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NAS-NSS Estimates of Private Consumption for Poverty Estimation

A Further Comparative Examination

The fact that NSS estimates of aggregate household consumer expenditure (HCE) tend to be lower than NAS estimates of private final consumption expenditure (PFCE) has spurred suggestions to pro-rata adjust the NSS-based size distribution on the basis of this difference. Drawing on a joint CSO-NSSO exercise at cross-validation of NAS and NSS, this paper details weaknesses of both types of estimates, but shows that NAS cannot be accepted as a more reliable yardstick for either aggregate consumption expenditure or that on specific commodity groups. This is due to the inherent 'fluidity' of NAS estimates, weaknesses in their underlying database, and the fragility of the rates, ratios and norms used in the commodity-flow balance underpinning the PFCE. Despite its shortcomings, it is argued that NSS is preferable because it is based on direct observations relating to the survey period and because, unlike NAS, it avoids recourse to adjustments based on arbitrary assumptions.

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I
Introduction

Concerns have recently been voiced about the use of National Sample Surveys (NSS) on household consumer expenditure (HCE) as the sole data source for calculating prevalence measures of poverty, that is, the estimated percentage of population living below a pre-specified poverty line, or headcount ratio. These have centred on a comparison of NSS-based HCEs with estimates of private final consumption expenditure (PFCE) based on National Accounts Statistics (NAS). NSS estimates of HCE have been found to be significantly *lower* than PFCE. Also, it is alleged that the NAS-NSS gap itself has widened over the 1990s, which would affect the level of the headcount ratio, as well as its trends over time. Pursuant to this, it has been argued that an old practice for adjusting the NSS-based size distribution by a uniform scalar correction obtained by shifting the NSS distribution uniformly to the right by the ratio of per capita PFCE to per capita HCE, be revived. Though once used by the Planning Commission, this practice has been discarded on the recommendation of the Lakdawala expert group [GoI 1993]. Nevertheless, critics of NSS estimates of HCE now advocate its revival. Hence this further critical examination of the issue.

In an earlier paper [Sundaram and Tendulkar 2001], we had undertaken a comparison of NAS and NSS estimates for 1993-94 to ascertain the appropriateness of uniform scalar correction. The exercise was based on published data disaggregated by commodity/item groups and by different fractile groups, obtained from the NAS and NSS, and the NSS respectively. We used two estimates for 1993-94 at current prices drawn from the NAS: one taken from the old series, with a 1980-81 price base, and the other from the new series, with 1993-94 price-base. These were compared with two estimates from the NSS: one with uniform reference periods and another, a synthetic estimate, with mixed reference periods. Two conclusions were reached.

First, those item groups that accounted for a very large proportion of the aggregate discrepancy between NAS and NSS estimates composed a relatively small budget share in the consumption basket of the bottom 30 per cent of the rural and the urban populations. Contrariwise, in those item groups that together accounted for over 75 per cent of this consumption basket the divergence between the two estimates was much smaller than the average for all of the above item groups, and, in some cases, *negative* in value. In other words, a uniform scalar correction would result in a significant *overstatement* of the consumer expenditure of the bottom 30 per

cent and would therefore show a spuriously low level of poverty. If the discrepancy between NAS and NSS estimates has been rising, as alleged by the critics, such a correction would also show a decline in headcount ratio where none existed. If there were a decline, a correction would exaggerate its magnitude.

The second and more important conclusion that we reached was that it was far from clear if NAS estimates of PFCE would be more correct and reliable than NSS-based HCE estimates.

We draw for this assessment on an exercise comparing NAS and NSS, which was carried out after the completion of our earlier paper [Sundaram and Tendulkar 2001] on a more recent, systematic, detailed and painstaking exercise carried out by the national accounts division (NAD) of the Central Statistical Organisation (CSO) and the survey design and research division (SDRD) of the National Sample Survey Organisation [GOI-NAD-SDRD 2001]. Their work in turn updated an earlier joint CSO-NSSO effort carried out in the same context [Minhas et al 1986]. We use the updated study to assess relative correctness and reliability of the NAS and NSS.

The plan of the paper is as follows: Section II provides a discussion of the basic differences in coverage, estimation procedures and databases of NAS and NSS in order to provide a general perspective on the problem being discussed. This is

followed in Section III by an empirical comparison across various NAS-based estimates of PFCE for 1993-94, which to emphasises the continued lack of firmness in the NAS estimates of PFCE – what Minhas and Kansal (1990) described as 'fluidity'. Section IV draws on a detailed comparison of NAD and SDRD to assess weaknesses in both the data sources. The final section re-examines the advisability of adjusting the NSS estimates of HCE on the basis of NAS estimates of PFCE.

II
NAS-NSS Differences in Coverage, Estimation Methods and Databases

It is useful for our purpose to start by outlining the major differences in coverage, estimation procedures and databases underlying consumption expenditure from NAS and NSS.

In respect to coverage, consistency with national accounting conventions requires that PFCE in NAS be subject to a *wider* coverage than HCE drawn from NSS. HCE relates to a directly observed estimate during the survey period of NSS, which is usually a year. PFCE is wider in scope than HCE in three respects. First, it includes, in addition to HCE, private final consumption expenditure of non-governmental, non-profit institutions serving households (NPISH). These include institutions that deliver religious, educational and health services. In addition, PFCE also includes two *notional* elements which are not captured by NSS through directly observed, *actual* HCE. The first element is *imputed* rents on owner-occupied dwellings. The second is described in the Indian NAS as 'financial intermediation services indirectly measured' (FISIM). These are the price-cost margins on banking and insurance services which are deemed to be part of PFCE. Thirdly, HCE being based on a household frame, excludes by definition, houseless and institutional sections of the population, like inhabitants of orphanages, prisons and hospitals.

