Constructing a Consumption Aggregate for the Purpose of Welfare Analysis:
Issues and Recommendations Concerning the POF 2002/3 in Brazil

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Introduction

The analysis of poverty and inequality has become a well-established field of research in Brazil and also serves as an important input into policy-making. While the very meaning of poverty and inequality remains the subject of debate, and differences of opinion persist in how to best study such themes, it is probably not far wrong to state that the basic steps in the empirical analysis of household welfare are becoming standard.

While the ultimate shape and scope of the analysis can vary dramatically, a nearly universal requirement for any empirical study of wellbeing is that individuals (or households) must be ranked on the basis of one or more indicators of living standards - usually income or consumption expenditures (but sometimes other indicators such as nutritional status, access to basic services, or even a composite measure). The choice and definition of an appropriate indicator might seem a fairly straightforward task. However, a person embarking on such an exercise is quickly confronted by a whole range of issues, many of which will require some kind of decision-making and on which guidance, in the form of best-practice conventions or theoretically derived results, is still rather scarce. As the basic welfare indicator serves as the foundation upon which most of the subsequent, detailed, analysis of welfare is based, it is important to select an indicator that can command broad endorsement and that will hopefully not require substantive revision.

In this note we are concerned with deriving a welfare indicator for households that captures the economic dimensions of wellbeing. We focus specifically on consumption data. There are both conceptual and pragmatic reasons why consumption expenditures available from household surveys might be preferred for the purpose of poverty and inequality analysis to an indicator such as household income. It is argued, for example, that consumption expenditures reflect not only what a household is able to command based on its current income, but also
whether that household can access credit markets or household savings at times when current incomes are low or even negative (due perhaps to seasonal variation or a harvest failure). In this way, consumption is thought to provide a better picture of a household’s longer run standard of living than a measure of current income. Further, calculating consumption expenditures is often easier than calculating household incomes, particularly for the poor. While poor households are probably purchasing and consuming only a relatively narrow range of goods and services, their total income may derive from multiple different activities with strong seasonal variation and with associated costs that are not always easily assigned. Getting an accurate net income figure for such households can be frustratingly difficult. Where consumption information is collected, an additional advantage is that not only are consumption expenditures available, but a poverty line can often be derived from the same survey, thereby strengthening the link between the welfare indicator used in the analysis and the threshold determined to separate the poor from the nonpoor.

The objective of this note is to examine the detailed information on household consumption expenditures that has been collected in the most recent *Pesquisa de Orçamentos Familiares* (POF) of 2002/3 fielded by the Instituto Brasileiro de Geografia e Estatística (IBGE), and to consider how best to construct a consumption aggregate from these data for the purpose of analyzing poverty and inequality. The note first considers the available building blocks for producing a consumption aggregate in the POF, and reviews some of the principles and issues that can guide decisions as to whether, and how, specific items should be included in the aggregate. Subsequently, some concerns are raised with respect not so much to the underlying sub-components of the POF consumption aggregate, but rather to the observed presence of extreme values in the data set. Such outliers can have a very strong impact on poverty and inequality measures and to the extent that one might have doubts that the outliers are actually conveying accurate information, there are arguments in favor of trimming these extreme observations from the data. The note explores some of these issues and proposes a moderate degree of trimming of the data prior to subsequent analysis.

**Constructing the Benchmark Consumption Aggregate**

Brazil’s POF is a nationally representative expenditure survey that was fielded by IBGE in 2002/3. The principal objective of the POF is to provide the detailed information on household expenditures required to produce cost of living indices such as the Consumer Price
Index. In previous waves of the POF (1987/8 and 1995/6) the survey was fielded only in 9 metropolitan areas (plus Goiânia and Distrito Federal). However, in 2002/3, IBGE extended the sample to the country as a whole (and is representative at the state level for urban and all-state totals – for rural areas the sample is designed be representative at the region level only). This latter feature makes the POF extremely interesting for the purpose of welfare analysis, because it marks the first time in several decades that a nationally representative survey yielding consumption information is available in Brazil.1 The overall sample size of the POF 2002/3 is just under 50,000 households.

