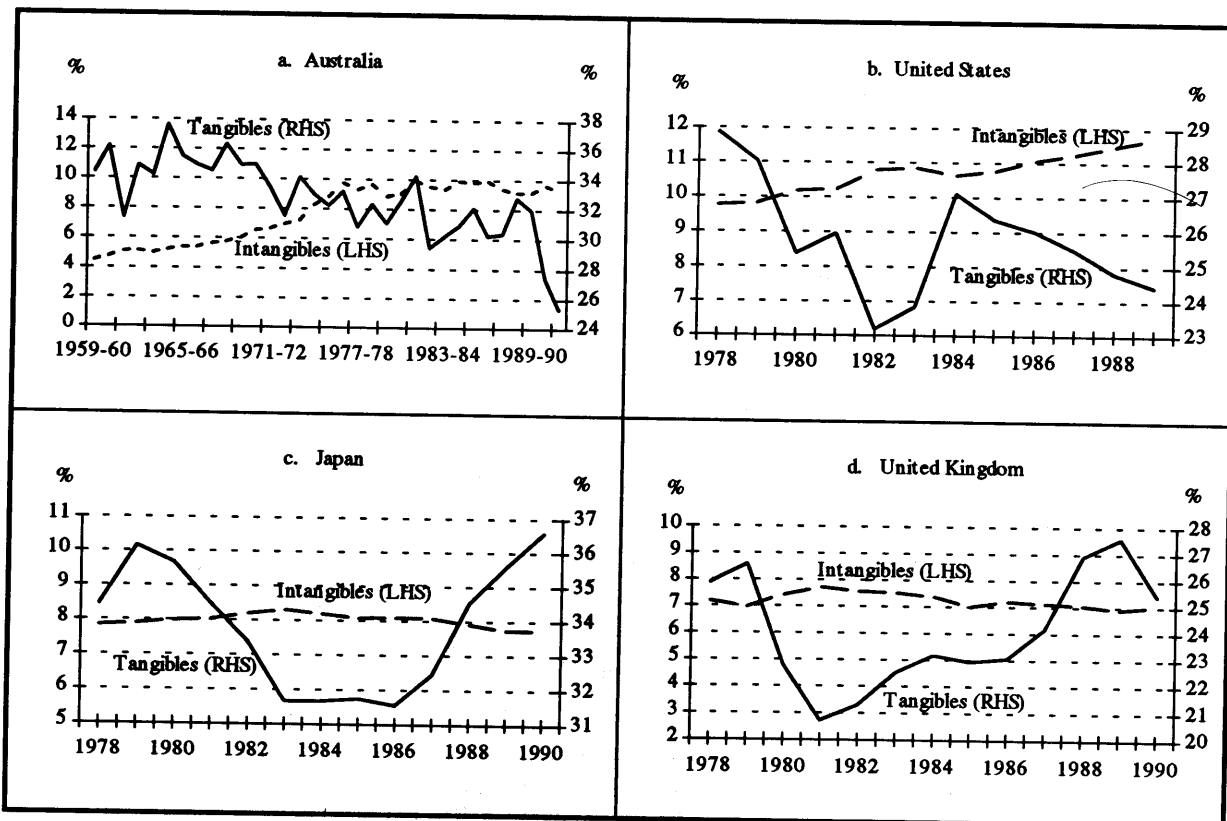
Source: OECD (1992), Chart 3.5

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3.3.2 Saving

Japan has a significantly higher saving rate than Australia, the United States and the United Kingdom - the gap is of the order of 12 to 15 per cent of GDP, when national accounts measures form the basis for comparison. However, the saving lead of Japan over Australia, the United States and the United Kingdom, is reduced by between 1.5 to 6.5 per cent of GDP if extended measures of saving form the basis for comparison (Table 3.2).