While estimates of notional elements are available from NAS and can be netted out, no independent estimates of consumption expenditure, relating to (a) NPISH or (b) houseless and institutional populations, are available. These elements therefore cannot be netted out in order to obtain an estimate comparable in coverage to HCE. It is the case that (b) is expected to be negligibly small in relation to total HCE

or PFCE. Further, the GoI-NAD-SDRD (2001) also offers the judgment that as regards (a) 'there are reasons to believe that it is rather small' (p 5). Our judgment is that the share of NPISH in PFCE has actually been rising over time with the increasing roles that various non-governmental organisations have come to play in the areas of education and health. However, HCE is in any case expected to be lower than PFCE because of the above-mentioned differences in coverage.

Turning to the estimation procedures, the basic point to note is that HCE from NSS is a directly observed stand-alone estimate relating to a given survey period (usually a year, as noted above) – while PFCE from NAS is an indirect, residual macro-level estimate of aggregate PFCE derived from GDP estimates. Also, as noted above, it must be consistent with national accounts conventions and derived from ex post national accounting identities. The residual nature of PFCE arises from its use of the commodity-flow method at the disaggregated level of a commodity or service. This method employs an ex post aggregate commodity-flow balance in which economywide domestic production is equated to its various uses. These include, in addition to PFCE: governmental final consumption expenditure, investment, changes in stocks, intermediate uses in inter-industrial consumption and net exports to the rest of the world. PFCE is indirectly derived by netting out from domestic production all other elements in the ex post commodity flow balance.

These differences in estimation procedures naturally lead to a discussion of differences in databases between NAS and NSS. Being derived from GDP the basic data underpinning PFCE in NAS are provided by estimates of the aggregate production within national geographical boundaries of all the goods and services produced in an accounting year (April-March). These are drawn from year to year, according to their availability as annual figures, from a large variety of administrative statistics with uneven quality across different sectors of production. Our subsequent discussion further elucidates this latter point. For a recent stocktaking in this respect, reference may also be made to the report of the National Statistical Commission [GoI-NSC 2001b:346-427].

In addition, NAS has to resort to what can be described as the indirect method of estimation to account for contribution to GDP by sectors/units for which annual

estimates of production are not regularly available. These relate to outputs of goods and services originating in the unorganised segments of the economy. These segments consist of a large number of small workshops and own-account household enterprises whose income-streams are irregular, uncertain and fluctuating from year to year; which are too small to keep accounts; are marked by frequent entry and exit even within an accounting year; and for which annual production estimates cannot be collected because there exists no regular machinery. In order to capture their contribution to GDP, periodical benchmark sample surveys are conducted, usually spanning five-yearly or longer intervals. The estimates from the benchmark survey year are extrapolated backward and forward to other years on the basis of some indicators of physical activity in the sector, which are often indirectly estimated.

In addition to weaknesses in the production data noted above, there are weak links in the commodity-flow balance estimation of elements other than PFCE, which are however transmitted to PFCE. In particular, data on changes in private stocks are conspicuously absent or scanty. Also, estimates of inter-industrial consumption and investment are frequently based on arbitrary or often outdated rates, ratios and norms.

Having discussed the NAS, we turn now to the NSS. In the HCE, as opposed to the PFCE, the basic unit of observation is a household defined by a common-kitchen criterion. Trained investigators elicit from each sample household information about the goods and services consumed or purchased by household members during a pre-specified recall period(s), preceding the date of interview. This recall, or reference period has been set at 30 days for most of the items composing HCE. The exception is a group of certain infrequently purchased items – clothing, footwear, durables, education and (institutional) health expenditure – for which the recall period currently stands at 365 days. As obtained from the NSS, HCE is an estimate of sample-design-consistent aggregation of sample household responses. Since the household is the primary unit of observation, NSS provides estimated size distributions of per capita total household consumer expenditure for the rural and the urban population separately, both at the all-India level, and at the level of individual states. This makes possible the calculation of poverty measures at a considerable level of disaggregation, which is

not possible on the basis of the national level aggregates yielded by NAS.

Notably, however, previous experimentation with sample survey methods and practices have shown that HCE's from NSS are sensitive to the choice of recall period, the design and length of the questionnaire, [GoI-NSSO 2000, Sundaram and Tendulkar 2002)] the training, motivation and commitment of the field staff, the quality of supervision and, finally, the degree of cooperation from respondent households included in the sample.

Finally, we may note that NSS estimates of HCE, although available with a fair degree of regularity, are standalone estimates whose periodicity and dates of release have not been fixed. In contrast, estimates of NAS have to be released every year at pre-specified dates, as they are required for the monitoring of changes in the economy and economic policy formulation of the government. However, the administrative statistics that are required for the compilation of NAS are generally not available with the kind of regularity demanded by the pre-specified release dates of the NAS. As a result, NAS estimates undergo periodical revision with the availability of more information or more complete coverage. Consequently, in NAS there is an inescapable element of what Minhas and Kansal (1990) describe as 'fluidity' or lack of firmness. This 'fluidity' is periodically accentuated when a comprehensive exercise is undertaken to update the price base underlying NAS – usually every 10 years. This exercise seeks to improve the quality of NAS by introducing new methods of estimation, update rates and ratios used in the estimation of NAS, and sometimes incorporate information from newer data or data sources. The manner in which this incorporates an element of 'fluidity' in NAS is illustrated in Section III. Contrariwise, the estimates of HCE from NSS incorporate an element of 'finality', in the sense of not undergoing revisions after the survey is conducted and findings are released. Furthermore, there is no scope for correcting sampling and non-sampling errors, except in the following survey round.

