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The Political Economy of Agricultural Statistics and Input Subsidies: Evidence from India, Nigeria and Malawi

MORTEN JERVEN

The political economy of agricultural policies – why certain interventions may be preferred by political leaders rather than others – is well recognized. This paper explores a perspective that has previously been neglected: the political economy of the agricultural statistics. In developing economies, the data on agricultural production are weak. Because these data are assembled using competing methods and assumptions, the final series are subject to political pressure, particularly when the government is subsidizing agricultural inputs. This paper draws on debates on the evidence of a Green Revolution in India and the arguments on the effect of withdrawing fertilizer subsidies during structural adjustment in Nigeria, and finally the paper presents new data on the effect of crop data subsidies in Malawi. The recent agricultural census (2006/7) indicates a maize output of 2.1 million metric tonnes, compared to the previously widely circulated figures of 3.4 million metric tonnes. The paper suggests that 'data' are themselves a product of agricultural policies.

Keywords: statistics, Green Revolution, agriculture, Malawi, Nigeria, India

INTRODUCTION

One of the most basic questions in development studies is how to raise the productivity of poor rural populations. One straightforward answer has been to subsidize agricultural inputs and thereby increase agricultural yields. Historically, this has been a popular response. Thus governments of poor (as well as rich) countries have tended to subsidize agricultural inputs such as seeds and fertilizers. The central issue is whether and how these policies work. This question been debated fiercely. Subsidies were an integral part of the state-led development push in the 1960s and 1970s, but were then scaled down as part of a larger trend of cuts in state spending during the structural adjustment programmes of the 1980s and 1990s. Now, however, subsidies are back on the agenda once again.[1]

Morten Jerven, Assistant Professor, School for International Studies, Simon Fraser University, Suite 7200, 515 West Hastings Street. Vancouver, BC V6B 5K3, Canada. E-mail: Mjerven@sfu.ca.

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[1] For policy prescriptions on how to break the 'poverty trap' in Malawi with interventions such as fertilizer subsidy, see Conroy et al. (2006). For a literature review, see Dorward et al. (2004).

The theoretical justifications for a fertilizer subsidy remain the same: either variations on the 'market failure' argument as taken from microeconomics, or those taken from the classics of development economics, such as the 'vicious circle of underdevelopment' (Nurkse 1953).[2] The essence of the argument is very similar. There is a potential high return on investment in fertilizer, but this potential is not met because of capital shortage. Low initial capital thus results in underinvestment in agriculture. In turn, this may provide justification for government intervention and/or official development assistance.[3]

The debate over the merits of state intervention in providing agricultural inputs such as fertilizers to increase agricultural yield is often portrayed as bifurcated between those who side with Jeffrey Sachs and his 'big push approach' and those who share William Easterly's scepticism of top–down, aid-financed development schemes. Easterly proposes that these debates are re-occurring in a pendulum-like fashion (2009, 416). However, academic debates are not driven purely by policy agendas and fashions; empirics and evidence do sometimes come into play. However, these empirics themselves are at times conflicting.

This paper focuses on these empirics and their attendant conflicts: what do we know about the effects of state intervention in providing agricultural inputs? This question is best addressed by looking at the empirical evidence – the agricultural output data – not only by a technical comparison of inputs on one side and outputs on the other, but by acknowledging that the data on output are themselves constructions that are subject to political influence.

Recently, Malawi has taken a central role in this public debate. Many scholars have commended the decision of the Malawian government to oppose the World Bank and reintroduce fertilizer subsidies, and often point to its subsequent success in overcoming food shortages since 2005. However, as this paper shows, there remain significant discrepancies in the measurement of the real extent of this success.

The results from the most recent agricultural census, published in 2010, indicate that the maize crop output for 2006/7 was 2.1 million metric tonnes. This compares with the previously reported 3.4 million metric tonnes, thus implying that the total output of the main food crop in Malawi was only 60 per cent of what was previously thought. This remarkable discrepancy provides the motivation for the paper: how should we evaluate agricultural politics in developing economies? It is argued that in order to get an answer to that question, one has to first ask where these data come from and how good they are.

Previous debates on the virtue of subsidizing fertilizers, and the role of evidence in these debates, are illuminating. The political economy of policy interventions in sub-Saharan Africa was analysed by Bates (1981, 1983, 1991), and in South Asia by Lipton (1977). Their central argument was that there was a dominant 'urban bias' in economic policy, and that this hampered economic development. It was posited that the central political role of urban groups meant that policies favoured urban centres, while the rural poor were politically unimportant and therefore neglected. However, it was also argued that governments would subsidize agricultural inputs, because it was politically convenient. This clarifies the contradictory situation of neglecting agriculture and often discriminating against the agricultural sector in foreign exchange policy, while simultaneously subsidizing the sector. According to Bates (1981), subsidies were preferred because they are politically productive, and thus he offered an

[2] Now frequently referred to as 'poverty traps' as in, for instance, Collier (2007).
[3] For a basic introduction to how this old debate has most recently been rephrased, see Banerjee and Duflo (2011).

explanation of why certain agricultural policy interventions were preferred over others.[4] This paper offers a new perspective on the political economy of the statistical evidence. It is argued that when creating or choosing between crop data sets, the same principle applies: *Cui bono*? It is further argued that the simplistic urban versus rural schism does not explain the motivation for tampering with agricultural statistics, and that the incentives for agricultural extension officers and pressure from donors are crucial in this process.

Quite clearly, for some, such as analysts and scholars, the lack of reliable evidence on the agricultural sector is a problem. For governments, however, it also provides an opportunity to ensure that the aggregate evidence that does exist supports their policies. Statisticians are vulnerable to this pressure because the data basis itself is weak. Any data series covering developing countries rests on questionable assumptions, especially those regarding food production. In order to create an aggregate output series for agricultural production on the national level, there is invariably a large amount of guessing involved. The aggregate series is built up from direct or indirect observations on cultivation and yields in specific localities (Svedberg 1999).[5] To reach an aggregate series, the data has to be multiplied by a number of total acreage or households. Outside census years, one does not have an accurate total number, and small changes to adjust the total or to adjust for sample representativeness will have large impacts on the final series.[6] This level of uncertainty makes it impossible for any statistician to claim that 'the data speak for themselves'. If the final data series is in conflict with other indicators, such as food imports, rainfall, input consumption, prices or other indirect evidence, agreement on the final series may be a political negotiation, rather than an empirical debate.

