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**AUSTRALIAN NATIONAL ACCOUNTS: IMPLEMENTATION OF
SNA93 CHANGES TO GROSS FIXED CAPITAL FORMATION AND
THE ASSET BOUNDARY**

ABS WORKING PAPERS

National Accounts Branch
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AUSTRALIAN NATIONAL ACCOUNTS: IMPLEMENTATION OF SNA93 CHANGES IN GROSS FIXED CAPITAL FORMATION AND THE ASSET BOUNDARY

ABS WORKING PAPERS

Introduction

The System of National Accounts 1993 (SNA93) is the revised international standard for the measurement of national accounts. Currently, the Australian National Accounts (ANA) are based on the 1968 international national accounts standards, SNA68. From late 1998 the ANA will be based on SNA93 recommendations as far as possible. Perhaps the more complex and inconclusive recommendations within SNA93 relate to gross fixed capital formation and the asset boundary.

The decision to adopt SNA93 recommendations as far as possible has prompted a number of in-depth investigations into the implications of the revised standards for the ANA. This document presents a collection of working papers covering many issues concerning the revised SNA93 treatments. In some cases the papers are relatively conclusive and, based on careful consideration, have accepted or disagreed with the SNA93 recommendation. However, in a number of cases the papers are inconclusive. In particular, both conceptual and practical difficulties of measurement have been encountered in some of the newer areas of SNA93. Perhaps the best example is the recommended treatment of non-produced intangible assets, such as patents. The working paper presented summarises the SNA93 treatment and then examines a range of measurement difficulties including the problems of definition and valuation and the problematic nature of collecting data when no business accounting standard is in effect for these assets.

While numerous issues are raised in the working papers the concerns are by no means exhaustive. Areas closely related to the topics presented, such as the treatment of research and development activity, have not been pursued. It should become clear from the working papers that far more discussion, investigation and development is required in a number of areas. It is hoped that these papers will stimulate discussion amongst the international statistical community and contribute to further development of the international standards.

Structure

The document is structured into five chapters. Each of the first four chapters presents working papers on a different type of asset. Chapter 1 deals with produced, fixed, tangible assets and includes papers on livestock, speculative construction, defence expenditures and monuments. Chapter 2 covers produced, fixed, intangible assets. The papers presented are on mineral exploration expenditure, computer software and entertainment, literary, and artistic originals. Chapter 3 considers produced valuables with the single paper focusing on the treatment of gold as a store of wealth. Chapter 4 discusses non-produced, intangible assets. The document concludes with Chapter 5 which selects a number of issues for discussion based on the content of earlier chapters.

Each working paper within the chapters is a discrete consideration of a particular asset type although a number of issues are interwoven. However, a consistent structure has been maintained between the papers. The SNA93 recommendations are outlined, followed by a description of the existing treatment in the ANA. The conceptual issues, including a consideration of consumption of fixed capital where appropriate, are then considered followed by a discussion of data issues. Finally the conclusions and decisions taken by the ABS are presented.

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Further information and comments on the Working Papers

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CHAPTER 1: Produced Tangible Fixed Assets

LIVESTOCK

by Carl Obst

Consistent with SNA68, SNA93 recommends the calculation of gross fixed capital formation and work in progress for livestock. Currently, the ANA does not follow the SNA68 treatment but it is intended to implement the recommendation when SNA93 is introduced. A life cycle model has been developed to account for livestock in the ANA.

SNA93 Recommendation

1. SNA93 recommends that gross fixed capital formation (GFCF) be estimated for "livestock that are cultivated for the products they yield year after year" (SNA93, 10.87). Such livestock include sheep raised for wool production, dairy cattle used in milk production and breeding stock. Work-in-progress (WIP) should be estimated for those livestock that produce an output only once and, in certain circumstances, for immature animals raised for future sale as fixed assets.

2. SNA93 recommends in paragraph 10.87 that GFCF should be calculated as the value of acquisitions of mature animals plus immature animals produced on own account less the value of disposals. Allowance is made for exceptional losses of animals in the Other Changes in Volume of Assets Account and estimates of consumption of fixed capital (COFC) are calculated in relation to incidental deaths and the decline in the value of an animal as it ages.

3. In regard to the estimation of WIP for livestock SNA93 suggests that

" Changes in work-in-progress for livestock reared for slaughter, including poultry, may be approximated by changes in the numbers of such livestock between the beginning and the end of the accounting period multiplied by the average price of the animals or poultry concerned." (SNA93, 10.108)

ANA Present Treatment

4. Although the estimation of gross fixed capital formation and work-in-progress on livestock was recommended in SNA68, the ANA has treated livestock as lying outside the production boundary until slaughter or export. The justification for this treatment is that "livestock numbers and values in Australia are much affected by drought, fire, flood and world market conditions" (*Australian National Accounts: Concepts, Sources and Methods*, Catalogue no. 5216.0, para. 8.7).

5. The implementation of SNA93 recommendations on livestock will increase GDP and will move the recognition of livestock in the accounts from the animal's death to its birth. Adoption of SNA93 recognises the growth of animals from immature animals to animals for slaughter or use as fixed assets as production. Also, SNA93 recommends inclusion of assets for the production of goods such as milk and wool. Currently, these products simply appear in the system.

Conceptual and Data Issues

Classification of livestock

6. Where young livestock are produced on own account, SNA93 suggests that the treatment as either fixed asset or WIP depends on the intentions of the farmer (SNA93, 10.86). However, farming intentions will change depending on cash flow positions, price and market movements and weather conditions, rendering statements of intent unhelpful from an estimation perspective.

7. In practice, classifications should be based on SNA93 definitions although varying assumptions may need to be made depending on individual country farming practices. For Australia, it is assumed that a purpose can be established for each animal on the basis of breed or sex. All mature animals are assumed to remain either fixed assets or WIP once classified. For immature animals assumptions have been made about the intended use of the animal in order to follow the recommendations in paragraph 10.86 of SNA93 which requires that immature animals be capitalised from birth if they are to be used on own account but where they are intended for future sale as fixed assets they are to be treated as WIP. An investigation into Australian farming practices has led to the classification of bulls under one year as WIP and rams under one year as fixed assets on the basis that bull calves are generally not raised for own use whereas ram lambs are raised for own use. The aim of the classifications should be to eliminate the need to determine farming intentions which are inherently difficult to measure.

Valuation

8. For most fixed assets the derivation of estimates of GFCF is based on transactions data. However, this type of data is not available for livestock. The Australian Bureau of Agricultural and Resource Economics (ABARE) conducts extensive surveys of individual farms and collects a large number of data items. It is clear from the types of items collected that the concepts of capital formation of livestock, as presented in SNA93, are not directly applicable. For example, estimates of sales of livestock are considerably greater than purchases of livestock.

9. The major problem is the extent of breeding livestock on own account. As it is considered that this is the major area of acquisition in livestock capital formation in Australia these acquisitions will not be captured in estimates of livestock purchases.

10. Given that direct estimation of capital formation is not possible it is necessary to estimate the numbers of livestock acquired and disposed of in a particular period and then apply an appropriate price. Two approaches are thought possible. One has been termed the "balance sheet approach" and the second a "life cycle approach".

11. The balance sheet approach involves estimating, at the end of each period, the value of each category of livestock and treating the change as either capital formation or change in inventories. While this approach is simple there are a number of reasons this approach is inadequate.

(a) Assume a situation where there is no change in the number of stock between the beginning and end of the period but that the balance date price is lower at the end of the period. Under the balance sheet approach this will imply the calculation of

negative capital formation or a negative change in inventories but no transactions have occurred.

This change between balance sheet values reflects two things. For livestock treated as inventories such a change must reflect a revaluation effect and should be recorded as such. For livestock classified as fixed assets the change will be either a revaluation effect or the effect of consumption of fixed capital. In neither case should capital formation or change in inventories be recorded.

A suggested refinement of the balance sheet approach is to adopt a stock valuation adjustment (SVA) methodology. This would calculate the constant price change in values and then reflate using average period prices. In the situation described this would calculate the correct estimate of both change in inventories and capital formation.

(b) Assume a situation where the number of acquisitions during a period is equal to the number of disposals and that prices are unchanged over the period. In this situation a balance sheet approach will derive either zero capital formation or zero change in inventories since there is no change in total numbers or change in price.

For change in inventories this is the correct result. A change in inventories should be valued at average period prices and since prices and numbers have not changed the total change in inventories must be zero. However, a capital formation estimate is likely to be positive where acquisitions and disposals are equal. This is because the acquisition price will be greater than the disposal price for a fixed asset. Even if average prices do not change this relationship must hold, implying total value of acquisitions must be greater than the total value of disposals.

The application of the SVA methodology will yield a zero result for both change in inventories and capital formation since both numbers and prices are the same at both balance dates. Thus, while deriving the correct result for change in inventories, the SVA approach does not correctly allow for differences in acquisition and disposal prices in the calculation of capital formation.

The balance sheet approach will thus only calculate the correct result for change in inventories if average prices do not change and this is unlikely to be the case. The application of an SVA approach for inventories would give correct results since it uses average period prices to value any movement in numbers. For livestock as fixed assets, even in a situation of no acquisitions and disposals and no change in price the balance sheet approach will not provide the best picture of the flows which occur. It will calculate the correct capital formation of zero in this circumstance but will not pick up the offsetting consumption of fixed capital and revaluation changes that will occur. In any more complex situations, i.e. prices change or some acquisitions and disposals take place, the balance sheet approach will incorrectly derive capital formation and will not recognise either revaluation or consumption of fixed capital. The use of an SVA approach cannot deal with the difference between acquisition and disposal prices and thus will derive incorrect results. The underlying reason for this is that, unlike inventories, fixed assets change over a period - either they grow to maturity (thus leading to capital formation) or their useful lives diminish (hence requiring estimation of COFC).

12. These concerns have led the ABS to the conclusion that it is necessary to model the life cycles of livestock in order to determine the numbers of stock acquired and disposed of in a

particular period. There are a number of justifications for this approach:

- (a) The general life cycle of a single animal is that it will grow for the first year or two and then hold some productive capacity before being killed. Since most livestock are produced on own account, acquisition will not relate to a market transaction. A life cycle approach enables the point of acquisition to be determined.
- (b) The acquisition of livestock as fixed assets is unlikely to occur during one accounting period. It is likely that capitalisation will occur in stages.
- (c) Estimates of COFC can be constructed under a modelling approach.
- (d) The modelling approach gives a basis for imputing an estimate of own account production.
- (e) Capital formation is estimated independently of revaluation effects, thus correctly relating capital formation and production.

13. The basic life cycle model is that an animal is born in period $t=0$. It has g growing years until maturity at $t=m$. Its productive years, p , start at $t=m$ and end at $t=d$, the time of slaughter. Several components need to be determined before estimation can be carried out:

- (a) The number of animals born in period $t=0$.
- (b) The number of growing years and the rate of growth.
- (c) An acquisition price at point $t=m$.
- (d) The length of p which represents the asset life.
- (e) A disposal price at point $t=d$.

14. It is necessary to assume mid period acquisitions since births will occur throughout the year. As a result, estimates of acquisitions are required in all years from $t=0$ to $t=m$. Mid period disposals are also assumed for the same reason as acquisitions, i.e. disposals occur throughout the year.

15. In the model it is necessary to assume a normal death rate for losses due to natural causes.

16. Not all acquisitions and disposals will be made explicit in this model. There will be trade in livestock between ages $t=m$ and $t=d$ with the value of acquisition equalling the value of disposal. Since the net value is zero, these transactions are not identified separately. A related issue is determining transactions between sectors. However, data regarding sectoral transactions are not available and thus it is assumed that all transactions are carried out intra-sector (e.g., within the household sector).

17. Estimating WIP using a life cycle approach may appear unnecessary. The basic approach to estimating WIP outlined in SNA93 only requires information regarding the numbers of livestock at the beginning and end of the period and average values for the period. Nonetheless, in order to derive prices of livestock at various stages of their lives and the corresponding numbers of livestock, use of the life cycle framework has proved necessary. Its use does not conflict with the simpler recommendation in SNA93.

Relationships to currently measured flows

18. The present estimates record the production of livestock as the value of slaughterings and exports. Including GFCF and WIP on livestock means measuring the production of livestock in a different way. To determine the effect of the new approach, it is necessary to understand the entries required after the disposal of livestock.

19. For those livestock treated as fixed assets, disposal represents a negative entry in the capital formation account of the producer (the farmer). In theory, since the disposal value is non-zero, the reduction from fixed assets is matched by an increase in inventories of the purchaser (a slaughter house or exporter) who then transforms the animal into inventories of meat products or live exports.

20. It is important to note that the value of the disposal is completely offset by a rise in the inventories of the meat processor or exporter. This rise in inventories is further offset when the animal is transformed into meat products or live exports. Consequently, it is only necessary to record the disposal of the asset (a decrease in capital formation) and the rise in inventories of meat product or exports. There is no impact on GDP until the second rise in inventories. It is assumed that the time taken from disposal as an asset to the rise in inventories of meat products is minimal (1-3 days). With regard to exports, the increase and decrease in inventories of the exporter is also believed to occur with minimal time lag. A similar situation will hold for those animals classified as WIP.

21. By using the new approach to measuring the production of livestock, the change in GDP(E) will equate to the sum of the GFCF and WIP on livestock. For GDP(I) the value of output will be equal to the value of the increase in GFCF and WIP but it is necessary to deduct the current value of output, i.e., slaughterings and exports, since these are included in the total WIP estimates. Currently, the ANA includes inventories of slaughtered meat and exports of live animals and thus no adjustment to inventories or exports estimates is needed.

22. A simple example may make these relationships clearer. Suppose current farm income estimates have an estimate of livestock sold for slaughter of \$100. Correspondingly, the expenditure estimates record an implicit increase of \$100 in inventories of livestock to be slaughtered. Assume that the slaughterings are of livestock classified as fixed assets. Under SNA93, disposals of livestock would be calculated as \$100. Suppose acquisition of livestock during the period is \$250. On the expenditure side capital formation of \$150 (250 - 100) would be recorded. The \$100 increase in inventories would continue to be recorded (thus offsetting the disposals). On the income side of the accounts the income from sales of livestock for slaughter, \$100, would still be recorded and there would be an addition to farm income of \$150 to reflect the extra production, in the form of capital formation, that has taken place. Thus GDP(E) and GDP(I) are increased by the same amount, \$150.

23. Where livestock as inventories are involved the increase in stocks currently recorded at the time of disposal needs to be recorded over the life of the animal. Therefore, the revised estimate on the income side must deduct the current income from sales of livestock for slaughter and add the WIP estimate for the relevant period. The expenditure side will also record only the WIP rather than the value of the increase in stocks at time of disposal. Thus if farm income from livestock raised and sold for slaughter is \$100 composed of WIP of \$50 in each of the past two period the revised estimates would record farm income of \$50 in each period rather than \$100 during period 2.

Pricing issues

24. The most difficult area in estimating GFCF for livestock is determining appropriate capital and disposal prices. The pricing problem is explained using the following example.

Consider a dairy cow born at $t=0$. Assume that it is mature at $t=2$ and its growth is equally distributed over the two time periods in question. Its acquisition price at maturity is \$1200 and it is disposed of in period $t=5$ for \$400.

25. Calculating GFCF as \$800 ($\$1200 - \400), i.e. the acquisition price less the disposal price is perhaps intuitive but is incorrect. Rather, estimates of capital formation must relate to one period and to the prices of that period. In the example it means that the dairy cow is acquired in years 1 and 2 and is disposed of in year 5. Assuming that this was the only animal, GFCF would be

Year 1	+\$600 ($\$1200 * 0.5$)
Year 2	+\$600 ($\$1200 * 0.5$)
Year 5	-\$400

26. Note that the example assumes no price change between periods 1 and 2. Assume again that growth over each period is equal but that the capital price for a mature dairy cow in period 1 is \$1000 and remains at \$1200 in period 2. This means that the value of acquisition in period 1 should be \$500 ($\$1000 * 0.5$). The value of acquisition in period 2 is then defined as the residual between the full capital value in period 2 of \$1200 and the acquisition in period 1 of \$500, i.e., \$700.

27. It is essential to recognise that GFCF in any period does not relate to the acquisition and disposal of an individual animal. Indeed, it is not clear how to record the first result of \$800 derived above. If it relates to GFCF in period 2, which seems the only plausible option, then it is necessary to forecast the disposal price in order to determine GFCF. However, since the disposal is in a separate period, the use of different period prices to derive current period estimates makes little sense, especially if the disposal price rises above the initial acquisition price. Consequently, GFCF needs to be visualised in terms of an individual period.

28. By including additional dairy cows of various ages in the model with their acquisition and disposal prices, it would be possible to determine GFCF as the total value of acquisitions less the total value of disposals in each period. Since it is not possible to trace and collect the values of all animals individually, a capital price and a disposal price and the numbers of acquisitions and disposals need to be calculated for each period in order to derive estimates of GFCF.

29. Numbers data are available from ABS collections. Each year the ABS conducts a census of agricultural establishments and collects the number of livestock by various livestock types. Data on the number of slaughterings and exports are collected on a monthly basis.

30. Price data are available from many markets around Australia and prices are usually classified by type and weight of animal. The distinction between fixed assets and WIP is not made and generally the data do not differentiate by age of animal. This is primarily a reflection of the large extent of production of animals on own account. While some data are available on acquisitions of livestock as fixed assets (e.g. dairy heifers and bulls), the data are ad hoc and refer to only a small proportion of the total number of acquisitions. One of the

major sources for livestock prices is the weekly National Livestock Report published by the Australian Meat and Livestock Corporation. It contains details of prices from saleyards around Australia, largely for meat cattle and lambs. Also included are prices from sales made using Computer Aided Livestock Marketing (CALM). While some mention is made in this source of buyers wishing to restock their herds or flocks there is no indication of a substantial or consistent market in the area of livestock acquisitions. Consequently, it has been assumed that market prices refer predominantly to disposal prices.

31. Despite the existence of data on disposal prices, defining a disposal price for all categories of livestock has proved difficult. A viable method is the use of present production estimates. These estimates can be seen to be based on market prices. A disposal price can be derived by dividing the production estimates of slaughterings and exports by the number of livestock disposed.

