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WIDER Working Paper 2015/044

Mozambique

Off-track or temporarily sidelined?

Channing Arndt,¹ E. Samuel Jones,² and Finn Tarp¹

April 2015

Abstract: Since 1994, a great deal has been accomplished. We argue that poverty reduction was temporarily sidelined in the 2000s. A series of shocks, especially the fuel and food price crisis of 2008, combined with poor productivity growth in agriculture and a weather shock, undermined progress in measured consumption poverty. We expect progress in poverty reduction to resume. These shocks also exposed persistent weaknesses in development strategies and programmes. Nevertheless, Mozambique has the potential to achieve rapid and broad-based economic and social progress. With key reforms and success in maintaining peace and stability, it will.

Keywords: Mozambique, consumption poverty, growth, inequality, non-monetary measures of well-being

JEL classification: D63, I32, O47, O55

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1 Introduction

The past four decades in Mozambique have been tumultuous by almost any standard. Unlike many African countries that gained independence during the 1960s, the struggle in Mozambique for political independence from the colonial Portuguese power lasted until 1974. The decade prior to independence was marked by increasing violence coexisting with a policy of settlement on the part of the Portuguese. Independence occurred following the Carnation Revolution in Portugal and the subsequent decision to withdraw support to the colonies. Once in power in Mozambique, the ruling Frelimo party initiated a Marxist economic and social regime. Simultaneously, a mass exodus of nearly all of the approximately 200,000 Portuguese settlers removed the vast bulk of skilled people. While macroeconomic collapse was avoided during the second half of the 1970s, the limitations of the collectivist economic strategy became increasingly evident. Before alternative policies could be put in place, armed struggle broke out with the National Resistance Movement of Mozambique (RENAMO) in the early 1980s, strongly abetted by the racist regimes in Rhodesia (now Zimbabwe) and South Africa.

The war that ensued was brutal and lasted for a decade. During the 1980s, more than one million people were killed and about five million displaced. The stresses of war, including the difficulties in enacting economic reforms under a wartime footing, led inexorably to economic collapse, in spite of the signing of the Nkomati Accord with South Africa in 1984. In 1986, Mozambique formally embarked on an Economic Rehabilitation Program controlled by the Bretton Woods institutions. However, without peace, few reforms were actually possible. Coincident with the release of Nelson Mandela from prison in 1990, peace talks began in earnest and culminated with the signing of a peace agreement in 1992. This was followed by general elections in 1994, when the Frelimo party took firm control, and by the fairly rapid implementation of an essentially standard structural adjustment programme.

In the more than two decades that have passed since democratic elections ushered in a new era in Mozambique, a great deal has been accomplished with nearly all development indicators registering improvements—often substantial—relative to the miserable levels posted in the mid-1990s. Headline economic growth has been among the most rapid in the world; enormous efforts have been made in improving access to education with complete primary education now in sight; and infant mortality rates have declined dramatically from about 175 deaths per 1,000 live births in 1975 to about 70 deaths per 1,000 live births in 2011. Moreover, the inherent potential for Mozambique to continue to register rapid economic and social progress is large. Recent major natural resource finds expand the possibilities set.

In this paper, we assess whether Mozambique is on- or off-track. Section 2 focuses on the record from the mid-1990s to about 2009. This period saw three major efforts to take stock of living conditions and to relate those to trends in the macro economy. Section 3 synthesizes the available information and notes that a reasonably coherent picture emerges from the record presented in Section 2. Unfortunately, perspectives from 2009 to the present are less clear due in particular to a lack of comprehensive data on how the fruits of continued rapid economic growth are being distributed. Nevertheless, the final Section 4 considers recent economic and social trends drawing from the available information base and provides some perspectives looking forward.

2 The record from the mid-1990s to 2009

2.1 Growth and monetary measures of poverty

As noted in the Introduction, economic growth has been rapid at approximately 7 per cent per annum since 1994. At this rate, the volume of goods and services produced domestically at the end of 2014 would be about four times greater than the (low) levels achieved in 1994. This expansion is spread across a larger population. The 1997 and 2007 censuses estimated the population at about 16.9 and 21.8 million respectively, implying a population growth rate of about 2.5 per cent per annum. In addition, a share of the GDP growth has been concentrated in highly capital-intensive activities (such as aluminium production and gas extraction) with substantial foreign ownership and very light tax burdens. These activities influenced the headline macroeconomic statistics during the 1996/2009 years, but had very limited implications for the living standards of the population. If we accept that about one percentage point of growth has been related directly to these island sectors, we end up with a rough estimate of per capita growth in GNP of around 3.5 per cent per annum. This implies, in turn, a rough doubling of goods and services produced whose incomes accrue to Mozambican nationals over the 20-year period from 1994 to 2014.