So how do we know whether agricultural input subsidies actually work? Banerjee has referred to the current state of ignorance as arising from 'the resistance to knowledge' (2007, 16), in which donors are more interested in funding development, rather than finding out what actually works. Banerjee and others suggest solving the problem by using randomized trials. The issue of fertilizer subsidies has been subject to such randomized trials by Duflo et al. (2008). Set in Kenya, the study conducted some demonstration experiments in which treatment and control plots were randomly selected. Perhaps unsurprisingly, it was found that 'fertilizer, when used in appropriate quantities, is highly profitable' (Duflo et al. 2008, 487). Thus this particular study gives a valuable answer to the debate referred to above, with the central question: is use of fertilizer profitable? In turn, the answer to this question can guide us in judging whether a fertilizer subsidy is justified or necessary, or even point us to how much one should subsidize.

However, these laboratory-like studies reveal little understanding of how the political dimensions of provision affect agricultural production in the aggregate or how the returns to fertilizer are distributed. Certainly, it is useful to know whether or not the fertilizer package works, and to have an idea about the returns to such investments. However, it is argued here that the central issue is how the political system will respond to and manage a fertilizer

[4] The 'urban bias' thesis has, of course, been criticized on many grounds; for reviews, see Karshenas (1996) and Byres (2003).

[5] Direct observations are only made if statistical officers would participate in a crop-cutting survey. Often statisticians rely on crop forecasting, which makes use of meteorological data to forecast planting and crops (for a discussion, see Jayne and Rashid 2010). Most survey evidence relies on recollection from the respondent. For a further discussion of methods in collecting agricultural statistics, see Mosley (1993), Kelly and Donovan (2008) or Deininger et al. (2012).

[6] Ponte (2002, 65) explains that in Tanzania, weather and crop condition data are multiplied by area estimates, which in turn are derived from the number of able-bodied men in the village. This method wrongly assumes that all men farm and, furthermore, that female-headed households do not farm.

subsidy programme. Studying these issues in laboratory-like experiments may misguide scholars and policy-makers – arguably it is the differences, not the similarities, between the political economy and the laboratories that are most important. This paper provides a study of how the statistical systems in India, Nigeria and Malawi respond to agricultural input policies. The manner in which the governments have manipulated the process shows how messy the real world is – and the paper makes the argument that it is precisely these lessons that we need to be most keenly aware of when agricultural input subsidies are discussed.

The debate on whether and how to subsidize agricultural inputs cannot be settled by simply pointing to a positive trend in aggregate food productions statistics, or by referring to micro studies measuring input versus outputs in closely observed localities. As this study of the political economy of statistics shows – both micro evidence and aggregate series are misleading, and the key to understanding how input subsidies affect production, distribution and accumulation is to study the social and political relations in the agricultural society in question.

THE POLITICIZATION OF AGRICULTURAL DATA: CASE STUDIES

The argument put forward here is that the state provision of subsidies and inputs is embedded in political economies. These countries all share one feature: they are marked by weak statistical evidence on agricultural production, but across these locations, political priorities vary. Given the weakness of the evidence, there is ample room for a negotiation of the agricultural data. Pressures from above to 'cheat' are strong if politicians need to justify their policies. The causation does not only or always run from top to bottom. The very existence of subsidies, particularly in the form of per capita vouchers, does provide an incentive for the agricultural sector to expand spontaneously. To be specific: when there is an agricultural subsidy in place, it is in the interest of smallholders and agricultural extension officers to 'increase' the numbers of farming households, not only to please superiors, but also because the vouchers themselves have a market value.[7] The case studies presented here display these different dynamics at work. In the case of India in the early 1960s and 1970s, political pressure was applied to ensure that the Green Revolution was visible in aggregate output statistics. In Nigeria during the period of structural adjustment, policy choice was confused because of the existence of competing data sets regarding trends in agricultural yields. The example from Malawi shows how the reintroduction of agricultural subsidies from 2005 onwards created a perpetual political demand for high growth rates. The evidence put forward here implies that the demand for high growth rates was spontaneously met with collusion by farmers and agricultural officers who oversubscribed to fertilizer vouchers. This created an illusion of growth in the Ministry of Agriculture's annual data that did not match up with the most recent agricultural census data.

The case studies set out to explain how big gaps in knowledge about output in the agricultural sector caused conflicts and discrepancies when the final official data series was to be agreed upon. India, Nigeria and Malawi are all diverse agricultural economies, and this paper will not have time or space to account for the complexity of production patterns, income distribution and power relations of the agricultural sectors of these countries. The cases were selected because of the visibility of the debates on the statistical series. The cases suggest that similar processes and negotiation of agricultural statistics are important in other

[7] For exactly the same logic inflating current official headcount poverty statistics in China, see Lü (2012).

countries too, but most often these types of conflicts are taking place behind the scenes, and thus information can be hard to come by. There are other cases of manipulation of official statistics in order to satisfy political objectives in the agricultural sector. Cases from planned economies are particularly striking, and manipulation of official statistics has had catastrophic consequences. Li and Yang (2005) describe how local cadres, eager to please superiors, reported that yields were increasing dramatically following the collectivization programmes in conjunction with the Great Leap Forward in China in the 1950s. The end result was that official grain output projects were massively out of line with the reality. A famine that cost millions of lives emerged in 1959. The same logic created exaggerated agricultural output figures in the USSR (Ellman 1978).

The cases discussed here are taken from mixed developing economies with a degree of democratic rule, and thus they are representative of many countries that are already or are considering the implementation of agricultural input subsidies today (Crawford et al. 2003). The case studies show that these measurement problems are typical, and thus highlight the importance of appreciating the political economy of statistics in the developing world today.

India: The Green Revolution

Discussions of the prospect of a Green Revolution in sub-Saharan Africa invariably make reference to the experience of India and South Asia from the late 1960s (Hunt and Lipton 2011).[8] Their focus is on the potential of replication, and on which lessons from India are transferrable to African agricultural economies. One aspect that has not received much attention is the importance of agricultural statistics and the politicization that necessarily follows their provision. From the case of India, some general lessons can be taken regarding the political importance of yield numbers and, in particular, the difficulty of independent monitoring.

The scholarship and research on agricultural data from India is far more comprehensive and sophisticated in comparison with most other developing economies. While data on food production from sub-Saharan Africa are either lacking (for the colonial period) or dismissed as too weak and/or unreliable (for the post-colonial period),[9] the issue of trends in Indian agricultural production has been the subject of intense research and debate (for both the pre-colonial and colonial periods).[10] This may reflect a higher technocratic competency in India, a higher degree of openness and democracy, and the relative strength of that country's agricultural economics and statistics disciplines. The higher availability of data in India is also due to the relative importance of land taxation in the country, an institution that historically has been much weaker in sub-Saharan Africa. This comparatively healthy situation has resulted in vigorous debate, and some aspects and findings from such debates will be drawn upon here.

