

From Calorie Fundamentalism to Cereal Accounting

ANGUS DEATON, JEAN DRÈZE

Utsa Patnaik's new critique of our work on food and nutrition is wholly unconvincing. Her analysis of international patterns of "total" cereal consumption, interesting as it may be, does not invalidate anything we wrote, and certainly does not indict us of any "fallacies". And her attempt to demonstrate that the decline of cereal intake in India reflects "severe demand-deflation for the majority of the population" is based on a circular argument.

We are grateful to Akansha Batra for helping with the analysis of FAO data.

Angus Deaton (deaton@princeton.edu) is at the Department of Economics, Princeton University, the United States and Jean Drèze (jaandaraz@gmail.com) at the Department of Economics, Allahabad University.

We are grateful to Utsa Patnaik for the interest she takes in our work, and impressed with her tenacity in attempting to find fault with it. Her critique, however, is wholly unconvincing. Having failed to debunk our paper on "Food and Nutrition in India" (Deaton and Drèze 2009), she changes the topic and picks on a comment we made in an earlier paper (Deaton and Drèze 2002). After distorting that comment and presenting irrelevant counter-arguments, she proceeds to repeat what she said in her failed rejoinder (Patnaik 2010), without addressing the queries we had raised, let alone acknowledging or trying to correct her own earlier errors. The new rejoinder ("On Some Fatal Fallacies", in this issue) adds further layers of misunderstanding and confusion.

1 Cereal Consumption and Animal Feed

Our comment (Deaton and Drèze 2002, Section IV.1) was about the recent decline of cereal consumption in India, and whether there was a possible inconsistency between this decline and independent

evidence, discussed in that paper, of a sustained poverty decline over the same period.¹ It was a fairly detailed comment, from which Utsa Patnaik quotes selectively and out of context. We pointed out that the inconsistency would be resolved if it were the case that cereal intake tends to decline with increasing income (at least beyond a certain threshold), as food consumption is "diversified". This pattern is intuitively plausible, and quite common in other countries, so much so that it is known as an aspect of the so-called "nutrition transition" (from cereal-dominated diets to more diversified diets). We noted that the National Nutrition Monitoring Bureau (NNMB) data suggest that this pattern also applies in India: cereal intake is lower at higher income levels. We also mentioned that, in this respect, there are inconsistencies between NNMB and National Sample Survey (NSS) data; the latter suggest a positive relationship between cereal intake and per capita expenditure, at least in rural areas. We did not pursue the matter further at that time, as it was just one among many issues discussed in that paper.²

Utsa Patnaik somehow takes this comment as evidence that we belong to an unspecified bunch of misguided economists who believe in "an inverse relation of income and cereal consumption". We did not, in fact, claim that such a relation holds, at least not as a general pattern (more on this below). For the moment,

however, let us suppose that we did. Utsa Patnaik's counter is that the relation between income and cereal consumption is usually positive if "consumption" is understood as "total consumption", including not only human consumption but also animal feed. This is correct, but quite irrelevant to the argument.

Indeed, any intelligent reader of our paper would understand that our concern, throughout, was with human consumption and not with animal feed. In fact, no intelligence is required, since we were explicitly discussing human consumption at every step. With this clarification (unnecessary as it should be), we stand by what we wrote. It is disingenuous of Utsa Patnaik to claim that we are guilty of a "fallacy of equivocation", a "fallacy of composition" and other sins by

very slowly in India, in spite of rapid economic growth, and that in this respect India is different from many other countries. Again, this is largely correct, but it has little to do with the issues discussed in our paper. It is quite possible that the comparatively low level and growth of cereal intake among domestic animals in India is an interesting topic of research. Pursuing it might involve some enlightening enquiries into various aspects of India's farm economy, such as animal feeding patterns, the availability of grazing land, the possible influence of vegetarianism on "indirect consumption", and so on. But again, this was outside the scope of our paper.