The process of creating a consumption aggregate is guided by a number of considerations. In this note we provide an overview of some of the issues that arise and the principles that can be applied.2 First of all, as our measure is supposed to proxy welfare, there is an interest in having as comprehensive a measure of consumption as possible. This is because a consumption measure that is narrowly defined would imply, for the purpose of comparing relative welfare levels, that the omitted components do not contribute in any way to welfare. Or alternatively, that while certain consumption components are omitted and are important to welfare, they would be distributed across members of the population in such a way that they would not affect rankings were they to be included. The extent to which these implicit assumptions seem reasonable varies with the specific components of consumption in question, but as a general rule one would want to include as many components of consumption as is feasible.

However, it is often not possible to include all components of consumption in an equally straightforward manner. For several components it becomes necessary to introduce additional assumptions in order to be able to add these to the consumption aggregate. This can quickly add to the complexity of the exercise and can threaten the transparency of the process.

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1 Recent analysis of wellbeing in Brazil has tended to employ income data from the Pesquisa Nacional por Amostrro de Domicílios (PNAD). Ferreira, Lanjouw and Neri (2003) suggest that the PNAD might not be suitable for at least some aspects of welfare analysis in Brazil. This appears to be especially the case for analyzing rural welfare (see also Elbers, Lanjouw, Lanjouw and Leite, 2001). One other survey fielded by IBGE in recent years has included consumption information – the Pesquisa Sobre Padores de Vida (PPV) of 1996. However, this survey had a relatively abbreviated consumption questionnaire, was fairly small in sample size (about 5,000 households) and covered only the Northeast and Southeast of the country (see Ferreira, Lanjouw and Neri, 2003, for further discussion).

2 Our treatment is informal and not exhaustive. An excellent reference document on this whole topic has recently been produced by Angus Deaton of Princeton University and Salman Zaidi (Deaton and Zaidi, 2002).
Some additional complexity need not in and of itself justify abandoning the exercise, except insofar as the credibility of the entire undertaking is thrown into doubt. The value of the entire enterprise of welfare analysis rests crucially on the degree to which the conclusions are widely accepted. As subsequent strategies aimed at income redistribution or poverty alleviation all rest on the credibility of the underlying consumption aggregate, it is vitally important not to sacrifice credibility in the process of adding some particularly tricky consumption component to the consumption aggregate.

In deriving the "preferred" consumption measure from the POF data, the multiple objectives of comprehensiveness, transparency and credibility must be retained as central focus. It is useful to approach the exercise in a series of steps. First, the food component of total consumption can be aggregated. This involves going through the consumption module, food item by food item, in order to arrive at a food expenditure total. The next step is to add a range of relatively straightforward non-food expenditures itemized alongside food consumption in the consumption module of the questionnaire. Third, a group of slightly less straightforward non-food items are added - less straightforward in that they are typically scattered throughout the entire survey questionnaire, and can be easily overlooked. These three steps of the sequence can be thought of as yielding a minimum, basic, consumption aggregate. Anything less, and the consumption aggregate would not satisfy the comprehensiveness or the credibility criteria.

One can then explore options aimed at strengthening the consumption measure. These steps should be approached in a more tentative manner, as one would not want to force the components into the consumption aggregate at the cost of unacceptably speculative assumptions or convoluted argumentation. First, options for including housing expenditures can be considered and where this is judged feasible, such expenditures can be added to the consumption aggregate. Second, the treatment of “lumpy” expenditures and of stocks of consumer durables can be considered. Where possible a flow of consumption from consumer durables can be added to the consumption aggregate, imputed from the available information on ownership, age and replacement value of consumer durables.

One key issue that must be borne in mind throughout the process is that care must be taken to not include expenditures for inputs into production, or investments, as consumption. If one includes expenditures on inputs into household production, and the income from household production is in turn devoted (at least in part) to consumption expenditure, then double counting
occurs, and the consumption aggregate is overstating the actual welfare levels achieved by the household. In most circumstances, the distinction between productive inputs and consumption is rather obvious. For example, it is clear that fertilizer expenditures should not be reflected in the consumption aggregate for farming households. In certain cases the distinction is much harder to establish. For example, how should one treat education? Education expenditures can surely be regarded as investment expenditures in that they contribute to an individual’s ability to achieve higher consumption levels in the future. But one might also view schooling as a bundle of services of which at least part can be regarded as contributing to wellbeing directly (e.g. the socializing associated with school attendance). In any event, inclusion of education expenditures in the consumption aggregate is unlikely to lead to double counting as the returns from this particular investment will probably not be reflected in current consumption levels. Current practice typically treats education as a consumption item, but it is obviously a matter of judgement.