III
Continued Fluidity of NAS Estimates

In an earlier paper [Sundaram and Tendulkar 2001], we had pointed out very large revisions in the 1993-94 NAS estimates of PFCE at current prices, as reported in NAS 1998 and NAS 1999 [GoI-CSO 1998, 1999]. We also find that NAS 2000 [GoI-CSO 2000] has made further revisions to their estimates of PFCE for 1993-94, at 1993-94 prices. To get an idea of the extent of differences in the NAS estimates of PFCE for one year (1993-94) at current prices, in three successive issues (1998, 1999 and 2000) of national accounts statistics, we present these estimates according to the level of detail provided in the published documents. In addition, following Minhas and Kansal (1990), we present, for each broad item-group as well as for the total PFCE, the sum of the absolute differences (ignoring signs) between the estimates for two pairs of years (NAS 1999 relative to NAS 1998 and NAS 2000 relative to NAS 1999). These are presented in columns (4) and (5) of the table.

In the aggregate, the PFCE estimate for 1993-94 in NAS 1999 was higher than that published in NAS 1998 by close to 14 per

Table: Alternative NAS Estimates of Private Final Consumption Expenditure, by Broad Items for 1993-94 at Current Prices

PFCE – Estimates
(Rs crore)

Item of Expenditure	NAS 1998	NAS 1999	NAS 2000	NAS 1999 Minus NAS 1998	NAS 2000 Minus NAS 1999
1 Food, beverage and tobacco	271,474	318,065	315,243	56,731*	13,994*
1.1 Food	246,521	298,182	290,841	51,661	8,871
1.1.1 Cereals and bread	74,482	82,264	80,267	7,782	(-)1,997
1.1.2 Pulses	11,160	11,615	11,994	455	379
1.1.3 Sugar and gur	21,389	21,815	20,162	426	(-)1,653
1.1.4 Oils and oilseeds	22,342	24,144	23,204	1,802	(-)940
1.1.5 Fruits and vegetables	30,993	62,338	62,570	31,345	232
1.1.6 Potato and other tubers	6,088	6,145	6,205	57	60
1.1.7 Milk and milk products	45,788	47,502	46,594	1,714	(-)908
1.1.8 Meat, egg and fish	22,107	22,946	21,737	839	(-)1,209
1.1.9 Coffee, tea and tobacco	4,596	5,787	5,852	1,191	65
1.1.10 Spices	6,186	7,988	8,015	1,802	27
1.1.11 Other foods	1,390	5,638	4,237	4,248	(-)1,401
1.2 Beverages, paan and intoxicants	8,144	5,929	5,951	(-)2,215	122*
1.2.1 Beverages	3,692	2,875	2,947	(-)817	72
1.2.2 Paan and other intoxicants	4,452	3,054	3,004	(-)1,398	(-)50
1.3 Tobacco and its products	10,968	8,534	12,809	(-)2,434	4,279
1.4 Hotels and restaurants	5,841	5,420	6,142	(-)421	722
2 Clothing and footwear	52,510	30,573	34,999	22,321*	4,988*
2.1 Clothing	48,359	26,230	30,937	(-)22,129	4,707
2.2 Footwear	4,151	4,343	4,062	192	(-)281
3 Gross rent, fuel and power	48,421	68,880	70,484	20,845*	2,013*
3.1 Gross rent and water charges	27,601	47,483	49,484	19,882	2,001
3.2 Fuel and power	20,820	21,397	21,385	963*	(-)12
3.2.1 Electricity	3,926	3,926	3,926	NIL	NIL
3.2.2 LPG	1,714	1,521	1,521	(-)193	NIL
3.2.3 Kerosene oil	2,906	2,906	2,906	NIL	NIL
3.2.4 Other fuel	12,274	13,044	13,032	770	(-)12
4 Furniture, furnishing appliances and services	14,849	16,940	17,610	3,411*	1058*
4.1 Furniture, furnishing and repair	909	1,458	1,312	549	(-)146
4.2 Refrigerator, cooking, washing appliances	1,689	1,530	1,559	(-)159	29
4.3 Glassware, tableware and utensils	7,825	7,324	7,679	(-)501	355
4.4 Other goods	2,687	3,209	3,689	522	480
4.5 Services	1,739	3,419	3,371	1,680	(-)48
5 Med care and health services	10,984	19,543	19,543	8,559	NIL
6 Transport and communication	60,940	64,376	65,993	3,678*	617
6.1 Personal transport equipment	2,391	2,284	2,294	(-)107	10
6.2 Operation of transport equipment	18,794	22,290	22,298	3,496	8
6.3 Purchase of transport service	354,861	35,847	36,143	(-)14	296
6.4 Communication	3,894	3,955	4,258	61	303
7 Recreation, edu and cult services	116,690	17,554	17,626	1,916*	110*
7.1 Eqpt, paper and stationery	5,208	6,349	6,330	1,141	(-)19
7.2 Recreation and cult services	1,639	1,113	1,204	(-)526	91
7.3 Education	9,843	10,092	10,092	249	NIL
8 Misc goods and services	23,059	31,308	36,519	8,249	5,537*
8.1 Personal care and effect	4,926	5,758	10,897	832	5139
8.2 Personal goods ncc	10,862	11,860	11,697	998	(-)163
8.3 Other misc services	7,271	13,690	13,925	6,419	235
Total PFCE	498,927	567,239	577,402	125,710*	28,317*

Note: The values marked with * relate to the sum of absolute differences in the appropriate sub-groups.

cent. However, this aggregate difference is a net effect of increases for some items and decreases for others. If we aggregate the absolute differences (ignoring signs) between the two estimates, the overall difference between the two estimates is closer to 25 per cent. And of the 37 items/item groups distinguished in the published documents, the absolute difference as a percentage of the NAS 1998 estimates was 5 per cent or more in 26 cases, and 20 per cent or more in 14 out of these 26 cases. In the case of 'other foods', the difference was more than 300 per cent [See also Sundaram and Tendulkar 2001].