It is true, of course, that animal feed does have an indirect relevance to the subject of human nutrition, related to the

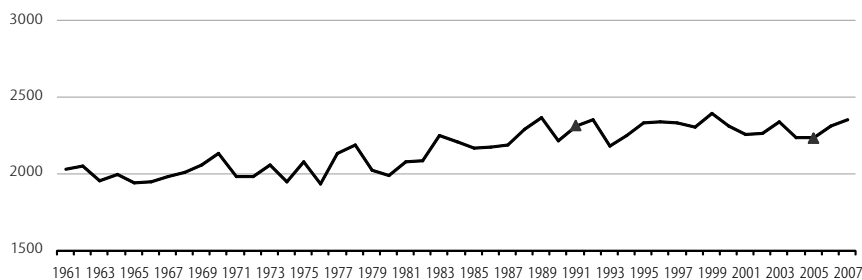
in its own right. Human nutrition depends on fulfilling the needs of humans, and if we measure those correctly, the eating patterns of cows (or chickens, or pigs) are neither here nor there. To assert otherwise is a fallacy of comprehension!

2 Income Elasticity of Cereal Intake

Oddly, Utsa Patnaik perhaps conceded too much when she implied that it is necessary to invoke animal feed in order to debunk the misguided belief that there is an "inverse relation of income and cereal consumption". By doing so, she appears to suggest that, if one were to keep the focus on human consumption, then the inverse relation would hold. In fact, this is not clear. The relationship between per capita income and direct cereal consumption is mildly negative across countries (see below), and also across Indian states (Deaton and Drèze 2009, Figure 11). But a more complex picture emerges from Indian household-level data.

At least three sets of national household surveys shed light on this matter: the nutrition surveys of the NNMB, the NSS consumer expenditure surveys, and the recent Indian Human Development Survey (IHDS) conducted jointly by the National Council of Applied Economic Research and the University of Maryland (Desai 2010). For rural areas, the following patterns emerge: (1) per capita cereal intake *declines* with per capita income according to NNMB data (see Deaton and Drèze 2002, Figure 6); (2) per capita cereal intake *rises* with per capita expenditure according to NSS data (Deaton and Drèze 2009, Figure 2); and (3) per capita cereal intake rises with per capita expenditure, but is more or less *unrelated* to per capita income according to IHDS data (Oldiges 2010). Further, the relationship between per capita cereal intake on the one hand, and per capita income or expenditure on the other, is far from constant over time. For instance, NSS data suggest that the curve relating cereal intake to per capita expenditure is "flattening" over time in rural areas, and even turning negative in urban areas, where it used to be hump-shaped (Deaton and Drèze 2009, Figure 2). The shape of this curve is also contingent on whether one

Figure 1: Food Supply, India 1961-2007 (kcal/capita/day)



Source: Food and Agriculture Organisation, "Food Balance Sheets" (<http://faostat.fao.org>).

equating "direct" cereal consumption with "total" cereal consumption, when we have done nothing of the sort, and clearly kept the focus on direct cereal consumption without confusing it with total consumption.

Utsa Patnaik points out that "total" cereal consumption, the sum of human consumption ("direct consumption") and animal feed ("indirect consumption") typically rises with income across countries, as well as within countries over time. This is correct and we know it. Pan Yotopoulos' work on this, cited by Utsa Patnaik, is well known to development economists and we are aware of it too. But our paper was not concerned with animal feed! It was concerned with human consumption, as it should. And recent trends in animal feed, whatever they may be or ought to be, do not affect the observations we made about human consumption.

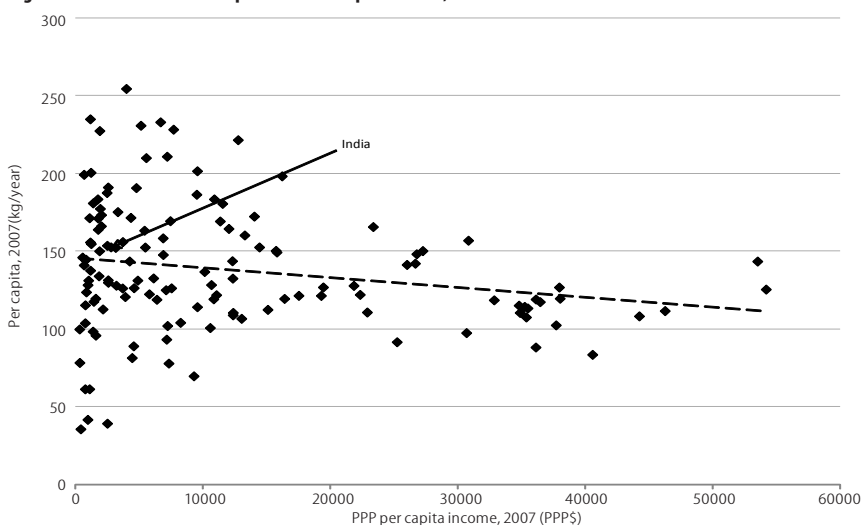
Utsa Patnaik observes that "indirect consumption" of cereals is rising (if at all)