Food Expenditures

The food consumption module in the POF is based on a diary left with each household for a period of seven days. Households are requested to provide a detailed description for each day of the week, of all items of food that are purchased or otherwise acquired. The questionnaire requires the household’s key informant to note each specific food item acquired, the quantity obtained (including specifying the unit of measurement in which the quantity is recorded), the value of the acquisition, the location of acquisition, and the form of acquisition (e.g. purchased, received as gift, produced by the household itself, etc.). In this way very detailed information is collected from each household about its food acquisition during a period of seven days.

The key piece of information here is the value of the acquired food item. Aggregating across all items, over the whole week, yields a measure of household weekly food acquisition. Multiplying this by the number of weeks in a month or in a year yields a measure of monthly or annual food “expenditures”. While it may not be strictly the case that all food acquired in a given week is consumed that week, the general assumption is that at the monthly or annual level, total food expenditures indicate the value of total food consumed by the household. This then provides us with the first, basic, component of the overall household consumption aggregate.
The POF data on food consumption are well organized and clearly laid out, and they can be compiled in the way described above without major difficulty. One issue that does arise, however, is that the reference period underpinning the food consumption data pertains to a period of one week only. Is this reference period appropriate? It is not easy to fully answer this question, but there is some evidence to suggest there may be a problem in the POF data. Figure 1 relates household level food shares in the state of Ceara to total consumption expenditures (based on the total expenditure figure that has been produced by IBGE to accompany the POF data). A non-parametric regression curve traces out the Engel-Curve summarizing the relationship, on average, between total household spending and the share of spending devoted to food. Contrary to “Engel’s Law” which states that the food share declines with total spending, there is clear evidence here that the Engel curve in Ceara first rises before it starts to decline. Why is this happening? Consider a simple example. Suppose that households in Brazil actually purchase food on a fortnightly basis (with households uniformly spread across weeks) but that the recording period in the POF is one week. Let F = average weekly food expenditure and Y = average weekly total expenditure. Suppose further that non-food expenditure = (Y-F) is correctly measured due to a longer recording period. If n households are sampled from a group with identical \{F,Y\}, n/2 will have food purchases of f=2F, with y = Y+F, and n/2 will have f=0, with y=Y-F. The mean food expenditure is correctly estimated as (1/2)*2F + (1/2)*0 = F. However, the distribution of consumption and income, and hence the Engel curve, are incorrectly estimated. The true food share is F/Y while the empirical food shares are zero, with probability one half, and 2F/(Y+F) with probability one half. The foodshare is increasing in y.

Figure 1: Share of Food Expenditure vs. Total expenditure: Ceara

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3 This relationship is observed not only in Ceara. A similar graph produced at the all Brazil level reveals a similar pattern. Thomas (1986) documents this phenomenon in many different datasets. It should be noted, however, that the range over which the Engel Curve is rising in these data is higher than one normally sees.
From Figure 1 it appears that one of the reasons why the Engel curve first rises is due to the presence of a number of very low food shares amongst households with low total expenditures. It is difficult to imagine that those observations provide an accurate depiction of consumption patterns – that the very poor should be devoting the bulk of their budget to non-food items. Our conjecture here is that for those households food expenditures may simply have been inaccurately collected due to an inappropriate reference period in the consumption questionnaire.

It is not clear what should be done about this. The presence of noise in the food consumption measure need not affect our calculation of average food consumption in the state as a whole. However, given that welfare analysis focusing on poverty or inequality is particularly interested in the tails of the consumption distribution the discussion here suggests that at least some of those who would be counted as the poor might be measured with error. To the extent that this problem occurs only with respect to food consumption, one might hope that for those

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4 Anecdotal evidence suggests that indeed, in Brazil, it is not uncommon for households to purchase many of their food items in bulk. Such behaviour is understandable in a setting where historically, high rates of inflation provided households with a real incentive to immediately convert their monthly salary into purchases of real goods and services.
households with significant non-food expenditures, their overall ranking in the welfare distribution may not be affected too badly by this problem. As a result this issue may be of less concern when trying to identify the rich (in an analysis of inequality, for example). However, amongst those with low incomes, for whom food expenditures are typically particularly important, the presence of noise in the food consumption data is likely to lead to an over-estimate of overall poverty and to make less sharp the distinction between the “poor” and the “non-poor” in terms of household and individual characteristics.\(^5\)

In terms of general recommendations, it is difficult to make a specific proposal to “correct” for this type of mismeasurement. We don’t know for which households the reference period is appropriate and for which it isn’t, and so we cannot propose an “adjustment” to those households where the reference period is problematic. A better way to proceed, perhaps, is to return to this question below in our discussion of trimming of the overall consumption data.

