A users perspective on the treatment of transport activities in input-output tables and suggestions for the future

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Abstract

Australia has a long history in the compilation and use of input-output tables. The tables are used for a variety of descriptive analyses, benchmarking of industry assistance and policy modelling at a regional and national level. This paper outlines the use made of input-output data in Australia and examines recent changes in the treatment of transport services in input-output tables. It suggests that some of these changes have been detrimental to economic analysis using input-output data. It also suggests that the changes reduce the efficiency of mathematical estimation techniques for compiling input-output tables. In view of these concerns, the paper outlines revised treatments of transport activities. The aim of these suggestions is to improve the homogeneity of input-output flows and in doing so, improve the usefulness of input-output tables for economic analysis.

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Introduction

The revised System of National Accounts released in 1993 (Commission of European Communities et al. 1993, SNA93) made a large number of changes from the previous edition of the system which was promulgated in 1968 (United Nations 1968, SNA68). In the main these changes are considered to have improved the analytical usefulness of national accounts statistics.

One of the more significant changes from the perspective of input-output analysis and arguably for industry analysis more generally, was the change to the definition of output at basic values, now termed output at basic prices by SNA93. Under SNA68, the added value arising through the transport of goods from a producer to a purchaser by a third party was excluded from the basic price of the good being transported (basic value in SNA68 terminology) and was recorded as a transport margin. Under SNA93, the added value of the transport of goods by a third party is excluded from the basic price if it is separately invoiced, but is included in the basic price if it is not. We suggest that this change in definition is fundamentally flawed from a theoretical perspective and that accounts compiled using this definition can potentially lead to an incorrect understanding of the economic interrelationships that are in play within an economy. Indeed, it is this criticism of the Australian input-output tables (federal and state governments, private sector economists and academics) that has prompted the preparation of this paper.

This paper explores this issue and concludes that the treatment recommended by SNA93 is regrettable and renders the accounts less useful than they need be. Accordingly, it is recommended that the SNA revert to the 1968 definition of basic prices

An overview of the use of input-output tables in Australia

Input-output tables are widely used in Australia. At one level, the tables are used as a statistical reference for describing inputs to industry, the source of those inputs, whether domestically produced or imported and the disposition of industry outputs. For example, it is often of interest in policy analysis to ascertain the main inputs, including transport on other goods used, to industry. The tables also are used to describe the relation between the basic price of goods and the price to purchasers. For example, to ascertain the impact of a change in production costs on prices faced by consumers. These descriptive uses typically focus on simple tabular presentations or ad hoc analyses and are undertaken by users with varying understandings of the implications of input-output compilation conventions.

At a second level, the tables are used to provide formal measures of economic structure of the Australian economy to benchmark other analyses and to provide the database for input-output multiplier analysis and general equilibrium modelling at the regional, national and cross-country levels. A number of important applications are worthy of mention. A flagship use of Australian input-output tables has been in the provision of the database for the MONASH computable general equilibrium model of the Australian economy (Dixon and Rimmer 2002). This model grew out of the earlier ORANI model (Dixon, Parmenter, Sutton and Vincent 1982). These models have been used extensively in policy analysis in Australia (see Dee 1994). Recent applications in policy analysis have been in the assessment of the implications of assistance reductions to the Australian passenger motor vehicle and textiles, clothing and footwear and industries (Productivity Commission 2002 and 2003, respectively).

The MONASH modelling framework has also been applied to the disaggregation of the national model to a regional general equilibrium model with 8 sub-national State and Territory regions

(see Naqvi and Peter 1996, and Peter *et al.* 1996) and in the preparation of national models for other countries, including Thailand and China (CoPS 2004) and the United States (see Dixon and Rimmer 2004).

In another framework application, input-output data are used to provide information about the structure of industry for the measurement and evaluation of assistance to industry provided by tariffs on imports, government marketing arrangements, budgetary assistance and other State and Federal Government measures (Productivity Commission 2003). This use has recently been extended to provide measures of assistance afforded by tariff concessions in the Australia-New Zealand Closer Economic Relations Agreement (Productivity Commission 2004).