(human!) consumption of meat and other animal products. If the consumption of meat, milk and eggs were much higher in India, animal feed consumption would surely be much higher too. From that point of view, the fact that animal feed consumption in India is low, and rising very slowly, can be seen as a matter of concern. But this concern derives from a concern about the human consumption of meat and other animal products, and is better captured by focusing directly on human consumption. And indeed, in our paper on food and nutrition, the grossly deficient nature of Indian diets, not only in terms of meat consumption (about 10 times as high in China as in India, according to Landy 2009) but also in terms of a wide range of other foods and nutrients, was discussed extensively. Having noted and discussed these (human) food intake deficiencies, we did not feel the need to discuss animal feed specifically, even though that topic may well be of interest

“controls” for other variables such as household composition, occupation patterns, and so on.

There is, thus, no simple or obvious relation between (human) cereal intake and per capita income – at least not in India. This is why, contrary to Utsa Patnaik’s claim, we did not subscribe to the view that there is a (general) “inverse relation of income and cereal consumption”.

Figure 2: Direct Cereal Consumption and Per Capita Income, 2007



Source: PPP per capita income from World Bank, World Development Indicators (<http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>). Cereal consumption from Food and Agriculture Organisation, “Food Balance Sheets” (<http://faostat.fao.org/>). Each dot on the graph represents one country.

Further research may help to clarify this matter and reconcile the different sources, but meanwhile, we see no reason to retract what we wrote on this subject.

3 International Patterns and FAO Data

In her misguided rebuttal of our alleged claims, Utsa Patnaik makes use of Food and Agriculture Organisation (FAO) data on food consumption. The reliability of these FAO figures is at best uncertain. For instance, the FAO figures interpreted by Utsa Patnaik as “calorie intake” are actually “food supply” figures, derived from rather speculative “balance sheets” of national food production and utilisation, instead of household surveys, which are often more reliable. This is one reason why we did not use FAO data in our earlier work.

To illustrate the problem, according to FAO data, there has been no decline in “calorie intake” in India during the last 20 years (see Figure 1, p 88). This contradicts

the survey-based evidence (not only from the NSS, but also from the NNMB), discussed in our earlier paper.³ This poses an interesting dilemma. If the FAO figures happen to be valid (perhaps because the NSS is progressively underestimating food consumption, as it arguably does for total consumption),⁴ then there is need for serious reconsideration of recent analyses of nutrition trends in India

based on NSS and NNMB data. For instance, the puzzle of declining calorie intake, discussed in our earlier paper, would not exist, while Utsa Patnaik’s entire thesis about a “deflation-driven” decline in calorie intake would stand contradicted. We doubt that Utsa Patnaik would be happy with this conclusion. On the other hand, if the FAO figures are misleading (this we believe to be more likely), then why use them at all?

Utsa Patnaik, however, has no patience for these complications. Instead of facing them, she “hides” the problem by picking convenient reference years (1991 and 2005) and creates the impression (in her Table 2) that the decline of calorie intake shows up in FAO data.⁵ It would have been more straightforward on her part to acknowledge that this pattern is absent in the FAO data, and to argue – rightly in our view – that the FAO statistics are misleading in this respect. Instead, Utsa Patnaik uses those parts of the FAO data that suit her purpose and ignores others.