In an article written for a special issue of the *Journal of Development Economics*, concerning the reliability of economic statistics and the data base for development, Srinivasan draws on examples from India and stresses that these relatively favourable characteristics still do not guarantee reliable data series for agricultural production. Since India's independence, such data series result from a process in which, first, 'the land revenue authority completely enumerates

[8] For a basic introduction to the various phenomena under the label 'Green Revolution', see Vaidyanathan (2010).
[9] See Jerven (2011a).
[10] The classic study of colonial output trends was provided by Blyn (1966). For a review of some the debates surrounding the data series, see for example Tomlinson (1993, 33–91).

agricultural plots' in all states, with the exception of three (1994, 6). This provides a basic multiplier needed to aggregate the final estimates. In order to reach annual totals of production for different crops, the area devoted to each crop in each season is multiplied with the average yields for that crop in the area. In order to determine these important components, 'eye-estimation' or harvest sample surveys are used: 'Over time "eye-estimation" has largely been replaced by sample survey of plot harvests for many of the crops. Replacement is nearly complete for many crops but eye estimation is still the rule for many of the crops' (1994, 6). It is also noted that the data from the resulting official series do not match those reported by traders. In conclusion, Srinivasan argues that 'the coverage and reliability of the data have been changing in an unknown fashion over time' (1994, 6). Some of the resulting data series can be cross-checked with other data:

> In the fifties there were three estimates of the production of food crops: the official estimate based on complete enumeration of area (except for three states) and a combination of sample harvests and eye-estimates for yield per unit area; National Sample Survey (NSS) estimates based on sample survey for crop area as well as yields; and an indirect estimate derived from the NSS surveys of household consumption. (Srinivasan 1994, 23)

These three series disagreed over levels and trends, and these discrepancies were discussed in official committees. However, neither the sources of disagreement nor the direction of bias were agreed upon. Consequently, the final, rather arbitrary, decision held that there should be only one series, and that this one series should rely entirely on the total enumeration multiplied by observations of acreage and yields from samples and eye-estimates.

In a series of volumes published in the early 1970s, entitled *Data Base of Indian Economy*, the role of political pressure in the provision of final output estimates is more directly commented upon.[11] In a study of agricultural statistics, it was noted that since 1967/8, 'there seems to have been an attempt on the part of the Ministry of Agriculture to vet the final estimates as given by the States before publishing the all India figures' (Srinivasan and Vaidyanathan 1972, 49). Furthermore, it was argued that these attempts went beyond any adjustments made with the goal of reaching reliable estimates, and were instead made 'to arrive at an estimate by negotiation on the basis of what are essentially preconceptions as to the impact of increased absorption of various inputs including high yielding varieties, [which] is on much shakier ground' (Srinivasan and Vaidyanathan 1972, 49).

In their conclusion, Srinivasan and Vaidyanathan questioned whether the data series had any bearing on the formulation of agricultural policy: 'For instance, had the final estimates of food grains output in 1970–71 been different by, say, 5 million tonnes in what way the short term policy would have been different?' (1972, 55). It seems, however, that causality ran the other way. In a section recording the discussion on agricultural statistics, it was noted that Minhas and Srinivasan 'were critical of the manner in which the production estimates forwarded by the States were amended by the Ministry of Agriculture for the years 1966–67 to 1969–70 and wanted to know if there was any sound basis for doing so' (1972, 62). Responding directly to this question, Sarma explained that 'there was an underestimation judged from the indirect evidence available with the Ministry on a number of related items'. Among these

[11] The initiative to the volume is explained by C.R. Rao in the foreword, who said it was put together after an econometric conference on 'war on poverty' held in Hyderabad in 1972, where participants 'were extremely critical of certain official statistics' and it had been argued that 'any economic analysis based on such defective data may be misleading' (Rao 1972, foreword).

items were data demonstrating an increased usage of improved seeds, fertilizer, irrigation and improved practices (1972, 64–5).

The debate did not end there. As Baker recounted, the controversy over the Green Revolution in India focused not only on the distributional consequences in the rural sector, but also on the 'contention that the Green Revolution never happened' (1984, 37). One can debate whether there really was evidence of a 'dramatic shift in trend around the magic year of 1966–67',[12] but if timing remains an issue, in the long term there is no doubt that the aggregate yields in Indian agriculture did eventually increase. The official statistics on land yields do show that they have increased, as one would expect, resulting from increased capital and labour inputs to land.[13]

A revolution would imply a sudden spurt of growth, but if such an event is visible in the growth statistics, it was the result of official tampering.[14] Chambers noted that, in hindsight, it was a mistake to believe that the high-yielding varieties could have caused such dramatic rises in output, but that this belief was sustained by misleading statistics. He argued that agricultural extension officers were given ambitious targets and 'reported these [targets as] achieved when the reality lagged far behind'. He also provided sources showing that the official statistics for some areas with high-yielding varieties were overstated by a factor of between three and five (1984, 362). This indicates that the production of official statistics on output, as established by the Ministry of Agriculture, was carried on in such a way as to reflect its own exaggerated statistics on uses of inputs. Thus, the Green Revolution was not only overstated in statistics, but it was artificially created before it really happened.

The result that the aggregate series was exaggerated, and that the early appearance of a Green Revolution was negotiated at the statistical office on the basis of overstated use of agricultural inputs, rather than physically observed in the field, does not mean that there was no increase in yields. There are a large number of studies, drawing on independent farm studies, detailed microeconomic studies, and secondary information such as price series and government grain stock holdings, that support that sizeable gains were made in both production and productivity (Bliss and Stern 1982; Lipton and Longhurst 1989; Singh 1990). The key lesson here, though, is that in the early years, it was the case that it was a sudden bump in aggregate agriculture yields that was independently observed. The political importance attached to the provision of agriculture inputs and the need for observable outcomes ensured that the results of the Green Revolution were visible in the contemporary statistics.

Nigeria: Structural Adjustment

Nigeria has been cast as the stereotypical case of 'urban bias' by both Bates (1981) and Collier (1988), indicating that Nigerian policy-makers were consistently implementing policies that were detrimental to the majority of the farmers. Forrest (1993, 181) disagrees that Nigeria fits this bill, and argues that until the 1970s the state was instead characterized by lack of

[12] For a detailed discussion of the fiercely contested rate of growth in the period leading up to this 'magic year', see Rudra (1982, ch. 11).