Some analyses have focused specifically on transport costs. For example, a version of the ORANI general equilibrium model that allowed detailed analysis of transport including the substitution between modes of transport, was used to quantify the effects of lower-cost coastal shipping (Industries Assistance Commission 1988). A similar model was also used to analyse the national and regional effects of national competition policy reform in rail and road transport (Productivity Commission 1999). While these studies have used high-level modelling, other studies have used input-output data more directly to assess the importance of changes in transport costs. For example, a Bureau of Industry Economics research paper used input-output data to, amongst other things, examine the importance of possible changes in transport and other infra-structure costs on the competitiveness of the Australian agri-food sector (Bureau of Industry Economics 1996).

Input-output data for one period are also used in the compilation of tables for subsequent periods (for example see Gretton and Cotterell 1979). The methodology applied to compile the Australian input-output tables involves estimating some input-output flows from basic data and then estimating the remaining flows from the preceding input-output table, to optimally satisfy the accounting constraints provided by basic data estimates. To improve the accuracy of this method, the cost of transport services by individual industry sectors is determined on the basis of the use of transportable goods.

The range and intensity of use of input-output data in Australia and of applications in other countries of analytical frameworks developed in Australia has elevated the interest in input-output tables and the basis on which they are compiled. The treatment of transport margins is considered a key issue for use of the tables in economic analysis. It is also important for the compilation of the tables.

Valuation transactions in SNA68

Output at basic values under SNA68

The starting point for a consideration of the treatment of transport costs and the subsequent analytical use of input-output tables is provided by the definition of the basic value of products — inclusive of transportable goods and transport services. The 1968 version of *The System of National Accounts* (SNA68) distinguished between ‘true’ and ‘approximate’ basic values. It is not necessary for the purpose of this paper to explain the differences between the two concepts. The key part of the definition for approximate basic values is:

> Producers’ values, that is the value on the market at the establishment of the producer, of the gross output of commodities, industries, etc less the commodity taxes, net, in respect of the gross output…"(Glossary of Main Terms).

Paragraph 6.12 of SNA68 elaborates:

> …The gross output of commodities, other than the services of the distributive trades, is to be valued at producers' values in the standard accounts and most of the supporting tables of the system. Producers' values are not to include charges involved in delivering goods to purchasers after the goods in question leave the producers' establishments, for example, charges in respect of transport and storage. The charges to be included will therefore reflect the scope assigned to the establishments where the goods are produced. For example it will often be necessary to define the producer's establishment so as to include short-range delivery services which he himself furnishes.

For the purpose of this paper the key point to note is that producers' values (and by implication basic values) are to exclude charges associated with delivery subsequent to the goods leaving the producing establishment. The point to note here is that these delivery charges are excluded from the basic-price valuation irrespective of which unit pays for the delivery — the end user or the producer.

Treatment of delivery costs under SNA68

The issue of the treatment of delivery costs and its impact on the basic value of the good being delivered is the key issue being canvassed in this paper. There are effectively six different arrangements that may apply to the delivery of a good from a producer to a user (the intervention of Wholesale and Retail reselling makes the issue slightly more complex but does not require explanation at this point). The six arrangements are:

- delivery by the producing units own employees and transport where the price of the good includes delivery, that is, no separate delivery charge;
- delivery by the producing units own employees and transport with an explicit delivery charge separate from the price of the good;
- delivery by a third party paid for by the provider of the good and no separate delivery charge;
- delivery by a third party arranged by the provider of the good and explicitly paid by the user;
- delivery arranged by the user using their own resources; and
- delivery arranged by the user through a third party transport operator i.e. the end user pays a third entity to pick up and deliver the goods.

In principle, the six separate arrangements relate to exactly the same activity of transporting a good from one point to another, and logically it is preferable that they be represented in an input-output table, or any other set of macroeconomic statistics, in a consistent manner. However, the SNA68 definition of output at basic prices permits variable treatment amongst the various arrangements. As explained above under the SNA68 treatment (short range) delivery undertaken by an establishment's own employees where no explicit charge is levied means that the delivery charge is implicitly included in the basic price of the good being delivered.