32. In order to derive a capital price, it is appropriate to consider the valuation alternatives offered in SNA93. Four approaches to valuing transactions are noted: (i) the actual transaction value, (ii) the value of similar traded items, (iii) valuation using the costs of production, and (iv) the discounted present value of expected future returns. As mentioned earlier, from an acquisitions perspective, there are limited transactions in any livestock and therefore the first two valuation methods are inappropriate. The data available for determining costs of production are too aggregated to attribute to animals on a per head basis. For instance, the total value of fuel used on farms is known but the relative fuel usage of sheep, beef and grain properties is not known. As a result, determining the cost of producing livestock and thereby estimating a capital price is not possible. This leaves the expected future returns approach. SNA93 notes that,

" Although this method is theoretically entirely justified, it is not generally recommended since it involves many assumptions and as a consequence the outcomes are highly speculative." (SNA93, 3.75)

33. A positive point is that livestock can be conceptualised reasonably readily in terms of future returns. For example, a dairy cow can be expected to produce a certain amount of milk and sheep should produce a certain amount of wool. Also, in the case of livestock, an integral part of the future economic returns of owning an animal are the earnings upon disposal. Thus, under the future economic returns approach, the capital price can be defined as the discounted value of the expected income flow plus the discounted disposal price.

34. Under a strict implementation of the future economic returns approach it is necessary to forecast returns, including the disposal value, for the full asset life. However, given the inherent uncertainty in forecasting, it is usually necessary to use current prices and costs as proxies for future prices and costs. This means that the capital price can be viewed as a function of the current disposal price. Since the value of each animal classified as a fixed asset is a combination of both income flow and disposal price, it is assumed that the current capital price must be at least as high as the current disposal price.

35. The difference between the capital and disposal prices is the value of the discounted future income excluding returns on disposal. The information needed to estimate income flows includes the value of the production of livestock products, numbers of livestock, production costs and values of offspring. Many of these data may be available from agricultural surveys but a number of assumptions are necessary. At this stage further investigation is necessary to determine the appropriate use of available data. In light of this, the difference between the capital and disposal prices has been described by a capital factor.

The factor allows for the discounted future income stream and the discounting of the disposal price. A capital price is established by multiplying the factor by the current disposal price. The factors have been determined by comparing ad hoc capital price data with derived disposal prices.

36. The model uses a capital price higher than the disposal price at any point. However, since the capital value of an animal will decline over time, the capital factor also declines such that, at the end of an animal's contribution as a fixed asset, the capital factor equals one, i.e. the animal is valued at its disposal price. The capital value of livestock at any age can be determined by using the current disposal price and the appropriate capital factor.

Consumption of fixed capital (COFC)

37. Two components to the COFC of livestock are noted in SNA93 paragraph 10.87 : (i) COFC equal to the value of incidental stock losses, and (ii) COFC due to the decline in the value of an animal as it gets older.

38. The model assumes that 4 per cent of livestock die of natural causes during a year. These livestock losses do not include catastrophic losses due to drought, famine, flood etc. for which allowance is made in the Other Changes in Volume of Assets Account.

39. The number of livestock that need to be depreciated in a period will be the sum of three items, (i) the animals which survive the whole period equal to the number of livestock at the beginning of the period less the total disposals (slaughterings, exports and incidental deaths), (ii) the animals disposed of which are assumed to be held for the first half of the period, and (iii) the animals acquired which are assumed to be held for the second half of the period.

40. The valuation of COFC is more difficult. It is possible to measure the reduction in capital value by the change in the capital factor over a period. For example, suppose, when capitalised, the capital factor applied was 7 and the mean asset life was 3 years. At the time of disposal the capital factor would be 1, i.e., the disposal price, and thus, using straight-line depreciation, the change in capital factor in each year would be 2. This change would relate to COFC for each year.

41. Despite the decline of the capital factor, the capital price may increase over time as the disposal price rises. However, it is necessary to see COFC as a forward looking measure that is determined at current replacement prices. Thus, it is sufficient to calculate COFC as the change in the capital factor multiplied by the average disposal price for the period.

42. Applying this methodology requires knowledge of which capital factors to apply to particular ages and numbers of stock. It has thus been necessary to estimate the demographics of livestock holdings and calculate changes in these holdings by adjusting for acquisitions and disposals. Capital factors are reduced as each livestock group ages and applied to the number of livestock in each age group.

Measurement of quality & constant price estimates

43. By using a price times quantity approach to the derivation of current price estimates, calculating constant price estimates should be reasonably straightforward. However, it is necessary to take account of changes in the quality of livestock. Changes in quality can be seen in two dimensions, (i) the rises and falls in quality of a single animal over its life time, and (ii) the change in quality of a flock or herd over the longer term through breeding and

selection. Both types will have an impact on the estimates.

44. Quality change reflects volume change and therefore, in deriving constant price estimates, any change in the price of livestock which reflects changes in quality must be identified and included as part of the measure of change in volume such that only pure price effects are removed from the current price estimates. Indicators such as the change in the kilograms of wool per head, the litres of milk per cow and the average slaughter weight should provide a reasonable indication of long term changes in the quality of livestock. At this stage, no data or indicators are available to measure short term or seasonal quality changes.

45. However, given that the indicators described above are available annually, it is probable that they will reflect quality changes due to drought, etc. to some extent thus measuring some seasonal changes. These indicators will predominantly relate to quality changes in the capital stock of livestock rather than the actual transactions in livestock. Without short term indicators it is necessary to assume that long-term quality measures will also be reasonable indicators of quality movements in respect of the acquisition and disposal of livestock. While this assumption is necessary further work is needed regarding the effects of quality change and its measurement.

Other changes in volume of assets account

46. This account allows for large decreases in livestock caused by events such as natural disaster. Values could relate to livestock treated as fixed assets or WIP. The largest difficulty in determining values in this account is the size of loss that needs to be incurred for it not to be treated as normal loss (and thus part of COFC).

47. Perhaps the most interesting determination to be made is whether loss refers only to actual deaths or whether a substantial fall in quality due to drought, etc. also qualifies for entry in the account. SNA93 is not particularly clear on the issue. The treatment of a subsequent rise in the quality of livestock following a change in weather conditions is perhaps the key area of concern. Whether this should be treated as GFCF, a revaluation or a positive change in volume of assets is not clear.

48. The valuation of the volume changes should use a similar method to that used to value incidental deaths of livestock. If a fall in quality is also included valuation would be more difficult. Whether firm data rather than anecdotal information can be found regarding any losses is not clear.

ANA Decision

49. The estimation of GFCF and WIP for livestock will be implemented in the ANA based on the methods outlined. It is believed that the approach described is conceptually valid and in line with the recommendations of SNA93. The estimation of GFCF and WIP will be an important step in improving the scope and consistency of the ANA.

50. The basic model appears to be able to cope well with the available data and the conceptual problems involved. Further analysis and improvement of data sources would improve the estimates and model development is needed particularly regarding the validity of the capital factors, the estimation of discounted future income flows and the measurement of quality change.

SPECULATIVE CONSTRUCTION

by **Tony Johnson**

SNA93 recommends treating speculative construction as work-in-progress (i.e. as an addition to inventories) of the producer. The ANA presently treats all building and construction activity, including speculative, as gross fixed capital formation. The treatment recommended by SNA93 will not be implemented in the ANA. Rather speculative construction activity will continue to be treated as capital formation. This departure is forced largely by the practical issue of data availability. However, the short-term nature of the large majority of speculative activity in Australia makes this, for most intents and purposes, a minor departure from the spirit of the SNA93 recommendation although it does pose some problems in linking financial activity with production.

SNA93 Recommendation

1. The treatment of contract and own account building and construction in SNA93 is identical to SNA68. However, the treatment of speculative building and construction has changed:

"Structures and other fixed assets, such as ships, typically take a long time to complete and frequently span two or more accounting periods. However, the output produced each period is classified as work-in-progress only when the producer, and not the eventual user, is the owner of the output produced. Uncompleted fixed assets that are being produced on own account by their eventual users, and also structures that are being produced under a contract of sale agreed in advance, are treated as being acquired by their users and cannot, therefore, be recorded as work-in-progress of the producers." (SNA93 para. 10.110)

That is, speculative construction projects are recorded as work-in-progress (WIP) inventories until sold or otherwise acquired. It is the eventual purchaser who capitalises the asset (capital formation). This treatment follows business accounting practices fairly closely.

2. While the rationale for the SNA93 recommendation is not made explicit, it is possibly an attempt to follow business accounting practice and to link financing activity with production. The principle being followed is that all building and construction projects which span more than one accounting period should be capitalised as a fixed asset as ownership transfers to the eventual user. Following are interpretations of this principle for contract, own account and speculative construction.

3. In business accounting, for building and construction undertaken on contract, ownership progressively transfers as progress payments are made. If SNA93 were to be consistent with business accounting, this practice should be reflected in the balance sheet as WIP of the contractor as the work is put in place and, when progress payments are made, an increase should be shown in produced fixed assets of the eventual owner and a withdrawal from inventories should be shown for the contractor. However, SNA93 (and ANA) treats ownership as transferring as work is put in place. A consequence of this accrual type treatment is that there is no addition to inventories as work is put in place or withdrawal from inventories as progress payments are made. Rather, the value of such work is recorded as gross fixed capital formation of the eventual owner as it is put in place. On the basis of reasonable assumptions, the work can be assigned to the owner's institutional sector and

industry.

4. Business accounting, SNA93 and ANA treat own-account construction in the same way as construction undertaken on contract. However, an implicit assumption underlies assigning own-account work to institutional sector and industry. It is assumed that the own-account producer will be the eventual owner of the construction. While it is likely that intentions regarding final ownership of building and construction projects will remain firm throughout their production, projects may shift between being own-account or speculative in nature depending on the economic climate.

5. SNA93 recommends a different treatment for speculative construction compared to contract and own account construction. The principle underlying this different treatment is that gross fixed capital formation should be assigned to the institutional sector and industry of the eventual owner. In the case of speculative construction, the eventual owner is (by definition) unknown and therefore it is not possible to assign an institutional sector or industry of ownership. Consequently, SNA93 recommends that speculative construction be reflected as WIP of the building and construction industry until such time as it is sold. This is consistent with business accounting practice in Australia. At the time of sale, the production is reflected as a fall in inventories of the building and construction industry and a rise in gross fixed capital formation of the purchaser. Importantly, the consistency of the system is preserved as the financing costs and production expenses are incurred by the same sector.

ANA Present Treatment

6. The present treatment in the ANA is that the total value of work completed on building and construction projects, speculative or otherwise, is treated as gross fixed capital formation.

7. The basis for the current ANA treatment stems in part from: (i) the nature of available data sources over the years; (ii) the nature of speculative building and construction activity in Australia; and (iii) an unease with the conceptual validity of adopting a treatment for speculative construction which differs from contract and own-account construction.

8. While the ANA treats all speculative building and construction activity as gross fixed capital formation as it is put in place, it is not necessarily allocated to the building and construction industry. Currently, most speculative building activity in Australia is for private dwellings and thus it can be allocated to the appropriate institutional sector and industry. However, when speculative, non-dwelling construction is undertaken allocation to sector and industry of final user is problematic.

Conceptual Issues

9. While the SNA93 treatment is consistent with commercial accounting practice, it does not appear consistent with parts of economic theory. In production function, capital and productivity analysis, estimates are made of the relationships between output and inputs of the factors of production - capital and labour. This would seem to call for a definition of capital formation that excludes WIP since WIP is the object of production, not the means of production. According to this principle, all construction, not just speculative, should be reflected in inventories until it is available for use in production. This may be before the point at which the completed construction is actually used in production. This treatment

would be applied irrespective of whether progress payments are made. If data were available, this approach would be the ANA's preferred approach for treating capital expenditure on long-term building and construction projects.

10. SNA93 paragraph 10.110 could appear contradictory in the case where building work is done under contract for a speculating developer who intends to sell the completed project, i.e. the developer is the first purchaser but not the eventual user/owner. While work done under contract is ordinarily treated as gross fixed capital formation of the eventual owner, in this case it may be that SNA93 would treat the work done as an addition to inventories of the developer and not as gross fixed capital formation until such time as it was sold by the developer to a "final" owner. In this instance, since the eventual user is unknown the work would be treated as speculative.

Data Issues

11. Since 1986-87, the ANA estimates of building and construction activity have been based on the Building Activity Survey (BACS) and the Engineering Construction Survey (ECS). These surveys are of building and construction contractors, not of building owners, and include the value of all work done, regardless of whether it is speculative construction or work done under contract. These data sources are described in more detail in Appendix 1.

12. A particular problem in the surveys of builders is how a profit mark-up is treated. For each type of construction (contract, speculative and own account), there is no certainty as to how builders are reporting the profit mark-up component in the value of work done in a particular quarter. Builders may apportion the mark-up over the expected life of the project; it may all be included at the end; or not at all.

13. This may lead to distortion in terms of attributing the capital formation of the asset to the correct quarter, or, if the profit mark-up is excluded, the value of gross capital formation may be understated. This is most likely to be an issue in relation to speculative construction, where the final selling price is unknown until the sale takes place. If the sale occurs after completion, it will also be after the project has ceased to be reported in BACS. Therefore, the total value of work done as recorded by BACS could be anywhere between the cost price and the developer's anticipated price, neither of which may accord with the actual market price. During downturns in the building industry the final sale price may even be discounted below cost price.

14. One additional data requirement of the SNA93 approach would be time of sale and sale value for speculative building projects. This implies that building jobs would have to be tracked until sold (or rented if the builder's intentions changed before sale) rather than just to completion as is the case now. Depending on economic conditions some projects could remain in the survey for several quarters beyond completion.

15. Many speculative building projects are sold before completion. Following SNA93 only the value of work done to point of sale should be transferred from the inventories of the builder to the new owner, not the sale value. This may be a difficult concept to explain to a respondent. A suggested approach to this problem is to identify a speculative project as being sold in a quarter and to cumulate all work done on that project as the "sale value". Ideally, the sale date should be collected because if it was sold near the beginning of the period, work done towards the end of the quarter would lead to an overstatement of the "sale value" of the uncompleted building. The collection of sale date would also imply that work done in the

quarter both before and after sale date would also be required. One alternative would be to assume the mid point of the quarter as the sale date and equally apportion current quarter work done between stocks and capital expenditure. Another alternative may be to identify speculative projects in the survey and to collect work done "before sale" and "after sale" on those projects, but again it was thought that this would cause difficulties for the respondent. Difficulties in establishing work done to sale date for unfinished construction has significant implications for the validity of estimates on the SNA93 basis.

16. The respondent selected by the ABS to report on projects will influence the result. If the building contractor is selected, and the work is being done for a developer, it would strictly be regarded as "under contract", not speculative (although it is unclear how it would be reported). If the developer/owner were the respondent for the same job, it may be regarded as speculative or own-account depending on the intentions on completion of the project.

17. A significant difficulty is that respondents may interpret the term "speculative" differently from that intended in the SNA93. A builder or developer who intends to lease a building on completion may regard it as speculative if a lease agreement had not already been made. SNA93 would attribute work done on such projects as capital expenditure rather than inventories. It is more complicated when the intention is to sell part and lease part of a development.

18. Selling "off the plan" is common practice in residential unit developments. This involves sale prior to or during construction. There is likely to be confusion by respondents about the status of such projects. It is also the case that investors buying off the plan often intend to sell at a profit on completion. This could be interpreted as either speculative or contract by the respondent. Moreover, for such developments, it is not uncommon for a developer to start a project with a certain, minimal number of sales, and depending on how many more were sold, more may be constructed either in anticipation of more sales or because more contracts had been signed. It would prove very difficult for a developer to separate these costs.

19. The ABS foresees difficulties in trying to collect reliable information on a strict SNA93 basis, given likely difficulties in the interpretation of "speculative". As a result, it may take some time to define survey questions that would provide a valid test. Any testing may also be hampered by the cyclical nature of speculative building.

20. Speculative housing projects are generally short term, being started, completed and sold over 1 - 3 quarters. The value of separating these transactions from gross fixed capital formation may thus be limited. Indeed, there are some doubts as to whether SNA93 intended short term projects, such as detached dwellings, to be treated in this way in practice, although it would follow in principle.

21. There is much policy interest in building investment for a variety of reasons. Under SNA93 the growth of speculative building would be first reflected in inventories rather than gross fixed capital formation on dwellings and non-dwelling construction. Consequently, users are likely to require changes in inventories to be separated into speculative building and non-construction inventories since the two categories would be regarded as analytically different.

22. Overall, implementation of the SNA93 recommendation regarding the treatment of speculative construction would complicate considerably the accounting for building activity, and would require major changes to existing quarterly data sources. BACS and ECS, the current sources of estimates of capital expenditure on buildings and other structures for the

ANA, cannot support the treatment recommended by SNA93. For these to provide information on the SNA93 basis, a major redesign would be required. It does not appear to be feasible to provide the splits required by the SNA93 through these collection vehicles.

23. Other collection vehicles (as outlined in Appendix 1) are consistent with each other and are, in the main, consistent with SNA93 treatments. However, the more limited scope of these surveys precludes them from being a suitable source of data for ANA purposes.

ANA Decision

24. The treatment recommended by SNA93 will not be implemented in the ANA. Rather, speculative construction activity will continue to be treated as gross fixed capital formation. This departure is forced largely by the practical issue of data availability. However, the short-term nature of the large majority of speculative activity in Australia makes this, for most intents and purposes, a minor departure from the spirit of the SNA93 recommendation.

Appendix 1: Data sources

Building activity survey

The scope of the Building Activity Survey (BACS) is all building activity, both private and public sector. Currently, BACS cannot determine the type of construction (contract, speculative or own account) undertaken by builders reporting data. The BACS collection frame is created from a variety of sources. For private sector construction, it is created from local government building approvals. A sample of approvals for detached dwellings is selected in the survey. For other projects, e.g., units and office blocks, there is complete enumeration. For an individual builder, this means that it may be reporting to BACS for only a proportion of the construction projects it is working on at any point in time.

A project may comprise construction undertaken on contract, speculatively, or on own account. The survey asks for the estimated value of the project when completed and the value of work done on it during each quarter. For all projects surveyed, the value of construction work done is tracked through successive quarters until the individual project is completed.

For the value of work done each quarter, builders are asked to report direct costs incurred and accrued to date, including the cost of materials fixed in place and the labour expended in fixing those materials in place. Value of work done is the variable used by National Accounts in calculating investment (gross capital formation) in new buildings and other structures.

Engineering construction survey

The engineering construction survey (ECS) is similar to BACS. It currently collects data on the value of new projects commenced and the value of work done during the quarter, as well as the value of work yet to be done at the end of the quarter. It is considered unlikely that there would be speculative engineering construction, i.e., a company is unlikely to build a bridge, road or water storage system on a speculative basis.

DEFENCE EXPENDITURE

by **Tony Johnson**

SNA93 recommends that certain military expenditures be treated as gross fixed capital formation. With the exception of defence housing expenditures which are capitalised, the ANA treats all purchases of goods and services for defence purposes as intermediate consumption of general government (and hence as government final consumption), regardless of whether they have the characteristics of capital expenditure or not. Despite some reservations on conceptual grounds, the SNA93 treatment of defence expenditures will be implemented in the ANA.