[13] For a view on how the official long-term land yield statistics look, see for instance Basu and Maertens (2010, 596–7).

[14] One of the more famous revisions of statistics that undermined the label of 'revolution' was done by Crafts, who showed that, contrary to previous, misleading, time series, the first Industrial Revolution in England in the seventeenth and eighteenth centuries was in fact slow, and not explosive as previously thought (2004). Incidentally, the same logic applies for both high-yielding varieties and steam engines; the adaptation was slow, and the aggregate growth rate will react very slowly because of the dominance of the economy where new technology has not yet been adopted.

intervention in the agricultural sector. The main priority in the 1980s was to reach food sufficiency, and to support large agricultural projects with inputs, such as fertilizer subsidies (ibid., 181–205).[15] One of the biggest challenges for food producers in Nigeria was the overvaluation of the naira, which made competing food imports cheap. Nigeria shared this policy situation with many other African economies at the time, and as in so many other economies, the policy situation changed rather abruptly with the introduction of structural adjustment policies in the 1980s.

In 1985, Nigeria agreed to undertake structural adjustment programmes. Important components in the package included the removal of fertilizer subsidies, the liberalization of agricultural marketing and devaluation of the naira. The former was reversed when it was claimed that fertilizer was too expensive and that agricultural growth was falling as a result. In an article called 'Policy Making without Facts', Mosley describes the conflicting stories about agricultural growth during this critical period, with explicit reference to the different data sets (1992).[16] It was reported that there were four sources of data on food crops, but that they frequently showed enormous discrepancies. Data were provided by the Federal Office of Statistics (FOS), the United States Department of Agriculture, the FAO and the Central Bank of Nigeria. Only the first series was derived directly from field surveys. The data sets from the Central Bank were arrived at by adjusting the estimates from the Office of Statistics with additional information made available by the Ministry of Agriculture for food crops. In addition, the data on commercial crops were scaled up by 30 per cent in order to include production from farms not surveyed by the FOS and to allow for produce sold on the black market:

> The FAO and USDA series are both indirect estimates which take into account estimated trends in consumption and imports, yielding production as a residual. Not being firmly based on observed production, they both convey an implausible impression of stability; but they may offer a better guide to the long-term trend of production than the field-based series. (Mosley 1992, 240)

Mosley also compared the data sets. According to the data approved by the Federal Office of Statistics, which were based on field surveys, there was negative growth in food production after structural adjustment programmes. The other data set, approved by the FAO and the Central Bank of Nigeria, showed very rapid growth in food production. The policy implications of these two different data sets were completely opposite: the first implied that structural adjustment policies did not work, while the second implied that they were indeed effective. The problem was further compounded by the fact that both conclusions could make economic sense through two different interpretations. One could plausibly argue that a liberalization of internal food prices, together with less competition from imports, led to a positive supply response. Another equally plausible interpretation would be that the removal of fertilizer subsidies caused a negative production response.

Mosley describes how some of the structural adjustment reforms were reversed shortly after they were introduced. In both cases, it was data that formed the basis of the decisions that were made. Mosley argued that the data from the Federal Office of Statistics were most

[15] Forrest notes that in the late 1970s, the Nigerian government, in collaboration with international organizations, was forecasting large food deficits in order to justify policy interventions in the agricultural sector (1993, 185).

[16] The title is a reference to Stolper's book on development planning in Nigeria following independence (1966).

likely to be more reliable, since they were based on field surveys and physical data (1992, 240). Four years earlier, in 1988, Collier had examined available data sets on food production in Nigeria. He noted that in the 1970s and 1980s, 'a combination of complex events and weak data' had yielded incompatible analyses (1988, 762). In his examination, the series based on assumed relationships between food production, income and imports was preferred, and thus Collier adopts the version of increasing food imports and decreasing imports. However, as Oya (2010, 87–91) has argued more generally, there is no automatic relationship between urbanization, food imports and reduced food production. Moreover, since the 1990s, FAO data has shown that *both* imports and food production are increasing.[17]

The Nigerian case is instructive in that there was a clear-cut policy choice: to remove or keep fertilizer subsidies. In the end, the removal of subsidies was reversed, although the government could have chosen to use a different data set that supported the opposite action. According to Mosley, the crucial 'fact' was that in 1987 it was reported that the utilization of fertilizers 'in the Agricultural Development Project Areas – the showpiece areas from which technology was expected to diffuse to less-favoured regions – had fallen' (1992, 232). This example shows how 'evidence based policy' may be an illusion; it was still up to the government to decide which version of the evidence should take supremacy. Likewise, when scholars analyse the period, they are again faced with picking competing series of trends in food production in the period leading up to structural adjustment, which in turn effects how the reforms are evaluated, in Nigeria and beyond.

Malawi: Fertilizer Subsidies

The current debate over the merits of state intervention – in particular, on the use of fertilizer subsidies – centres on the case of Malawi and the government's decision to break with the IMF and the World Bank by reintroducing fertilizer subsidies. According to Jeffrey Sachs, writing in the *New York Times*, President Bingu wa Mutharika of Malawi 'broke old donor-led shibboleths by establishing new government programs to get fertilizer and high-yield seeds to impoverished peasant farmers who could not afford these inputs. Farm yields soared once nitrogen got back into the depleted soils' (Sachs 2009). It is widely acknowledged that the change from recurring famines to more recent relative affluence is due to an increase in land yields, which has been helped by the increased use of subsidized agricultural inputs (Lea and Hanmer 2009, 8).[18] However, as more recent data shows, the previous food production output series have grossly exaggerated these gains.

In Malawi, the success of President Mutharika was intimately linked with this agricultural success story. He proposed the fertilizer subsidy programme as part of his larger Malawi Economic Growth Strategy during the election campaign in 2004. Indeed, it is thought that this contributed significantly to his electoral victory. In 2009, Mutharika was re-elected to the presidency, obtaining 66 per cent of the popular vote, and arguably his continued success is due in large part to the agricultural focus of his development agenda – an agenda that targets smallholders and therefore generates broad support among the electorate (Chirwa et al. 2006). It is testament to the popularity and importance of the fertilizer subsidies that in 2009 both parties did base their campaign on fertilizer subsidies. The subsidy thus has popular support, and it is likely that this support came from an observed and experienced advantage among voters.

[17] Oya (2010, 90) cites Kidane et al. (2006, 9).
[18] In addition to better weather conditions.