Table 3.2: Average Gross Saving 1978-1990[a]
(percentage of GDP)

	US	Japan	Australia	UK.
National Accounts	17.3	32.0	20.2	17.0
Extended measure	**35.1**	**43.7**	**35.5**	**30.4**

[a] US: 1978-89

3.3.3 Using national accounts data

Section 3.3.1 illustrates our contention that, because the mix of investment differs between countries, national accounts data will give misleading impressions of relative saving and investment performance. The key point is that if a country commits more of its expenditure to human capital, knowledge or consumer durables, its investment and saving rates, as measured by the national accounts, will be understated relative to other countries.

Moreover, we observe substantial differences between OECD countries in their mix of investment (Chart 3.6). This suggests that international comparisons of investment and saving behaviour made between OECD countries using national accounts data may be misleading.

It has become commonplace to compare Australia's saving and investment performance with that of the rapidly developing countries in the region using national accounts data. We could not obtain sufficient data to make comparisons with these countries using extended measures of investment and saving. However, we do have sufficient data to compare investment in human capital[19] for Singapore and Taiwan with that for Australia, the United Kingdom, the United States and Japan.

Chart 3.8: International Comparison Human Capital Component of Extended Saving (1989-90)
(percentage of GDP)
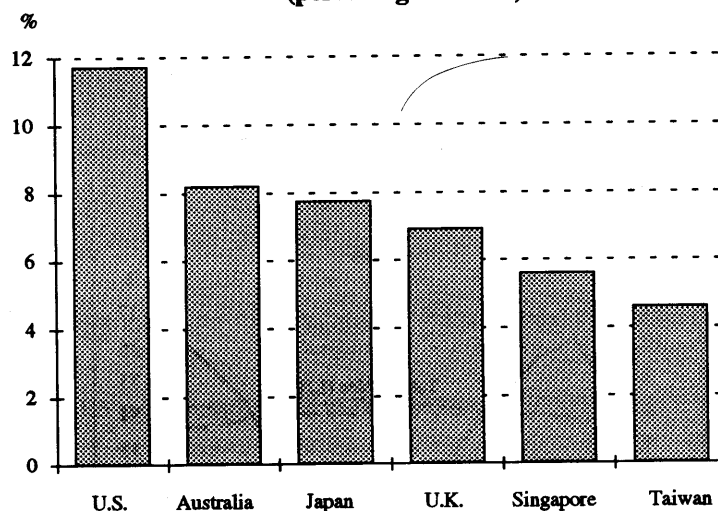
Source: OECD (1992); Dept. of Statistics, Singapore (1991);
Directorate-General of Budget, Rep. of China (1992);
Ministry of Education, Rep. of China (1991); World Bank (1991).

The four OECD countries invest substantially more in human capital than the two non-OECD Asian economies (Chart 3.8). This suggests that comparing our saving performance with these economies may systematically underestimate our relative saving and investment performance if national accounts measures of saving and investment form the basis for the comparison.

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[19] Human capital investment is estimated as expenditure on education and half of the expenditure on health.

4. CONCLUSIONS

Much of economic policy focuses on the question of how governments can improve the living standards of their citizens. We have argued that the national accounts measures of consumption, income, investment and saving are not sufficiently comprehensive to provide complete policy insights in this area.

In particular, we argue that expenditures on consumer durables, knowledge (in the form of research and development and exploration of mineral reserves), education, and part of health represent investment.

There are a number of alternative measures of saving and investment each one suited for a particular purpose. We have chosen an extended measure of saving that represents the extent to which a nation defers current consumption. Our measure says nothing about the quality of the investments made with that saving nor do we claim that the investments made can necessarily be justified given the returns that they generate.

For Australia, our extended measure suggests that the decline in our willingness to save has been much less than that suggested by the measures of national saving produced in the national accounts. For example, the national accounts suggest that the average national saving rate for 1974 to 1992 is about 4.3 per cent of GDP lower than the average for 1959 to 1973. However, our extended measures suggest that the average extended saving rate for 1974 to 1992 is only about 2 per cent of GDP lower than the average for 1959 to 1973.

The difference arises because Australia has been following a long term trend in which we now allocate a larger share of our saving to investment in intangible assets such as education, health and knowledge. Similarly a smaller share of saving now goes to investment in tangible assets such as equipment and structures.