These large changes were not justified by the mere fact that NAS 1999 was reporting the NAS estimates under the new series, using 1993-94 as the base year, while NAS 1998 was reporting the old series with a 1980-81 base. *This is because both the estimates pertain to the same year, 1993-94, and are set at 1993-94, prices – which are of course the 'current prices' for 1993-94. If price changes are ruled out, the reported changes must therefore reflect changes in the estimates of underlying quantities.*

To understand these changes, note that NAS estimates of PFCE are predominantly based on the commodity flow method, as discussed in Section II. This method requires firm data on: (i) domestic production; (ii) net exports; and (iii) changes in stocks. When the last two elements are netted out, along with intermediate uses, we obtain what is available for domestic absorption. To derive, *residually*, from the portion available for domestic absorption the net quantity available for private consumption, one has to net out capital formation, and consumption by government and business. Further, in order to use appropriate valuation, the portion consumed by households from home-grown stocks needs to be distinguished from market purchases. Therefore, the data on marketed surplus is also needed. In the case of agriculture crops, we also require information on seeds, feed and wastage. At virtually every step of this procedure there are significant gaps and weaknesses of database, which are papered over by the use of a number of rates, ratios and norms of varying vintages.

As more current data become available, NAS estimates are also modified through subsequent revisions. At the time when a new price-based NAS is introduced, a big-bang effort is made to bring as much fresh evidence as possible to bear on these estimates. Accordingly, at the time of a changeover in a series, large changes, as that between NAS 1998 and NAS 1999, are understandable. However, even with the introduction of the new series – in this case one using a 1993-94 base – the reliance on rates and ratios remains substantial [GoI-NSC 2001].

Less understandable is the need for a further set of revisions between NAS 1999 and NAS 2000. The changes in many sectors are less than 5 per cent of the corresponding estimates in NAS 1999; this is the case for 25 of the 37 item-groups. Despite this, in the remaining 12 items/item-groups the differences are large enough to take the NAS 1999 ratio of absolute difference-to-aggregate PFCE perilously close to the 5 per cent limit (4.99 per cent to be exact). These 12 item/item-groups are listed below, alongside the respective difference between their estimates in NAS 2000 and NAS 1999, as a percentage of NAS 1999.

Sugar and gur (7.58); meat, egg and fish (5.26); other foods (24.85); tobacco and products (50.09); hotels and restaurants (13.32) in the food, beverages and tobacco group; clothing (17.95); footwear (6.47); furniture, furnishing and repair (10.01); other goods in furniture furnishing appliances and services category (14.96); communications (7.66); recreations and cultural services (8.10); and personal care and effect (89.25). It is particularly worth noting the revisions of 50 per cent or more in tobacco and products, as well as personal care and effect. To observe changes of this magnitude in one year is truly astonishing.

The case of revisions in the NAS estimates of clothing is also worth highlighting. The basic explanation given for the sharp drop in the NAS 1999 estimates relative to that given in NAS 1998 was to bring these estimates in line with the underlying GDP estimates, rather than having to use the 'independent' estimates from the office of the textile commissioner [GoI-CSO 1999b:34]. So far so good. However, why then raise the new estimates by 18 per cent? Tangentially, there is an interesting sidelight to this issue: Bhalla, an otherwise ardent advocate of aligning the NAS and NSS estimates of private consumption expenditure, prefers to use the NAS 1998 estimates for clothing rather than the ones aligned with the GDP estimates!

The point of drawing attention to the continued fluidity of the NAS estimates is of course neither to argue that the concomitant revisions are necessarily unwarranted, nor to detract from the massive effort that goes into the preparation of a system of national accounts. It is merely to highlight that it is problematic to use NAS estimates as an unqualified 'touchstone' to test the validity of the NSS estimates: even with the new NAS series, the 'currentness' of the database for the NAS falls considerably short of what is required for these purposes.

It is important to stress that by 'currentness of the database' we mean that the data in question would reflect the actual flow of goods and services during the accounting year for which the estimates are presented. Accordingly, the use of the 'latest' survey reports for updating benchmark values and/or for revising some of the rates and ratios used in the NAS estimates, does render data 'current'. That a number of sample survey-based results, albeit the latest available, are nevertheless widely used in the NAS estimates – reinforces the following important point made by Minhas over a decade ago: "The national accounts data get their copious share of sampling errors, not from one but many sample surveys from which the production database of the national accounts gets built up" [Minhas 1988:14]. This continues to be the case even today.

IV
NAS-NSS Comparison: Results from a Recent Cross-Validation Exercise

As mentioned in the introduction, the NAD of the CSO and the SDRD of the NSSO carried out a detailed joint study [GoI-NAD-SDRD 2001] aimed at cross-validating private consumption expenditure available from household survey and national accounts, hereafter referred to as the NAD-SDRD study. The study presents a comparison of estimates of PFCE for 1993-94 based on NAS 2000, with estimates of household consumer expenditure based on the NSS 50th round consumer expenditure survey, carried out for the same year. This is a major and painstaking effort at rendering comparable the said estimates: close to 200 items are distinguished in the exercise. Whenever feasible, it also presents the implicit unit values from the two sources and undertakes comparisons with and without adjustment for prices. In general, the adjustment for prices narrows the gap. Wherever possible,

the study also corrects for differences at the level of data collection and compilation in the detailed classification schemes used in NAS and NSS.

In discussing these results, we first get out of the way the notional elements in the NAS estimates that unnecessarily inflate the divergence between the two estimates, as mentioned in Section II. These are imputed rent and FISIM, which are included in miscellaneous goods and services in the non-food group of PFCE. As per NAS 2001, these items contributed Rs 49,098 crore[1] to the Rs 2,19,001 crore difference between the two estimates, that is, over 22 per cent of the aggregate difference. Excluding these items, the difference between the two estimates becomes Rs 1,69,903 crore. In total, the exclusion of notional estimates reduces the divergence between NSS and NSO from 38 per cent to 30 per cent of the NAS estimate. In the following sub-sections we discuss in detail each of the items/item groups that are of concern to us in our comparison of NAS and NSS.