Table 1. Census data and Ministry of Agriculture data compared, 2006/7 crop estimates (metric tonnes)

Crop	*Census data*	*Ministry of Agriculture data*
Maize	2,116,650	3,444,655
Rice	68,053	113,166
Sorghum	13,256	63,698
Millet	7,609	32,251
Cassava	407,167	3,285,127
Sweet potato	247,000 (1)	2,307,354
Pulses etc.	250,000 (2)	415,551 (3)

Notes:
(1) Figure cited in NSO (2010, xii); note that tables 3.8 and 3.9 show identical figures for sweet potato and groundnuts, so there is an error somewhere.
(2) Figure cited in NSO (2010, xii), for beans, pulses and groundnuts.
(3) Figure in MEPD report for pulses alone.

However, the subsidy has become even more important politically, also externally towards donors, since Malawi and Mutharika have seemingly succeeded in changing the World Bank's stance on the issue. The 1997 World Bank Country Report for Malawi targeted the removal of input subsidies. By contrast, in 2011 the Bank stated on its website that it 'strongly supports Malawi's efforts to improve smallholder production. The national input subsidy has made an important contribution to this objective' (World Bank n.d.).

The scale and size of the programme is impressive. In 2008/9, the fertilizer programme involved 2.5 million farm households, with 1.5 million fertilizer coupon recipients. These beneficiaries received 5.9 million coupons (Dorward and Chirwa 2011a, 237). According to Dorward and Chirwa, the value of all subsidized commodities was approximately US$220 million; and for more than 40 per cent of the population, the value of one fertilizer coupon was greater than 10 per cent of annual household income (ibid.).

The impressive growth data reported from Malawi, and re-reported in the *New York Times*, following the reintroduction of the fertilizer subsidies have been supported by crop data collected by the Ministry of Agriculture and published in the *Malawi Annual Economic Report*. These reported crop data were based on the last census, in 1992/3, and the annual projections of agricultural production were built up by using yield and acreage observations from agricultural extension officers (Malawi and Paris 21 2009). A National Census of Agriculture and Livestock was undertaken in 2006/7, but the report was not released until 2010. The census was funded by the Norwegian Agency for Development Cooperation (NORAD) and was conducted by the National Statistical Office (NSO). The delay itself was an issue of concern (Malawi 2009), and when it was finally published, the results were not accepted by the Ministry of Agriculture.[19]

The problem was that the census showed remarkably lower figures for the total output of all crops, including the prestigious maize crop. A comparison of the data from the census and those from the Ministry of Agriculture is shown in Table 1. According to the census, the

[19] This information was obtained during interviews conducted at the National Statistical Office, the IMF Office, the Norwegian Agency for Development Cooperation and the Reserve Bank Malawi in Lilongwe, Malawi, in November 2010.

maize crop is only 60 per cent of the numbers reported by the Ministry of Agriculture and the total discrepancy is about 1,300 million metric tonnes.

Notably, the maize figures reported from the census are much closer to national food needs, while the official figures in 2006/7 would imply that either huge stockpiles of maize had accumulated around the country or a significant portion of the population was getting fat, neither of which are evident.[20] Indeed, the caloric output of the official numbers would imply that the average Malawian consumes something in excess of 4,000 calories a day, compared to the commonly assumed figure of around 1,500–2,000 (IMF, pers. comm., 2010).

When the average yield figures from the two reports are compared, they show only a marginal discrepancy. The significant difference derives from how the data are aggregated. The issue of disagreement is the number of agricultural households, where the Ministry of Agriculture used a figure nearly 1 million higher than that used by the census.[21] Statistical officers diplomatically stated that this may have been due to the different definitions of the household being employed (NSO, pers. comm., 2010). In other circles, it was hinted that some farmers might have been invented in some cases in order to qualify for subsidies (NORAD, IMF pers. comm., 2010).

Although there is no direct evidence of tampering, the indications are strong, as were the incentives. The president and the ministry desired good, consistent performance in order to keep the electorate convinced of the continued success of the agricultural development strategy. Perhaps more importantly, they needed to be able to convince donors that the fertilizer and seed programmes were working, thus ensuring that financial support would be forthcoming. The fertilizer subsidy programme totalled 4.6 per cent of GDP in 2008/9, or approximately one-third of the aid inflows (Lea and Hanmer 2009). It was also in the interest of smallholders and agricultural extension officers to 'increase' the numbers of farming households, not only to please superiors, but also because the vouchers themselves have a market value. There is some evidence and growing concern that the vouchers are not reaching the right recipients, and that officials and local authorities are able to profit from them (Africa Research Institute 2007; International Food Policy Research Institute 2009). These worries aside, the situation of agricultural data in Malawi fits into an established pattern of strong executive pressure on statistical authorities to get the particular data that the leadership needs, where the motivation is not to monitor the economy, but to affirm success (Malawi Reserve Bank, NSO, pers. comm.).

The fertilizer programme in Malawi has been depending on donor support, not only politically, but also financially. According to official data collected by Dorward and Chirwa (2011a), the fertilizer subsidy programme accounted for about 6, 8, 9 and 16 per cent of the national budget in 2005/6, 2006/7, 2007/8 and 2008/9 respectively. In turn, direct donor support for the programme was US$9, 7 and 38 million, which accounted for 9, 10 and 14 per cent of the total financing for the programme. Donors have grown increasingly weary of the Mutharika government in recent years, and following political suppression of political protest during the summer 2011, donors – and central among them, the UK Department for

[20] Also note the huge discrepancy in cassava production. This issue is discussed further in the conclusion to this paper.

[21] Dorward and Chirwa (2011b) report that the Ministry of Agriculture used household estimates that are 30 per cent higher than the ones used in the census. Furthermore, they show that according to the Ministry of Agriculture, the reported farm families increased by an average annual rate of 9.1 per cent in the central region from 2005/6 to 2010 and by 5.5 per cent in the northern region, but by only 2.2 per cent in the southern region over the same period. Their analysis indicates that the total or rural households in the census data are probably more precise (ibid., 30).

International Development (DfID) – temporarily suspended aid to Malawi (for a discussion of the events, see Wroe 2012, 135). President Mutharika died of a heart attack in Lilongwe on 5 April 2012, and the former vice-president, Joyce Banda, was sworn in as the President of the Republic of Malawi on 7 April. How this will affect the fertilizer programme, which has undoubtedly been important for farmers' livelihoods in Malawi, but the aggregate success of which has been overstated because of its political importance, is as yet unknown.

DISCUSSION

The political economy of agricultural policies – why certain interventions may be preferred by political leaders rather than others – is well recognized. This paper explores a perspective that has previously been neglected: the political economy of the production of agricultural output data. In developing economies, the data on agricultural production are weak. Because these data are assembled using competing methods and assumptions, the final series are subject to political pressure.