In spite of their uncertain reliability for specific countries (including India), FAO data may be of some use in identifying broad international patterns. This, however, requires looking at a wide and non-arbitrary set of countries, instead of picking selected countries (India, China, Mexico, Russia, Germany, United States) without any explanation of the principles underlying the selection. A more comprehensive picture is given in Figures 2 to 4 (pp 89-91), combining FAO data on food consumption in 2007 with World Bank data on “gross national income per capita” (in “purchasing power parity” terms) for the same year.⁶ The expected patterns emerge: per capita “direct” cereal consumption is only loosely related to the levels of per capita income with, if anything, a negative slope, while “indirect” consumption as well as “total” consumption tend to be higher at higher levels of per capita income.

What is not so clear is what one should conclude from these international patterns, as far as India is concerned. Utsa Patnaik’s conclusion seems to be that there is something wrong with the stagnation of “total consumption” in India. We would not necessarily disagree with that. But if this is a concern, the main culprit would seem to be animal feed, since the decline of direct consumption as per capita income increases is consistent with international experience, according to FAO data. In effect, Utsa Patnaik is arguing that there is something wrong with the low levels of animal feed consumption in India. This may be true, but it does not affect anything we wrote, and certainly does not indict us of any “fallacies”.

None of this is to deny that the stagnation (even decline, in per capita terms) of foodgrain production and availability in India during the last 20 years may be a serious issue. While we disagree with UP’s claim that the “only explanation” for this decline is “severe demand-deflation for the majority of the population” (more on this below), there are other reasons why the decline itself may be a matter of concern. For instance, it can be seen as a symptom of slowdown in the growth of agricultural yields, with possible adverse effects on farmers’ incomes, agricultural employment, and food prices.⁷ Higher

“indirect consumption” (and perhaps even “direct consumption”) of foodgrain may well be important for the improvement of nutrition levels in India. And higher foodgrain production would also help to raise procurement levels, and expand India’s Public Distribution System (PDS), as proposed under the forthcoming National Food Security Act. For these and other reasons, the decline of per capita foodgrain production and availability in India is an important

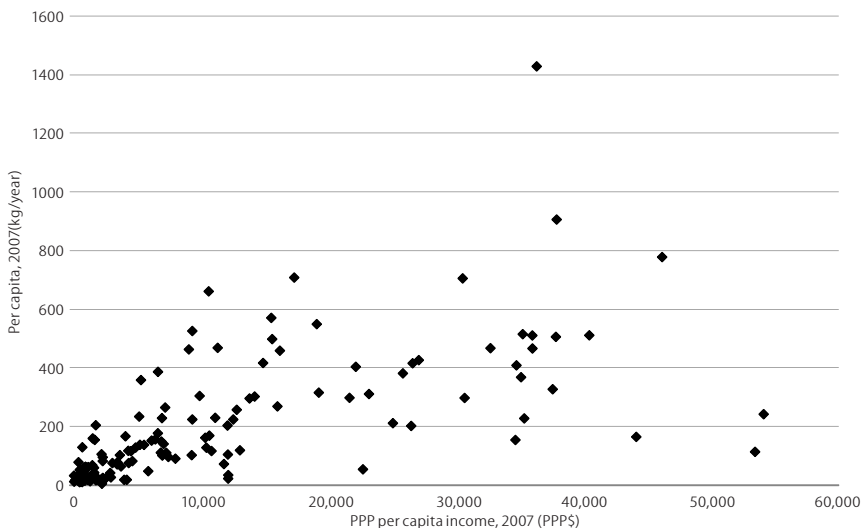
puts it (page 84): “All that is required is that there is a positive monotonic relation between per capita real income/expenditure on the one hand, and per capita foodgrain/cereal/calorie intake on the other. Such a relation not only exists but is a strong and robust relation as the international data show...Given this robust relation, per capita foodgrains/cereals/calorie intake become *good proxies* for per capita real income/real expenditure” (emphasis added).

intake” is treated as if changes in cereal intake can happen only if real income changes: “If we want to say that spending in ‘real’ terms is the same at two points of time, this means that the nominal average spending level of a later year must give the same constant foodgrain/cereal/calorie intake as in the earlier year. Any one of these three indices could be used”. And there is more: not only are “calorie/cereal” intake and real income assumed to invariably move together in Utsa Patnaik’s approach, but for good measure, they are also conflated with “nutrition” (as when “direct poverty lines” are renamed “nutrition-invariant poverty lines”), blithely ignoring a host of other determinants of nutrition such as education, sanitation and healthcare. This is not just a non sequitur, but an epidemic of non sequiturs.