**Non-Food Expenditures**

In the consumption module of the POF information on non-food expenditures is divided into two broad classes: expenditures at the individual level; and household level expenditures. The information is compiled across two separate questionnaires (POF2 – household - and POF 4 – individual - respectively) and these in turn are differentiated on the basis of the recall period during which these expenditures are to have taken place. The recall periods refer to: previous 7 days (POF 4), previous 30 days (POF 4); the preceding 90 days (POF 2 and 4); and the past 12 months (POF 2 and 4).

**7-day recall**

The shortest recall period applies to expenditures on public transport, public telephone calls, newspaper purchases, and also includes food purchased and consumed outside the home. While the contents of this latter item are itemized to a certain degree, there is no information on quantities consumed. It is therefore impossible to add the nutritional contribution of this outside-purchased food consumption component to total household food consumption (making it difficult to incorporate this consumption in the poverty line calculations).

\(^5\) Ravallion (1988) and Deaton and Zaidi (2002) discuss issues surrounding poverty measurement in the presence of noisy data in greater detail. See also Lanjouw and Lanjouw (2001).
30-day recall

A 30 day recall period is applied to a range of non-food consumption goods, such as soap, and basic services, such as going to the cinema. These can be straightforwardly added to the consumption aggregate. In addition, this recall period covers expenditures on a number of pharmaceutical products. It is not entirely obvious how these items are to treated. As has been argued by Deaton and Zaidi (2002) the problem with health expenditures is that we are unable to measure the loss of welfare associated with being sick, and the degree to which expenditures on medicines alleviate this loss. It is clearly incorrect to include expenditures on health without explicitly recognizing the loss of welfare (good health) these are intended to ameliorate. Problems can also arise when some households obtain their medicines at subsidized costs (due perhaps to insurance) while others pay the full market price. In an examination of health expenditure elasticities in a set of developing countries, Deaton and Zaidi find that these are generally quite low and argue that this provides a further reason not to include health expenditures in the consumption aggregate. The general recommendation with respect to health expenditures is thus that these are probably best excluded from the POF-based consumption aggregate. Returning to the specific set of items included in the section on pharmaceutical expenditures in the 30-day recall sub-section of POF 4, however, it does seem clear that certain items are perhaps better seen as discretionary and welfare enhancing (for example, perfume, suntan lotion, contraceptives, etc). Extracting these items from the list of medical expenditures and adding these to the consumption aggregate would seem appropriate.

90-day recall

The 90 day reference period applies to both household (POF 2) and individual (POF 4) level questionnaires. At the household level, this reference period refers to expenditures on public services such as utilities (07), purchases of fuel (07A), the purchase of building and gardening materials (08), and maintenance of appliances (09). Deaton and Zaidi (2002) generally recommend against the incorporation of expenditures on publicly provided services in the consumption aggregate. This is because finding the proper set of prices with which to value these goods is difficult. Including expenditures on networked water and sanitation, for example, while not being able to properly take account of the fact that some households are not connected to a water network at all, that some households do not receive bills although they are connected, and that some households receive only sporadic supply of water and supplement their publicly provided water with purchases from private vendors, could introduce important biases in rankings of households. Whether to include such expenditures with the POF data, should thus
depend to whether these are publically provided and whether there are reasons to be concerned about rationing of access.\textsuperscript{6} If there is any reason to think that expenditures on networked water, electricity and gas is only weakly linked to the welfare that is associated with the actual consumption of those services the general recommendation would be to exclude these expenditures from the consumption aggregate. Other services, such as internet access, telephone expenditures and television subscriptions, are more straightforwardly added to the consumption aggregate.

Whether to include expenditures on fuel (Section 07A in POF2) is a question that is to some extent linked to how publicly provided versions of such services were treated. If expenditures on networked electricity, gas and water are not included in the aggregate, it would not make sense to incorporate expenditures on such goods from other sources either. Again, the worry would be that inclusion of such items would compromise comparability of welfare across households.