Food, Beverages and Tobacco Group

We first focus on the food, beverages and tobacco group. In the net, NAS estimates exceed NSS estimates for this group by Rs 91,177 crore, notwithstanding the fact that there are some items, notably non-alcoholic beverages, where the NSS estimates exceed the NAS. This number is equivalent to about 54 per cent of the aggregate difference between NAS and NSS, excluding notional elements. This is also the group which accounted for 76 and 72 per cent of the expenditure of the bottom 30 per cent of the population in rural and urban India, respectively [Sundaram and Tendulkar 2001].

Effect of adjustments for differences in unit values: In the food, beverages and tobacco group, revaluing the NAS estimates of PFCE at NSS-based unit values reduces the NAS estimate by Rs 5,835 crore. For the NSS, these values are mostly lower, with pulses and products being the major exception. Correspondingly, without any other adjustment, the excess of NAS PFCE estimate over the corresponding NSS-based estimate is also reduced by the same amount. It may be noted that this is a little over 3 per cent of the aggregate difference between the two estimates, excluding the notional elements.[2] As a percentage of the difference in the food

category, this would be equivalent to 6.4 per cent.

Assumptions about Intermediate Consumption and Private Stocks: The NAS estimates of PFCE for a number of commodities in the food, beverages and tobacco group are based on the assumption of zero use for intermediate consumption. The products/items affected by this assumption, as is indeed explicitly stated, are the following: pulses and products, milk and milk products, vanaspati, chicken and eggs. Though not stated to be the case, the same is also likely to be true for 'maida' and fish. Also, it may be asked why vanaspati would fall in this category, but not other edible oils? It should be obvious from the commodity flow balance that understatement of intermediate consumption would, ceteris paribus, lead to overstatement of PFCE.

After adjusting for NSS-based unit values wherever quantities are reported, the excess of NAS PFCE estimates over the corresponding NSS-based estimates in respect of items so affected adds up to Rs 18,466 crore. This is a little over 20 per cent of the difference between the two sources for food, beverages and tobacco, taken as a group. The breakdown by items is as follows: pulses and products Rs 764 crore; milk and milk products Rs 10,977 crore; vanaspati Rs 1,790 crore; chicken and other birds Rs 3,589 crore; eggs and products Rs 1,341 crore. To this may be added the excess of NAS estimates over NSS-based estimates with respect to maida Rs 1,705 crore, and fish Rs 3,013 crore.

A further example is provided by the case of sugar and gur, where the price-adjusted NAS estimate exceeds the NSS-based estimate by close to Rs 10,000 crore, the NAS-assumption is that 5 per cent of the production is used for intermediate consumption. Yet, as the NAD-SDRD study puts it: "....it appears that *taking 5 per cent of gur and sugar production as intermediate consumption is unrealistic* [author's emphasis]." As Minhas noted in 1988, there is also in the case of sugar and gur the additional problem of not inconsiderable *unrecorded exports* of the said items across the long and porous land border.

Of course, it cannot be anybody's argument that all of the observed differences between the NAS and NSS-based estimates with respect to the items listed above are due simply to the assumption of zero or low use for intermediate consumption

that underlies the NAS estimates. The idea is to bring out weaknesses in the underlying database. But by overstating PFCE, such assumptions are likely to have contributed substantially to the observed divergence.

Absence of data on privately held stocks: In the food group, we have the NAS estimate of PFCE on oilseeds, amounting to Rs 3,508 crore, compared with the NSS-based estimate of Rs 33 crore. (the consumption of groundnuts is shown elsewhere as part of the estimates of consumption of fruits and nuts.) In part, the difference could flow from the underlying assumption about what part of the output is marketed. But, primarily, this flows from the assumption underlying the NAS estimates that "the entire amount of oilseeds retained by the producers is consumed as oilseeds"! Besides being implausible, this assumption primarily reflects the absence of information about privately held stocks.

Recall period sensitivity of NSS: There is another important issue pertaining to comparison of NSS and NAS that is relevant with respect to NSS-based estimates of household consumer expenditure on food, beverages, 'paan', tobacco and intoxicants. This is the fact that all the comparisons are being conducted by reference to NSS estimates on a uniform recall period of 30 days, for all items of expenditure. However, experiments with an alternative 7-day recall period in the annual, 'thin sample' rounds for 1994-95, 1995-96 and 1996-97, covering food, paan, tobacco and intoxicants, revealed that estimates of per capita expenditure on these items when reported on the basis of a shorter recall were substantially higher than those obtained on the 30-day recall. Deaton (2001) has rightly cautioned about the possibility of 'telescoping' error being present in estimates on the 7-day recall. Accordingly, 'higher' is not necessarily better. Nevertheless, one must accept that a long recall period of 30 days with respect to these frequently purchased items which are not salient in respondents' memory could have resulted in depressing the reported per capita consumption such that it was lower than some 'true' value. Accordingly, a part of the difference that is observed between NAS and NSS-based estimates based on the 30-day reference period could be, and is perhaps real.

Fruits – a weak database in NAS: The aforementioned recall-period sensitivity would also affect the difference between

NAS and NSS estimates for the consumption of vegetables and fruits. However, the detailed NAD-SDRD study shows that with respect to vegetables, the NSS-based estimates are higher by Rs 4,362 crore when adjusted for differences in unit values. In fact, this is the case even without such an adjustment. Accordingly, the overall excess of NAS estimates over the NSS-based estimates for the group of vegetables and fruits, which is Rs 38,000 crore, is primarily due to divergent estimates for consumption of fruits. These differences are sizeable in the case of banana, coconut and mango among fruits where the data base for estimates of production are relatively firmer, and in the case of groundnuts.[3]

But, by far the largest contributor to the NAS-NSS difference is a catch-all category of 'other fruits'. In this respect, NAS estimates exceed NSS estimates by Rs 29,482 crore. In other words, this single item accounts for a little over 32 per cent of the difference between the NAS and NSS-based estimates for food, beverages and tobacco as a group.