Under the second arrangement — delivery by own employees with an explicit charge for that delivery — no particular complexity exists. The producing unit is, along with whatever good it is supplying, providing the end user with a transport service. The only complexity associated with this transaction is whether to classify the transport service as a margin or as a non-margin service. According to SNA68, trade and transport margins are defined as

> …The value of the transport and distributive trade services provided in delivering commodities from the establishments of the producers to the end-use purchasers.

It is clear from this definition that the transport service provided in this way is to be considered as a margin service rather than a non-margin service.

The third type of arrangement outlined above involves delivery by a third party who is paid by the establishment providing the good. Under the SNA68 definition, this type of transaction is clearly treated as a transport margin rather than a non-margin service. The definition also implies that the transport margin should be recorded as a purchase of the end user. This is how it was recorded in the Australian input-output tables prior to 1994-95. It is also how it is recorded in a set of input-output table for 1996-97 prepared for key users such as the Productivity Commission and CoPS.

The fourth arrangement — payment by the end user for third party delivery — is clearly a purchase of a margin by the end user and does not pose any particular difficulties.

A user arranging for delivery using their own resources is the fifth type of arrangement. Assuming the user is another business, then the cost of delivery to the user will be hidden in their wage, fuel and other costs and certainly will not be recognised as a transport cost, nor will it be recognised as a part of the cost of the good. The cost of providing transport will effectively be incorporated in the price the user business charges for its output. Of course, where the user is a household, the activity falls outside the production boundary.

The sixth and last arrangement which is essentially identical to the fourth, again does not pose any particular difficulties as the purchase of the transport service by the user should clearly be treated as the use of a transport margin by the user.

Valuation transactions in SNA93

Output at basic prices in SNA93

The SNA93 promulgated a change to the definition of output at basic prices — termed ‘basic values’ under SNA68. Paragraph 6.205 of SNA93 defines basic prices as follows:

> …The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale. It excludes any transport charges invoiced separately by the producer.

Paragraph 15.42 of SNA93 gives a full explanation relating to the treatment of transport costs,

> …The full cost of transporting a good from the place where it is manufactured to the place where the purchaser takes delivery of it may be included in a number of items. If the producer transports the good, or arranges for it to be transported without extra cost to the purchaser, these transportation costs will be included in the basic price. If the producer transports the goods himself this represents an ancillary activity and the individual costs will be included but not identifiable as transportation costs. If the producer pays a third party to transport the goods then transportation will appear as one of the intermediate costs to the producer. Similarly, wholesale and retail traders may arrange for goods to be moved from where they take delivery of them to where another purchaser takes delivery. As in the case of producers, these costs will be included in the trade margin if no separate charge is made for transportation to the purchaser. Again, as with producers, these costs may represent ancillary activity of wholesale and retail traders or the purchase of an intermediate service, thus entering trade margins. Finally, when transport is arranged in such a way that the purchaser

has to pay for the transport costs even when done by the producer or the wholesale or retail trader, these are separately identified as transport margins. The full component of transport services in the trade and transport margins - composed of the transport margins themselves and the transport services included in the trade margins - may be analysed separately in a more analytical version of the supply and use table.

The issue of interest in this paper is how this definition differs from the SNA68 definition and what are the implications of such a difference.

The SNA93 definition does not require that output be valued 'at the establishment of the producer'. The requirement to value output at the establishment under SNA68 imposed a geographic boundary on the valuation of output, basic values of transportable goods in this context was understood to relate to an ex-farm, ex-mine or ex-factory value. Once the good left the producer's establishment any value added as a result of transport was deemed to be a margin providing that it was not an ancillary activity. Under SNA93 there is no such requirement.