Treatment of purchases of building equipment such as cement and house-paint and of laborers’ building and housing repair services (POF 2, Section 08) can also be viewed from various perspectives. On the one hand, these expenditures are likely to be irregular and infrequent – not unlike durables expenditures. For example, a household may have incurred no house painting expenditures in the past 90 days, but be enjoying the fruits of such expenditures incurred in some relatively recent period preceding the 90 day recall interval. Such a household would be recorded as incurring no such expenditures but would in fact be enjoying consumption associated with a recently painted house. Including such expenditures thus inserts a wedge between those who incurred these expenses and those who are consuming the associated services but who incurred the expenses in some preceding period. A further argument against inclusion concerns the possibility that housing repairs and improvements may be seen, at least in part, as investments that will be reflected in higher rental values or higher home-enterprise income. In this case, inclusion of such expenditures might be seen as double counting.

On the other hand, however, many of these “lumpy-ish” expenditures are not likely to be very large. And while the arguments about their lumpiness are correct, such arguments also apply to expenditures on clothes and other infrequent items. From this perspective inclusion of

\textsuperscript{6} Hentschel and Lanjouw (1996) also discuss these issues in some detail.
such expenditures might not seem so problematic. And some expenditures in this list – such as expenditures on gardening materials – really do appear to have a recurring quality and are likely to be directly welfare enhancing. All in all, it seems that these expenditures can probably be included in the aggregate without too much concern.

The decision as to whether to include expenditures on maintenance and repair of consumer durables such as freezers, televisions, etc. (POF2 Sec 09), is directly linked to the decision as to whether purchases of such goods are included in the consumption aggregate. We will return to this issue below, but if the POF consumption module does not allow for inclusion of a stream of consumption services from possession of certain consumer durables then expenditures on repair, maintenance and installation of such durables cannot be incorporated into the consumption aggregate either. In this case expenditures in Section 09 should not be included in the aggregate.

90-day expenditures (by individuals) in POF 4 refer, in Section 31, to a range of services (haircuts, sauna, shoe repair, etc.) which can be readily included in the consumption aggregate. Section 32 refers to the purchase of stationary and related items. Although it is likely that these will represent in part “regrettable necessities” – i.e. expenditures on goods and services that yield no direct welfare in their own right but that have to be purchased, for example, in order to earn income – they will also in part directly enhance welfare (see Deaton and Zaidi, 2002, for further discussion). On balance it seems sensible to include these expenditures in the consumption aggregate. Section 33 refers to expenditures on recreational activities and items such as roller skates, fishing rods, sporting equipment. Some of these items will be non-recurrent (like clothing) but will generally be minor in overall value and are thus, on balance, candidates for inclusion in the aggregate.

Sections 34-38 refer to expenditures on clothing, shoes and apparel, and should be included in the aggregate, notwithstanding that they also have an element of lumpiness attached to them. Sections 39 – 40 refer to expenditures kitchen and bathware, and to small items such as watch batteries. Given that these expenditures, while occasional, are also likely to be rather modest, it does not seem unreasonable to include them in the aggregate. Transport services in Section 41, are singled out as an example of “regrettable necessities” by Deaton and Zaidi (2002) who argue in favor of including them in the consumption aggregate, even though it is clear that they will be in part expenditures incurred in order to get to one’s place of work, etc.
Health expenditures, listed in Section 42, should not be incorporated into the consumption aggregate – for the reasons stated in the previous sub-section referring to 30-day expenditures on medicines. If there is a clear case that can be made for certain sub-items to be seen as directly welfare enhancing (plastic surgery, perhaps) then one could justify inclusion of such sub-items. Expenditures in Section 43 should also be dropped as they refer to various expenditures on automobile accessories and maintenance. As automobile purchases will not be included in the aggregate (see below) it does not make sense to include these expenditures in the aggregate. Finally, expenditures on various taxes and financial services in section 44 should not be included. As discussed by Deaton and Zaidi (2002) these refer to a household’s capital account, or should be deducted from income, and as such should not be seen as consumption expenditures.

12-month recall

Both the household-level module (POF 2) and the individual-level module (POF 4) include expenditures over a 12 month interval. In the household level module these start with expenditures on housing (Section 10). For those households that are renting their home a good measure of the consumption stream of services that derive from housing is provided by the rent payments made by the household. In the case where a household owns its house, no rent is paid, but it is clearly consuming housing services. In the POF questionnaire a specific question is posed to such households and asks respondents to estimate what rent they would pay in the hypothetical case that they were renting their home. As respondents are likely to be well informed about the value of their home and the kind of rent they would have to pay for a home with similar quality and locational attributes, this estimated response is generally found to be quite satisfactory. It there are doubts as to the reliability of the information provided by this hypothetical question, there exist methods for imputing the rental value of an owner-occupied home based on a model of observed rent on housing characteristics (see Deaton and Zaidi, 2002, and Hentschel and Lanjouw, 1996).