It is also interesting to speculate whether, in the novel and deeply confused expression “cereal/calorie intake”, Utsa Patnaik refers to total cereal consumption or to direct cereal consumption.⁹ If it is total cereal consumption, then it surely cannot be equated with “calorie intake”, unless the latter is meant to include the calorie intake of animals, which would be absurd. But if it is direct consumption, then it is simply not true that there is a “positive monotonic relation” between “cereal/calorie intake” and real per capita income in international data, as claimed by Utsa Patnaik: in the case of direct cereal consumption, this relation is negative, not positive, as Figure 2 illustrates.

In her work on “direct poverty lines”, Utsa Patnaik explicitly reverts (quite rightly!) to “direct consumption” rather than “total consumption”. In effect, she invokes the positive relation between per capita income and total consumption in international data as a justification for equating real income with direct consumption in Indian data. While the distinction may not matter much, because direct consumption accounts for the bulk of total consumption in India, one wonders what Patnaik would do if the two differed substantially. Presumably, for the sake of logical consistency, she would have to take total consumption (not direct consumption) as the “good proxy” for real

Figure 3: Indirect Cereal Consumption and Per Capita Income, 2007



Source: PPP per capita income from World Bank, World Development Indicators (<http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>). Cereal consumption from Food and Agriculture Organisation, “Food Balance Sheets” (<http://faostat.fao.org/>). Each dot on the graph represents one country.

subject of investigation.⁸ But once again, none of this detracts from what we wrote earlier on the subject of human consumption and nutrition.

4 Food Consumption and Rural Poverty

In the second part of her paper, Utsa Patnaik repeats a circular argument to the effect that the decline of cereal consumption (or, interchangeably in Patnaik’s analysis, calorie consumption) in the last 20 years reflects a “decline in real spending in rural India”. The circularity arises from the fact that cereal (or calorie) consumption is effectively assumed to be the ultimate barometer of “real spending”, so that if cereal (or calorie) consumption has fallen, so must have real spending.

Patnaik denies that this is an assumption, and claims that it is a substantive proposition based on evidence. As she

This argument is simply false. The fact that two variables are monotonically related does not mean that they are “good proxies” for each other. Even if it were the case that “cereal/calorie intake” rises with “real income”, other things being equal, it would not follow that the two are good approximations for each other. That would require not just that the relation between them is monotonic but also that cereal/calorie intake depends only on real income and on nothing else (or at least nothing that might change over time). But cereal and calorie consumption do indeed depend on other things – prices, mechanisation, activity patterns, body weight, water supply, the epidemiological environment, and the demographic composition of the population, among the important variables that we considered in our earlier papers. All these complications are swept aside in Utsa Patnaik’s work, and “cereal/calorie

income, implying that animal feed is a constituent of “real income”!

5 Back to Square One

After this long and unnecessary detour, we end by reverting to the initial (and pertinent) query raised in Utsa Patnaik’s initial rejoinder (2010), regarding the validity of price indexes used to deflate Indian poverty lines. As explained in our response to that rejoinder (Deaton and Drèze 2010), if it were the case that standard price indexes (such as the Consumer Price Index for Agricultural Labourers) substantially understate actual increases in the cost of living, as Patnaik suggests, this might help to explain one of the nutrition-related puzzles we have been concerned with: why calorie consumption is going down even as

Utsa Patnaik considers it as “obvious” that price indexes understate actual increases in the cost of living, but we are unable to share this faith without any evidence (especially after years of detailed work by one of us on Indian price indexes failed to uncover any biases of the requisite magnitude). While official price indexes in India can certainly be criticised (e.g., for outdated weights, or weights that are not appropriately tailored to the rural poor’s consumption patterns), the improvements in food price indexes that are explored in Deaton (2008), although acting to diminish the rate of growth of real incomes, are never sufficient to reverse the well-documented picture of positive increases in real income across the income distribution.¹⁰ If