We draw two conclusions from our work regarding comparisons of saving behaviour over time and across countries. First, compositional changes may make it misleading to compare national accounts measures of saving over long periods of time. Second, because of the different investment mixes of countries it is often misleading to compare national accounts' measures of saving and investment across countries.

One important area of future study, therefore, would be to investigate the extent to which the change in Australia's investment pattern towards intangible assets and away from tangibles has been beneficial.

APPENDIX A: CONCEPTS, DEFINITIONS AND MEASURES

A.1 Introduction

In this appendix we:

- discuss the relationship between our definitions of income, consumption, investment and saving and the definition developed by Haig, Simons and Hicks;

- explain why we have used gross rather than net measures of saving;

- set out the definitions that link *ex post* measures of income, saving, consumption and investment; and

- set out the components of the ABS measures of saving and investment.

A.2 Concepts

Haig (1959), Simons (1938) and Hicks (1946) remain the main references for defining income, consumption, investment and saving. We focus on the definitions proposed by Hicks and explain why and how we think his definition needs to be modified to suit our purpose - which is to provide information that is useful in understanding the relationship between saving, investment and growth in living standards.

Hicks defined *income* to be "the maximum value that [a person] can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning" (p.172). Hicks goes on, "Thus, when a person saves, he plans to be better off in the future; when he lives beyond his income, he plans to be worse off in the future" (p.172).

Our definition is very close to Hicks' except that we explicitly define the term 'well off' to relate to living standards.

Hicks' definition and our definition are impracticable in the sense that the central components of both definitions - 'how well off one is' in the case of Hicks' and 'living standards' in the case of our definition - are nebulous and impossible to measure with precision.

We depart from the Hicksian approach when it comes to the question of how to make the definitions practical. Hicks suggests using a first approximation in which 'how well off one is' is measured by the "capital value of prospective receipts" (p.173).

The problem with Hicks' approximation is that it is valid only where there are complete markets that operate well, without any externalities and without government induced distortions. In contrast, much of modern economic theory focuses on the possibility that markets for assets such as human capital, knowledge and even physical capital are incomplete or operate imperfectly. Modern theories of economic growth focus on the possibility that investment in knowledge, human capital and physical capital may produce external effects that are not adequately reflected in market prices.[20] Moreover,

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[20] In a perfectly competitive economy with complete markets private benefits are equated to the cost of investing at the margin and, in the absence of external effects, social benefits are equal to private benefits. However, the suspected presence of external benefits in investment, heavy government involvement in health and education and the possibility of

welfare economists such as Amartya Sen point out that living standards are influenced by a range of factors other than market outcomes and thus economic aggregates such as GDP are inadequate indicators of relative living standards.

These considerations mean that we need to distinguish between:

- the opportunity cost in terms of current consumption of the flow of resources diverted from current consumption; and

- the expected value of the stream of future benefits from the investments made using resources diverted from current consumption.

We also need to distinguish between private valuations, market valuations and social valuations.

Finally, we need to come to grips with the issue of how to value the future benefits from assets that are not mediated through the market.

In the face of these problems we have taken the view that it is not possible to produce meaningful concepts of investment or saving, capable of being measured, that are suitable for all purposes. Our view is that the best approach to understanding the relationship between saving, investment and living standards is to construct a range of partial measures each of which provides some relevant information. In some cases the measures will be precise; in other cases the measures will be more qualitative.

In this paper we have chosen to produce a measure of saving that represents the extent to which the nation defers consumption of goods that are mediated through the market, measured at market prices. In doing this we have also produced measures of investment in intangibles, measured in terms of market prices. We can therefore compare investment in intangibles with investment in tangibles.

A.3 Definitions

Like Hicks, we provide *ex ante* definitions of income and saving - definitions that are meant to be used for the analysis of behaviour. Measurement, however, is usually more concerned with *ex post* definitions which look at what people actually saved, not what they intended to save.

Ex post definitions of saving have two important features that we employ when constructing our extended measures of saving. First, *ex post* net saving is equal to the change in the value of public and private assets. Second, gross saving is equal to gross investment plus net lending to foreigners.