In his classic work, Bates argued that governments prefer to tax the agricultural sector and then selectively subsidize it by providing inputs to production, in order to ensure that they are able to manipulate political support (1981). It has also been argued by Bates and others that small-scale smallholders find it more difficult to mobilize politically, and therefore they tend to be marginalized in policy-making, resulting in what has been called 'urban bias' (Lipton 1977). This paper has examined these questions from a different perspective: what is the political economy of agricultural data? The paper has gone from the basic familiar starting point, that agricultural statistics are weak, to finding that political bias does translate into the aggregate output series.

This paper suggests a significant revision to the 'urban bias' paradigm: if smallholders are not politically important, why are governments concerned with the statistics of agricultural performance? The investigation tends to cohere with the general argument that agricultural policies fit into patron–client relationships, and that politicians, local authorities and agricultural extension officers will not always act in a technocratic manner but, rather, in accordance with what is politically beneficial. In the Indian and Malawian cases, there is evidence that governments went to considerable lengths to 'prove' that the policies were working. In the Nigerian case, the implications are less clear. It does indicate, however, that policy-makers did react politically and even attempted to justify that reaction with reference to data on agricultural production. In a distorted way, the 'feedback mechanism' does work. When the information in the mechanism does not fit the aims of political leaders, it is occasionally tampered with, while at other times there is conflicting information that may support different conclusions and political leaders can choose which information they will act upon.

In India, the incentives of the agricultural extension officers played a crucial role, and in Malawi the pressure from the donor community to show results was important. This falls in line with evidence found elsewhere; for example, in Tanzania by Ponte (2002, 65), who argued that 'production figures are likely to be revised upwards at the district and/or regional for political reasons as each area is expected to show "success". Agricultural production estimates are thus subject to an inflationary chain from the village upwards.' It is further argued that in Tanzania the upward bias was intensified in the late 1980s as 'the Government and International Financial Institutions had high expectations concerning the outcomes of the reforms in the Agricultural sector' (2002, 72). Ponte finds that the 'success' was achieved on paper, but that this 'success' at best was unreliable, and that production estimates were more

inflated during structural adjustment than before (2002, 66).[22] Oya argues more generally that officials may inflate or deflate numbers in order to please the administration, or to attract donor funds to generate local rents (2010, 88).

These cases indicate that growth rates are adjusted upwards in negotiations. However, according to some recent micro studies, the overall situation may still be that the total level of production is understated in many countries' official statistics – both at the national and household level. Klaus Deininger and co-authors discuss the use of different methods to measure agricultural production (Deininger et al. 2012). Their study was situated in Uganda, and they found that the use of diaries, in which smallholders record their daily harvesting of all crops, yields far higher numbers than those based on recollection. This is particularly true for tubers, roots, vegetables and fruits, which are typically harvested on a daily basis depending on recurring needs. All together, the data from the diaries generated a production value that was 60 per cent higher than that reached using the responses from the National Household Survey (ibid., 11). If measurement instruments such as these were used regularly on a small scale, states would be aware that the contribution of smallholders to the wealth of the nation is currently underappreciated. These findings and changes in methods of measurement do create problems in interpreting the long-term trend of agricultural production in African economies.

It was shown in the case studies that particular problems arise when one is attempting to generate aggregate statistics. Hill (1984) and Berry (1984) both noted that in what Hill called 'the rural tropical world', the diversity of performance by crop and locality are so high that any aggregate statistics are going to be very misleading. The situation is bad for export crops, worse for food crops, and worst for statistics on tubers and roots. Huge discrepancies for cassava in the case of Malawi were noted here earlier, and similar gaps in the data on crops are found elsewhere. Mosley (1992, 240) noted that the Central Bank of Nigeria revised its own estimates for 1987 from 1,486 tonnes to 3,151 thousand tonnes between the 1987 and 1989 editions of its annual report. Jerven (2011b) found that between the 1995 and the 1999 editions of the annual statistical abstract, the estimates for production for 1993/4 were increased from 15,861 to 22,709 thousand tonnes for yam and from 17,201 to 31,005 thousand tonnes for cassava. Root and tubers are grown together on tiny plots and are not harvested until they are needed (after harvest, the tubers only last for a couple of days). Hill argued that when it comes to roots and tubers, 'no West African country can have the faintest idea as to how much is really produced' (1986, 34).

In this paper, the focus has been on food production. It has been noted that there are methods and studies that can establish with very good accuracy the food production at the micro level – as in, for instance, the noted studies of Deininger et al. (2012) and Duflo et al. (2008) – but that it is hazardous to generalize from these observations to arrive at an aggregate measure. The problem is not only diversity and sampling, but that in the countries discussed here, the data needed for aggregation – total acreage, total population or total numbers of households – are often not available, or the existing estimates not reliable. The demand for hard data to aggregate the total estimates is overwhelming, and data will be created, invented or otherwise imputed to fill the gap (Jerven 2013). And as we have seen, different administrative units and reporting agencies use different methods to reach the aggregate, or arrive at it using indirect measures. The end result is disagreement and conflict regarding both levels and trends.

[22] This falls in line with the bias in the GDP series for Tanzania that overestimates growth post-structural adjustment Jerven (2011c).

This mirrors the discussion of the 'food crisis' or 'agrarian crisis' since the 1970s and 1980s.[23] The claim of a crisis then was built on the evidence of a trend of declining per capita in food production, which in turn was founded on very poor agricultural statistics, and indeed almost entirely lacking food production statistics. A decline of 15 per cent per capita over three decades from 1965 to 1995 is not very large, and it is certainly 'well within the range of errors in the data' (Wiggins 2002, quoted in Oya 2010, 88). Moreover, a commonly used method when aggregating agricultural statistics is to assume that food production is growing proportionally with rural population growth, which introduces an artificial downward bias in the data in rapidly urbanizing economies (Jerven 2011a; Jerven 2013). In turn, this raises questions about the reliability of the historical times series of agricultural production, particularly as we know that there are more data available on food crops today as compared to earlier decades.[24]

This study of the role of evidence in agricultural policy formulation has important implications for the potential Green Revolutions in sub-Saharan Africa. The catchphrase 'evidence-based policy' assumes that evidence and policy are somehow independent. On the contrary, this study has shown how evidence is deeply embedded in policy structures. Failure to understand that data are social products, and that the relations of power condition the production of them, may lead researchers and donors to place undue confidence in data sets (Herring 2001, 151). Thus, a policy recommendation is to use qualitative methods and ethnographers to study not only how agricultural polices affect agricultural producers, but also how the different collection methods affect the kind of data that is collected.[25] Problems related to the collection and aggregations of reliable data exist and may be challenging. However, this does not mean that we can sidestep the issue. The 'data' are themselves a product of agricultural policies, and research employing mixed methods is required to meet this challenge.