Section 11 in the POF2 questionnaire repeats many of the questions posed in section 8 concerning expenditures on building materials such as cement, gardening materials, etc. A choice has to be made as to which of these two sections will be used for the consumption aggregate, as using both is likely to result in double counting. Given that these are relatively infrequent it is probably best to include the items listed in Section 11 rather than those in Section
Section 12 refers to a number of tax payments and these should not be included in the consumption aggregate if it is not obvious that they are related to consumption services being provided. If, on the other hand, the taxes are better seen as commodity taxes (resembling, for example, sales taxes on food and clothing items) than these can be included in the aggregate. In any event, where taxes are itemized and related to the ownership of consumer durables that are not included in the consumption aggregate, then these taxes, even if they resemble commodity taxes, should not be included in the consumption aggregate either.

Section 13 refers to rental payments for certain items such as televisions and computers. To the extent that consumption of the services provided by these items will not be included for households that own such goods (see below), it does not seem reasonable to include rental payments as consumption either.

In Section 14 household provide information about ownership (as opposed to purchase) of a list of consumer durables. In principle this section of a consumption module can be used to infer the consumption of a stream of services from such durables. However, the POF questionnaire is somewhat unusual, relative to questionnaires in a number of other countries, in that it does not collect sufficient information from respondents to allow the analyst to straightforwardly calculate a stream of consumption services associated with the ownership of these items. The basic issue is as follows. Consumer durable purchases are typically large expenditures that occur very infrequently. A classic example is the purchase of a car or motorcycle. A particular household is likely to purchase a car only once every number of years. With a 12 month recall period, there will be a certain subset of households in the data who do indeed report purchasing a car. They will report spending a considerable sum of money for this item. Other households in the dataset will, in fact, own a car but will have purchased it in some preceding period, and will thus report zero expenditures on a car. Attributing a consumption value of zero to households that own but did not purchase a car in the specific recall period, will understate their welfare because they will in fact be consuming the services of a car. Attributing the purchase value of the car to those households in the data that happened to purchase a car during the reference period will overstate their welfare because they will not be consuming all of the services provided by a car in this one-year reference period. The car’s services will be consumed over a period of several years. The attributes of a consumer durable imply that it is
unappealing to simply add expenditures over the reference period directly to the consumption aggregate.

In an effort to get a better fix on the value of consumption services provided by these lumpy goods, analysts typically look for information detailing whether or not a household owns a particular item, when the item was acquired, its value at the time of purchase, and an assessment by the household of the current value of the good. The availability of information on such questions allows one to calculate a flow of services from the ownership of durables, and this flow can then be added to the consumption aggregate (Deaton and Zaidi, 2002, provide a good discussion of the available methods – and illustrate how these considerations are linked also to the issue of measurement error).

In POF2 information on durables is divided between a set of questions on stocks (Section 14) and then a set of questions on purchases during the past year (Section 15-18). The durable stocks questionnaire includes no information on value (either original purchase value or current replacement value). Only information on age of the item is provided. The Sections covering expenditures collect data on total expenditure and whether the item was purchased new or used. But no data is provided on the age of the item if it was purchased second-hand. These modules thus provide useful information of the current value of a new item only, while the Section 14 provides information on the age of items that are already owned. What is missing is any way of working out what the current value would be of a used item. As a result it is not clear how one could produce a reliable estimate of the flow of services that stem from ownership of these durables, absent making a number of arbitrary assumptions.