Hence, a change to the measure of investment will change the measure of saving. Thus, for this paper, the definition of investment is pivotal. Consistent with most definitions, we define *investment* as the 'formation of assets that are expected to produce benefits beyond the current period', which equals 'the change to the capital stock'. *Consumption*, in contrast, is the using up of assets in the current period.

It is important to note that the terms we have been using are all 'net concepts', that is, net of capital consumption in the form of depreciation or obsolescence. Although *net* investment, in principle, gives a better measure of the change in productive capacity of the economy, *gross* investment is used more often. This is for several reasons. First, the measurement of depreciation and obsolescence is fraught

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incomplete markets means that we cannot use the perfect competition assumption to justify valuing investment on the basis of cost of production.

with difficulty, and therefore often unreliable. Second, international comparisons of gross investment, and thus saving, are more reliable than those of net investment, because of the unreliable measurement of depreciation and the different techniques used. Third, it is often gross investment that is important, since it better reflects the introduction of new technology into the economy. Hence, we will concentrate on gross investment and saving measures rather than the net measures.

We can summarise the relationships involving the concept of saving as:

$$Saving \equiv \Delta\ Wealth$$

$$\equiv Income - Consumption$$

$$\equiv Investment + Net\ Lending\ to\ foreigners$$

A.4 The ABS Measures of Saving

The Australian Bureau of Statistics (ABS) bases the Australian National Accounts (ANA) on the United Nations' *A System of National Accounts* (SNA). In the ANA, saving is defined as the excess of each sector's income over its outlays. It appears in the ANA disaggregated into its components (Figure A.4).

Figure A.4: ABS Measure of Saving
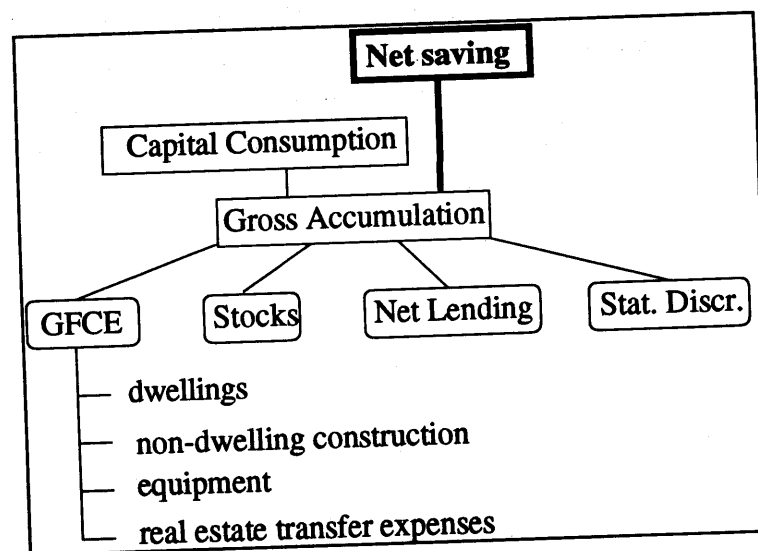
However, this is a **net** saving measure; to obtain a **gross** saving measure, the ABS adds back the estimate of capital consumption. The ANA refers to this as the *finance of gross accumulation*.

Equal to the *finance of gross accumulation* is the *gross accumulation* estimate, since the former is the source of funds for the latter. The ANA also disaggregates *gross accumulation* into its components.

Ignoring the statistical discrepancy[21], we can compare the ABS measures with the economic concepts given in section A.2. That is:

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21 The statistical discrepancy represents the inequality between the *finance of gross accumulation* and *gross accumulation* due to methodological differences and data collection errors.

Economic Concepts:	*Saving*	$\equiv$	*Investment*	+	*Net lending*
ABS Measures:	*Finance of gross accumulation*	$\equiv$	*Gross fixed capital expenditure*	+	*Net lending to overseas*
			+		
			Total increase in stocks		

The key correspondence is between the economic concept of investment and the measure of 'gross fixed capital expenditure + total increase in stocks'.