With increased production, one would expect increased consumption, and this is indeed observed. Data on consumption patterns, growth, and distribution are derived principally from household budget surveys. Three major surveys have been undertaken: 1996/97, 2002/03, and 2008/09. A fourth survey, 2014/15, is currently in the field (Ministry of Planning and Finance/DNPO 1998; 2004; Ministry of Planning and Development/DNEAP 2010). These surveys are *employed* for a vast array of purposes including rebasing national accounts and estimation of inequality. However, they are *designed* principally for the estimation of absolute poverty rates. Table 1 presents the official headcount results for consumption poverty at the national level and for rural and urban zones.

Table 1: Official consumption poverty headcounts

	Levels (%)			Difference (% points)	
	1996/97	2002/03	2008/09	1996/97 to 2002/03	2002/03 to 2008/09
National	69.4	54.1	54.7	-15.3	0.6
Urban	62.0	51.5	49.6	-10.5	-1.9
Rural	71.3	55.3	56.9	-16	1.6

Source: Ministry of Planning and Finance/DNPO (1998, 2004); Ministry of Planning and Development/DNEAP (2010).

The story from 1996/97 to 2002/03 is reasonably straightforward. Economic growth was accompanied by a substantial reduction in consumption poverty. About 15 per cent of the population passed from poor to non-poor status. Gains occurred in both rural and urban zones and the gains in rural zones were somewhat more pronounced. Consistent with the poverty, growth, and inequality triangle of Bourguignon (2004), measured inequality remained roughly constant.

Furthermore, as documented in the second national poverty assessment (Ministry of Planning and Finance/DNPO 2004), this reasonably well-distributed GDP and consumption growth occurred in tandem with improvements across a large array of measures including real agricultural incomes, estimated production levels, anthropometrics, child mortality rates and a variety of social indicators. These improvements are all relative to the very low levels observed in

the mid-1990s. Hence, the progress realized reflects some combination of a development process coming into place and a natural snapback from the deeply depressed conditions prevailing in the immediate post-war period.

The next period, from 2002/03 to 2008/09, presents a different story. Even though published GDP growth rates continue at roughly similar rates, no progress was realized in reducing absolute consumption poverty rates. With increasing population, this implies a growing number of absolutely poor people. Stagnation occurred in both urban and rural zones though the point estimate declines in the urban zone and increases in the rural. None of these changes are statistically significant. Furthermore, inequality, measured in exactly the same way as in 1996/97 and 2002/03, again remained essentially constant. Hence, at face value, the growth, poverty, and inequality triangle presents a conundrum. More is being produced and the measured distribution of consumption remains constant; yet the poverty rate is not declining.¹

Section 3 is dedicated principally to analysing this conundrum. Before considering this, we present non-monetary measures of welfare with a focus on the 2002/03 to 2008/09 period where outcomes appear to be less straightforward.

2.2 Non-monetary poverty measures

Assets

The quality of a household's shelter or housing is a widely accepted indicator of material wealth. Housing often represents the single largest category (by value) of investments in durable assets made by individuals over the course of their lifetime. Households will often need to save or access credit facilities in order to make housing investments, meaning that such investments typically reflect a temporal dimension of material well-being. Thus, they are a reasonable proxy for longer-run income (typical/average individual income). Crude differences in housing quality are also relatively easily observed, making them less prone to measurement error.

Table 2 reports changes over time in four measures of housing quality. Each measure is represented as a dummy variable, which takes the value of one if a household's home has the characteristic indicated and zero otherwise. Accordingly, the average of such a dummy variable for a population sub-group gives the share of households in that group with that characteristic. The results show that, on average, all characteristics of housing improved from 2002/03 to 2008/09. The share of families that have roofs made of a durable material (concrete, zinc, or fibrous cement) increased by 4.4 percentage points, and the share using electricity, a generator or solar energy for lighting almost doubled from 6.9 per cent to 13.3 per cent of households.

¹ Poverty gap measures stagnate as well, indicating that the mean distance to the poverty line for those living below it has also remained roughly constant.

Table 2: Indicators of housing quality 2002/03 and 2008/09, (% households)

	Durable roofing		Durable walls		Electric lighting		Toilet/latrine	
	IAF02	IOF08	IAF02	IOF08	IAF02	IOF08	IAF02	IOF08
National	25.8	30.2	14.2	17.9	6.9	13.3	11.2	16.0
Urban	57.8	65.6	36.9	43.2	21.7	41.8	32.5	41.6
Rural	12.2	15.6	4.5	7.5	0.6	1.6	2.1	5.5

Note: IAF02 = 2002/03 Budget Survey; IOF08 = 2008/09 Budget Survey.

Source: Ministry of Planning and Development/DNEAP (2010) using data from the 2002/03 and 2008/09 budget surveys.

It bears emphasizing that, while the trends in housing are positive, the levels remain low. Nationally, 65 per cent of the population in 2008/09 reported living in housing with none of the four improvements in focus in Table 2 (down from 71 per cent in 2002/03).