If the price of a good includes a delivery charge that is not separately charged (invoiced) to the end user, then that delivery charge is considered to be a component of the basic price for the good. This differs from the SNA68 treatment where the delivery charge was treated as a margin. Thus, under SNA93, the basic price of a good delivered by a third party operator and paid for by the producing establishment exceeds the basic value of that good, as per SNA68, by the amount of the delivery charge. The transport charge is recorded as an input of a non-margin transport service into the producing industry, under SNA93. Of course, if the cost of delivery is borne by the end user then the transport is still treated as a margin service.

It is important to note that the estimate of usage by an end user of any given product is identical at purchasers' prices under both the SNA68 and SNA93 treatment. While purchasers' prices are important for economic analysis, the building block measures expressed in basic prices are the theoretical core of the application of Australian tables and are the focus of this discussion. The following table summarises the SNA68 and SNA93 treatments of the six cases of transport delivery costs identified above.

Of the six arrangements identified in paragraph 9 only the third — delivery by a third party paid for by the producer — has changed. Previously this was treated as a margin. Under SNA93 it is treated as a non-margin input of the industry which produces the good being delivered. Unfortunately, this arrangement is very common in Australia and the change in treatment has a significant impact on the usefulness of the tables in economic analysis and as benchmarks for updating tables for later periods. [1]

[1] A further complication and source of concern to users of input-output tables is that under SNA93, where a wholesaler or retailer arranges delivery but does not invoice it separately, the delivery costs are recorded not as transport margins but as trade margins. Under SNA68, such transport costs would be recorded not as trade margins but as transport margins. Available information indicates this arrangement is of relatively minor significance in Australia.

Table 1: Treatment of transport delivery costs

Type of arrangement	*Included in basic price of producer's output*		*Included in transport margin*	
	SNA68	SNA93	SNA68	SNA93
Delivery by producer — no separate invoice	Yes	Yes	No	No
Delivery by producer — separate invoice	No	No	Yes	Yes
Delivery by third party arranged by producer — no separate invoice	No	Yes	Yes	No
Delivery by third party arranged by producer — separate invoice	No	No	Yes	Yes
Delivery by user	No	No	No	No
Delivery by third party — arranged by user	No	No	Yes	Yes

Links to other frameworks

The changed treatment described in the preceding section of the paper appears to result in a significant inconsistency between the SNA and the guidelines used for compiling balance of payments statistics given in the IMFs *Balance of Payments Manual* (BPM5, IMF 1993). The inconsistency manifests itself at the detailed product (commodity) level and would suggest different recording of supply and use depending on whether SNA93 or BPM5 standards are applied.

Specifically, in the situation where a domestic producer arranges for, but does not separately invoice, the delivery of goods to a non-resident user, under the SNA93 valuation rules, the basic price for the good(s) would be equal to the delivered price to the non-resident. For example, an Australian coal producer may arrange for the delivery of the coal to the port (or even factory) of a Japanese user of that coal. In the case where the transport price is borne by the mining establishment and not separately invoiced, the basic price would be the price at the delivery point.

On the other hand, BPM5 recommends valuation of exports free on board (fob) Under the fob principle, goods are valued at the value of the goods themselves plus the related distributive services required for the goods to reach the customs frontier of the economy from which the goods are exported (BPM5 paragraph 222). Interestingly, this valuation basis is adopted — without cross reference to the treatment of transport costs — for the recording of exports in input-output tables according to SNA93. Clearly, in the example above, the exports valued fob will be less than the value of sales reported by the producer of the coal. Thus, the supply of coal measured at basic prices would exceed the recorded usage — as measured by the fob value of export sales. Further, if the shipping is provided by a non-resident shipper a problem arises. Namely, the transaction between the resident coal miner and the non-resident shipper is not recognised as an import by Australia for balance of payments purposes. This means that the use of transport services as recorded by intermediate and final users is not matched by the available supply as these type of transactions are deemed to be out of scope of the balance of payments of the exporting country. Although there are also differences between SNA68 and BPM5, the

SNA68 treatment of transport services not separated invoiced would appear to be more in line with BPM5 specifications than the SNA93 treatment.