The ABS defines 'gross fixed capital expenditure' as the outlays on assets with a productive life exceeding one year. Excluded from the measure are expenditures on non-reproducible tangible assets such as land, mineral deposits and timber tracts. Because of the uncertainty associated with their future productive capacity, the ABS also excludes additions to livestock, and outlays on mineral exploration, research & development and durables for military use.

The ABS defines stocks as including goods for sale, work in progress and raw materials and stores. Again, livestock are excluded.

A recent review of the SNA has recommended a number of changes to the treatment of several expenditures:

• mineral exploration expenditure reclassified as investment expenditure;

• expenditure on entertainment, literary or artistic works and computer software reclassified as expenditure on intangible assets; and

• expenditure on military equipment and non-dwelling construction which could be used for non-military purposes reclassified as gross fixed capital expenditure.

Rejected were the reclassification of military equipment not covered above and research and development as investment.

The SNA treat changes in livestock as gross fixed capital expenditure or inventories depending on the purpose for which they are raised. The ABS have not followed the SNA treatment because of data difficulties; however, this practice is to be reviewed.

The ABS is also intending to extend their treatment of natural capital by producing 'balance sheets' for land, major sub-soil assets, livestock and forests.

APPENDIX B: METHODOLOGY FOR ESTIMATING HEALTH INVESTMENT

B.1 Overview

We argued in Section 2.3.2 that a portion of what the ABS defines as final consumption expenditure on health would be more properly described as investment. Health expenditure, however, is composed of highly differentiated components - some are predominantly consumption, others are predominantly investment - so no general assessment can be made. The task, therefore, is to develop a method to determine the relative proportions of health expenditure that are consumption and investment.

Two approaches have been taken by research overseas. The first is to make an intuitive estimate, perhaps guided by professional opinion, but not based on any systematic method. Kendrick (1976) and Eisner (1989) take this approach. The second approach is that of Gates (1984). He disaggregates total current health expenditures into separate components and determines whether these components are likely to result in the formation of assets that are expected to produce benefits within the current period (consumption) or beyond the current period (investment). We have adopted Gates' systematic method, which we judge to be more precise and to allow for future development as better sources of data become available.

The best disaggregated data is that of the Australian Institute of Health and Welfare (AIHW), which is essentially consistent with the more highly aggregated ABS expenditure data.[22] Unfortunately, the AIHW (1992) data exists only for the year 1989-90, and thus we have been forced to apply our results for this one year to the entire time series. As time series data becomes available, we would wish to derive and apply a more appropriate investment ratio for each year.

With the ABS already treating <u>capital</u> health expenditures as investment, we have applied our methods to the AIHW <u>current</u> health expenditures. This current expenditure can be divided into institutional (hospitals, nursing homes, etc) and non-institutional (general medical and dental practices) categories.

B.2 Institutional

Institutional current expenditure can be divided into three main expenditure groups:

* psychiatric hospital and nursing homes;

* non-psychiatric hospital treatment of ailments; and

* other institutional services (including ambulance).

Psychiatric hospital and nursing homes

Expenditures on these items are assumed to provide few benefits outside of the period in which they are incurred.

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[22] See ABS (5204.0). Differences arise because of minor methodological differences and AIHW estimates includes health research funded by universities as health expenditure, whereas the ABS treats it as education expenditure.

Non-psychiatric hospital treatment of ailments

Expenditures on ailments are divided into eighteen categories, each of which has consumption and investment components. That is, medical treatment can have short and long-term benefits. We have adopted the rule that treatment, no matter how worthwhile, of patients who nevertheless die in hospital should be classified as providing no benefits outside of the current period and therefore classified as consumption[23]; other treatment, because its beneficiaries survive into the future, should be classified investment[24].

For each category of ailment, we have calculated two statistics: the ailment morbidity rate and the resource expenditure on ailment treatment.

ailment morbidity rate (M_i). This is the proportion of hospital patients who die from the ailment, and therefore is the proportion of expenditure that we deem consumption. It is approximated by the ratio of 'the number of deaths by the ailment' to 'the number of hospital episodes of the ailment'.[25]

expenditure on ailment treatment (E_i). This is the total current expenditure that the hospital devotes to the treatment of an ailment. It is approximated by multiplying 'the number of hospital episodes of the ailment' by 'the average length of stay for treatment of the ailment'[26].