SNA93 Recommendation

1. SNA93 paragraphs 6.167 to 6.172 and 10.65 to 10.68 recommend that certain military expenditures be regarded as gross fixed capital formation.

"... only expenditures by the military on weapons of destruction and the equipment needed to deliver them should be classified as intermediate consumption. Conversely, the construction of buildings for use by military personnel, including hospitals and schools, and also of roads, bridges, airfields, docks, etc. for use by military establishments should be treated as gross fixed capital formation. In addition, machinery and equipment of the same type as that used by civil establishments for non-military purposes should also be treated as fixed capital formation; for example, vehicles, ships or aircraft used for the transport of persons or goods; computers and office machinery and equipment; etc." (SNA93 para. 6.171)

2. It should be noted that the SNA93 recommendation impacts on GDP to the extent of consumption of fixed capital (COFC), which has to be added to government final consumption expenditure. Under SNA68, all defence expenditure is treated as consumption expenditure and thus no COFC estimates were required.

ANA Present Treatment

3. Consistent with SNA68, all purchases of goods and services for defence purposes are classified in the ANA as intermediate consumption and hence as government final consumption expenditure, regardless of whether they have the characteristics of capital expenditure or not. The reason for this treatment was not explicit in the 1968 SNA, but presumably it is because they are expendable in war situations. Some further thoughts are offered later in this paper.

Conceptual Issues

4. Central to the SNA93 recommendation regarding capitalisation of certain defence expenditures is the boundary between intermediate (and final) consumption and gross fixed capital formation. The defining characteristic of fixed assets (and hence gross fixed capital formation) is that they are produced assets that are used repeatedly, or continuously, in processes of production for more than one year. SNA93 recommends that the construction of buildings, roads, bridges, airfields, docks etc. for military purposes be capitalised because they are used continuously and repeatedly in production. Furthermore, they are used in a

similar fashion to civilian assets, and could conceivably be switched from civilian to military use or vice versa. Transport equipment, communications equipment and computers are also to be capitalised. On the other hand, expenditures on weapons of destruction are to be regarded as intermediate consumption. This includes rockets, missiles, war heads, and their means of delivery - missile silos, warships, submarines, fighter aircraft and bombers and tanks.

5. SNA93 offers the following rationale for treating destructive weapons as intermediate consumption:

- they are not used repeatedly or continuously in production;
- they are single use goods; and
- they are used for destruction, the antithesis of production. (SNA para. 6.168)

6. The following reasons could also be advanced in support of SNA93's limit to the asset boundary on defence equipment:

(a) The nature of defence equipment is clearly capital in the sense that it is normally durable and produces defence deterrence services into the future. However, from an economic standpoint there would be grounds for not including such equipment in a nation's investment and capital stock as its contribution if any to future productive capacity of a nation is incidental. Economic growth models attempt to explain and predict a nation's economic performance/standard of living and future prospects for growth. A nation's capital stock and investment in both produced and human capital are major explanatory variables in this. Given the special nature of defence "capital" there would be good reasons why economists would want to exclude it from the concept of investment. In fact, it is more likely to be an inhibiting factor and belongs within the realm of politics rather than economics. In extreme examples, the inclusion of defence in a nation's spending could present a distorted picture of productive investment and likely future production. SNA93 must make economic as well as accounting sense.

(b) The idea that defensive expenditures generally are not productive has often been made in welfare contexts and more recently in relation to expenditures to defend the environment from degradation. While such a concept has shortcomings, not the least being that GDP is not meant to be a measure of welfare, a wider recognition of "goods" and "bads" is gradually occurring in the national accounts (albeit by way of satellite accounts), for example the environment and unpaid household production. Thus, while defence spending is included in GDP, the exclusion of combat equipment (which could be viewed as a "bad"), from investment in SNA93 could be seen partly as a welfare/moral judgement.

7. Nonetheless, the SNA93 treatment is not flawless. Defence hardware would normally have a service life of more than one year. It can be seen as providing continuous defence services by way of deterrence. Indeed, the western defence strategy has been built around the concept of deterrence. The principle of defence "services" is recognised in para. 6.169, but it is concluded that, while some durable goods produce continuous defence services over a number of accounting periods, weapons are either never used, or if they are used, are not inputs into a productive process. There is no doubt that combat is destructive, but by extension, dedicated airfields and ports would all ultimately contribute to the destructive process in that case. Significantly, all defence expenditure is already deemed productive because it contributes to GDP as government final consumption expenditure. The value judgement that weapons are destructive rather than productive would seem to conflict with

this.

8. Many borderline cases can be raised. For example, three auxiliary minesweepers owned by the Australian Navy are ex-commercial trawlers that tow minesweeping apparatus. They obviously have an alternative civilian use but, in war conditions, their life could be short. As their asset value and characteristics have been significantly changed by the addition of sophisticated military technology, it would be reasonable to exclude them from the SNA93 definition of assets. Another example is fighter training planes which carry armaments but, realistically, would not be used in military operations.

9. SNA93 states in paragraph 10.67 that where data are not available to distinguish the various categories of defence expenditure on equipment, all expenditures by default should be treated as intermediate consumption.

"Thus, whereas structures such as military hospitals, and the equipment contained therein, are fixed assets, weapons and their supporting systems are not. It may sometimes be difficult to determine where to draw the line between the two kinds of goods, and it is necessary to recognize that it may not always be possible to obtain the necessary data to distinguish different categories of military expenditures. ... If it is not feasible to separate expenditures on such equipment from expenditures on weapons and their support systems, all expenditures on equipment for the military have by default to be treated as intermediate consumption." (SNA93 para. 10.67)

10. Overall, while arguments can be raised over the placement of the boundary between capital and consumption defence expenditure there is sufficient support to suggest that such a distinction can be made and that the boundary suggested by SNA93 is reasonable.

Data Issues

11. Data are available to implement the spirit if not the letter of SNA93. The Department of Defence (DoD) finance system distinguishes "capital facilities" and "capital equipment" programs. Expenditure on capital facilities refer to expenditure on roads, buildings and other construction. Equipment expenditures relate to all other items, such as vehicles, armaments and delivery systems. These distinctions are carried forward to the Department of Finance Budget Management System (DoF BMS) and hence to the ABS Public Finance system. Annual Reports for the last ten years were examined together with Commonwealth budget documents. The "capital facilities" program data are available on a quarterly basis in the DoF BMS. The "capital equipment" program data are not so readily available.

12. Unfortunately, the various sources have different ways of presenting data which can lead to some confusion as to coverage. Even the DoD annual report adopts different definitions in different parts of the same report.

13. The DoD finance system has recently undergone a major overhaul to place it on a full accrual basis from 1994-95. One feature of this change is that an emphasis is now being placed on balance sheet requirements. Current cost values of "capital assets" are being prepared and initial estimates were published in the 1993-94 annual report.

14. Four areas of capital expenditure data on defence equipment have been identified and treatments are discussed in the following paragraphs.

15. (i) *Capital facilities program* These expenditures include the construction and redevelopment of defence facilities such as bases, airfields, and training and logistics

establishments. Annual reports and budget documents provide explanations of major facility programs. All new works listed fit the SNA93 definition of gross fixed capital formation. Purchases and sales of existing assets are shown in the annual report. Care has to be taken when using annual report data to ensure that property maintenance and estate management are excluded. Maintenance and property management are treated as intermediate consumption for national accounts purposes. Environment studies for new work would be capital for our purposes but some others would not e.g. historic building conservation plans, investigations into environmental assessments of existing facilities. Any purchases of land should be treated as purchases of a non-produced asset. Department of Finance BMS data isolate these various components, at least for recent years.

16. Any own-account construction should be included. Any wages and salaries paid and materials used should be capitalised. It is assumed they would be costed to the facilities program.

17. (ii) *Major capital equipment program* This program is responsible for advising on and acquiring major capital equipment. Again, major purchases for the year are listed in annual reports and/or Budget documents. Major expenditures in recent years are for submarines, ANZAC ships, helicopters, F/A-18s, major upgrades of frigates and F-111s and "other" (residual). Unfortunately, "other" has been over one-third of the total. Small arms replacement, radios, sundry upgrades, sundry vessels, light field vehicles and trucks would be examples of items that could be in the residual. An allowance could be made in the estimates for capital items in the residual. The major share of purchases/expenditures in this program should be classified as intermediate/final consumption expenditure as they are for the purposes of weapons delivery.

18. The "major equipment purchases" section of the annual reports and budget statements need to be examined for items that should be classified as acquisition of produced assets. These would include trucks, oil tankers, v.i.p air fleet, survey vessels, tugs, general purpose launches, and transport aircraft, computers and communications networks. Investigations of annual report and Budget documents reveal that values for major programs are only available back to the early 1980s. Even then, in some years expenditures on a particular program may not be shown so that gaps appear in time series. It is clear that this information should only be considered approximate but acceptable for the purposes of backcasting. Backcasting prior to the 1980s by identifying relevant major items of equipment (for example survey vessels, v.i.p. aircraft) using imports data does not appear to be a possibility. It is likely the numbers would have to be trended for early years.

19. The DoF BMS does not include a useful dissection of the capital equipment program. Backcasting by quarter will be difficult and an arbitrary allocation of annual estimates to quarters may be required.

20. It appears likely that the new Department of Defence Finance System will distinguish "support and ancillary" equipment from "combat hardware" and "inventories". It is hoped this will provide a ready source of data for the future that is consistent with SNA93. It may also provide a means of adjusting back period data for individual equipment expenditures that are not considered "major" equipment but in aggregate may be substantial.

21. (iii) *Defence housing* The construction of defence housing is already capitalised in the ANA.

22. (iv) *Gross fixed capital expenditure in other programs* Some capital expenditure will be

hidden in other programs. According to DoD, alterations and refurbishments under \$250,000 and office furniture and equipment would be included in the "replacement equipment and stores" and "repairs and overhauls" categories in the DoF BMS and thus treated as consumption. An adjustment may have to be made for these categories

Asset lives and capital stock

23. The DoD annual report will be prepared on a full accruals accounting basis from 1994-95. Expenditures are classified as either capital or current and a statement of assets and liabilities (assets register) has been prepared. They intend to publish current cost values for the broad asset classes:

- facilities
- support and ancillary incl. VIP aircraft
- combat hardware
- inventories
- total

The first two categories appear to accord with the SNA93 definition of capital assets.

24. The assets register is exceptionally detailed, containing 1.6 million line items. DoD have prepared estimates of asset lives at that detailed level and are currently experimenting with the broadbanding of those asset lives for account presentation purposes. The assets register should be a very rich source for the determination of asset lives more generally for use in a perpetual inventory model (PIM).

25. Standard PIM methods should be used for the derivation of capital stock estimates for defence assets and COFC. The length of the capital formation time series required before the first reference period will be determined by the chosen service lives for the fixed asset classes. The availability of directly derived current cost values for capital stock from the DoD annual report will provide a point of comparison for PIM based estimates

ANA Decision

26. Despite some reservations on the conceptual basis of the distinction between capital and consumption expenditures on defence, the treatment recommended by SNA93 will be implemented in the ANA as far as data allow.

MONUMENTS

by Ross Macindoe

SNA93 recommends treating monuments as produced assets. Presently, the construction of monuments is within the scope of the ANA estimates of non-dwelling construction. However, monuments are not specifically identified as recommended by SNA93. The recommendation of SNA93 will not be implemented due to the difficulties involved in the identification and valuation of monuments. This departure from SNA93 is not considered to be significant for Australia.

SNA93 Recommendation

1. Historic monuments are characterised by their historic, national, regional, religious or symbolic significance. They can be objects, structures or sites of special significance. Monuments are usually accessible to the public and often admission is charged to enter the monument or its vicinity. Often they are used to produce cultural or entertainment services.

2. Under SNA93 newly constructed historic monuments are classified as gross fixed capital formation, as are major improvements to existing historic monuments. They are to be classified as dwellings, non-residential buildings or other structures as appropriate and do not appear separately identified in the accounts. Monuments appear in the capital account when newly produced or when major improvements occur. The capital account also records any transactions for existing monuments. This is to say, monuments are treated in a similar manner to other buildings.

"In principle, the gross fixed capital formation in historic monuments should be included in dwellings, non-residential buildings, and other structures as appropriate; in practice, it may be desirable to classify them with other structures. Consumption of fixed capital on new monuments, or on major improvements to existing monuments, should be calculated on the assumption of appropriately long service lives." (SNA93, 10.71)

3. Monuments already in existence that, for one reason or another, have not been already recorded on the balance sheet are treated as an economic appearance and recorded in the other changes in the volume of assets account. An example would be a building which has been written off but retains some additional value as a building of historical significance. SNA93 notes that

"In the case of goods not already recorded on the balance sheets, it is the recognition of a significant or special value...that is considered an economic appearance to be recorded in the other changes in volume of assets account." (SNA93, 12.23)

Note that the material value of a written off monument does not make (another) appearance in the account, only its special value. Importantly, the entry of the special value through the other changes in volume of assets account means that such inclusions do not affect GDP.

ANA Present Practice

4. The ANA does not make any specific adjustments for the inclusion of monuments at present. The construction of new monuments falls within scope of the Engineering Construction Activity survey and hence is in the ANA estimates of non-dwelling construction but monuments are not separately identified. Monuments which have acquired significance over time are not included through the other changes in volume of assets account.

Conceptual Issues

5. The definition of monuments noted previously is potentially very broad, taking into account sites and buildings of special significance: "special" in this case referring to cultural, historical, religious and archaeological significance. Given the wide meaning of the word "culture" this definition could arguably include the Sydney Opera House, the Melbourne Cricket Ground, and Uluru (Ayer's Rock). Note that all of these buildings/sites are used to create cultural and entertainment services. Given that monuments are a component of produced assets the use of the word "site" presumably refers to "produced sites" such as the Rocks area of Sydney, rather than land itself. Thus aboriginal sites such as Uluru would be excluded because, despite their religious and cultural significance, they are not "produced" as such.

6. The requirement for a distinction between produced and non-produced "sites" seems to be a valid interpretation of SNA93 but, at least in Australia, the concept of monument can easily be extended to non-produced areas. Further, given that the basis for classification as monuments is the existence of special value, it is not clear why a special value should only be calculated for produced assets. Indeed, special value may better be treated as an intangible non-produced asset rather than being considered an integral part of a produced asset.

7. The issue of consumption of fixed capital (COFC) is also somewhat vexing. While SNA93 suggests COFC should be calculated on new monuments there is no indication that COFC should be applied to any special or significant value of a monument. Certainly, it would seem strange to suggest that special or significant value will necessarily decline or be used up in some way.

8. Given these considerations the treatment of monuments is not resolved. However, the following presents a possible treatment for further discussion.

(i) While some buildings and other constructions are built as monuments and other constructions gained monument status over time, the impact of monuments on total production should only be the total value of the initial construction activity.

(ii) Some constructions have or attain historic or other special value which may be considered to be a legitimate component of a complete balance sheet. Such special value should be treated as an intangible non-produced asset and should be entered on the balance sheet through the other changes in volume of assets account.

(iii) Consideration should also be given to the inclusion of special value on the balance sheets for non-produced historic or significant sites, such as battlefields, which generate entertainment or other services. Again, such special value should be entered on the balance sheet through the other changes in volume of assets account.

9. SNA93 suggests valuation of monuments at either cost to produce or purchase price. While these approaches are relatively straightforward to apply to the structure value of new monuments, the valuation of special significance for monuments is extremely problematic. Indeed, it is not clear how this could be achieved. Perhaps the more obvious approach is some measure of discounted future income streams but the exceptionally long lives of monuments may make this approach too difficult to calculate.

Data Issues

10. As just noted new monuments are to be valued at purchase price or at cost of production. Examination of local, state and federal government records could, assuming that they are complete, provide a source for the cost price of many monuments. This research task would be extremely large. The very large number of monuments erected by non-profit institutions, such as the Returned Services League (RSL), would prove very difficult to value as they say no records are kept for the majority of monuments. The RSL suggested some information could be available on high profile monuments, such as those on ANZAC Avenue in Canberra where there are many war monuments including the National War Memorial.

11. If the broad definition of monument mentioned above is taken then this problem is compounded. For example, the cost of construction of the Sydney Opera House should be available. However, as a monument its cost of construction or income stream may be impossible to determine given its status as a symbol of Sydney and Australia. Moreover, its value is inextricably interwoven with its role as a centre for the performing arts.

12. A key problem is estimating the number of monuments. It would be necessary to establish the existence and location of monuments but as no aggregated data exist on this topic it would require extensive research or a survey of local councils to identify the monuments in each local council's area. The compilation of such a list would be expensive.

13. The RSL noted that there was no complete list of armed forces related monuments yet compiled in Australia, although the Department of Veterans Affairs was considering compiling such a list. At this stage this list would only cover monuments relating to the armed forces. As an indicator of the size of the task it has been estimated that in the State of Victoria there may be as many as 1,100 war related memorials, and 432 in Queensland.

14. Price data would be even more difficult to obtain as many monuments have been erected by non-profit institutions or local governments which no longer exist or who may not retain such information beyond their statutory requirements to do so.

ANA Decision

15. The inclusion of some monuments in the ANA may be possible although many problems exist. Even for those constructions built as monuments data do not exist, and to collect this information would be a major research task. Further, were this research task undertaken it is doubtful whether it would yield more than an estimate of the number of memorials given the limited nature of information on prices of monuments.

16. Consequently, no specific estimates of monuments will be included in the ANA at this stage. The value of work done on the construction of new monuments will continue to be included in the ANA estimates of capital formation.

CHAPTER 2: Produced Intangible Fixed Assets

MINERAL EXPLORATION

by Sean Thompson

SNA93 recommends that all expenditure on mineral exploration, whether successful or not, be treated as gross fixed capital formation. Presently, the national income, expenditure and product (NIEP) accounts of the ANA treat all mineral exploration expenditure as intermediate consumption. The input-output (I-O) accounts of the ANA presently treat own account mineral exploration on petroleum production leases as gross fixed capital formation but treat all other exploration expenditure as intermediate consumption. The SNA93 recommendation will be consistently implemented throughout the ANA.

SNA93 Recommendation

1. SNA93 recommends the following treatment for mineral exploration expenditure:

"Expenditures on mineral exploration are not treated as intermediate consumption. Whether successful or not, they are needed to acquire new reserves and are, therefore, all classified as gross fixed capital formation." (SNA93, para. 6.166)

2. An assumption underlying this recommendation is that the knowledge gained from either successful or unsuccessful exploration is useful to the company undertaking the expense for a period greater than one year. To treat exploration expenditure as a current expense would be to suggest that the knowledge is only used in the year in which the expenditure is incurred. Further, from a national perspective, exploration by one company adds to the knowledge of all exploration companies.