Transport margins in CGE modelling

As mentioned previously, computable general equilibrium (CGE) models are used extensively in Australia by both public- and private-sector researchers to analyse a wide range of policy issues. The ORANI and later the MONASH models are the best known. Both of these incorporate the full range of margin detail shown in the ABS input-output tables: they divide transport demand between margin and direct usage and distinguish margin usage according to both the commodity transported and the user of that commodity. Such a detailed treatment of margins in CGE models is rather unique to Australia, and greatly adds to the complexity (and computing time) for producing such models. CGE modellers in other countries have normally treated transport demand as a direct demand, partly because detailed (user- and commodity-specific) margins data are rarely made available by statistical agencies. Others have assumed that the share of transport in the purchaser's cost of individual products (such as wheat) is the same for all domestic users.

The detailed margins approach used in MONASH recognizes that transport costs form a larger share of user costs for those industries that are far away from their suppliers — in Australia, the agriculture, mining and related processing industries. Increases in transport costs (perhaps caused by fuel taxes) bear more heavily on such users. The SNA93 treatment of margins tends to ignore variation in transport costs between using industries — by allowing the transport of wheat as a cost of producing wheat to be the same for all users.

Substitution between modes of transport, such as road and rail transport, can also be modelled by the MONASH model. The substitution is modelled separately for direct and margin usage. In such analyses, the choice of mode will be influenced by changes in the relative price of the modes — road and rail in this example — and, for margin use, by the shares of road and rail in the cost of transporting goods to users. Under SNA93 these shares are more influenced than under SNA68 by the billing conventions of suppliers — significantly eroding the veracity of model results and even of the validity of undertaking the analysis. For example, if road transport of cement appeared as a direct cost of cement production while rail transport was included in margins, there would be no substitution in MONASH between the two ways of getting cement to users.

Australia also has an active tradition of building and using regional CGE models. The models treat from 3 to 50 regions of Australia as separate economies linked to the rest by commodity trade. Underpinning such models is the idea that freight transport costs, which increase with distance, cause users to purchase more goods produced in nearby regions. Under SNA68 we would expect that a reduction in transport costs would increase trade of cement between regions, especially between more distant regions. As SNA93 can attribute some transport costs to the producing industry, the empirical basis of the CGE sourcing decision is reduced. For example, cheaper transport would still reduce the delivered cost of cement, but the effect would be distributed more equally amongst users, whether their suppliers were distant or nearby. Hence trade between regions would not increase as much.

CGE simulations normally focus on some area of policy concern. In Australia, recurring concerns have included: the desire to reduce CO2 emissions (partly by taxing petroleum and diesel); the desire to integrate remote regions (by the construction of road and rail links); and the desire to move freight from road to rail. Analysis of these issues is based on measurements of the

contribution of transport costs to the delivered prices of goods to various users. The adoption of SNA93 has reduced the reliability of these measurements and the realism of simulations.

Global trade-policy analysis

As the world economy becomes more integrated and computing capabilities have developed to record and analyse the international economy, the interest in quantitative analysis of policy issues on a global basis has increased. Global modelling frameworks are now used extensively in addition to national frameworks. For example, the Global Trade Analysis Project (GTAP) based a Purdue University provides a framework for the analysis of issues that cut across countries and sectors within countries.

> The central ingredient in GTAP's success has been the global data base. It combines detailed bilateral trade, transport and protection data characterizing economic linkages *among regions* together with individual country input-output data bases which account for intersectoral linkages within regions. (Hertel 2000, p. 1-2).

Early versions of the GTAP data base were developed on the SALTER Project which was undertaken by the Australian Industry Commission during the 1980s and early 1990s. Since those early efforts many more regions and additional sector detail, amongst other things, have been added to the framework. Currently 66 regions and 50 or more industry sectors are represented in the data base. The GTAP model includes the cost of margin transport at two levels. Transport margins on locally source and imported merchandise is included as an input of a transport service by the user of the merchandise item being transported — that is in accordance with the SNA68 treatment of margins. To satisfy this modelling requirement and after consultation with the GTAP data base managers, the 1996-97 input-output table for Australia was adjusted from a SNA93 to a SNA68 basis and provided to the GTAP consortium. The tables provided to the GTAP consortium have a consistent treatment of transport margin flows compared with tables included in the ORANI and MONASH models, although, as noted, the national models contain a disaggregation of margins flows not included in GTAP.[2]