These two statistics are used to construct a weighted proportion that represents <u>the proportion of current non-psychiatric hospital expenditure on these ailments that is investment</u>.

Algebraically, this equals:

$$\frac{\sum_{i=1}^{n}(1-M_i)\bullet E_i}{\sum_{i=1}^{n}E_i} \quad \text{where i = ailment, n = number of ailments}$$

Our analysis for the year 1989-90 gives an estimate for investment proportion of 92.5 per cent of non-psychiatric hospital current expenditure.

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[23] Strictly speaking, to make our measure consistent with our treatment elsewhere in the paper, we should look at the proportion of people who die within a year of receiving hospital treatment.

[24] This is not to say that treatment classified as consumption is more or less worthwhile than that classified as investment.

[25] We have used data on the *number of reasons for hospital episode* for this, since data on the *number of people treated in hospital for an ailment* are unavailable. Although the ABS reports that each person may have reported more than one reason for hospitalisation, multiple reporting of reasons is not common.

[26] We assume that cost of treatment is proportional to length of stay. The OECD (1987) has observed that due to the higher intensity of services generally performed at the beginning of the stay at hospital (emergency procedures, for example), shorter stays at hospital are generally associated with higher costs per day. Due to the lack of data on this relationship, however, we have assumed that length-of-stay is linearly related to hospital expenditure.

Other institutional services

We assumed that other institutional services (such as ambulance) would follow a similar expenditure pattern to that of non-psychiatric hospitals. Thus, 92.5 per cent of this category was also assumed investment.

Sources

AIHW, 'Health Expenditure Bulletin' No.7, July 1992.

OECD, 'Health Data' on floppy disk.

ABS, 'National Health Survey: Summary of Results' Cat. no. 4364.0, 1989-90.

ABS, 'Deaths, Australia' 1991, Cat. no. 3302.0.

B.3 Non-Institutional

Non-institutional services include a range of activities operating outside the formal hospital system.

Medical Services

Using the work of Gates (1984) as a guide, we assessed the extent to which treatment provides benefits outside of the current period based on the reason for the visit (Table B.1). Making the assumption that expenditure on medical services for a specific reason is proportional to the number of visits to a general practitioner, we determined 25.7 per cent of current expenditure on medical services provides longer term benefits and thus qualifies as investment.

Table B.1: Reason for G.P. Consultation by expected duration of benefits

Benefits from treated expected to occur primarily within one year	Substantial proportion of benefits from treatment expected to extend beyond one year
Infectious & parasitic diseases Neoplasms Endocrine, nutritional and metabolic diseases and immunity disorders Mental Disorders Diseases of the nervous system and sense organs Diseases of the circulatory system Diseases of the respiratory system Diseases of the digestive system Diseases of the genitourinary system Diseases of the skin and subcutaneous tissue Symptoms, signs and ill-defined conditions Check-up/examination Contraceptive management Other reasons	Diseases of the blood Complications of pregnancy, child-birth and the puerperium Diseases of the musculoskeletal system and connective tissue Injury and poisoning Disability n.e.c. Tests/X-Ray Pregnancy supervision Immunisation

Source: Gates (1984)

Dental Services

We made a similar judgement based on Gates methods of the extent to which the benefits from treatments are expected to extend beyond one year based on the reason for the visit (Table B.2). Making the assumption that expenditure on dental services for a specific reason is proportional to the

number of visits to a dentist[27], we estimated that 47.4 per cent of current expenditure on dental services is expected to provide benefits beyond one year and therefore qualifies as investment.