The choice then falls to one between including just information on actual expenditures on consumer durables, or dropping durable goods consumption from the aggregate altogether. The latter option would seem rather extreme. A middle-ground might be found by recommending that the list of durables expenditures (section 15-18 in POF2 and ) be scrutinized item by item. Items to exclude would comprise those that: a) are very infrequent (e.g. car, television, computer); and b) are very costly when they do occur. As mentioned above, the problem with including the purchase of a car in the consumption aggregate is that many households will record 0 expenditure on a car in the reference year, because a given household might purchase a car only every 5-10 years or so. Those that do report purchasing a car will record a very high expenditure – but again, this expenditure should ideally be smoothed in some way over the
lifetime of the item, a period that extends well beyond the one-year reference period. Including expenditures on this item risks driving a large wedge in recorded consumption between those who purchased a car and those who own a car but purchased it in a preceding period. This wedge would be inappropriate from the perspective of comparing welfare across such households because in both cases the services of a car are being consumed. On the other hand, including expenditures on items that are infrequent but not very large in absolute terms (e.g. juice presser, coffee grinder, etc.) may be less controversial as the wedge driven between those with recorded expenditures and those without will not be so large. It is also likely to be the case that for a long list of such infrequent, but not terribly expensive, items there will be some canceling out across households of expenditures on different items. For example, suppose a juice presser and a coffee grinder each have a lifetime of 2 years and that they cost roughly the same. Suppose that in the data we observe one household recording zero spending on a juice presser, but it does record the purchase of a coffee grinder. In another household we observe the opposite. Including both juice pressers and coffee grinders in the consumption aggregate may yield a combined durables consumption measure for each household which is about right.

In light of the above arguments, the recommendation is thus that the durables data not be discarded altogether, but that big headline items such as cars, motorcycles, DVD players, televisions – items that are both expensive and very infrequent – be excluded from the aggregate. The smaller items, less infrequent and less costly, can be included. As noted earlier, to the extent that there is information collected elsewhere in the survey on rental, repair, or installation of durables items that are excluded here, those expenditures should also be excluded from the aggregate.

The final section in POF2 refers to expenditures by the household on domestic servants during the past year. These items seem to be clearly linked to enhanced welfare and can be straightforwardly included in the consumption aggregate.

The individual-level questionnaire (POF4) also includes a large number of items for which the recall period is 12 months. Section 45 refers to expenditures on festivals and celebrations. As with consumer durables these are often occasional expenditures that can become very costly and ideally we would like to have some smoothed value rather than actual, total, expenditure on the event. Following Deaton and Zaidi (2002), the general recommendation is to exclude these items from the consumption aggregate. The sole exception might be made with
respect to birthday parties and wedding anniversaries – events that occur on an annual basis. For such items the 12 month reference period is the appropriate one and one could thus justify including these items in the consumption aggregate.

Section 46 refers to individual-level purchases of jewelry, watches and cellular telephones. The same consideration arises here as was discussed above for infrequent durables purchase in POF2. If the purchase of these items occurs very infrequently (one could detect this by looking at the number of 0 values in the data) and they are very expensive, then such items should probably be excluded from the aggregate. Otherwise they can be safely included.

Section 47 refers to expenditures on property that is distinct from the house within which the individual resides. To the extent that such expenditures refer to property that is used to generate an income flow to the individual they should be treated as production costs and not included in the consumption aggregate. However, they could refer to expenditures on a secondary residence (holiday home, for example) in which case they could be included. However, in the latter case, one would want also a question on the estimated rental value of property for those individuals that own, rather than rent, a secondary home. Such a question is not included. The above considerations lead one to conclude that it is probably better to exclude the expenditures in Section 47 from the overall consumption aggregate.

Section 48 refers to financial expenditures during the preceding 12 months and should be excluded from the consumption aggregate.

Section 49 refers to expenditures on education during the past 12 months. As Deaton and Zaidi (2002) note, one can debate whether such expenditures are to be included or excluded. The general stance in the literature is to include these expenditures in light of the fact that there is clearly some degree to which education expenditures directly enhance welfare. As Deaton and Zaidi (2002) note, education expenditures are also included as consumption in national income accounting practice and this provides an additional argument in favor of inclusion.

Sections 50 and 51 look explicitly at a variety of expenditures related to vehicle ownership. We have recommended above that purchases of such highly infrequent and very costly items be excluded from the consumption aggregate, and as a result these expenditures should also be excluded.
Trimming of Overall Consumption

Our examination of the components of the POF consumption questionnaire lead us to suggest that the POF consumption data may suffer more than perhaps other similar datasets for other countries, from measurement error. In the case of food expenditures we have suggested that there may be grounds for concern associated with an inappropriate recall period of one week – which results in a large percentage of zero-food expenditures in the data. Further, we have noted above that we are unable to impute a stream of consumption services from the very long list of consumer durables included in the data set. We are compelled in this case to include actual expenditures on such items (abstracting away from those highly infrequent and costly items that we suggest should be excluded altogether). This means that, once again, there will be many households which record zero expenditures on specific items and other households that record expenditures that are probably in excess of the value of the stream of consumption that they derive from the item during the reference period. The overall effect, again, is the same as if we had measurement error in the data.