As the NAD-SDRD study itself notes, "while the cereal and pulses consumption is estimated to be Rs 78,000 and Rs 12,000 crore respectively in the NAS, that for 'fruits' alone is Rs 48,000 crore. Moreover, the estimated consumption of fruits alone is found to exceed the consumption of vegetables and that of 'meat, fish and eggs', taken together." It appears that the heart of the problem lies in the underlying database for output and prices of fruit. For the NAS, as the NAD-SDRD study notes, "the National Horticulture Board (NHB) is the main source for the production and price data for the fruits not covered in area and production statistics of the directorate of economics and statistics (DES) of the ministry of agriculture. The NHB compiles data on area, production and productivity through the state horticulture board (SHB). It has, however, been noticed that there is a sizeable divergence between the figures the SHBs supply to DES and those to NHB [author's emphasis]." In the light of this, further comment on the sizeable divergence between the two estimates of consumption of fruits is superfluous.

Tobacco and Intoxicants: As regards the estimates of consumption of tobacco and products, Minhas commented over a decade ago that household surveys are poor instruments for collecting data on the consumption of products which are associated with *social stigma* or *taboo.*

Consequently, it may be readily accepted that 'true' levels of consumption of these products are significantly higher than what is reported in the NSS surveys. However, without a clear understanding of how and why the relevant NAS estimate of consumption for 1993-94 jumps by nearly 50 per cent from Rs 8,534 crore in NAS 1999 to Rs 12,809 crore in NAS 2000, the extent of the Rs 6,432 crore divergence between the two estimates remains a puzzle, and is less readily acceptable. Curiously, the agreement between the NAS and NSS estimates is in fact rather close in of the case of alcoholic beverages and intoxicants – the difference being just 5.5 per cent. This is just one clear example of an instance in which both estimates are perhaps equally bad.

Cooked meals (NSS) and hotels and restaurants (NAS): Finally a brief comment on the difference between the NSS-based estimate for purchased 'cooked meals' and NAS estimate for hotels and restaurants. This difference is of the order of Rs 2,377 crore, equivalent to a little over 2 per cent of the aggregate difference for food, beverages and tobacco. In part at least, this is attributable to the fact that the NAS estimate includes accommodation charge (about 9 per cent of the receipts as per the enterprise survey) as well as receipts from the sale of food and beverages other than cooked meals.

Food, beverages and tobacco Group – major findings: It is useful to summarise the major findings about NAS-NSS differences in the estimation of expenditures on the food, beverages and tobacco group, before we turn to the respective difference in the case of non-food items. As noted above, the former is an important group, which accounted for 54 per cent of the aggregate excess of NAS estimates over the NSS-based estimates, excluding notional elements. To recap then, the major findings are as follows:

– Over 6 per cent of the NAS-NSS difference with respect to this group can be eliminated by adjusting for differences in unit values;
– 29 per cent of the difference is due to unrealistic assumptions about there being zero or low, 5 per cent use for intermediate consumption in regard to a number of items, including maida, fish, banana and cashewnut. The value of this difference aggregates to Rs 26,473 crore;
– 7 per cent of the divergence for the group, or about Rs 6,122 crore, is due to groundnuts and other oilseeds. This is the result

of an assumption underlying the NAS estimates, namely, that the entire amount retained by producer households is taken to be consumed by them as groundnuts and oilseeds. Essentially, the problem is therefore a reflection of a lack of information on privately held stocks;
– NSS estimates are higher in respect to consumption of vegetables;
– 32 per cent of the difference for all foods – over Rs 29,000 crore – is due to the category fruits (consumption of which is larger in absolute size than the total NAS estimate for consumption of 'meat, eggs and fish'). This seems to arise largely from the weak database underlying the production figures and prices used as inputs for NAS estimates, particularly of 'other fruits';
– NAS estimate of consumption of tobacco and products are higher than NSS estimates. The *direction* of this difference can be readily accepted, but there are questions about the Rs 6,432 crore order of the difference, because of the unexplained Rs 4,275 crore jump in the NAS estimates, for the same year as between NAS 1999 and NAS 2000;
– Part of the explanation for the NAS estimate for food, paan, tobacco and intoxicants being higher may also be traced to possible understatement of consumer expenditure in the NSS consumer expenditure surveys due to recall lapse manifesting over the 30 day reference period;
– Overall, as much as 75 per cent of the divergence between NAS and NSS estimates with respect to all food, beverages and tobacco items may be traced to divergence of unit values, poor or infirm databases, or patently untenable assumptions about zero or very low use for intermediate consumption of some items in NAS. The full extent to which this is the case is contingent on the allowance to be made for 'recall lapse'- related understatement in the NSS Surveys.

Consumption Expenditure on Non-Food Items

With respect to expenditure on 'non-food' items as a group, adjustment for 'notional' element in the NAS estimates-imputed rent, banking services and insurance services – reduces the excess of NAS estimates over the NSS-based estimates, from Rs 1,28,000 crore to Rs 79,000 crore. Four item groups account for over 89 per cent of the excess of NAS estimates for the non-food items group, relative to the corresponding NSS-based estimates. These

are clothing and footwear, furniture, furnishing, appliances and services, transport equipment and operational cost, and transport services.

Two other items, medical care and health services and education, account for a further 9 per cent of the overall difference between NAS and NSS estimates of private consumption expenditure on all non-food items. In absolute numbers, the respective differences are Rs 1,322 crore and Rs 5,508 crore. In the case of medical care and health services, for which NAS estimates are directly carried over from the NSS, the excess of Rs 1,322 crore is seen to be due to an error arising from double-counting of employees' contributions to CGHS. With respect to education, almost all of the difference reflects the activities of the non-profit institutions that serve households.

As for expenses on fuel and power, NSS estimates exceed the NAS estimates for the group as a whole. This is also true of individual components, except charcoal and 'gobar' gas.