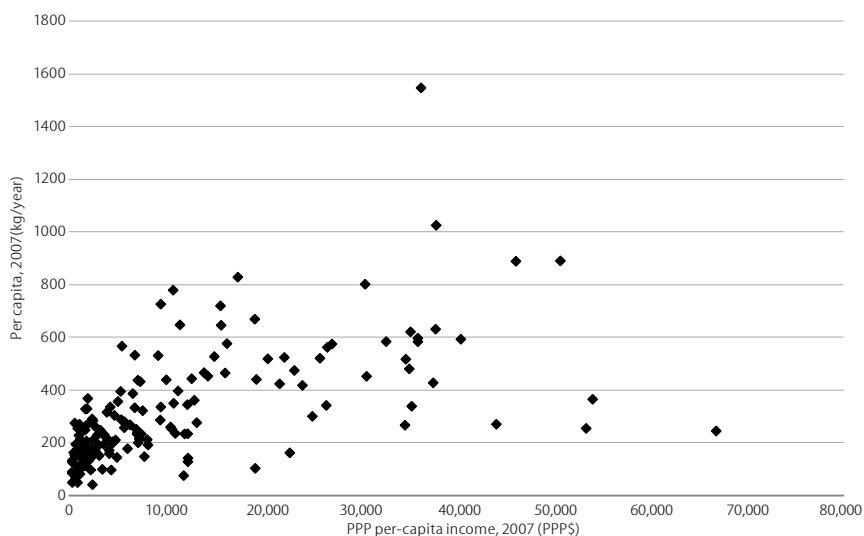
lower and lower in “real” terms over time because the price indexes used to update them underestimate real increases in the cost of living. We would agree that India’s official poverty lines are abysmally low, whether as normative benchmarks for a minimum standard of living, or judged in international perspective where they – along with China’s poverty lines – are among the lowest in the world (see for example, Deaton 2010, Figure 2). That is why one of us has argued, on many occasions, that these poverty lines should not be used as eligibility conditions for the Public Distribution System or other entitlements (Drèze 2010). But India’s poverty lines were low from the beginning, and there is no obvious sense in which their purchasing power today is lower than it used to be. If their purchasing power is indeed going down, this should be traceable to specific defects of the price indexes, not to a circular argument in which the price index is *defined* so as to make real income low enough to “explain” the reduction of calorie intake at the (official) poverty line.

Utsa Patnaik’s own “deflators”, based on her so-called “direct approach”, suffer from all the logical flaws discussed in the preceding section. They also lead to many counter-intuitive patterns, as noted in our earlier response. Utsa Patnaik’s claim that we “simply cannot believe that even the higher per capita expenditure groups in rural India could have got worse off” is gratuitous and unfounded, but we do find it difficult to believe that 90% of the urban population was worse off in 2004-05 than in 1993-94, and even more so, that average real spending declined in both rural and urban areas in that period, as if the economy’s entire income growth had been stashed away in Swiss bank accounts. Yet this is the sort of cataclysmic picture that emerges from Utsa Patnaik’s work;¹¹ fortunately, it is a picture based on conviction rather than on evidence.

6 Appeal Dismissed

To conclude, we stand by what we wrote and retract none of our earlier conclusions. There are certainly many loose ends in our current understanding of poverty, nutrition and food consumption in India.

Figure 4: Total Cereal Consumption and Per Capita Income, 2007



Source: PPP per capita income from World Bank, World Development Indicators (<http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>). Cereal consumption from Food and Agriculture Organisation, “Food Balance Sheets” (<http://faostat.fao.org/>). Each dot on the graph represents one country.

real per capita incomes are, apparently, going up. The explanation would be that real per capita incomes are, in fact, not going up – they are going down, but look like they are going up because of faulty price indexes. Even then, some difficult questions would remain, e.g., why is the share of food expenditure in total expenditure going down, and why is the consumption of non-cereal food items (including vegetables, fruit, edible oil and animal products) going up, if real incomes are going down. But the price-index hypothesis is at least coherent and worth pursuing (as we already did, briefly, in our earlier study, Deaton and Drèze 2009).