Own account and contract exploration

3. SNA93 distinguishes two broad means by which mineral exploration may be conducted: (i) by the general mining industry on their own account, or (ii) as a contracted service by the "services to mining" industry (referred to as specialised enterprises in SNA93).

"Mineral exploration is undertaken in order to discover new deposits of minerals or fuels that may be exploited commercially. Such exploration may be undertaken on own account by enterprises engaged in mining or the extraction of fuels. Alternatively, specialized enterprises may carry out exploration either for their purposes or for fees. The information obtained from exploration influences the production activities of those who obtain it over a number of years. The expenditures incurred on exploration within a given accounting period, whether undertaken on own account or not, are therefore treated as expenditures on the acquisition of an intangible fixed asset and included in the enterprise's gross fixed capital formation." (SNA93, para. 10.90)

4. While SNA93 recommends that both exploration undertaken on own account and exploration by the services to mining industry should be capitalised, exploration expenditure should only be capitalised in the accounts of the company which is undertaking the exploration expense. That is, receipts of the services to mining industry for the provision of exploration services are not capitalised by the services to mining industry. Rather, the payments are capitalised by the company receiving the exploration information. Note that

capital expenditure incurred by the services to mining industry in the provision of exploration services should be capitalised independently.

Scope of exploration expenditure

6. SNA93 recommends that all costs associated with exploration should be capitalised.

"The expenditures included in gross fixed capital formation include not only the costs of actual test drillings and borings, but also the costs incurred to make it possible to carry tests, for example, the costs of aerial or other surveys, transportation costs, etc. The value of the resulting asset is not measured by the value of new deposits discovered by the exploration but by the value of the resources allocated to exploration during the accounting period. Consumption of fixed capital may be calculated for such assets by using average service lives similar to those used by mining or oil corporations in their own accounts". (SNA93, para. 10.91)

7. Note: (i) while the scope of exploration expenditure is wide, SNA93 has been interpreted as excluding exploration expenditure in the form of cash bids (see paragraph 10 below); and (ii) estimates of the service lives of exploration expenditures are required to estimate consumption of fixed capital (COFC).

ANA Present Treatment

8. Outlays on mineral exploration and research and development are treated as intermediate consumption in the NIEP accounts. The treatment is based on an interpretation of SNA68 that the accrual of future benefits from exploration expenditure is uncertain and thus expenditure should be expensed. In the NIEP accounts, estimates of mining industry gross operating surplus (GOS) are based on Australian Taxation Office (ATO) data. Estimates of mineral exploration expenditure are deducted from gross income in the process of deriving estimates of GOS to reflect the treatment of such expenditure as intermediate consumption.

9. While the NIEP accounts treat all mineral exploration expenditure as intermediate consumption, the I-O accounts treat own account mineral exploration on petroleum production leases as gross fixed capital formation. All other petroleum exploration expenditure and all other mineral exploration expenditure is treated as intermediate consumption in the I-O accounts.

Conceptual and Data Issues

Cash bids

10. Cash bids are tenders for the right to undertake mineral exploration. While SNA93 states that all costs associated with exploration should be capitalised, it is argued here that successful "cash bids" for either onshore or offshore permits should not be included in mineral exploration. Rather, successful cash bids should be treated as intangible non-produced assets in line with the following SNA93 recommendation.

"Intangible non-produced assets consist of patented entities, leases or other transferable contracts, purchased goodwill and other intangible non-produced assets. Such leases are on land, subsoil assets and residential and non-residential buildings." (SNA93, para. 10.130)

11. However, the definition of exploration expenditure used by the ABS survey of Actual and Expected Private Mineral Exploration includes successful cash bids. It defines exploration expenditure to include

"... expenditure on aerial surveys (including landsat photographs), general surveys, report writing, map preparation and other activities indirectly attributable to exploration. Cash bids for offshore petroleum exploration permits are also included." (Actual and Expected Private Mineral Exploration, Australia, page 5, ABS Catalogue No. 8412.0).

Data sources are available to separate out cash bids from other exploration expenditure.

Service lives

12. An estimate of the service lives of mineral exploration expenditures is required to derive estimates of consumption of fixed capital (COFC). SNA93 recommends "...using average service lives similar to those used by mining or oil corporations in their own accounts." (SNA93, para. 10.91). Following is a summary of options for estimating service lives of mineral exploration expenditures in the ANA.

(i) Mean asset lives

13. The ANA uses the following mean asset lives in estimating capital stock for the mining industry:

Non-dwelling construction	31 years (weighted average)
Equipment	16 years (weighted average)

One approach to estimating the service life of mineral exploration expenditures is to apply these mean asset lives. However, the nature of expenditure associated with exploration is likely to be quite different from usual non-dwelling and equipment expenditure. Further, mineral exploration is an intangible asset and its life would not necessarily be related to the physical assets used in mining production. This approach is not recommended.

(ii) Average mine lives

14. An alternative approach is to use an estimate of average mine lives. Indeed, the use of average mine lives to calculate COFC on exploration expenditure is consistent with Australian Accounting Standards 7 (AAS7)¹. AAS7 allows for capitalisation of successful mineral exploration and the expected life of the successful expenditure should be the period of the production phase (*Australian Society of Accountants Handbook*, pages 1064-1065).

15. However, SNA93 recommends that all exploration expenditure be capitalised, not only successful exploration expenditure. In practice, it is probably only possible to depreciate unsuccessful mineral exploration at the same rate as that recommended for successful exploration, i.e., using average mine lives.

16. In deriving average mine lives the calculation needs to be based on those commodities for which exploration is carried out. The exploration estimates collected by the ABS distinguish between mineral and petroleum exploration expenditure. Thus average mine lives should be calculated separately for "petroleum commodities" and "all other minerals".

17. There are two alternative sources available for the derivation of average mine lives; (i) the mine lives derived in Australia's experimental national balance sheets; and (ii) the mine lives used in the accounts of mining companies. Details of these sources and the methods they use are contained in Appendix 1.

18. In line with the discussion in Appendix 1, it is recommended that the service lives derived in the balance sheets, along with the shorter, and more realistic, service lives for black coal (60 years), and iron ore (30 years) (based on annual report data), together with an estimate of 40 years for Uranium and "other" commodities should be used in the estimation of COFC for mineral exploration. The use of generally shorter mine lives is seen as more realistic given the probability of substitutes arising in the longer term.

Estimating consumption of fixed capital

19. A perpetual inventory model (PIM) is used in the ANA to estimate the stocks of tangible, produced assets of the Australian economy together with the value of capital assets used in the productive process, i.e., COFC. While the PIM is not ideal, it is suggested that PIM be used to calculate COFC for each type of commodity. A table showing estimates of COFC on mineral exploration for the year 1993-94 is provided in Appendix 2.

Implementation

20. The ATO is a major data source for ANA estimates of mineral exploration expenditure. However, a difficulty with this source is the changing nature of taxation rules on mineral exploration. In general, certain items of exploration can be expensed while others cannot leading to difficulties in identifying appropriate estimates of GOS from ATO data.

21. Nonetheless, NIEP has used ATO data to calculate GOS for the mining industry. Until now, all mineral exploration expenditure has been treated as intermediate consumption. To adjust these estimates to conform to SNA93, ABS data on mineral exploration have been used. The total exploration expenditure which should be capitalised is estimated to be \$1.3 billion in 1993-94.

ANA Decision

22. All mineral exploration expenditure will be capitalised in the ANA, consistent with the SNA93 recommended treatment. The estimation of service lives for the expenditure is quite difficult but appropriate data sources and methods have been found to estimate these lives.

Footnotes:

1. AAS7 outlines the following standards in relation to the recording of exploration expenditure by mining companies;

"Costs arising from exploration and evaluation related to an area of interest may be written off as incurred, except that they may be carried forward provided that rights to tenure of the area of interest are current and provided further that at least one of the conditions is met:

(a) *such costs are expected to be recouped through successful development and exploitation of the area of interest, or alternatively, by its sale; and*

(b) *exploration and evaluation activities in the area of interest have not at balance date reached a stage which permits a reasonable assessment of the existence or otherwise of economically recoverable reserves, and active and significant operations in, or in relation to, the area of interest are continuing."*

Appendix 1 : Sources and methods for deriving average mine lives

Method 1: National balance sheets

The only aggregated information currently available on average mine lives for the major minerals in Australia is published as part of the subsoil assets estimates in the national balance sheets. Average mine lives for each mineral were calculated by dividing the Economic Demonstrated Resources (EDR)¹ of each mineral in a particular year by the average annual production rate for that mineral.

Average mine lives in the balance sheet represent the expected life of the remaining EDR of a mineral as at a particular date and as such are not a measure of the total possible mine life. However, they are considered by companies in their annual accounts to be an acceptable basis for amortising exploration expenditure. For example, a major mining company determines the expected economic life of mineral exploration based on the estimated life of reserves on a unit of production basis. Any additions to these remaining reserves from new exploration discoveries will add to the expected mine life of the commodity, *ceritus paribus*. While the expected mine life of mineral resources will be significantly influenced by the amount of exploration, given that EDR divided by production is the method used by companies to determine the economic life of mineral exploration in their own accounts, this approach is recommended.

While SNA93 suggests that **proven** reserves should be the reserves which are valued in the balance sheets, ABS believes that proven reserves, in the Australian context, are too limited for decision making, and consequently, **proven plus probable** reserves (which equates to EDR) have been used in the balance sheets and are recommended for use in deriving mine lives for mineral exploration COFC purposes. Table 1 below shows the calculated average mine lives used in the balance sheets.

A weighted average of company mine lives for each commodity could be compiled if information on mine lives were collected in the mining census. However, since such data are not available, at least in the short term, the average mine lives calculated in the balance sheets are suggested, except in the case of commodities where either the mine lives are considered too long a period to sensibly depreciate the expenditure, for example brown coal (which is over 800 years), or data on the average service lives used by companies are readily available (in annual reports).

Table 1: Average mine lives of the commodities shown in the National Balance Sheets publication⁽¹⁾

<i>Commodity</i>	<i>Average mine life 1989-92 (No. of years)</i>
Copper, lead, zinc, silver, nickel, cobalt	25.00
Gold	9.23
Petroleum (Recoverable) - Crude oil	9.63
Petroleum - Natural gas	43.55
Petroleum - Condensate	34.03
LPG naturally occurring	33.03
Iron ore	149.58
Tin, tungsten, scheelite, wolfram	15.40
Ilmenite, rutile, zircon	50.99
Uranium	108.41
Black coal ⁽²⁾	314.42
Diamonds, gem and industrial	24.20
Other ⁽³⁾	80.58
Average	69.08

(1) Average mine lives in earlier years will have to be calculated to be fed into the PIM model at some later stage. (2) A weighted average mine life for coal was based only on black coal, rather than black and brown coal. Brown coal has an average mine life of 852 years, and consequently leads to an upward bias in the weighted average. It is expected that very little brown coal exploration would be performed. In fact, there is only one known user of brown coal, Generation Victoria (formerly the Victorian Electricity Commission). (3) Other commodities consist of antimony, bauxite, cadmium, garnet, lithium, magnesite, manganese ore, platinum, rare earths, talc, tantalum. This is a non-weighted average.

Method 2: Companies' own accounts

SNA93 suggests that COFC may be calculated for mineral exploration by using average service lives similar to those used by mining or oil corporations in their own accounts. This approach aligns with the practices of a number of mining companies in Australia which amortise successful exploration over a "period of benefit". The period of benefit is "based on the estimated life of reserves (which usually equates to proven plus probable reserves) on a unit of production basis". The tables below show the commodity mine lives used by a selection of Australia's major mining companies based on data from their annual reports.

Table 2: BHP Group: Expected economic lives for successful exploration expenditure as at 31 May 1993.

<i>Commodity</i>	<i>Reserves</i>	<i>Production</i>	<i>Average life</i>
Coal (mill. tonne)	2,551	44	58 years
Iron ore (mill. T)	1,226	43	29 years
Copper (mill. pounds)	15,767	585	27 years
Gold ('000 oz's)	2,225	216	10 years

Table 3: Coolgardie Gold: Expected mine life for gold as at 30 June 1993.

<i>Commodity</i>	<i>Reserves</i>	<i>Production</i>	<i>Average life</i>
Gold ('000 oz's)	208,276	53,487	3.9 years

Table 4: Ampol: Expected mine life for crude oil and gas as at June 1993.

<i>Commodity</i>	<i>Reserves</i>	<i>Production</i>	<i>Average life</i>
Crude oil (Million barrels)	230	12.6	18 years
Gas (Billion cubic feet)	257	6.5	40 years

Table 5: Santos: Expected mine lives as at 31 December 1993.

<i>Commodity</i>	<i>Reserves</i>	<i>Production</i>	<i>Average life</i>
LPG ('000 Tonne)	4,844	243.8	20 years
Crude oil (Million barrels)	55	10.2	5 years
Condensate (Million barrels)	40	2.0	20 years

While not explicitly stated in some of the company reports, it is assumed that their "reserves" consist of proven plus probable reserves. The service lives used by the mining companies approximate those derived in the balance sheets except for black coal and iron ore.

Weighted average mine lives for petroleum.

While a commodity breakdown is available for non-petroleum exploration, no breakdown is available for petroleum exploration. This is because miners cannot be sure what type of petroleum commodity they will find. (To a lesser extent, the allocation of hard rock prospecting to commodity can also be an issue. For example, in the sort of formation where one might find gold, deposits of copper, uranium, nickel etc may be unearthed.) Consequently, to derive COFC on petroleum exploration an average of the mine lives of crude oil, natural gas, LPG and condensate must be used.

There are two approaches which have been considered to derive this average: (i) a simple average of the mine lives of the four petroleum commodities published in the balance sheets; or (ii) an average of the mine lives derived in the annual reports of mining companies. The second method provides a shorter average life and is recommended.

Footnotes:

1. Economic Demonstrated Resources - are those resources which can be expected to be profitably extracted, processed and sold under current and foreseeable economic conditions.

COMPUTER SOFTWARE

by Sean Thompson

SNA93 recommends that computer software expected to be used in production for more than one year be treated as an intangible fixed asset. Presently, the ANA treats all software as intermediate consumption except for software included as a major hardware purchase. Although the SNA93 recommendation is contrary to commercial accounting practice in Australia and the available data are not ideal, it will be implemented in the ANA.

SNA93 Recommendation

1. SNA93 recommends that any computer software or database be treated as an intangible fixed asset when a producer expects to use the software or database in production for more than one year, regardless of whether the software is purchased or developed in house.

"Computer software that an enterprise expects to use in production for more than one year is treated as an intangible fixed asset. Such software may be purchased on the market or produced for own use. Acquisitions of such software are therefore treated as gross fixed capital formation. Software purchases on the market are valued at purchasers' prices, while software developed in-house is valued at its estimated basic price, or at its costs of production if it is not possible to estimate the basic price." (SNA93, para. 10.92).

"Gross fixed capital formation in software also includes the purchase or development of large databases that the enterprise expects to use in production over a period of time of more than one year. These databases are valued in the same way as software, described above" (SNA93, para. 10.93).

ANA Present Treatment

2. The ANA treats all private business expenditures on software, other than those included as part of a major hardware purchase, as intermediate consumption. That is, private business expenditure on computer software is treated as an expense in deriving estimates of gross operating surplus from taxation data.

3. In the case of public expenditures, although expenditure on computer software is not separately identified, it has been implicitly treated as government final consumption expenditure in the ANA.

4. To implement the SNA93 recommendation for private businesses an estimate will need to be made of the value of private business expenditure on computer software which according to tax laws is generally treated as intermediate consumption. This estimate will be treated as gross fixed capital formation, thus raising GDP(E). On the production/income side of the accounts intermediate usage will be reduced by an amount equal to the gross fixed capital formation thus raising GOS, GDP(I) and GDP(P).

5. Under SNA68, licence fees, royalties, etc., paid for software were treated as property income and thus did not affect measures of GOS. However, once SNA93 is implemented, licence fees will be treated as an expense, and will be deducted in deriving GOS.

6. To implement the SNA93 recommendation expenditure by government on computer software will need to be deducted from government final consumption expenditure and added to gross fixed capital formation. This switch will have no effect on GDP. However, an estimate of consumption of fixed capital (COFC) will need to be added to government final consumption expenditure thus adding to GDP.

Conceptual Issues

The scope of computer software

7. Definitions of software type products as used in the 1993-94 Survey of Industry Use of Information Technology are as follows.

Packaged software. General purpose off-the-shelf software (e.g., Word, Lotus 1-2-3, DOS, Windows, etc.). Packaged software includes:

- applications
- systems management and utilities
- tools and
- other software.

Software and systems services. Services provided generally by information technology (IT) professionals to meet specific purposes. These include consultancy services and the development of special purpose software to meet the needs of a single client. Software and systems services includes:

- systems analysis, design and programming
- system integration
- software maintenance and
- facilities management.

8. Not all of the expenditure related to software and systems services should be regarded as capital formation. Software maintenance and facilities management are day to day activities by support staff who ensure the system is running properly. Such costs should be treated as operating expenses and not capitalised. However, where support services are involved in a large upgrade of a system, so that its expected life is lengthened, these costs should be capitalised.

9. A final issue on the scope of computer software is whether software embedded in other machinery should be treated separately. Many office machines and production equipment have software systems which could comprise a substantial proportion of a machine's overall value. It has been assumed that such software remains part of the machinery in which it is embedded and thus is not capitalised as computer software.

The distinction between computer hardware and software

10. In many cases it may not be possible to separate the value of software which is purchased as an integral part of computer hardware. To the extent that both of these items need to be capitalised this is perhaps not so much of a problem although two main issues are raised:

- (a) The assets lives of hardware and software may be quite different. Thus the inability to separate hardware from software would lead to difficulties in the estimation of COFC.
- (b) The derivation of constant price estimates may be difficult if there are significant

changes in the relative contributions of expenditure on software and hardware over time. If so it would be important to measure expenditure on them separately. In fact, it seems that software prices have not declined nearly as steeply as hardware prices over recent years thus pointing to a need to separate estimates of hardware and software.

The relationship to other intangible assets

11. The ABS is concerned about the imprecision of the boundary between intangible produced and intangible non-produced assets. For example, both computer software and artistic originals are classified as produced intangible assets and there is little difference in their methods of production. That is, in both cases an original (film, computer programme) is developed and copies are on-sold for use. However, for artistic originals it is the original that is capitalised. For computer software it is the copies which are capitalised. Given that the copies on disk or otherwise are relatively tangible there seem reasonably good grounds for treating computer software as tangible produced assets. A distinction from artistic originals and mineral exploration appears valid.

12. A further aspect relates to the calculation of COFC. COFC is calculated on the basis of replacement cost. It is not clear that intangibles, in general, have a replacement cost. Certainly, valuing the original of a film at replacement cost makes little sense. However, it is not too difficult to imagine a replacement cost for computer software. This again supports the notion that computer software may best be treated as a tangible produced asset.