The big question of whether agriculture inputs are working or not cannot be settled with reference to the aggregate macro number; nor can one draw the needed wisdom from closely watched micro studies. The answer is that provision of agricultural inputs on a societal scale is quite a different proposition than the micro context, and due to the weakness of the statistical system the aggregates will be manipulated in accordance with the power relationships in the society. When designing systems for the provision of agricultural input subsidies, this effect on the statistical system must be closely watched; otherwise, the reality and the numerals might quickly depart. Discrepancies such as those found here, in the order of ± 30 per cent, can be vital differences in countries where large parts of the populations are living in, or are close to living in, absolute poverty.

REFERENCES

Africa Research Institute, 2007. 'Making Fertiliser Subsidies Work in Malawi'. Briefing Note 0703, December.

Baker, C.J., 1984. 'Frogs and Farmers: The Green Revolution in India, and its Murky Past.' In *Understanding Green Revolutions: Agrarian Change and Development Planning in South Asia: Essays in Honour of B.H. Farmer*, eds B.H. Farmer, S. Wanmali and T. Bayliss-Smith, 37–52. New York: Cambridge University Press.

Banerjee, A., 2007. *Making Aid Work*. Cambridge, MA: the MIT Press.

[23] For a review, see Oya (2010) and Platteau (1995).

[24] For a particularly bold, but – on the basis of the evidence presented here – probably misguided effort, see Block (2010).

[25] For instance, Dorward and Chirwa (2010) found that when agricultural extension officers spend more time with producers, the resulting yield estimates are biased upwards.

Banerjee, A. and E. Duflo, 2011. *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. New York: Public Affairs.

Basu, K. and A. Maertens (eds), 2010. *The Concise Oxford Companion to Economics in India*. Oxford: Oxford University Press.

Bates, R.H., 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Berkeley, CA: University of California Press.

Bates, R.H., 1983. *Essays on the Political Economy of Rural Africa*. Cambridge, UK: Cambridge University Press.

Bates, R.H., 1991. 'Agricultural Policy and the Study of Politics in Post-Independence Africa'. In *Africa 30 Years On*, ed. D. Rimmer, 115–29. London: James Currey.

Berry, S., 1984. 'The Food Crisis and Agrarian Change in Africa: a Review Essay'. *African Studies Review*, 27 (2): 59–112.

Bliss, C.J. and N.H. Stern, 1982. *Palanpur: The Economy of an Indian Village*. Oxford: Clarendon Press.

Block, S., 2010. *The Decline and Rise of Agricultural Productivity in Sub-Saharan Africa since 1961*. NBER Working Paper no. 16481, National Bureau of Economic Research.

Blyn, G., 1966. *Agricultural Trends in India, 1891–1947: Output, Availability and Productivity*. Philadelphia, PA: University of Pennsylvania Press.

Byres, T.J., 2003. 'Neo-Classical Neo-Populism 25 Years On: Déjà Vu and Déjà Passé. Towards a Critique'. *Journal of Agrarian Change*, 4 (1–2):17–44.

Chambers, R., 1984. 'Beyond the Green Revolution: A Selective Essay.' In (eds) *Understanding Green Revolutions: Agrarian Change and Development Planning in South Asia: Essays in Honour of B.H. Farmer*, eds B.H. Farmer, S. Wanmali and T. Bayliss-Smith, 362–80. New York: Cambridge University Press.

Chirwa, E.W., J. Kydd and A. Dorward, 2006. *Future Scenarios for Agriculture in Malawi: Challenges and Dilemmas*. Research Paper 3, The Future Agricultures Consortium.

Collier, P., 2007. *The Bottom Billion. Why the Poorest Countries Are Failing and What Can Be Done About It*. New York: Oxford University Press.

Collier, P., 1988. 'Oil Shocks and Food Security in Nigeria'. *International Labour Review*, 127: 761–82.

Conroy, A.C., M.J. Blackie, A. Whiteside, J.C. Malewezi and J.D. Sachs, 2006. *Poverty, Aids and Hunger. Breaking the Poverty Trap in Malawi*. New York: Palgrave Macmillan.

Crafts, N., 2004. 'Productivity Growth in the Industrial Revolution: A New Growth Accounting Perspective'. *Journal of Economic.History*, 64: 521–35.

Crawford, E., V. Kelly, T.S. Jayne and J. Howard, 2003. 'Input Use and Market Development in Sub-Saharan Africa: An Overview'. *Food Policy*, 28: 277–92.

Deininger, K., C. Carletto and S. Savastano, 2012. 'Can Diaries Help in Improving Agricultural Production Statistics? Evidence from Uganda'. *Journal of Development Economics*, 98: 42–50.

Dorward, A., J. Kydd, J. Morrison and I. Urey, 2004. 'A Policy Agenda for Pro-Poor Agricultural Growth'. *World Development*, 32 (1): 73–89.

Dorward, A. and E. Chirwa, 2010. 'A Review of Methods for Estimating Yield and Production Impacts'. Unpublished.

Dorward, A. and E. Chirwa, 2011a. 'The Malawi Agricultural Input Subsidy Programme: 2005–6 to 2008–9'. *International Journal of Agricultural Sustainability*, 9 (1): 232–47.

Dorward, A.R. and E.W. Chirwa, 2011b. *Evaluation of the 2010/11 Farm Input Subsidy Programme, Malawi: Report on Programme Implementation*. London: School of Oriental and African Studies.

Duflo, E., M. Kremer and J. Robinson, 2008. 'How High Are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya'. *American Economic Review*, 98 (2): 482–8.

Easterly, W., 2009. 'Can the West Save Africa?' *Journal of Economic Literature*, 47 (2): 372–447.

Ellman, M., 1978. 'The Fundamental Problem of Socialist Planning'. *Oxford Economic Papers*, New Series, 30 (2): 249–62.

Forrest, T., 1993. *Politics and Economic Development in Nigeria*. Boulder, CO: Westview Press.

Herring, R., 2001. 'Data as Social Product'. In *Q-Squared. Combining Qualitative and Quantitative Methods in Poverty Appraisal*, ed. R. Kanbur. New Delhi: Permanent Black.

Hill, P., 1984. 'The Poor Quality of Official Socio-Economic Statistics Relating to the Rural Tropical World: With Special Reference to South India'. *Modern Asian Studies*, 18 (3): 491–514.