In GTAP, in line with traditional input-output accounting practices, imports and exports are valued at border prices, that is imports are valued on a cost, insurance and freight (cif) basis while exports are valued free on board (fob) (Gehlhar and McDougall 2000). The difference between these two valuations is an implicit measure of the transportation margin applying on all commodities traded between two countries. Earlier versions of GTAP treated international freight and insurance as a single service sector, supplied by exports of national trade and transport sectors. The more recent versions of the GTAP data base has disaggregated transport into three modes — sea, air and land (Itakura and Hertel 2001). This disaggregation is very demanding of data and is subject to heavy approximation and imputation to complete. Subject to this important data qualification, the increased attention to international transport costs coincides with increased attention to these costs in international trade. It will support improved analysis of liberalisation of services trade under the World Trade Organizations General Agreement on Trade in Services. This interest in the cost of transport provides a strong parallel with the interest in transport costs at the national level in Australia and underlined the importance of cost of transport disaggregated by mode in economic analysis. It also underline the importance of

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[2] Work has begun to separate domestic margin services from non-margin services in GTAP. Should that work succeed the relevance of the SNA treatment of transport margins would be as direct as it is for analyses based on the MONASH model and related frameworks.

recording flows on a consistent basis. The GTAP framework provides an additional requirement for consistency of recording of transport margin flows between countries.

How significant is the difference

A broad indication of the significance of the change in the treatment of transport margins costs can be obtained, for Australia, from the annual mining and manufacturing surveys conducted by the ABS. Specifically, those expenses reported as outward freight and cartage by establishments were previously netted off sales to get to the SNA68 basic value concept. This treatment was changed for the 1994-95 and 1996-97 input-output tables, which were compiled on an SNA93 basis. The change of treatment resulted in the aggregate estimate of output for the mining and manufacturing industries at basic prices in 1994-95 being higher by about $6 billion than it would have been under the SNA68 framework. This represents an increase of approximately 0.5% in the output of the Australian economy.

Against this background, we have considered the input-output table for 1996-97 compiled on the basis of SNA93 (ABS 200) and a table compiled on the basis of SNA68 (ABS 2003). The broad magnitude of the differences between flows estimated on the SNA68 and SNA93 bases is outlined in table 2.

Table 2: **Broad comparison of service supply and intermediate use for transport margin commodity groups[a] 1996-97**
($ million)

		SNA68		*SNA93*		*Difference (SNA93 less SNA68)*	
		Total inter-mediate use	*Supply*	*Total inter-mediate use*	*Supply*	*Total inter-mediate use*	*Supply*
61.01	Road transport	13508	21910	15223	21910	1715	-1
62.01	Rail, pipeline and other transport	1901	7154	2924	7154	1023	0
63.01	Water transport	1534	3455	1625	Na	91	0
64.01	Air and space transport	7320	16286	7434	Na	113	0

a Each commodity group contains margins and non-margin components. The differences reported are therefore net of changes in the component flows.

The table shows that total intermediate inputs of road transport and rail etc transport were increased by over 10 per cent and 50 per cent respectively, indicating that the change in treatment has shifted a significant value of transport services from final purchasers to goods suppliers that, in doing so, would have had a substantial impact on the input-output structure pertaining to transport services.

As would be expected, supply of transport services is unchanged by the revision.

Secondly, we examined the differences between input-output coefficients pertaining to the use of transport services under SNA93 and SNA68. Our comparison of input coefficients is reported in table 3.