13. A final concern relates to the accurate measurement of computer software which is leased or for which continuing licence fees are paid. This software should be capitalised in the books of the lessor. However, given that such software may be the result of research and development (which is not capitalised in the system) it is not clear whether such software would/should be capitalised. The lessor may in fact report the copyright over the software which should be treated as a non-produced intangible asset and thus no produced asset may underlie the income flow to the lessor on the software.

Data Issues

Public sector expenditure on computer software

14. Australian government departments have been introducing accrual accounting over recent years. This has resulted in a renewed focus on the distinction between capital and current expenditure and the valuation of assets for inclusion in balance sheets. New accounting guidelines have been issued to departments which will affect the availability of data in the future. However, it is important to note that the Department of Finance (DoF) Budget Management System (BMS), which is the major source of federal government data to the ABS, is remaining substantially on a cash basis, although the new emphasis on the distinction between capital and current expenditure at the departmental level may eventually feed through to that system.

15. DoF provides guidelines to the various departments on how they should account for computer software in their accounts. According to DoF, "software purchased externally" should be capitalised to the extent arrangements allow. However, only large payments and any upgrades which extend the service life of the asset should be capitalised. Software which is leased must be expensed.

16. For internally produced systems DoF recommendations are as follows:

"Internally developed software would be unlikely to satisfy the asset recognition criterion of reliable measurement until a department has the necessary costing systems and associated departmental policies and procedures in place. Costs associated with internally developing computer software prior to the installation of these systems, policies and procedures would therefore be recognised as an expense in the operating statement." (DoF, Guidance Release 8)

These guidelines are interpreted to mean that if the data are not currently available, internally produced systems should not be recognised as an asset. Otherwise, they should be recognised as an asset and capitalised, as has been the case with systems in the ABS, the Department of Social Security (DSS), and the Department of Defence (DoD).

17. In order to determine the extent of compliance with these guidelines, some of the departments which contribute the major part of Commonwealth government information technology (IT) expenditure have been examined. In 1993, the DoD accounted for 34 per cent of this expenditure, the DSS was 13 per cent, and the Treasury (including the ABS) accounted for 7 per cent of the expenditure. Four case studies of the treatment of computer software expenditure by Australian government departments are included in Appendix 1.

Private sector expenditure on computer software

18. There are no direct accounting standards applicable to the treatment of computer software in companies' accounts. The treatment is dependent on a company's interpretation of Standard of Accounting Concepts (SAC) 4. SAC 4 defines assets as "*service potential or future economic benefits controlled by the entity as a result of past transactions or other past events*". In the case of computer software, this concept is interpreted to mean that where there are future benefits or services associated with a system or package, then the software should be recorded as an asset in the balance sheet, and thus capitalised.

19. However, according to the Australian Society of Certified Practising Accountants, most businesses expense both their externally produced software and their in-house system development. Only those systems which involve very large costs will be capitalised. The reason for businesses treating computer software as an expense is likely to be the advantageous tax laws. Basically, all expenditure on computer software is deductible in its year of purchase except for software which is an integral part of a computer system. In practice it is likely that businesses will attempt to separate out the software component of a computer system to as large an extent as possible in order to write that expenditure off in the year of purchase. Appendix 2 contains more detail on Australian taxation rulings.

20. The practice noted above is consistent with the investigations into business reporting in the Economic Activity Surveys (EAS) conducted by the ABS. Investigations have indicated that most businesses do not capitalise purchases of computer software, even when this could be considered to be of some significance i.e. above \$5,000. The general consensus is that once purchased the software has a limited 'life' and no resalable value.

Sectoral estimates

21. It will be important to develop sectoral estimates to identify household consumption expenditure on computer software from capital expenditure by private business and government.

Consumption of fixed capital on computer software expenditure

22. If possible, average service lives should be calculated separately for the various components of computer software, e.g., general purpose software, and in-house databases. The services lives which are used for hardware are inappropriate because of their longer lives. Asset lives used by the ABS and the DoD could provide a reasonable proxy. Service lives of 3 years for externally purchased software, or 8 years for in-house development could be used.

Available data sources

23. Neither taxation data nor public finance data may be able to provide the detail required for the implementation of the SNA93 recommendation. In light of the variations in treatment a number of ABS surveys have been investigated to see how they may be able to provide data to fulfil the recommendation. The detail of these investigations are contained in Appendix 3. It appears as though point in time estimates may be able to be constructed every 3 years but indicators of movement between these benchmarks need to be developed and refined.

Backcasting

24. There appear to be no data available for estimating expenditure on computer software for earlier periods. As a result, estimates of expenditure in earlier periods will need to rely on indicators. The main problem in estimating earlier periods is the dynamic nature of the computer software market. The use of technology has changed rapidly in the last couple of decades, and it would be very difficult to calculate a rate of expansion.

25. The most appropriate available indicator may be imports data for computer hardware. It would also be necessary to take account of trends in local production of hardware and to deduct computers sold to households. A possible indicator for the former may be some proportion of manufacturing production of the electronic equipment industry. As for the latter, no historic sources have come to light and an indicator may have to be estimated to reflect the strong uptake by households of computer technology. The resulting total indicator series can only be interpreted as a rough indirect indicator as it relies on an assumption that there is a fixed relationship between expenditure on hardware and requirements for software (both purchased and developed in-house). Several further refinements could be applied to the indicator. For example, it is likely that, over time, software purchases have been an increasing proportion of total expenditure on IT. If this can be established it should also be taken into account.

26. The allocation of total expenditure estimates to sector will require further approximations and assumptions. Estimates of computer hardware included in government final consumption expenditure have been prepared for each of the constant-price base years. However, consistency with future general government estimates will be an issue. Historic allocations between the business sectors and by industry may have to be constant proportions based on industry data from the 1993-94 IT survey. Again, a number of ad-hoc refinements may be considered; for example, the financial sector may have a higher share of expenditure in earlier periods.

27. An alternative estimation process may be to build up a short time series of computer software in a satellite account until sufficient data are available to provide a time series.

However, this is not really a satisfactory solution to the backcasting problems since ultimately a full time series including backcast data would be required.

ANA Decision

28. The capitalisation of computer software as recommended in SNA93 will be implemented in the ANA. The ABS has a number of concerns about the treatment of computer software as an intangible asset but accepts that capitalisation of software is consistent with other sections of SNA93. While the SNA93 treatment differs from commercial accounting practice, investigations have found that satisfactory data can be found to implement this approach.

Appendix 1: Departmental case studies

Australian Bureau of Statistics (ABS)

When the ABS used cash accounting principles, all computing expenditure associated with developing statistical systems and/or databases and the purchase of external software was written off and expensed in the year in which the expense was incurred. The ABS, like other government departments, adopted accrual accounting in 1993/94. Under accrual accounting, the expenditures incurred in developing such systems (and the purchase of software) should be written off over the years of benefit. In other words, the cost of the systems/software should be capitalised and the product treated as an asset.

The ABS has adopted this policy for all system development expenditure incurred on or after 1 July 1994. However, expenditure incurred in connection with the population census program will continue to be expensed until an approach is identified which adequately "reflects the special and unusual considerations applicable to the census program" (ABS Accounting Policies on Capitalisation of Internally generated Statistical and Other Systems).

The ABS considers accounting procedures for capitalisation of internally generated assets as particularly complex; therefore, it does not capitalise minor amounts where the benefits would not be commensurate with the costs involved. As a consequence, the ABS is not capitalising the direct costs of a system when they are less than \$500,000. The ABS is engaged in developing systems costing less than \$500,000 on a continuing basis. Such development activities have no discernible peak or trough from one year to the next, so capitalisation of these smaller systems is seen to have little advantage. A decision is still to be made as to whether systems developed before 1 July 1994 will be recognised (as capital expenditure and thus depreciated) and the \$500,000 rule may not apply.

Following from the above, the ABS regards the following items as included in the cost of internally generated systems:

1. Salaries and related costs (including leave and superannuation) of personnel engaged in the development of the systems.
2. Cost recharges in respect of IT including Technology Applications programmers directly related to the development of the systems.
3. Other costs that can be directly attributed to the development of the systems.
4. An appropriate share of significant overheads should be included as part of the cost of internally generated assets.

However, the ABS regards costs incurred in upgrading self generated software as an expense. An exception may be when the upgrade involves amounts of \$250,000 or more and significantly improves the useful life and/or the operating capacity of the software.

The ABS treats all externally purchased software as assets and therefore capital expenditure.

The general principle is that the cost of an asset should be written off over its useful life. The ABS policy is that the useful life of internally generated systems should be determined on a case by case basis. Estimated useful lives of internally generated systems should be reviewed

annually. At present, the ABS writes off externally purchased software over 5 years. In-house software systems such as the business register, the prices system and household survey processing system are written off over 10 years, while the ABS database is written off over 8 years.

Department of Defence (DoD)

The DoD indicated that, with the implementation of accrual accounting, they are capitalising some very large in-house projects while software provided externally is expensed unless it is purchased in conjunction with hardware. At this stage they have not established an expenditure cut-off limit for the capitalisation of in-house software, but because of the department's high materiality limits, only the very large projects are selected on a somewhat arbitrary basis for capitalisation. Software development that is capitalised will not be recognised in their financial statements as an intangible asset but will be included with plant and equipment. This treatment may change over time. In the case of externally provided software, the asset life is considered too short to be worth depreciating (around three years). They do not keep a software register.

Department of Social Security (DSS)

The DSS intend to implement accrual accounting in the 1995-96 financial year. As part of this policy the DSS intends putting a value on their in-house computer systems, based on their development costs. To do this, they will use a *Function Point Analysis* approach whereby their IT people will break down the complexity of the system and indicate the costs associated with its development. It is intended that all future systems be valued the same way.

Any off-the-shelf software with a purchase price of over \$2000 is capitalised. The asset life presently used is 4 years. Any initial costs associated with mainframe software are capitalised. However, any yearly fees which cover maintenance costs and the latest version of the software are expensed. The reason the DSS do not capitalise that portion of the yearly fees associated with providing the latest version of the software is that the initial costs of the software, although capitalised, are not depreciated. This is presumably on the grounds that the asset never depreciates because it is regularly upgraded to maintain its service life.

New South Wales Treasury

To ensure consistency of approach within the New South Wales public sector, the following guidelines are in place for accounting for computer software:

1. All physical non-current assets costing more than \$5,000 individually **must** be capitalised.
2. Assets with acquisition costs less than \$500 are generally expensed in the year of purchase.
3. In respect of assets with acquisition costs of between \$500 and \$5,000, the question of capitalisation is a matter for decision by the individual agencies concerned having regard to the materiality of the items involved within the overall context of the financial statements.
4. Generally, the costs which form part of a network (e.g., computer systems and

office furniture) should be aggregated when applying the capitalisation threshold tests.

Appendix 2: Australian Master Tax Guide rulings

The Australian Master Tax Guide rulings related to computer software include the following.

1. Where software is an integral part of the computer system, the total system would be depreciable. Software costs are otherwise deductible in the year they are incurred.

2. In-house work - the cost of developing computer software to facilitate a larger research and development project is deductible. The same applies to the cost of a software package which is purchased for use in an R & D project. If the software is developed as a product in itself, the cost qualifies if one of the purposes of the development is to sell, rent, license, hire or lease the software to multiple clients.

3. Royalties - as regards payments in relation to computer software, a payment is a royalty where it is in consideration:

(a) for the granting of a license to reproduce or modify a computer program in a manner that would, without such a license, constitute an infringement of copyright (e.g., payments for (i) the right to manufacture copies of a program from a master copy for distribution and (ii) the right to modify or adapt a program); or

(b) for the supply of know-how.

However, the following are not considered to be royalties for income tax purposes: (i) payments for the transfer of all rights relating to copyright in the program; (ii) payments for the granting of a license which allows only simple use of the software; (iii) payments for the provision of services in the modification or creation of software; and (iv) the proceeds from a sale of goods (e.g., where hardware and software are sold without being unbundled).

Appendix 3: Available data sources

(i) 1992-93 Information Technology Survey

The 1992-93 Information Technology (IT) survey covered the main industries involved in the production and distribution of IT goods and services. The survey covered all industries associated with the sale of computer software, but excluded major retail stores. The IT survey is the main source of total sales information. For 1992-93 the survey estimated total sales of packaged software to be \$1379m.

One issue is the inclusion and valuation of software that is bundled together with hardware sales: no guidance is given in the survey form.

Excluded from the estimate is the value of work done on in-house software and databases by industries other than the IT industry. This may be worth another \$0.5 - 1 billion.

A significant problem is that the survey does not provide information on the sales of software

by sector. It is likely that there could be significant sales of computer software to households by retailers covered in the survey, and these sales would need to be separated out.

(ii) 1993-94 Information Technology Survey by industry

The ABS conducted an industry survey of IT purchases in respect of 1993-94 covering 8,500 businesses across all industries. The results provide expenditure on "in-house computer and communication support" by industry. The survey does not separate out purchases of externally produced software from purchases of computer and communication hardware. Nonetheless, the survey has provided some useful information on expenditures on the development of in-house systems by the private sector.

(iii) 1993-94 Information Technology Survey of General Government and PTE's

In 1993-94 the ABS also conducted a survey of IT purchases by general government and government business enterprises. The survey is a source for a benchmark estimate of government expenditure on computer software. The results separately identify software purchases and expenditure on in-house development of software.

(iv) Australian Information Industry Association Limited

This association was able to provide members' performance statistics from 1991-92 to 1993-94. For 1993-94 their data provided total revenue from software sales of \$1,106m and exports of \$146m. These estimates are about \$200m less than the IT survey, but this is most likely the result of under-coverage of their membership compared to those businesses accounted for in the IT survey.

(v) Economic Activity Survey (EAS) treatment of computer software expenditure

In the 1995-96 EAS form, computer software is shown as an inclusion under capital expenditure on intangible assets together with patents, licences and goodwill. A dollar value for computer software is unable to be determined as it is not identified separately on the form.

However, investigations of past EAS results found that many businesses recorded computer software purchases as part of expenses. An additional item has thus been included in the expenses section of the form to collect the value of computer software expensed in year of purchase.

For the ABS to implement the SNA93 more completely EAS would need to make a change to collect capital expenditure on computer software separately from hardware purchases and identify all other expenditure on software/databases separately.

(vi) Capital expenditure survey

A revised form for this survey has been introduced which collects computers and peripherals as a separate item but software is not mentioned as either an inclusion or exclusion. Thus whether computer software expenditure is included would depend on businesses' treatments in their own accounts.

FILM ORIGINALS, OWN ACCOUNT PRODUCTION

by Lindy Ingham

SNA93 introduces the concept of artistic originals as part of the asset category intangible produced assets. The production of artistic originals should thus be capitalised and reflected as an acquisition of produced assets. The ANA intends to implement this recommendation of SNA93 using a net present value approach to valuation where possible. The extent of implementation will depend on the availability of data. This paper focuses on the largest area of the production of artistic originals in Australia, film production on own account.

SNA93 Recommendation

1. This paper relates only to the own account production of the artistic originals of films, the original being defined as the master negative, after sound synchronization and editing.

2. SNA93 recommends that own account production of films together with other literary, entertainment and artistic originals be capitalised as intangible produced assets (SNA93 paragraph 10.95)

3. Regarding valuation SNA93 states

"the value of the original depends on the actual or expected receipts from the sale or use of copies at the second stage (of production)..."(SNA93, paragraph 6.143)

4. However, if an artistic original is not sold but is retained by the copyright owner of the original, SNA93 suggests that

"its value could be estimated on the basis of its production costs with a mark-up. However, the size of any mark-up must depend on the discounted value of the future receipts expected from using it in production, so that it is effectively this discounted value, however uncertain, that determines its value."(SNA93 paragraph 6.144)

5. Nonetheless SNA93 recognises that the valuation of artistic originals

"may be difficult because it depends on the future benefits that the owner expects to derive. These benefits may be difficult to estimate in advance. In the absence of other information it may be necessary to value the original by its costs of production, as in the case of many other kinds of output produced for own gross fixed capital formation" (SNA93 paragraph 10.95)

6. It can be inferred from these comments that, ideally, SNA93 would like to use a present value method to value artistic originals. Artistic originals are assets for which the returns are generally delayed and/or spread over a long period. The present value approach applied to films calculates the future income generated from films and then discounts this income to get the present value of film income in any given year. As SNA93 assumes this approach is likely to be difficult to implement it suggests that the production cost approach can be used as a second best solution. This approach would be based on obtaining data on production costs of films and capitalising this data.

7. However, in the case of film in Australia it is more appropriate to use a present value

approach for both conceptual and data availability reasons.

ANA Present Treatment

8. The ANA does not capitalise any artistic originals at present and treats income associated with films, such as royalties, as property income.

Conceptual and Data Issues

The Australian film industry

9. Before discussing conceptual and data issues concerning the treatment of films, some background to film making and the Australian film industry is provided.

10. In the case of the artistic original, film, the actual value of the master negative resides not in the negative itself but in the copyright. The owners of the copyright in the finished film possess the right to make decisions about how the asset is exploited. Ownership of this asset is determined by the complex contractual arrangements between producers, creative contributors, film financiers and potential distributors under which a film is made. These contractual arrangements also determine the sharing and priority of claims to revenue and profit generated by the exploitation of the film.

11. The copyright owners are generally

- (1) the investors who fund the production of the movie; and/or
- (2) the producer and other creative principals.

The copyright owners of the film license, to other parties, the right to sell other rights. This gives the copyright owners a stream of future income. In Australia, the copyright is rarely if ever sold in its entirety. Hence the situation of own-account production as defined in SNA93 is usual industry practice in Australia.

12. In many countries the average return on copyright ownership is usually negative for the following reasons:

(a) Copyright owners in Australia and many other countries are often government agencies (or other self- or government-subsidised investors) who invest in movies for reasons which are only partly commercially-based. Governments subsidise local production to encourage local cultural values and to allow the local economy to enjoy the benefit from the strong multiplier effects generated by the industry.

(b) The tradition that the primary commercial risk of movie-making should be borne at the production or copyright level. In practice, this means that a copyright owner's share of the proceeds of a movie (apart from any advances that may be paid by a distributor) is contingent on the movie generating sufficient income to first pay out its exhibitors and distributors who in effect, stand ahead of the copyright owner in queue for payment.

(c) Free to air television has 80 percent of the market for movie viewings but generates less than 20 per cent of movie revenues, thus forcing down returns to copyright holders. This has been the case for much of the period since television was

introduced. However, as the new media such as pay television develop, average returns for copyright holders may start to increase.