The following subsections further detail the divergence between NAS and NSS estimates for these and other aforementioned items in the non-food group.

The commodity flow method and non-food expenditure: However, before we consider the 'big ticket' items mentioned above, it is useful to recall the general method for deriving NAS estimates of private consumption of manufactured goods. As the NAD-SDRD study notes, "the commoditywise value of consumption of manufactured goods is derived from the estimate of value of production, by applying various ratios and norms respectively: (i) percentage share of consumables, (ii) gross distributive margin, (iii) percentage shares used for fixed capital formation and inter-industry consumption and government consumption." In fact, the only firm and current database used is that pertaining to government consumption.

For registered manufacturing, the Annual Survey of Industries (ASI) provides a firm database, but since detailed results from the ASI are made available only with a fair time lag, the use of ratios from an earlier ASI are inevitably resorted to. This is the case for commodity shares of consumable items in the total output – both of product and by product. However, this does not affect the comparison for 1993-94, as the ASI-based NAS estimates use detailed results from 1993-94 Annual

Survey of Industries. As regards the *unregistered manufacturing, product and by-product ratios to value-added have been worked out from the enterprise survey in unorganised manufacturing, 1993-94.*[4] The concomitant percentage shares of capital formation are based on norms worked out on the basis of the results of the All-India Debt and Investment Survey, 1981-82. What this means, in other words, is that there are a number of rates and ratios at work in the estimation of non-food expenditure, including one set of such numbers dating back to 1981-82!

Clothing and Footwear – difference due to different recall periods?: With respect to clothing and footwear, the NSS estimates based on the 365-day reference period canvassed and reported for in the 50th round survey, are significantly higher than estimates based on the 30-day recall period, which are the ones used in this cross validation exercise. The difference is close to Rs 8,000 crore with respect to clothing and about Rs 650 crore for footwear. Coincidentally, the difference between NSS (30-day) estimates of Rs 18,203 crore and the NAS 1999 estimate of PFCE on clothing, amounting to Rs 26,230 crore, is also about Rs 8,000 crore. The extra difference of about Rs 4,700 crore comes about precisely because of the unexplained jump in the NAS estimates between NAS 1999 and NAS 2000, with the latter serving as the comparator estimate.

Furniture Group – no plausible explanation for divergence: The broad item group, furniture, furnishing, appliance and services, accounts for close to 15 per cent of the difference between NAS and NSS estimates for 'all non-food', after netting out 'notional' elements. Of this, more than half is accounted for by the sub-group 'glassware, tableware and utensils'. More than half the difference with respect to this category is in turn attributable to the item 'other metal/household utensils'. Unfortunately, there is really no satisfactory explanation for this large difference between NAS and NSS estimates with respect to these goods.

Durables – divergence, but not as much as claimed by critics: The really significant part of the story of NAS-NSS differences with respect to durables is what does *not* contribute to this difference. With respect to the sub-group 'freeze, cooking, washing appliances', NSS estimates are about 20 per cent lower than the NAS estimates. Even with respect to 'refrigera-

tors and air conditioners' the difference, though higher, is well below 40 per cent. With respect to purchase of 'mobike, scooter and cycle', also found under the 'transport equipment and operational costs' category, the NSS estimate is lower than the NAS estimate by just about 8 per cent. With respect to wooden and steel furniture, the difference between the two estimates is also a shade below 11 per cent. In light of this, claims of vast underestimation of private consumption of durables in the NSS consumer expenditure survey, putatively by a factor of four or five, appear to be vastly exaggerated. It needs to be noted that many of these durables of are, in NAS parlance, partly capital goods. So that simple comparisons of NAS figures for their production and sale, with NSS estimates of household consumption, would appear to miss their dual-use nature.

NPISH and operational cost of transport equipment: The divergence between NAS and NSS estimates for transport equipment and operational cost accounts for 22 per cent of the difference for 'all non-food' items. The single largest source of divergence is found in figures for the consumption of petrol and diesel, amounting to over Rs 12,000 crore. Related repairs and repair services add a further Rs 4,500 crore. Part of this is due to a measure of duplication in the calculation of repair costs in the NAS estimates. Otherwise, however, this sizeable difference between the two estimates would appear to turn on the manner in which the respective estimates allocate vehicles on the road, as belonging to the households and non-profit institutions serving the households, and on the use of "the allowance prescribed for computing rebate on income tax with respect to repairs and maintenance of different vehicles," as the basis for computing the per-vehicle operating cost. Both these issues would bear further scrutiny.

Transport Services – dubious ratios at work: The final item group for consideration is transport services, for which ratios play a large role in NAS estimates. In the respective NSS survey, underestimation of household expenditure with respect to air fare and rail fare may be conceded. As for the other modes of mechanised road transport covered in the NAS, gross passenger earnings are estimated as the product of an estimated average 'earnings per vehicle' and estimates of total number of vehicles, which are available from the ministry of surface transport (MoST). As

the study itself recognises, the key issues as regards this estimation are: (i) whether the MoST estimates represent the actual number of vehicles in operation; (ii) the validity of estimates of per vehicle earnings used at present; and, (iii) the validity of the assumed ratios of private consumption of these services used for deriving NAS estimates of PFCE for these items. The latter ratio is given as 50 per cent for taxis and 90 per cent for autorikshaws and buses.

In the case of railways and air transport, gross passenger earnings estimates are annually available but arbitrarily fixed ratios of 80 per cent for railways and 5 per cent for air travel for these earnings are assumed in calculating PFCE for every year.

Non-Food Expenditure – overall conclusion: In the overall non-food category, a fair measure of underestimation in the NSS-estimates must be conceded, pertaining to consumption of clothing, footwear, durables and some items of personal goods, jewellery, for example. However, the validity of some of the key rates and ratios underlying the NAS estimates remains an open question, including in the case of transport services, the proportion of vehicles in actual operation, average earnings per vehicle, and the assumed ratios of private consumption, as discussed above. There are also other sources of divergence, including duplication in repair services and medical services; the allocation of expenses incurred by non-profit institutions serving households, in the case of education; operational costs of transport equipment; and possible overvaluation with respect to domestic services.