Utsa Patnaik’s case on price indexes is to be sustained, it must involve the presentation of an alternative price index, based on actual prices, that rises fast enough to support her claim that real incomes have been declining for the bulk of the rural (in fact, rural and urban) population. Anecdotes about the price of aubergines in Delhi are hardly an adequate substitute. It is true that vegetable prices have risen in Delhi lately, but this is captured in the standard price indexes – there is no obvious lacuna in this respect.

Similar comments apply to poverty lines. Utsa Patnaik feels that official poverty lines are very low, and getting

We have tried to draw attention to them, and to assess the relevance of various possible explanations. While much remains to be learned, Utsa Patnaik's answers are of little help. Her thesis of a "crisis of animal feed" in India, interesting as it may be, does not affect our own analysis of human consumption. And her "direct approach" to the construction of expenditure deflators and poverty lines is a circular one that leads straight back to conclusions that seem to have been decided on in advance.

NOTES

- 1 Our main focus, in that paper, was on the 1990s, but National Sample Survey data suggest that the decline of cereal intake started much earlier (in the 1980s and possibly even 1970s). On this see e.g. Dyson and Hanchate (2000), Rao (2000), Radhakrishna et al (2004), and earlier work cited there; also Deaton and Drèze (2009), Figure 6.
- 2 One problem with the diversification hypothesis is that calorie intake, or for that matter the intake of many other nutrients, also declined in the same period. This is not what one would expect during the nutrition transition, at least not in a country like India where calorie intake is well below recommended intakes for a large proportion of the population. This issue was discussed in our follow-up paper on "food and nutrition" (Deaton and Drèze 2009; see also Landy 2009).
- 3 The NNMB data pertain to specific states (Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu and West Bengal), but they are broadly consistent – in this respect – with NSS data for the same states; see Deaton and Drèze (2009), Table 8.
- 4 Some studies suggest that national accounts (similar to the FAO's "Food Balance Sheets") are actually more reliable than household surveys for at least some non-cereal items (Kulsheshtre and Kar 2005).
- 5 Taking 1991 as the baseline for comparison is perhaps not arbitrary, since Utsa Patnaik considers that year to be a "turning point" as far as trends in cereal consumption in India are concerned. But why 2005? Utsa Patnaik herself mentions that "2007 is the last year for which FAO-FBS data are available". The FAO's "calorie intake" (actually food supply) figure for 2007 is 2,352 kcal/capita/day, a little higher than the 1991 figure of 2,316 kcal/capita/day. More importantly, there is no downward trend in "calorie intake" post-1991, if we look at the entire series of annual figures (see Figure 1 in the text).
- 6 The income estimates are available at <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>.
- 7 The annual compound growth rate of agricultural yields fell from 3.2% in the 1980s to 1.3% in the 1990s for rice, and from 3.1% to 1.8% for wheat (Government of India 2009b, Table 7.6).
- 8 A comparison with China would reinforce these concerns. While (direct) cereal consumption levels in India and China are much the same, according to FAO data (they used to be higher in China, but declined sharply in the last 20 years or so), China produces about twice as much foodgrain as India, and rice yields are also about twice as high in China as in India (FAO 2010; Gulati 2010). This is likely to contribute, in diverse ways, to China's better nutrition levels, even if animal feeding patterns in China not necessarily "models" for India.
- 9 It would appear to be the former, judging from the following "clarification", added in brackets after the statements quoted in the preceding paragraph: "Remember again that all grains/

cereals include animal products to which they are transformed".

- 10 Utsa Patnaik takes issue, quite rightly, with the fact that the weighing diagrams (reference consumption baskets) used to update official poverty lines are out of date (the current "base" of the CPIAL is 1986, but for the purpose of updating official poverty lines, some of its components are re-weighted using 1973-74 weighing diagrams). But this can work either way – underestimating or overestimating real increases in the cost of living. And once again, recent research using updated price indexes do not lead to fundamentally different results, as far as the issues discussed here are concerned. This applies not only to Angus Deaton's (2008) work, but also to the re-estimation of poverty counts for 1993-94 and 2004-05 presented in the recent Tendulkar Committee Report (Government of India 2009a).
- 11 See Patnaik (2010), Tables 1 and 2 and Patnaik (this issue), Table 2b.

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This particular exchange is now closed – Editor.

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