13. In Australia it has been estimated that 75 per cent of the industry has some form of government funding. Further, Australian films nearly always cost more to make than they return. Indeed, on average, seven out of ten films will not get back in revenue more than 10 per cent of their budgets. For documentaries, the return is even lower. In effect the vast majority of Australian films lose money, even with a government subsidy .

Problems with the cost of production approach

14. The cost of production approach uses, as its name indicates, the costs of production to estimate the value of the artistic original. Because of the typically low return on Australian films, if the cost of production approach were used to represent the capital expenditure on the master negatives produced in each year, it would significantly overstate gross fixed capital formation.

15. Specifically, the costs of production approach would result in the current year's balance sheet entry for film being valued in excess of future earnings related to that asset. Since the future earnings at a given point will be an indication of the value of the asset there may need to be a significant revaluation of the asset if the initial balance sheet entry is overstated. In general a holding loss would need to be recorded. (Any revaluation would be recorded when balance sheets are constructed.) However, if the asset were to be valued at the present value of future net receipts it is likely that any holding losses/gains would be significantly smaller. See Appendix 1 for a numerical depiction of the issue, assuming the typical case where a film does not recoup its costs of production.

16. A practical complication with the cost of production approach is that the film industry has, to varying extents, adopted accounting practices which result in the non-payment of production costs when they are due or the non-reporting of profits when they actually occur. This would distort national accounts estimates. Current cost accounting, as recommended in SNA93, requires that assets and goods used in production be valued at their actual or estimated current market prices at the time the production takes place. The types of arrangements outlined below do not line up with that recommendation in practice which is an argument for not using the cost of production approach to value the master negative of a film.

17. The "above-the-line" production costs in a film budget refer to those costs which cover the creative elements of the film - the producer, director, some actors, script and writers. The payment of these costs is often deferred. Above-the-line talent frequently participate in the "point" (percentages of profits) in the film, reflecting the many and varied participation arrangements for sharing in the profits of a film. Producers, or any of the creative elements for example, may not even be paid their flat fee (which was included as part of production costs) until several periods later. This enables a film to be produced with less finance than would otherwise have been the case.

18. In major film industry centres like Hollywood various studio accounting practices frequently affect the bottom line. Basically, it is in a studio's interests to keep a film as far from a net profit position as possible in its accounts because studios earn interest on the float which allows them to finance new ventures. Also they reason they are taking all the risk (being copyright holders) and should be paid well for that. The related consequence is that the actual reporting of the profit of a film to economic surveys may be delayed.

19. In the Australian case the Australian Film Finance Corporation (AFFC), which is the Federal Government's main agency for financially supporting the Australian film and television production industry, also has some arrangements for allowing producers to share in the net profits although they are considerably less complicated than in the American case. Since 1994 Australian film producers have been allowed to receive a 10 per cent share of the AFFC's revenues, as an advance against their profit share, once the AFFC has recouped a certain percentage of its investment. This percentage depends on the production category. For features, the threshold is 35 per cent of AFFC investment. For television drama it is 45 per cent and for documentaries it is 20 per cent. Once the total budget of a project has been recouped and prior to the producer sharing in actual profits, the revenue entitlement must be prepaid to the AFFC. The arrangements are intended to bring money to the producer more quickly than previously, to reward success and focus producers' minds on recoupment. To the AFFC, however, the downside is that there is less money for investment in new ventures.

20. Fees are generally not deferred on AFFC productions as the AFFC prefers the fees to be part of the budget. However, fees are sometimes deferred on non AFFC productions. These are generally low budget. The above-the-line talent (and sometimes below-the-line cast and crew) would defer part or all of their fee which is then paid out of first returns or after full recoupment by the investors. (As the majority of films do not break even the latter is less likely.)

21. The data for the cost of production approach in Australia are not very timely as they are currently published biennially. For the past five years the Australian Film Commission, in conjunction with industry analyst Entertainment Business Review, has conducted an annual survey of audiovisual production in Australia. Data by the different categories of film and television were last published in October 1994 including data up to 1992/93. New data will be available early in 1997, including data up to 1994/95. In contrast, data for the present value approach are available from the AFFC for 1995/96.

Present value of future film rentals

22. The aim of this method is to discount the future cash flows from all exploitation of the rights associated with a film in order to provide one figure for the present value of those flows, after adjusting for risk. These discounted future cash flows provide the value of capital formation in a year when calculated using to flows associated with one year's production and provide balance sheet estimates when calculated for all films. It is a well established technique and is used in many industries to value assets or to appraise a potential investment in a long-term project.

23. The present value method avoids the problems associated with the cost of production approach. In Australia, the utilisation of the approach is dependent on the AFFC and the various state government film financing agencies supplying the ABS with the appropriate data as many of them are not publicly available.

24. The first data required are the gross sales from all sources for all films produced in each year. These should be cross-classified by the AFFC categories: Features, Adult TV Drama, Children's TV Drama and Documentaries. Gross sales receipts (GS) in the Australian context refer to all revenue from sales of a film, including receipts from exploitation of ancillary and underlying rights, export marketing grants, export expansion schemes, statutory licences under the *Copyright Act* and interest on the returns account. The AFFC uses the percentage of gross sales against budget as a measure of the market support of the projects in

which it invests. A project with gross sales in excess of 50 per cent of the budget is considered to have achieved significant market support.

25. For the purposes of calculating present value of future film rentals the films should be grouped depending on the length of time over which income on the film is earned. AFFC advises in their annual report (1994/95, p.32) that the majority of feature film sales occur within the first year of completion. Children's projects, however, have a shelf life of ten to twelve years. Sales of television programs to broadcasters tend to be recouped over a three to seven year period as buyers frequently indicate an intention to purchase but the contracting does not occur until a slot in the transmission schedule becomes available or when acquisition budgets permit.

Example of estimation methodology

26. The following presents an example of the calculations for gross fixed capital formation for films produced in 1988/89. Table 1 presents mock data for the purposes of exposition.

Table 1: Annual gross sales (GS)

Year	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
t	0	1	2	3	4	5
GS(\$m)	1	8	16	5	7	3

Assuming there are no sales beyond 1993/94 the present value of the future cash flows for 1988/89 films is calculated using the following formula

$$\text{Present value} = \sum_{t=0}^5 \frac{GS_t}{(1+d)^t}$$

The discount rate (d) may approximate a long term government bond rate although an extensive debate exists surrounding the appropriate rate to use. Appendix 2 provides a discussion of the issues involved. Using the data above and assuming a discount rate of 10 per cent, the estimates of gross fixed capital formation for 1988/89 is \$31.9 million.

An estimated average return can be calculated by dividing the present value by production costs. Assuming production costs of \$100m the average return is 31.9%.

28. For more recently produced films the total income from the sales of the films will not be known. In such instances the following estimation methods may need to be applied:

(i) While total gross sales may not be known the total production costs may be available. Using the ratio of discounted gross sales to production costs for earlier periods, such as 1988/89, estimates of capital formation can be derived using the production costs data.

(ii) Average patterns of gross sales from earlier years could be calculated to extend limited gross sales series. For example, for films produced in 1990/91 gross sales figures for 1990/91 to 1993/94 may be available but not for 1994/95, 1995/96 etc. In

this situation it could be assumed that the pattern of gross sales for 1988/89 feature films is repeated or some average of the pattern over years for which data are available is applicable.

Data sources for present value of future receipts

29. AFFC will be the principal source of data for the present value methodology. However, unravelling the various monetary flows may be difficult. Detail on these flows is provided in Appendix 3. Despite the complexities of these flows, AFFC is likely to provide the best and most direct source of data.

30. Alternative sources which may be available include the ABS survey of the film and video industry in 1993/94 and the annual Economic Activity Survey (EAS). The 1993/94 film and video industry survey may help develop a benchmark estimate and could be used as a check on some of the data supplied from AFFC. The items on the EAS form relating to exhibition and ancillary rights are:

Income from the sales of rights for completed works

including

- . Income from advances
- . Minimum guarantee payments
- . Program licence fee
- . Pre-sales

Sales of ancillary rights

including

- . Merchandising
- . Soundtrack
- . Literary

These two items added together are the nearest approximation in the ABS collections to the value of the master negative, once it is completed, for own account production. However, these two EAS items provide only part of the future income stream, i.e., they relate to one year only and thus are not directly applicable for use in the present value approach.

31. For non own-account production, EAS may be able to provide some data on so-called "suitcase producers" who pre-sell all of the rights of a film before it is even made and do not collect any royalties thereafter. The EAS item "Income from the production of commissioned works" corresponds to this production. However, as noted above this is not common in Australia.

Consumption of fixed capital

32. SNA93 states in paragraph 6.145, with respect to artistic originals that

"Consumption of fixed capital is recorded in respect of the use of the asset in the same way as for any other fixed asset used in production". (SNA93, para. 6.145)

SNA93 goes on to state that:

"The value of a fixed asset to its owner at any point of time is determined by the present value of the future rentals (i.e., the sum of the discounted stream of rental values) that can be expected over its remaining service life." (SNA93, para. 6.182)

33. The treatment adopted in this methodology uses the principle outlined in SNA93 paragraph 6.146. In the case where the owner of the artistic original licenses other producers to make use of the original in production

"... the owner is treated as providing services to the licensees that are recorded as part of their intermediate consumption. The payments made by the licensees may be described in various ways, such as fees, commissions or royalties, but however they are described they are treated as payments for services rendered by the owner. The use of the asset is then recorded as consumption of fixed capital in the production of services by the owner. These services are valued by the fees, commissions, royalties, etc. received from the licensees." (SNA93, para. 6.146)

34. There is little difference in principle regarding the consumption of fixed capital (COFC) in the cases of the producer exploiting the artistic original himself or licensing someone else to do so. The COFC in the case of the producer exploiting the original on own account is, by analogy, equal to the value of the royalties, the future income stream generated by the original. This is more realistic in the case of film than for other fixed assets used in production.

35. It could be assumed that the total capital value of the film is consumed in later years consistent with the relevant discounted gross sales in that year, for example, consistent with the method above

$$\begin{aligned} GS_0/(1+d)^0 & \text{ equals COFC in year 1} \\ GS_1/(1+d)^1 & \text{ equals COFC in year 2, etc.} \end{aligned}$$

36. This reflects the fact that the value of the film dissipates as it earns revenue. Some of its value is gone once it has been shown at cinemas, more is gone once it has been seen on television and, still more once it has been released as a video etc., until finally almost all of its value has gone.

37. In the event that subsequent data alter the income stream from films in any year two alternatives are available: (i) the initial estimate of capital formation may be adjusted thus affecting the estimate of production in that year or (ii) the balance sheet value of the asset can be adjusted through the revaluations account. The decision as to which approach to take may be a matter for decision on a case by case basis. However, the decision will depend on the interpretation applied to the role of the present value approach in the estimation of market price.

38. A final issue on COFC concerns whether COFC is the appropriate concept for artistic originals. In particular, is it possible to construct a replacement cost for artistic originals? While replacement cost is applicable to many asset types it is perhaps more meaningful to imagine amortising or writing-off the initial value of an intangible asset such as artistic originals. Amortisation is recommended in SNA93 for non-produced intangibles (such as patents) and, while it is not clear whether this term is used deliberately, it would certainly appear to be applicable to write-off both produced and non-produced intangible assets rather than calculate COFC.

The French approach

38. A paper was produced for the ESA Workshop on Capital Formation in February 1996 outlining first estimates of artistic originals for the French National Accounts in the framework of ESA95. The business accounting system in the French film industry books the value of the films they produce under an intangible fixed assets item. The industry is much

more vertically integrated than in Australia, with the requirement by the government that all French films must be handled by a French distributor. Production companies exist over longer periods than in Australia and hence the copyright value of films are booked as assets in the firms' books. This detail is identifiable in the annual structural survey of service activities and allows the identification of a firm's production (including own account production) corresponding to the formation of an asset, liable to generate income over several periods, thereby giving a readily available measure of gross fixed capital formation.

39. This approach is not so applicable in Australia. The vast majority of producers do not capitalise production, except for the largest producers such as Village Roadshow. For projects in which the AFFC is an investor the production costs are expended. Investment funds from the AFFC would be treated as income and fully expended. Income could be treated as capital receipts amortised over the life of the production (which would be a few months) but there would be no benefit in doing so. Hence the data would not be easily obtained from economic surveys in the Australian case. However, the television stations do capitalise part of their production costs so this approach may be more appropriate in their case. It may be possible to get data from the firms which do capitalise their film production and assume the resulting proportion holds across the whole of the industry.

Work-in-progress

40. The SNA93 states in paragraph 10.102

"Work-in-progress consists of output produced by an enterprise that is not yet finished, i.e., not yet sufficiently processed to be in a state in which it is normally supplied to other institutional units. Work-in-progress occurs in all industries, but is especially important in those in which some time is needed to produce a unit of finished output- for example in...films..." (SNA93, para. 10.102)

This paragraph is written in the context of a discussion on changes in inventories. From the quotation above, it seems clear that uncompleted artistic originals are to be treated as work in progress rather than capitalised. The only case where unfinished assets may be capitalised is cited in paragraph 10.86 which concerns cultivated assets.

Balance sheet data

41. SNA93 gives some direction in paragraph 13.45 on how to treat entertainment, literary and artistic originals. It suggests valuation at cost of production but if this is not possible a present value approach should be used. However, this paragraph seems to contradict statements in Chapter 6 of SNA93 which implies the use of present value techniques ahead of costs of production approaches. The ABS proposes that the present value approach be used to estimate both flows and balances.

ANA Decision

42. The ANA will implement the SNA93 recommendation on artistic originals as far as possible. The major artistic original to be covered is film production on own account and data are available to estimate this item. A present value approach is recommended for the valuation of film in Australia.

Appendix 1: Valuation of Artistic Originals Using Cost of Production Approach

	Year 0	Year 1	Year 2	Year 3
Film production costs	220			
Royalties	0	50	10	10
GFCF	220			
ex post value of asset	70			
Holding loss	-150			

Appendix 2: Choice of Discount Rate for Artistic Originals - Film

To calculate the present value of the future receipts expected from using film originals in production a rate of discount to convert future receipts into values in the year the films were produced must be chosen. SNA93 recommends derivation of the rate of discount from information relating to transactions in the particular types of assets rather than using a general rate of interest, such as one derived from the yield on government bonds (SNA93 13.34).

However, to operationalise this in the Australian film industry is difficult as there is unlikely to be any information available on transactions involving films. In fact the most relevant discount rate which might be used for this industry is that which is applicable for the government sector as the main investor in the film industry.

As the Australian film industry is largely subsidized by the government the opportunity cost of the government investing in the film industry, at the margin, would be reducing its borrowing from markets. The government makes various types of borrowings, short term and long term. Most government borrowings are through Treasury notes and Treasury bonds. A reasonable approximation of the average interest rate paid by Government would be a weighted average of short term and long term bond rates.

By conducting a sensitivity analysis with discount rates, say, 2 percentage points either side of this weighted average, an indication of how significant the choice of discount rate is to the overall results would be obtained.

It is interesting to note that the Netherlands, in their valuation of artistic originals used a discount rate of 8.0 per cent in 1990 and 7.8 per cent in 1991 (equivalent to a moving 10-year average of the long term rate of interest). The discount rate was used at the aggregate level for recorded media, book publishing and films.

CHAPTER 3: Produced Valuable Assets

VALUABLES: WITH A FOCUS ON GOLD

by Ross Macindoe and Tony Johnson

SNA93 recommends that acquisitions of new or existing assets in the form of valuables be recorded in the capital account. Presently, valuables are not accounted for as an asset in the ANA. While the SNA93 recommendation is supported in principle, it cannot be implemented at this stage due to data constraints.

SNA93 Recommendation

1. SNA93 defines valuables to be goods of considerable value that are not used primarily for purposes of production or consumption, but are held as stores of value over time. They are held in the expectation that their value in real terms will increase, or at least not decrease, in the long run. Valuables are one type of non-financial produced asset in the System and include:

- jewellery;
- works of art and antiques; and
- precious metals and stones.

2. SNA93 recommends that

"Acquisitions and disposals of new or existing assets in the form of valuables are recorded in the capital account. Acquisitions are valued at the actual or estimated prices payable by the units acquiring the assets to the units disposing of the assets plus any associated costs of ownership transfer incurred by the units acquiring the assets such as fees payable to expert valuers, agents, auctioneers, etc. The prices of valuables payable to dealers include their margins, of course. Disposals are valued at the prices payable by the units acquiring the assets to the units disposing of the assets minus any associated costs of ownership transfer incurred by the latter. On aggregation, therefore, acquisitions less disposals of valuables include dealers' margins and the costs of ownership transfer on new and existing valuables, whether the transactions consist of purchases and sales, barter or capital transfers in kind." (SNA93, para. 10.117).

3. In some cases items may only gain a status of valuable some time after initial production, e.g., artworks or jewellery. In such a situation it is not correct to reflect additional production for these items. This would occur if appearance was shown in the capital account. Instead, SNA93 recommends that items which attain valuable status after production make their economic appearance in the other changes in volume of assets account (SNA93, para. 12.23). Note that the entry in the other changes in volume account only enters a valuable onto the balance sheet. Simultaneously, there may be entries in the capital account to show the sale and purchase of the valuable and the associated transfer costs. These entries should be treated in the same way as defined in SNA93 paragraph 10.117 above.

4. While many valuables may enter the balance sheet through the other changes in volume of assets account some important items should enter through the capital account and thus be classified as valuables at the time of production. The most important item in this respect is likely to be gold bullion which can be treated as a store of wealth, and thus as a valuable, from the time it is produced.

ANA Present Practice

5. Valuables, as defined by SNA93, are not accounted for in the capital formation estimates of the ANA.

Measurement Issues

Jewellery

6. Although jewellery is specifically identified in SNA93 as a possible valuable it is debatable what sort of jewellery meets the broad definition of a valuable. Some particularly well made pieces may hold their value over time. However, much jewellery is of low value and worth less as an investment than the value of its constituent precious metals and stones (which is likely to be less than the purchase value of the manufactured good). It is argued here that jewellery is not usually purchased to be held as a store of wealth in Australia but, instead, is purchased as a consumption good. The benefit of purchasing jewellery is received through its use as a fashion accessory rather than as an investment. As only rare pieces sustain their value, expenditure on jewellery holds more of the characteristics of consumption expenditure than capital formation.

Works of Art

7. Works of art also pose considerable difficulties in the estimation of valuables. A key distinction made in SNA93 is that valuables include "recognized" works of art. In a manner similar to jewellery, much "unrecognized" art is bought and held for its decorative value rather than investment value and would more appropriately be considered a consumption good. However, some recognized art work is of considerable value and is held by households, government and corporations in the expectation that its value will increase over time. However, this art work seems to have a very low turnover and consequently is extremely difficult to value. While artworks do have a market, there is no exchange mechanism that can provide consistent pricing. Art dealers such as Sotheby's could be a source of information on sales of artwork but the coverage may be low. Information on private holdings of art would be extremely difficult to collect.