Table B.2: Reason for Dental Consultation - Consumption and Investment

Benefits from treated expected to occur primarily within one year	Substantial proportion of benefits from treatment expected to extend beyond one year
Teeth/dentures cleaned or polished Fluoride Treatment or coating Check-up Other Treatment (50 per cent) No Treatment	Teeth Filled Teeth Extracted X Ray Other Treatment (50 per cent)

Source: Gates (1984)

Other Professional Services, Community Health Services, Total Pharmaceuticals, Other non-institutional

We assumed that 'other professional services' would follow the same expenditure pattern as 'medical services'. Thus 25.7 per cent of these services were assumed investment.

Aids and Appliances, Health Promotion and Illness Prevention, Research

We assumed that all of these expenditures are investment.

Administration

We assumed all of these expenditures to be consumption.

Sources

ABS, 'National Health Survey: Summary of Results' Cat. no. 4364.0, 1989-90.

ABS, 'Consultations with Health Professionals, Australia' Cat. no. 4376.0, 1989-90.

AIHW, 'Health Expenditure Bulletin' No.7, July 1992.

B.4 Aggregate

When the two major categories are combined and each given appropriate weight, the final proportion of current expenditure on health we deem investment is equal to 53.7 per cent. This is for the single year 1989-90. In Section 2.3.2, we have then applied this proportion to the ABS final consumption expenditure on health time series to derive the extended component of investment on health for the period. As better health data becomes consistently available, we would wish to apply a separate investment ratio for each corresponding year, as we would expect this ratio to change overtime.

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[27]   The ABS notes that people who visited a dentist may have reported more than one reason for the visit. Therefore, these percentages are the percentage of *reasons why the dentist was visited* (and not the percentage of people who visited the dentist).

DATA APPENDIX

	NATIONAL ACCOUNTS		EXTENDED MEASURES OF INVESTMENT				
	GDP	Nat. Accounts Gross Saving	Health	Education	Consumer Durables	R&D	Mineral Exploration
	$m	$m	$m	$m	$m	$m	$m
1959-60	14,308	3,414	312	325	1,308		
1960-61	15,208	3,610	348	369	1,305		
1961-62	15,593	3,533	377	409	1,282		
1962-63	16,841	3,933	408	452	1,487		
1963-64	18,702	4,752	445	486	1,624		
1964-65	20,579	5,354	512	558	1,763		
1965-66	21,630	5,211	555	605	1,712		
1966-67	23,838	5,929	610	672	1,793		
1967-68	25,483	5,728	671	757	2,004		
1968-69	28,721	7,385	737	850	2,203		66
1969-70	31,813	8,181	820	996	2,457		105
1970-71	35,111	8,869	963	1,188	2,692		144
1971-72	39,288	9,999	1,126	1,418	2,981		82
1972-73	44,793	11,811	1,283	1,756	3,393		96
1973-74	53,610	14,359	1,552	2,225	4,213		95
1974-75	64,786	15,881	2,126	3,133	5,219		106
1975-76	76,777	17,483	2,806	3,895	6,153		97
1976-77	87,723	19,809	3,228	4,640	6,973	619	126
1977-78	95,394	19,722	3,563	5,157	7,155		152
1978-79	108,544	23,362	4,007	5,647	7,733	716	174
1979-80	122,988	26,986	4,411	6,233	8,511		269
1980-81	140,280	30,060	5,029	7,276	9,963		429
1981-82	158,261	32,062	5,827	8,378	11,157	1,088	524
1982-83	171,849	29,635	6,582	9,444	11,875		392
1983-84	194,883	37,751	7,442	10,455	13,114		395
1984-85	216,257	41,538	8,224	11,356	14,721	1,597	413
1985-86	240,224	44,797	9,084	12,477	16,445	1,879	404
1986-87	264,488	50,631	10,345	13,460	17,046	2,130	515
1987-88	298,266	61,698	11,543	14,357	19,466	2,267	
1988-89	339,582	76,871	12,940	15,750	21,993	2,667	
1989-90	369,897	77,668	14,097	17,176	24,285	3,007	
1990-91	379,262	69,596	15,278	18,527	23,372	3,200	
1991-92	386,283	62,308	16,156	19,700	24,579		

Sources: ABS 5204.0, 8104.0, 8109.0, 8407.0

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