The effect of measurement error in the analysis of welfare can be quite significant. As has been shown by Ravallion (1988), Lanjouw and Lanjouw (2001) and Deaton and Zaidi (2002), measured poverty is likely to be higher than it should in the presence of measurement error. Similarly, measured inequality will be biased upward.

These considerations lead us to recommend that some protocol for trimming extreme values from the consumption aggregate be considered prior to utilization of the consumption aggregate in applied welfare analysis. While we have not yet constructed a consumption aggregate following the recommendations outlined above, we can examine the impact of trimming with reference to a the already existing consumption aggregate that simply puts together all of the consumption components. Table 1 shows that sensitivity of measured inequality at the level of each Brazilian state is indeed quite significant. At the level of Brazil as a whole, untrimmed per capita consumption inequality yields a Gini coefficient of 0.559. When half of a percentage point of all observations is dropped from both the bottom and from the top of the per capita consumption distribution the Gini declines to 0.531. A more draconian trimming protocol, cutting 2.5 percentage points from both ends of the distribution yields a Gini of 0.507.
At the all-Brazil level inequality is likely to be overstated due to the fact that spatial price differences have not been accommodated. However, Table 1 indicates that high inequality occurs also at the level of each state, but that, again, measured inequality is quite sensitive to the question of whether extreme value observations are to be trimmed or not. In Ceara, for example, measured inequality is even more sensitive to trimming than at the all-Brazil level. The Gini coefficient in Ceara declines from 0.577 to 0.505 when 2.5 percentage points of observations are dropped from both tails of the income distribution.

What specific trimming protocol to adopt is not an easy question to answer. Indeed, it is possible that a consumption aggregate constructed following the recommendations outlined above would be less sensitive to trimming than Table 1 suggests. After all, the consumption aggregate above would exclude some of the larger durable good expenditures and this would presumably remove some of the extreme values at the top end of the consumption distribution.

Nonetheless it seems prudent to scrutinize the (new) completed consumption aggregate for sensitivity in the way described above. It is quite likely that some level of trimming will in the end remain advisable.

**Conclusion and Recommendations for the Future**

In this note we have briefly scrutinized the POF 2002/3 questionnaire with a view towards identifying which items of expenditure for which information has been collected, should be included in a consumption aggregate. We have emphasized that a consumption aggregate compiled for the purpose of welfare analysis (poverty and inequality, for example) may require different treatment than one compiled for some other purpose. We have emphasized that the objective here is to be able to produce reliable and credible comparisons of welfare across households and individuals. We have suggested that such a measure of consumption would exclude expenditures that are better seen as investments or inputs into production. Moreover we have described the desirability of capturing not simply expenditure levels, but rather a monetary value of the stream of services that is enjoyed by an individual or household from the consumption of a particular good or service. We have underscored that there can be a tension between the level of comprehensiveness of a consumption aggregate on the one hand (the more comprehensive the better – in principle) and the transparency and interpretation of the aggregate, on the other.
Our examination has led to various suggestions for treatment of specific consumption items. We have also indicated that there may be reasons to worry about measurement error in the final consumption aggregate than cannot be avoided. At least some of that measurement error may be associated with certain design features of the POF questionnaire, and in that light we can conclude with two principal recommendations for revision of the questionnaire for future reference.

1. Recall period for food expenditures: we noted that the POF data appears to include a relatively large proportion of households that report zero, or very low, spending on food based on the recall period of one week in the questionnaire. It is unlikely that such households are, in fact, not consuming food. Rather it seems possible that many households in Brazil purchase food on a fortnightly, or even monthly, basis. Future experimentation with the design of the POF consumption questionnaire may wish to consider alternative recall periods to the one-week recall. Experiments along such lines could reveal whether the conjecture above has any basis in fact.

2. Consumer Durables Consumption: We have noted above that the POF consumption questionnaire includes a very exhaustive listing of expenditures on a variety of infrequently purchased goods and services – notably consumer durables. However, information of stocks of durables owned is far less exhaustive and moreover, there is no information collected on households’ estimation of the current value of the durables that they own. The absence of such information makes it very difficult to include in the consumption aggregate a calculation of the stream of services consumed by households of all durables that they own. In a relatively rich country such as Brazil, the ownership of consumer durables is likely to be quite widespread and as such there is good reason to expend the additional effort to produce a consumption aggregate that reflects well the contribution of that ownership to wellbeing.
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