Table 3: **Comparison of intermediate input coefficients for transport margin commodity groups[a], 1996-97**
(SNA93 coefficient less SNA68 coefficient)

		-5 and less	*>-5 to -2*	*>-2 to <0*	*0*	*>0 to <2%*	*2 to <5%*	*5% and more*	*Total*
61.01	Road transport	2	13	55	0	25	7	4	106
62.01	Rail, pipeline and other transport	0	1	38	0	63	3	1	106
63.01	Water transport	0	0	51	0	55	0	0	106
64.01	Air and space transport	1	1	57	0	45	2	0	106
	Total	**8**	**28**	**290**	**0**	**278**	**24**	**8**	

a Coefficients calculated using total intermediate use of the respective industries as the denominator.

For road transport usage, there were 15 of the 106 using sectors for which the coefficient is more than 2 percentage points lower under SNA93 than under SNA68. For these sectors, the negative effect of re-allocating margins on purchased inputs significantly exceeds the positive effect of including outward freight and cartage as an input to transportable-goods production. On the other hand, there were 11 sectors for which road transport usage is more than 2 percentage points higher under SNA93 than under SNA68. Overall, in our view, the changes have had a significant impact on measured inputs of the high-profile road transport items to individual industries. The significance of such differences would be compounded if transport services were disaggregated into their margin and non-margin components.

Conclusion

Clearly, it is undesirable from the perspective of input-output analysis for the output of two units that produce an identical good to be valued differentially — that is, including delivery cost or not depending on the billing arrangements of the particular business involved. While differential valuation existed under the SNA68 framework in that the basic price of a good included cost of delivery undertaken by an establishment's own employees, the change introduced under SNA93 has resulted in further, rather than less, distortion. The added distortion significantly reduces the usefulness of input-output tables for national and potentially global analysis. It also appears to us to introduce an inconsistency between national accounting and balance of payments standards that could have significant implications for global analysis.

This mixture of treatments of hire and reward transport pertaining to the distribution of goods inherent in SNA93 is confusing for policy analysis and violates the homogeneity assumptions which underpin the compilation and use of input-output tables. It also subjects flows of transport services to uneven recording over time because of their sensitivity to changes in business accounting conventions. A real practical concern, therefore, with the SNA93 treatment of transport services is the poor conceptual anchor it provides against which to examine the level or change in the structure of transport service provision, and to test alternative hypotheses about the

impact of policy and other economic change. The SNA68 treatment of transport margins better avoids these problems and focuses more directly on the organisation of industry.

Because of the strength of user concerns over the treatment of transport costs under SNA93, the Australian Bureau of Statistics has compiled analytically preferred tables in which transport costs are treated on a SNA68 basis. The authors envisage that the SNA68 method for recording transport margins will be maintained in modelling frameworks based on input-output data.

We believe that the SNA93 definition of basic prices, and input-output tables based on that approach, is not appropriate from an analytical perspective. From an analytical perspective, there would appear to be a good case for the definition of output at basic prices, and all consequent basic price valuations, to revert to the SNA68 treatment in national accounting standards promulgated in the future.

Appendix A Illustration of the difference between SNA68 and SNA93

For the purpose of illustrating the difference between SNA68 and SNA93 in respect of transport margins and basic prices the following example may be helpful.

Coal miner A has sales to a single user — steel maker B — of $5,000m. The contract price requires that the miner delivers the coal to the user. Miner A pays the local railways $1,000m to move the coal from the mine to the steel maker and does not provide a separate invoice.

Under SNA68 these transactions would be recorded in input-output tables in the following way:

- Coal (output at basic values) $4,000m = Sales of $5,000m less $1,000m cost of delivery.
- Note: the $1,000m delivery cost is not treated as an intermediate input (cost) to the mining industry.
- Rail transport output of $1,000m (at basic values) is recorded as a rail transport margin.
- Steel maker B records inputs of $4,000m of coal and $1,000m of rail transport margin.

Under SNA93 these transactions would be recorded as follows:

- Coal (output at basic prices) $5,000m = Sales of $5,000m
- Note: the $1,000m freight charge is recorded as an intermediate input of the mining industry. Value added remains the same under both treatments.
- Rail transport output of $1,000m (at basic prices) is recorded as production of non-margin rail services.
- Steel maker B, records an input of $5,000m of coal but zero input for transport.

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