8. Governments also collect works of art for public collections which could be considered to be part of a "national cultural estate". However, these works of art also have an extremely low turnover. These works would have an acquisition value that could be measured but this is unlikely to reflect their current value. Artworks in public collections frequently have important historical, national, religious or symbolic significance, as well as an educational value. In this regard they may have the characteristics of a monument rather than a valuable.

9. At this stage no data are available to estimate works of art as valuables, either within the balance sheets or in the capital accounts. One possible avenue of investigation is insurance valuations however the most significant artworks may be unable to be insured. Since the number of transactions in these items is thought to be low the effect of this omission on the flow accounts is thought to be minimal.

Precious metals and stones

10. It does not appear possible to collect information on the value of precious stones held as a

store of wealth. However, they are unlikely to be significant in the Australian context. On the other hand, precious metals appear to offer the best avenue for producing a somewhat restricted estimate of valuables as a store of wealth because Australia is a major producer of gold and silver. Precious metals have well established exchanges which provide relevant pricing and valuations. In Australia, gold is the most important class of precious metals. In the work completed on valuables the focus has been on gold and the remainder of the paper considers the treatment and measurement of gold.

Gold

11. SNA93 distinguishes three categories of gold:

- (a) monetary gold included in international reserves;
- (b) gold used as final or intermediate consumption; and
- (c) gold held as a store of wealth. (SNA93, para. 11.64)

12. As noted, gold as a store of wealth is in scope of the SNA93 concept of valuables.

Measurement

13. Gold comes in four major states of purity:

- (a) *Gold Ore*. Crushed rock bearing gold of a very low purity.
- (b) *Gold Concentrate*. Crushed rock and flotation chemical slurry bearing gold.
- (c) *Doré*. An ingot of gold and other material with an average purity of approximately 80 per cent. This is sometimes referred to as *unrefined bullion*.
- (d) *Refined Gold*. Also known as fine gold, with two major levels of purity 99.95 per cent and 99.99 per cent. These are more commonly referred to as *bullion*.

14. Only refined gold is used as a store of wealth as the other forms of gold are only used as "intermediate steps" toward the production of refined gold. The measurement of the level of purity is important if estimates of the value of gold are to be estimated using volume and price data, since the proportion of gold will impact on the relative price per unit of weight.

Characteristics

15. Gold has a number of characteristics that make it difficult to trace and to quantify directly. Gold has been a medium of exchange and store of value from very early times and has retained a credibility in these capacities.

16. Transactions in gold, like currency, are not always accurately recorded, e.g., in cases of illegal activity and tax evasion. Gold's low melting point, chemical robustness and high price per kilogram mean that it is ideal for smuggling and once melted down, untraceable. Gold is particularly suitable for international money laundering as it does not need conversion when exported, unlike paper currencies. Therefore, the characteristics of gold make it difficult to collect reliable direct information on the amount of gold held as a store of wealth.

Estimation as a store of value

17. One approach to estimating gold as a store of wealth is to collect information on fine gold stocks and domestic sales from refiners, bullion dealers, bullion banks and other banks holding gold on own account and for clients. Bullion assets of banks are collected in the

ABS Survey of Balance Sheet Information (SOBSI) but the amounts are fairly small. The Australian Bureau of Agricultural and Resource Economics (ABARE) collects production data from gold producers but respondents refuse to provide any information on stocks for security reasons. Similar resistance was encountered during informal telephone contact with major refiners. While willing to supply some information, they were unwilling to give any indication of dollar or volume data on stocks held. Given the obvious difficulties of collecting reliable direct information on gold held as a store of wealth, the approach taken in this paper is to investigate the feasibility of deriving an indirect estimate.

18. An indirect approach to measuring gold held as a store of wealth is reflected in the following supply/use identity:

Gold held as a store of wealth	<i>equals</i>	Production of bullion and coin
	<i>less</i>	Net exports of gold (incl. re-exports)
	<i>less</i>	Net coin exports
	<i>less</i>	Net monetisation of gold
	<i>less</i>	Intermediate usage of gold
	<i>less</i>	Increase in gold inventories awaiting export or intermediate usage

19. The monetisation or de-monetisation of gold is a rare occurrence and has only happened once in Australia since 1979. Also, change in gold inventories is assumed to be zero because of the high security cost of holding significant amounts of gold. This leaves production, net exports (exports less imports) and intermediate usage of gold to be estimated.

ABS industry collections and the I-O tables

20. Ideally, the supply and disposition of fine gold bullion (including gold held as a store of wealth) should be explicit in national Input-Output (I-O) tables given the importance of gold production in the Australian economy, particularly as an export. However, the intricacies of gold as a commodity and its ownership in the various stages of processing and export do not appear to be well understood or accounted for in ABS collections or the I-O tables. The commodity balancing of "gold" has been a long standing problem for I-O statisticians. The delineation of management units involved in gold refining and bullion trading and their coding to industry classifications has also been problematic. For this reason it has not been possible to use ABS value of production data or the I-O tables to provide an estimate of the value of fine gold production or the residual gold held as a store of wealth. Appendix 1 explains these difficulties in more depth.

Production : Refined gold and gold coin

21. ABARE data on refined gold production have been used to estimate production within the supply/use identity presented in paragraph 18. ABARE's *Quarterly Minerals Statistics* contains estimates of primary and secondary production (i.e., recycling second hand gold and offcuts) of refined gold, ex refinery. In addition to refining its own metal, Australia also refines products of mines from other countries in the region including Papua New Guinea and this gold has been included in the calculations. Appendix 2, Table 2.1 contains details of gold production since 1989-90.

22. There are two organizations which mint gold coins in Australia; the Gold Corporation (GC) (including the Perth Mint) and the Royal Australian Mint (RAM). Based on data in the 1990-91 GC annual report, 90% of gold coin production is assumed to be exported. However, not all gold coin production should be included in total supply. Since refined gold is an intermediate input into gold coin production, only the margin for fashioning the coin should be added to total supply of gold that could be used as a store of value. More detail is contained in Table 2.2 in Appendix 2.

Imports and exports

23. Australia accounts for 10 per cent of world gold production and is a major exporter of gold, ranked number three in the world. Foreign trade data indicate that gold imports (excluding coins) are made up of doré and unwrought gold being imported for the purposes of refining. Only preliminary refining has occurred prior to shipping. Estimates of gold exports (excluding coin) have been sourced from ABS and ABARE statistics. Foreign trade data indicate that almost all gold exports are in a highly refined form. Exports can be measured on a trade or Balance of Payments (BOP) basis. The difference represents gold sold into foreign ownership that has not crossed the customs frontier. International trade data on gold coins are compiled from entries lodged by importers and exporters with the Australian Customs Service. Estimates of all imports and exports are contained in Tables 2.3, 2.4 and 2.5 in Appendix 2.

Unreported exports

24. There is no requirement to report bullion movements in and out of the country to either the Australian Customs Service (ACS) or the Australian Transaction Reports and Analysis Centre (AUSTRAC). According to the National Crime Authority, the purchasing of gold bullion in Australia and shipping it overseas for deposit is a major method of laundering money. In fact there is no need to physically move the gold overseas, only the title to the gold need be transferred. In theory, the repatriated proceeds of the sale of this gold overseas are measured by the ABS Survey of Foreign Investment but there is no complementary record of the export of the gold bullion.

25. Newspaper reports and investigations by the ABS have revealed that bullion dealers convert significant amounts of cash into bullion and that this gold is largely untraced through the Customs systems. Predominantly, this gold is carried by travellers from Australia to Asian countries. It is not illegal for travellers to take gold out of Australia. However, while such movement of gold should be recorded on Customs forms, it is believed that the majority of gold carried by travellers is not reported. There is no evidence of gold being imported into Australia by similar methods.

Intermediate use

26. Consumption of gold by industry is unknown as no data are collected. Gold can be used for the production of coin, jewellery, silverware, dental work, medical procedures, gold leaf, paints, lustres and electronics, etc.

27. For practical purposes the intermediate consumption of gold in coin production can be taken as the value of coin output. From the 1989-90 I-O tables, the jewellery and silverware commodity supply at basic prices from Australian production was \$234 million. Given that the scope of this item includes all jewellery and silverware, not just goldsmithing, and that it includes all inputs into production, including primary inputs, the gold component would probably be well under \$20 million. Nothing is known about the remaining uses (medical, dental, etc.) but the gold content would be unlikely to be more than \$5m.

28. It appears from the above rudimentary analysis that industrial use of gold excluding coins may be up to \$25 million a year but is probably a lot less. This compares with a ABARE working estimate of local consumption of \$4m to \$6m.

Gold as a store of wealth

29. Using the information above estimates of gold as a store of wealth have been calculated as a residual. The following table presents the results.

**Table 1. Estimated value of gold as a store of value: Residual method
(\$A million)**

	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Refined gold output ⁽¹⁾	3,754	3,913	4,153	4,554	5,443	4,963
Coin production	263	217	288	252	239	186
Coin imports & re-imports	54	23	11	0	1	2
Exports BOP basis(2)	3,527	3,941	4,346	4,353	5,306	4,740
Exports trade basis(2)	2,872	3,672	4,022	4,313	5,268	4,699
Coin exports	237	195	259	227	215	167
Intermediate usage:						
- Coin	263	217	288	252	239	186
- Other	25	25	25	25	25	25
Change in inventories	0	0	0	0	0	0
Residual:						
- BOP basis	19	(225)	(466)	(51)	(102)	33
- Trade basis	674	44	(142)	(11)	(64)	74

(1) Source: ABARE, price (mean) multiplied by volume (kilograms). Includes imports of gold for refining and sale.

(2) Excluding coin.

30. The existence of negative residuals in some years reflects a number of possible causes. By the very nature of gold as a store of wealth, there are likely to be inconsistencies in the valuation of the various flows depending on the gold price at the time the transaction occurred. Such inconsistencies are all the more likely when the value of production is estimated as kilograms produced in a quarter multiplied by the average gold price in that quarter (which may be quite volatile), while export values represent "actual" values. Exports data would also include transport and insurance margins to the Australian customs frontier

whereas the production data would not. A further possibility is that, from time to time, exports will include gold that may have been produced and held as a store of value in earlier years. It may also be that the assumption of zero gold inventories awaiting export and other uses is invalid.

31. Even after allowing for valuation problems, other inconsistencies, and deficiencies in the assumptions used in deriving the residuals above, the results do not seem to support the existence of large amounts of gold held as a store of value in Australia.

32. Given the magnitude of fine gold production in the Australian economy it would seem highly desirable that the I-O tables could facilitate a complete analysis of gold supply and its disposition as an edit and data confrontation tool.

Conclusion

33. The indirect method used to estimate the value of gold held as a store of wealth in Australia provides only an approximate estimate but gives an idea of the significance of the issue. However, it does appear that the amount of gold held as a store of wealth by individuals, businesses and for the purpose of gold trading is not particularly significant in the context of the national balance sheets. Because of this relatively small order of magnitude and the considerable uncertainties in the calculation of "residual gold" from period to period, the ABS will not show gold as a valuable in the national accounts for the time being. A further reason is that "unrecorded" exports of gold are apparently significant but not included in official estimates of exports. This implies that some gold accounted for as a store of wealth should, in fact, be included in exports. Estimates of the supply and use of gold require further investigation which will be undertaken within the framework provided by the input-output tables.

ANA Decision

34. The concept of valuables as a store of wealth is supported in principle but will not be implemented in the ANA until such time as data for current values for public art collections become available, possibly some time after the introduction of accrual accounting for government. Also, because of the seemingly small amounts involved and the lack of adequate data, gold as a store of wealth will be included in inventories for the time being rather than treated as valuables, pending the outcome of further investigations within the input-output framework.

Appendix 1: Difficulties in ABS data sources

The commodity "gold bullion and ores" is produced by the mining industry and shown as a data item in the ABS Mining Census. The purity of this commodity varies but could generally be expected to be doré. However, beyond this point gold is difficult to trace in ABS statistics until exported. Export data show that gold exported is virtually all refined gold (99.5% purity or higher). The nature of the carriage of gold from mining to export is not clear and there are conflicting reports on its nature. It is understood that the refiner does not take ownership of the gold but merely provides a service on contract. ABARE sources explain that the gold bullion ex-mine is refined to an agreed level of purity by the refiner, at which time it is sold to one of twelve bullion dealers. Ownership to this point remains with the miner. A different interpretation of the process is that "gold is bought on a daily basis in Australia by the majority of bullion dealers and held until they have enough to produce gold bars". The point is important because if ownership is retained by the miner, it would appear that the ABS should be measuring a commodity "fine gold", not the existing commodity "gold bullion". Ownership from purchase by bullion dealer to export is very difficult to trace.

Although a detailed investigation has not been undertaken, it appears that the bullion dealers are variously classified on the business register to the finance and insurance industry and to metal and mineral wholesaling. Gold refiners would show commissions in services income, and not as output of the commodity "gold". Gold coin minting is included in jewellery and silverware manufacturing. Vertical integration also serves to further complicate the picture. For example, one of the major players is involved in mining, refining, dealing and financial services, minting of gold coin, jewellery and silverware manufacture and in exporting gold on own account. It becomes apparent that a commodity "refined gold" as commonly known cannot be fully traced in ABS data.

Appendix 2 : Tables

Table 2.1: Refined gold production¹

	<i>89-90</i>	<i>90-91</i>	<i>91-92</i>	<i>92-93</i>	<i>93-94</i>	<i>94-95</i>
\$A million	3,754	3,913	4,153	4,554	5,443	4,963
kilograms	234,230	255,318	281,835	288,188	307,336	296,626

(1) 1994-95 data preliminary

**Table 2.2: Estimated Australian production and exports of gold coins
(A\$ million)**

	<i>89-90</i>	<i>90-91</i>	<i>91-92</i>	<i>92-93</i>	<i>93-94</i>	<i>94-95</i>
Coin exports	237	195	259	227	215	167
Australian production	263	217	288	252	239	186

Table 2.3: Australian gold imports (A\$ million)

	<i>89-90</i>	<i>90-91</i>	<i>91-92</i>	<i>92-93</i>	<i>93-94</i>	<i>94-95</i>
Imports	284	618	1,036	1,019	979	708

Table 2.4: Australian gold exports (excluding coin), A\$ million

	89-90	90-91	91-92	92-93	93-94	94-95
ABS						
Trade basis	2,872	3,672	4,022	4,313	5,268	4,699
BOP basis	3,527	3,941	4,346	4,353	5,306	4,740
ABARE						
Trade basis	2,182	3,657	4,003	4,302	5,260	4,690
est. kg ¹	189,108	255,488	278,554	275,900	298,750	284,000

(1) 1994-95 data preliminary

Table 2.5: Trade in Australian gold coin (\$A Million)

	89-90	90-91	91-92	92-93	93-94	94-95
Exports	237.2	195.4	259.1	226.7	214.7	166.9
Imports	30.7	14.8	6.2	0.2	0.7	1.4
Re-imports	22.5	7.9	5.4	0.1	0.2	0.6
Re-exports	184.0	172.7	247.5	226.4	213.8	164.9
- est. kg ¹	11,474	11,273	16,754	14,330	12,135	9,902

(1) Kilograms of gold are estimated by dividing the value of gold coins by the average gold price for the year.

CHAPTER 4: Intangible Non-Produced Assets

INTANGIBLE NON-PRODUCED ASSETS

by Louise Talbot

SNA93 recommends that intangible non-produced assets enter and leave the System via economic "appearance" and "disappearance" in the other changes in volume of assets account. SNA93 recommends that transactions in these assets, once they have "appeared", be recorded in the capital account. In the ANA, until adequate data become available, transactions in intangible non-produced assets will be limited to those involving general government, public trading enterprises and public financial enterprises. However, the ABS feels a number of issues are left unresolved in the SNA93 treatment.

SNA93 Recommendations

Definitions

1. SNA93, in the Annex to Chapter 13, defines intangible non-produced assets as;

"Non-produced assets that are constructs of society. They are evidenced by legal or accounting actions, such as the granting of a patent or the conveyance of some economic benefit to a third party. Some entitle their owners to engage in certain specific activities and to exclude other institutional units from doing so except with the permission of the owner. Intangible non-produced assets consist of patented entities, leased and other transferable contracts, purchased goodwill and other intangible non-produced assets." (SNA93 page 310, AN.22)

2. SNA93 distinguishes four broad categories of intangible non-produced assets, three of which are defined in the Annex as follows:

-Patented entities. "Inventions in categories of technical novelty that, by law or by judicial decision, can be afforded patent protection. Examples include constitutions of matter, processes, mechanisms, electrical and electronic circuits and devices, pharmaceutical formulations and new varieties of living things produced by artifice." (SNA93 page 310, AN.221)

-Leases and other transferable contracts. "Leases or contracts where the lessee has the right to convey the lease to a third party independently of the lessor. Examples include leases of land and buildings and other structures, concessions or exclusive rights to exploit mineral deposits or fishing grounds, transferable contracts with athletes and authors and options to buy tangible assets not yet produced. Leases on the rental of machinery are excluded from non-financial intangible assets." (SNA93 page 310, AN.222)

-Purchased goodwill. "The difference between the value paid for an enterprise as a going concern and the sum of its assets less the sum of its liabilities, each item of which has been separately identified and valued. The value of goodwill, therefore, includes anything of long-term benefit to the business that has not been separately identified as an asset, as well as the value of the fact that the group of assets is used jointly and is not simply collection of separable assets." (SNA93 page 310, AN.223)

3. Significantly, SNA93 does not define the asset category *other intangible non-produced assets* by example. This is likely to be the most important category in the ANA. Potential inclusions in this category appear to be mastheads, trademarks, brand names, franchises,

broadcasting licenses, aircraft landing rights and taxi plates.

Treatment of balances and flows

4. Table 1 presents a summary of the SNA93 recommended treatment of stocks and flows for intangible non-produced assets.

Table 1. SNA93 Recommended treatment for intangible non-produced assets

<i>Account</i>	<i>Item represented</i>
Opening Balance Sheet	Stock of intangible non-produced assets in the economy at the beginning of the year
Other Changes in Volume of Assets Account	Economic appearance of new intangible non-produced assets Economic disappearance of existing intangible, non-produced assets
Capital Account	Acquisitions less disposals of existing intangible non-produced assets
Closing Balance Sheet	Stock of intangible non-produced assets in the economy at the end of the year

5. In SNA93, the "appearance" and "disappearance" of intangible non-produced assets is recorded in the other changes in volume of assets account, not the capital accounts. This treatment distinguishes these assets from produced intangible assets. The capital accounts in SNA93 only record transactions in non-produced intangibles once they have "appeared".