So how do we conclude? The key point to note in considering collectively the estimates of consumption of non-food items, is that items affected by-as-yet unresolved doubts about NAS estimates contribute the lion's share of the total difference between NAS and NSS estimates. Notably, this mirrors also our conclusion in Section IV, regarding the causes of differences between NAS and NSS estimates for the consumption of food items.

V
Concluding Observations

This paper has re-examined the underlying issues that should be considered in the comparison of NAS estimates of PFCE and NSS estimates of HCE, in the light of suggestions to revive the officially discarded practice of adjusting NSS estimates by NAS estimates, using uniform scalar correction.

After outlining differences in coverage, estimation procedures and databases of PFCE and HCE in Section II, we illustrated the inherent and hence continued 'fluidity' of NAS-based estimates in Section III. We then discussed the results of the important cross-validation of NAS and NSS estimates undertaken jointly by the NAD of the CSO and the SDRD of the National Sample Survey Organisation (NSSO). We presented its results in considerable detail in order bring out the weaknesses of both NAS and NSS. Accordingly, we did not deny the presence of underestimation of HCE in NSS.

However, the basic question at hand is whether a residually estimated PFCE from NAS provides an independent and more reliable yardstick for correcting directly observed NSS-based HCE estimates for the purposes of poverty estimation. Our unambiguous conclusion is that this is not the case. We base this assessment on an empirical examination presented in Sections III and IV, highlighting the inherent and inescapable 'fluidity' of NAS estimates, weaknesses in their underlying database, and the fragility of the host of rates, ratios and norms used in the commodity-flow balance that underpins the residually estimated PFCE. Accordingly, the suggested pro-rata adjustment of NSS on the basis of NAS was found to be based on patently implausible assumptions, and to be empirically unacceptable – as we have shown earlier [Sundaram and Tendulkar 2001:124]. In addition, our discussion in the present paper found little basis for using the NAS-NSS differences at the level of distinct commodity groups to adjust the NSS estimates.

Accordingly, the basic argument for relying on NSS as the best available source for calculating poverty measures, as provided by the expert group [GoI 1993:12-13] still holds true. It rests on two important considerations. First, NSS provides a valid estimate based on direct observations relating to the survey period. Second, unlike NAS, NSS avoids recourse to adjustments based on arbitrary assumptions. This is not to deny that there is scope for continuously refining and improving NSS survey design and procedures. However, as long as reasonable comparability of NSS estimates is ensured over time, NSS will enable the monitoring of *changes* in poverty over time, even though level comparability in a continuous fashion over time may be subject to difficulties [Sundaram and Tendulkar 2002)]. In addition to our findings, both Ravallion (2000) as well as Deaton and Dreze (2002) independently confirm the appropriateness of continuing to use NSS as the sole source for poverty measurement.

As mentioned in the introduction, critics have also questioned the NSS on account of its comparability over time. They maintain that the extent of underestimation of HCE based on NSS has been increasing in the 1990s. We have not examined this issue in the present paper because a critical assessment is already available in Sen (2000, Section III). Using a detailed examination of NSS and NAS estimates of aggregate private consumption at current prices, covering the 13 NSS rounds from 1972-73 to 1997, he shows that loud claims of increasing divergence between NAS and NSS are based on incorrect comparisons.

He shows that, contrary to what is claimed by critics of the NSS, the NAS-NSS discrepancy – if based on correct comparisons – was in fact wider in the 1970s and 1980s than in the 1990s; that the NAS to NSS ratios in the 1990s varied within a narrow band of 0.68 to 0.72; and that the critics failed to take note of a break in the NAS series occurring due to the transition from the earlier 1980-81 price base to a new 1993-94 price base, and accordingly based their conclusions on incorrect comparisons. Consequently, there is no substance whatever to the hypothesis of a *growing* underestimation of HCE based on NSS.

Nearly a decade-and-a-half ago, Minhas (1988) warned against 'mindless tinkering' with the NSS size distribution of consumer expenditure, which he saw manifested in the pro-rata adjustment that the Planning Commission used to make in deriving official headcount ratios. His detailed validation exercise did not find the pro-rata adjustment 'permissible either in theory or in the light of known facts' (37). Our earlier work, as well as this paper, also fails to find valid grounds for making NAS-based adjustments at a more detailed commodity group-level. Nevertheless, 'mindless tinkering' is reportedly being taken to a new and bizarre level, by a practice of adjusting, at the level of individual surveyed households,

reported consumption of individual items, by a number of item-specific scalars that are derived from NAS that remain invariant across households. If true, this represents a conscious attempt to alter the observed size distribution of NSS without any objective basis whatsoever. The patent absurdity of this is too obvious to warrant any serious comment. [EPW]

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Notes

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1 Note that 100 crore equals 1 billion.
2 It is possible that the effect of the adjustment for the differences in unit values is somewhat greater than what is indicated in this text. The detailed tables in the NAD-SDRD study place the value of consumption of tapioca and its products at Rs 1,024 crore, as against the NSS-based estimate of Rs 290 crore – a difference of Rs 734 crore. It is possible that, as in the case of coarse cereals, the NAS unit values are higher (by about 16 per cent). If so, the difference would come down by a further Rs 163 crore.
3 With respect to banana as also cashewnut, the NAS estimates assume 'that none of the two fruits are used in other industries as intermediate consumption'. And in the case of mango, only 30 per cent of the market supplies are assumed to be used for intermediate consumption.
4 Note that the annual estimates of gross value added (GVA) in unorganised manufacturing are themselves obtained by moving forward benchmark estimates for a base year by reference to some physical indicators (often based on ASI) and current-price estimates obtained by adjusting for price-inflation.

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