Hill, P., 1986. *Development Economics on Trial*. Cambridge, UK: Cambridge University Press.

Hunt, D. and M. Lipton, 2011. *Green Revolutions for Sub-Saharan Africa?* Briefing Paper, Chatham House, Africa Programme. Royal Institute of International Affairs.

International Food Policy Research Institute, 2009. *Fertilizer Subsidies in Africa. Are Vouchers the Answer?* IFPRI Issue Brief 60.

Jayne, T.S. and S. Rashid, 2010. *The Value of Accurate Crop Production Forecasts*. Food Security International Development Working Papers 97032. Michigan State University, Department of Agricultural, Food, and Resource Economics.

Jerven, M., 2011a. 'Users and Producers of African Income: Measuring African Progress'. *African Affairs*, 110 (439): 169–90.

Jerven, M., 2011b. *Controversy, Facts and Assumptions: Lessons from Estimating Long Term Growth in Nigeria, 1900–2007*. Simons Papers in Security and Development, No. 13/2011, School for International Studies, Simon Fraser University, Vancouver, August.

Jerven, M., 2011c. 'Growth, Stagnation or Retrogression? On the Accuracy of Economic Observations, Tanzania, 1961–2001'. *Journal of African Economies*, 20 (3): 377–94.

Jerven, M., 2013. *Poor Numbers: How We Are Misled by African Development Statistics and What To Do About It*. Ithaca, NY: Cornell University Press.

Karshenas, M., 1996. 'Dynamic Economies and the Critique of Urban Bias'. *The Journal of Peasant Studies*, 24 (1–2): 60–102.

Kelly, V.A. and C. Donovan, 2008. *Agricultural Statistics in Sub-Saharan Africa: Differences in Institutional Arrangements and Their Impacts on Agricultural Statistics Systems. A Synthesis of Four Country Case Studies*. Food Security International Development Working Papers 54558. Michigan State University, Department of Agricultural, Food, and Resource Economics.

Kidane, W., M. Maetz and P. Dardel, 2006. *Food Security and Agricultural Development in Sub-Saharan Africa: Building a Case for More Public Support*, Rome: FAO.

Lea, N. and L. Hanmer, 2009. *Constraints to Growth in Malawi*. Policy Research Working Paper 5097. World Bank, Africa Region: Southern Africa Poverty Reduction and Economic Management Unit.

Li, Wei and D. Tao Yang, 2005. 'The Great Leap Forward: Anatomy of a Central Planning Disaster'. *Journal of Political Economy*, 113 (4): 840–77.

Lipton, M., 1977. *Why Poor People Stay Poor: A Study of Urban Bias in World Development*. London: Temple Smith.

Lipton, M. and R. Longhurst, 1989. *New Seeds and Poor People*. London: Unwin Hyman.

Lü, Caizhen, 2012. *Poverty and Development in China: Alternative Approaches to Poverty Assessment*. Abingdon, Oxon: Routledge.

Malawi and Paris 21, 2009. 'Peer Review of Malawi National Statistical System'. Republic of Malawi and Partnership in Statistics for Development in the 21st Century.

Mosley, P., 1992. 'Policy Making without Facts: A Note on the Assessment of Structural Adjustment Policies in Nigeria, 1985–1990'. *African Affairs*, 91 (363): 227–40.

Mosley, P., 1993. *Policy and Capital Market Constraints to the African Green Revolution: A Study of Maize and Sorghum Yields in Kenya, Malawi and Zimbabwe, 1960–91*. Innocenti Occasional Papers, Economic Policy Series no. 38.

NSO (National Statistics Office), 2010. *National Census of Agriculture and Livestock* (*NACAL*). Zomba, Malawi: NSO.

Nurkse, R., 1953. *Problems of Capital Formation in Underdeveloped Countries*. London: Oxford University Press.

Oya, C., 2010. 'Agro Pessimism, Capitalism and Agrarian Change: Trajectories and Contradictions in Sub Saharan Africa'. In *Political Economy of Africa*, ed. V. Padayachee. London: Routledge.

Platteau, J.-P., 1995. 'The Food Crisis in Africa: A Comparative Structural Analysis'. In *The Political Economy of Hunger – Selected Essays*, eds Drèze, J., A.K. Sen and A. Hussain, 445–553. Oxford: Clarendon Press.

Ponte, S., 2002. *Farmers and Traders in Tanzania*. London: James Currey.

Rao, C.R. (ed.), 1972. *Data Base of Indian Economy: Review and Appraisal*, vol 1. Eka Press.

Rudra, A., 1982. *Indian Agricultural Economics: Myths and Realities*. New Delhi: Allied Publishers.

Sachs, J., 2009. 'Homegrown Aid'. *New York Times*, 8 April, A23.

Singh, I., 1990. *The Great Ascent: The Rural Poor in South Asia*. Baltimore. MD: published for the World Bank by the Johns Hopkins University Press.

Srinivasan, T.N., 1994. 'The Data Base for Development Analysis: An Overview'. *Journal of Development Economics*, 44 (1): 3–27.

Srinivasan, T.N. and A. Vaidyanathan, 1972. 'Agricultural Statistics'. In *Data Base of Indian Economy: Review and Appraisal*, vol. 1, ed. C.R. Rao, 33–62. Eka Press.

Stolper, W.F., 1966. *Planning without Facts: Lessons in Resource Allocation from Nigeria's Development*. Cambridge, MA: Harvard University Press.

Svedberg, P., 1999. '841 Million Undernourished?' *World Development*, 27 (12): 2081–98.

Tomlinson, B.R., 1993. *The Economy of Modern India, 1860–1970*. New York: Cambridge University Press.

Vaidyanathan, A., 2010. *Agricultural Growth in India: Role of Technology, Incentives and Institutions*. Delhi: Oxford University Press.

Wiggins, S., 2002. 'Smallholder Farming in Africa: Stasis and Dynamics'. In *Renewing Development in Sub-Saharan Africa: Policy, Performance and Prospects*, eds D. Belshaw and I. Livingstone, 101–20. London: Routledge.

World Bank, 1997. *Accelerating Malawi's Growth: Long-Term Prospects and Transitional Problems*. Washington, DC: World Bank Southern Africa Department.

World Bank, n.d. *Malawi, Fertilizer Subsidies and the World Bank*, http://go.worldbank.org/KIGRBOO0B0 (accessed January 2012).

Wroe, D., 2012. 'Donors, Dependency, and Political Crisis in Malawi'. *African Affairs*, 111 (442): 135–44.