6. The SNA93 recommended treatment of the flow of intangible non-produced assets through the economy is no different from other types of assets in the System except that their initial entry into the accounts is not via production, but rather via "economic appearance". The difference in treatment occurs since they are not produced assets. Intangible non-produced assets may come into existence as a result of an economic transaction but this is still reflected by their economic appearance in the other changes in volume of assets account. For example, when a taxi driver purchases a taxi licence from the government there is an economic transaction. Because the intangible non-produced asset "taxi plates" had not entered the national accounting system prior to the transaction, this is reflected in the national accounts as the economic appearance of an asset "taxi plates" in the other changes in volume of assets account. At the same time a transaction is shown in the capital account between general government and the institutional sector of the taxi owner.

Time of recording transactions

7. SNA93 provides some guidelines for the time when intangible non-produced assets should be recorded in the accounts:

"They (intangible non-produced assets) make their appearance in the system when entities are patented, transferable contracts are written, or enterprises are sold at prices that exceed the net worth of the enterprise in question, etc. The patenting consists of the entity being granted legal protection by law or judicial decision. The writing of transferable contracts consists of the coming into force of a binding agreement that provides some economic benefit that can be passed on to a third party independently of the provider of that benefit." (SNA93, para. 12.21).

"When an enterprise is sold at a price that exceeds its net worth, this excess of purchase price over net worth is the asset "purchased goodwill". Goodwill that is not evidenced by a sale/purchase is not considered an economic asset: the only way that goodwill enters the System is for such a purchase to occur." (SNA93, para. 12.22).

8. The time of recording varies according to which type of intangible non-produced asset is being recorded. Note that goodwill is not considered an economic asset until it is actually purchased and, therefore, internally generated goodwill is excluded from the SNA93 asset boundary.

Valuation of transactions

9. For all transactions, the overriding valuation basis recommended by SNA93 is market value. SNA93 also accounts for ownership transfer costs in valuing intangible non-produced assets:

"The value of acquisitions of intangible non-produced assets include the associated costs of ownership transfer incurred by the purchaser while disposals are valued after deducting the costs of ownership transfer incurred by the seller. The costs of ownership transfer are a component of gross fixed capital formation." (SNA93, para 10.130)

Amortisation

10. SNA93 recommends that the amortisation of intangible non-produced assets be included in the accounts.

"Just as the appearance of intangible non-produced assets is recorded in the other change in the volume of assets account, so is their write-off, termination, or exhaustion. For purchased goodwill, amortization should be recorded over a period of time after the purchase of an enterprise, following country accounting standards; the exhaustion of patent protection should be recorded over the duration of the patent." (SNA93, para. 12.34).

11. Some guidance is provided by SNA93 toward the timing of the calculation of depletion of goodwill and patents. However, no information is provided on the timing of the amortisation for other types of intangible non-produced assets.

12. Table 2 presents a summary of SNA93 timing, valuation and amortisation recommendations for intangible non-produced assets.

Table 2. SNA93 recommendations for intangible non-produced assets

<i>Type of asset</i>	<i>Time of recording</i>	<i>Valuation basis</i>	<i>Amortisation</i>
Patented entities	When legal protection is granted by law or judicial decision	No specific guidance provided in SNA93	Recorded over duration of the patent
Leases	When binding agreement comes into force	Payments made to original or subsequent tenants or lessees when leases or concessions are sold or transferred	No specific guidance provided in SNA93
Other transferable contracts - for example fishing and taxi licences	When binding agreement comes into force	Payments made to original or subsequent tenants or lessees when leases or concessions are sold or transferred	No specific guidance provided in SNA93
Purchased goodwill	When enterprise giving rise to goodwill is purchased	Excess of purchase price over net worth	Recorded over a period of time from purchase following country accounting standards
Other intangible, non-produced assets ⁽¹⁾	No indication given in SNA93	No specific guidance provided in SNA93	No indication given in SNA93

(1) Other intangible non-produced assets include mastheads, brand names, trademarks, airport landing rights, management and trustee rights, other types of rights, and franchises.

ANA Present Treatment

13. The present treatment in the ANA is to regard all intangible assets as a transfer of wealth, not an addition to it. Therefore, although such expenditures are classified as being of a capital nature, and are included in the relevant capital accounts, (to the extent that it is possible to identify them) they are not included in gross fixed capital formation.

14. Because of the lack of available data, estimates for the purchase (net) of intangible assets in the ANA represent only those transactions identified in the accounts of public authorities. The net purchases of intangible assets by public authorities are assumed to equal the net amount of such sales by private companies and no entry is shown for households. Thus, due to data constraints, the acquisition and disposal of intangible assets by sector has never been satisfactorily accounted for in the ANA. This remains a source of potential differences between the real and the financial accounts in the ANA. Intangible non-produced assets are also excluded from the national balance sheet for Australia, again because of data and

measurement issues.

Conceptual issues

15. The definition and treatment of intangible assets, both produced and non-produced, is complex and difficult. Indeed, it is an area which SNA93 has not fully resolved. The following discusses a number of conceptual issues that have been considered by the ABS.

Boundary between produced and non-produced intangible assets

16. SNA93's rationale for the boundary between produced and non-produced intangible assets is difficult to apply consistently. SNA93 states:

"By definition, non-financial non-produced assets are not created by processes of production. Thus, they are not among the assets that result from gross capital formation, as recorded in the capital account. ...these assets ... come into existence in ways other than through processes of production as what might be referred to as constructs devised by society." (SNA93, para. 12.14).

17. However, the process involved in establishing a patent does not appear any different from the establishment of entertainment, literary and artistic originals. Produced intangible assets are the result of a process of production. In the case of artistic originals effort is expended in producing, for example, a film or television show. This effort culminates in the production of an asset, "artistic originals", in the System. Similarly, the bringing into existence of a patent (a non-produced asset) requires expenditures on research and development, legal fees, lodging applications, etc. However, this activity is deemed to be non-productive by SNA93 and the costs are expensed against profits rather than being capitalised as an asset, although it is difficult to see how this is any different from the artistic originals example.

18. Further difficulties arise when considering the valuation of intangible produced or non-produced assets. For example, an artistic original, which is produced, is often valueless without the rights to distribute the original. These rights should be treated as a non-produced asset distinct from the produced artistic original. Since both should be valued using the future stream of income, they generate a potential for double counting. This is also true for the mining industry where the future stream of income may be used to value a mining lease and the sub-soil asset itself.

19. As another example, SNA93 distinguishes a broad category of produced intangibles, *other intangible fixed assets*. Examples given are new information, specialised knowledge etc, whose use in production is restricted to units which have ownership rights over them or are licensed to use them. Again, there is a danger of double counting with the various intangible non-produced rights such as copyright and trademarks.

20. A case where double counting will not eventuate will be research and development (R&D) in the situation that the R&D leads to a patent. The patent should be valued based on the future stream of income but since R&D is not capitalised a double count should not eventuate. However, as noted above there seems to be a strong link between the activities of R&D and the production of other intangible assets which brings into question the treatment of all intangibles including R&D.

COFC / Amortisation

21. Related to the issue of the boundary between produced and non-produced intangible assets is the difference in wording for the allocation of the cost of using these various assets. For produced intangibles SNA93 recommends the estimation of consumption of fixed capital (COFC) presumably at replacement cost. However, for non-produced intangibles, SNA93 recommends amortisation. Amortisation is interpreted to mean the writing off at historical cost of the asset in question. For instance, in Australia the copyright on a book may be amortised over at least 50 years. The issue of replacement cost does not arise. It would seem consistent and logical to treat intangible produced assets such as artistic originals in a similar fashion since the concept of replacement cost is not applicable.

22. One exception to this suggestion is computer software for which replacement cost seems valid. However, the fact that replacement cost can be constructed would provide some support for the treatment of computer software as a tangible asset. (See the paper on computer software for further discussion.)

Summary

23. Overall, the ABS feels that the links between intangible produced and non-produced assets have not been adequately addressed in SNA93. However, the ABS is very aware of the immense difficulties involved in defining intangibles and this discussion is simply an attempt to highlight some of the issues that require further discussion.

Data issues

24. The potential impact of including intangible non-produced assets in the ANA is large. Results from a survey of Australia's top 100 industrial companies, conducted by accounting firm Ernst and Young (released in 1995), estimated the value of intangibles at \$22.2 billion. This estimate is significant compared with the estimated value of Australia's forests, \$15.2 billion, and livestock, \$24.7 billion, at 30 June 1992. Moreover, the Ernst and Young estimate is for only Australia's top 100 industrial companies. In light of this finding, following is a consideration of the relationship between business accounting practice and national accounting data requirements, a brief summary of the international accounting debate, data presently available and future options.

Business accounting versus national accounting

25. The nature of business accounting for intangible assets has been the cause of much debate recently, both in Australia and internationally. Currently in Australia the only intangible asset which is fully covered by an accounting standard is goodwill. Other intangible assets were the subject of an accounting exposure draft (ED49), *Accounting for Identifiable Intangible Assets*, released in August 1989. Due to the lack of agreement within the accounting and business arenas, ED49 was withdrawn in March 1992. No subsequent Australian standard has been released. Present Australian business accounting practice for the major categories of intangible non-produced assets are considered below in light of SNA93 requirements.

(i) Goodwill

26. The relevant Australian Accounting Standard is AAS18, *Accounting for Goodwill*. AAS18 defines goodwill as "the future benefits from unidentifiable assets" (AAS18, para.

2(d)). Unidentifiable assets would normally include market penetration, effective advertising, good labour relations and a superior management and operating team. The valuation of goodwill recommended in AAS18 is closely aligned with SNA93:

"Purchased goodwill should be measured as the excess of the purchase consideration plus incidental expenses over the fair value of the identifiable net assets acquired." (AAS18, para.38)

While recognising that internally generated goodwill can exist, AAS18 specifically excludes this type of goodwill from being brought to account due to difficulties of identification. AAS18 permits only purchased goodwill to be recorded in the accounts of a business.

27. According to AAS18, purchased goodwill should be amortised, by systematic charges against income, over the period when the benefits are expected to arise. SNA93 specifies that the period over which goodwill should be amortised is to be based on the country's accounting standards. In summary, there appears no "in principle" reason why the SNA93 recommendations cannot be implemented for goodwill.

(ii) Leases on sub-soil assets

28. Business accounting in the mining industry is largely covered by AAS7, *Accounting for the Extractive Industries*, which mainly relates to the treatment of exploration and development expenses. Exploration leases are not explicitly mentioned in AAS7 but it appears that their cost is to be treated as part of the exploration, evaluation and development costs carried forward to the balance sheet. Thus, such leases are an integral component of capitalised exploration costs. Further, once reserves are demonstrated it appears that the value of the lease is inextricably part of the subsoil asset value, which may be referred to as "leases".

29. SNA93 distinguishes and recommends different treatments for:

- mineral exploration which is a produced fixed intangible asset;
- mining leases which are non-produced intangible assets; and
- sub-soil assets which are tangible non-produced assets.

Thus, in practice, estimation of the SNA93 treatment using business accounts data could result in a double counting of leases, capitalised exploration and subsoil assets. In order to avoid double counting, leases will have to be valued at cost but may then be shown to have little economic value.

(iii) Other intangible assets

30. Assets included in this category are likely to be the most significant for Australia. There is no specific accounting standard or standard business practice for other intangible assets. Other intangible non-produced assets include patents, trademarks, brandnames, mastheads, franchises, etc. As previously mentioned, ED49, *Accounting for Identifiable Intangible Assets* was released in 1989 but withdrawn in 1992 due to lack of agreement on the treatment of these assets in business accounts.

31. Intangibles meet the definition of assets contained in Statement of Accounting Concept 4 (SAC4), *Definition and Recognition of the Elements of Financial Statements*. The main difference between ED49 and other accounting standards, particularly AAS18, *Accounting for Goodwill*, is that ED49 allows internally generated as well as purchased intangibles to be brought to account. Internally generated intangibles had to meet the SAC4 recognition

criteria prior to being included in business accounts. These criteria are:

- "(a) It is probable that the future economic benefits embodied in the asset will eventuate; and
- (b) the asset possesses a cost or other value that can be measured reliably." (SAC4 para 38)

The major problem with the recognition of internally generated intangibles is their valuation. By comparison, valuing purchased intangibles is relatively easy.

32. Because there is no specific business accounting standard on the recognition of identifiable intangible assets there may be a wide variety of reporting practices employed by businesses. The decisions about whether to account for these assets, how to account for them, how to value them, and whether to amortise them are decided by individual businesses policy. It is likely that consistent information for the national accounts is not currently available in Australia.

33. Although internally generated goodwill is deemed not to appear until it is sold, the SNA93 is not entirely clear on the treatment of other internally generated non-produced intangibles. For patents, trademarks, brandnames, mastheads and other rights and contracts, it is assumed the SNA93 intends that they appear in the other changes in volume account and the balance sheet when the legal protection or contract comes into force. Goodwill is the only exception to this. However, businesses' valuation of internally generated assets such as brandnames and mastheads could be quite subjective and the boundary between these assets and goodwill may be blurred. It is generally accepted that some large businesses used these items in the late 1980s to artificially raise the value of their assets and thus deflate their debt to equity ratios. The valuation issue is a major factor in any decision on the treatment of non-produced intangibles in the national and sector balance sheets.

The international debate

34. The international accounting community is currently debating the treatment of identifiable intangible assets. The International Accounting Standards Committee (IASC) released an exposure draft (ED) on identifiable intangibles in 1995 which stated that internally generated intangibles could not be recognised in business accounts, and that purchased intangibles must be amortised, over a maximum time period of 20 years. The international exposure draft is broadly similar to standards in the United States.

35. The British Accounting Standards Board responded to the international ED with an opposing proposal. The British proposal fully accounts for the value of goodwill and intangibles (both purchased and internally generated) at their net present values. Also, the British proposal states that intangibles do not have to be amortised. Australian standard setting bodies believe the British proposal would be subject to manipulation by businesses and are favouring the international ED. However, leading Australian businesses have expressed their strong support for the British proposal. A resolution of the debate is still some time away.

Data presently available and future options

36. The ABS Economic Activity Survey (EAS) has collected data on acquisitions and disposals of "intangible assets" since it commenced in 1990-91. However, estimates of the value of disposals from the EAS are relatively small compared to the value of acquisitions. The discrepancy in the EAS estimates may, in part, be due to the exclusion of general government transactions from the disposals figure. The discrepancy may also indicate that the emergence of new (internally generated) intangibles are being reported in acquisitions.

Further, it is likely that when a business is sold, the purchaser would report the revalued acquisitions of any intangibles but, since the seller would no longer be on the ABS business register, no disposal of intangibles would be recorded. Indeed, even if the buyer and seller remained in the population of EAS appropriate sampling to capture both sides of the transaction would be difficult.

37. To measure non-produced intangibles for the SNA93 capital accounts, institutional sector data are required. Current EAS data include acquisitions and disposals of intangibles by sector although the scope of these data is not clear given the lack of accounting standards. Importantly, a distinction would have to be made between internally generated assets and purchases of existing assets. The former would be included in the other changes in volume account, and the latter in the capital account. Note that net transactions in intangibles for all domestic sectors will not necessarily equal zero. Allowance will be made in the revised Balance of Payments capital account for transactions in non-produced assets.

Coverage and concepts

38. Apart from the ABS Survey of Balance Sheet Information, where the coverage of the trading enterprise sector is limited, there is no ABS source for complete balance sheet information. Therefore, a source will need to be developed to facilitate the inclusion of intangible non-produced assets in the national and sector balance sheets. The annual economic collections only collect a limited range of asset and liability data. Consideration will need to be given to extending this range when non-produced intangibles are included in the national and sector balance sheets. However, given the lack of accounting standards for businesses and difficulties in establishing the boundary between produced and non-produced intangibles, the collection of data may be problematic.

ANA Decision

39. For the time being, because of the unavailability of satisfactory data, transactions in intangible, non-produced assets will only be included in the capital accounts to the limited extent currently possible. Thus, only general government, public trading enterprise and public financial enterprise transactions will be covered in the capital accounts, together with the same transactions in the counterparty accounts.

CHAPTER 5: Issues for Discussion

These nine papers raise a number of measurement and conceptual issues and generally highlight the difficulties in defining and measuring concepts related to capital formation. Following are selected issues which warrant discussion. This list is not exhaustive and any feedback on these or other issues would be appreciated.

General issues

1. Should accounting for capital costs on intangible assets, both produced and non-produced, use a consumption of fixed capital (and hence replacement cost) approach or an amortisation approach?
2. How can the boundary between produced and non-produced assets, particularly for intangible assets, be more rigorously defined?
3. How should backcasting be accomplished for new asset types?

Livestock

1. How could variation in the quality of animals be accounted for?
2. Does the extent of own-account imputation required for estimating capital formation on livestock detract from the usefulness of the farm production estimates in terms of comparison to incomes actually received by farmers?

Speculative construction

1. How should the role of developers, as opposed to builders, be treated?
2. Should the value of all construction work done be treated as inventories until completion rather than only speculative construction?
3. What alternatives are available for reflecting construction in the balance sheet and capital stock estimates?
4. How should the builder's profit mark-up on a speculative construction project be estimated if the project is sold before completion?
5. Is it the intent of SNA93 to cover only long-term projects in speculative construction, i.e., projects taking over one year?

Defence

1. Does the fact that COFC on defence equipment adds to GDP through government final consumption expenditure overstate the productive effects of defence expenditure?
2. What is the rationale for the SNA93 treatment and is it appropriate?

Monuments

1. Are all monuments necessarily produced assets?
2. Does there need to be a non-produced component in all monuments which reflects special or significant value?

Mineral Exploration

1. How should service lives for mineral exploration expenditures be calculated?
2. How should complex and changing taxation treatments in relation to mineral exploration be dealt with in estimation systems?

Computer software

1. How important is the distinction between computer hardware and computer software?
2. What collection strategies should be adopted to deal with the usual treatment of software as an expense in business accounting?
3. Should computer software be treated as a tangible produced asset?

Film

1. Should film originals be valued as if their value is dependent on the possession of distribution rights which are a non-produced asset? In other words, what is the relationship between produced and non-produced intangible assets?
2. How should government subsidies be treated in the estimation of the present value of future returns?

Valuables

1. How should valuables be valued in a situation of low market turnover?
2. How should information on private individuals' holdings of valuables be collected?

Intangible non-produced assets

1. Can the boundary between produced and non-produced intangible assets be precisely defined? If the boundary is necessarily blurred what effects does this have on the system?
2. In data collection, can ways be found around the problem of the limited business accounting treatments for these assets?
3. How should internally generated intangibles, such as trademarks, be valued?