It is also useful to look at patterns of ownership of durable consumer goods. These typically represent lumpy investments that require a minimum level of income to purchase and sustain (for example, batteries to play a radio). Again, measures of this kind incorporate a temporal dimension to material well-being that may not be fully reflected in the consumption poverty measures.

Table 3 summarizes trends in ownership for eight different goods, differentiated by urban and rural areas. Figure 1 then plots the average number of these goods owned by each household (ranging from zero to eight), which represents a simple composite non-monetary poverty indicator. Whichever way one looks, the trends are unambiguously positive. Perhaps the only exception is ownership of radios in urban areas; however, this is offset by the large increase in ownership of TVs and phones (driven by cell phones), which suggests some substitution between these goods.

Four more specific points can be made. First, as with housing, while the trends are positive, the levels are low, particularly in rural areas. Rural households owned, on average, about 1.36 goods in 2008/09. Not surprisingly, the use value of durable goods represents a small share of total consumption with a median value of about 1.2 per cent in rural areas and 3.1 per cent in urban areas in 2008/09. The small number of durables available, particularly to rural households, and their relatively small value illustrates the limits of consumer durable ownership as a reliable indicator of welfare as well as the limits of asset sales as a means to smooth consumption.

Second, as expected, one finds much greater levels of asset ownership in urban compared to rural areas (excluding bicycles). Third, the change in the share of households owning consumer durables has been moderately larger in urban areas for many goods, contributing to a growing rural-urban divide in asset ownership, at least in absolute terms. The average number of goods owned by rural households increased from 0.98 to 1.36 (or by 0.38) goods over the 2002/03 to 2008/09 period; in urban areas the increase was from 1.88 to 2.54 (or by 0.66) goods.²

Finally, we see from Figure 1 that the increase in ownership of consumer durables has been stronger in the south, particularly in comparison to rural parts of the central region of the country.

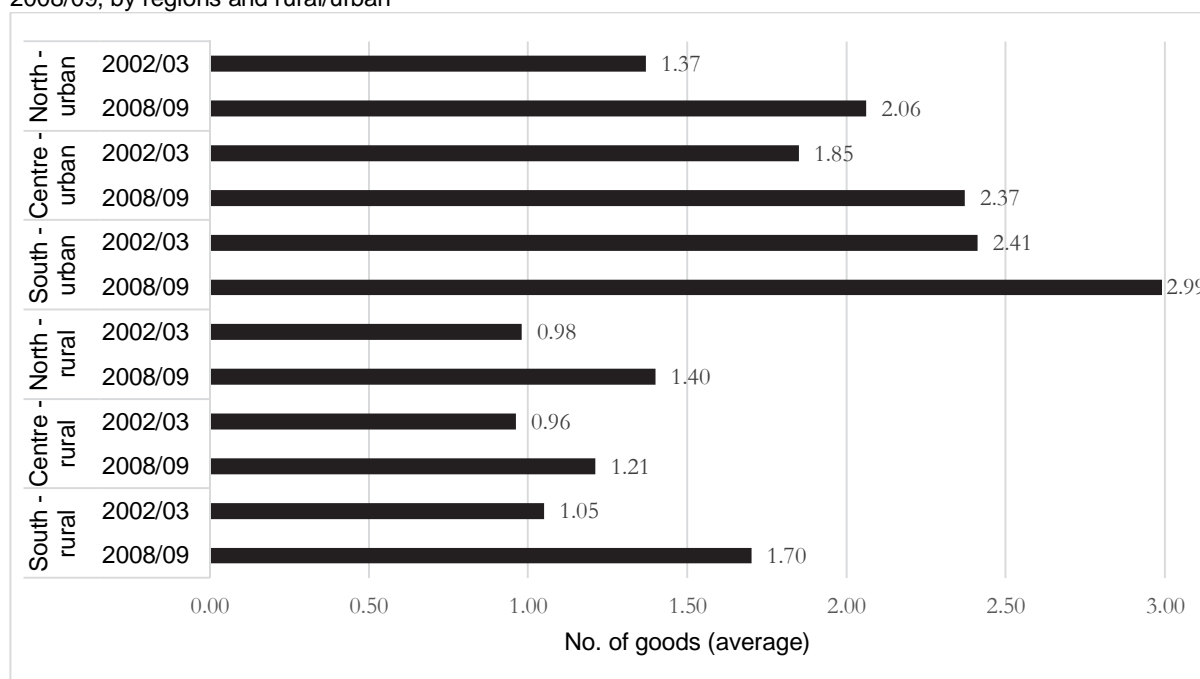
² In terms of rate of growth, the rural rate is slightly faster than the urban rate.

Table 3: Ownership of consumer durables 2002/03 and 2008/09, (% households)

		Urban	Rural	National
Bicycle	2002/03	19.4	31.8	28.1
	2008/09	24.1	43.8	38.1
	<i>change</i>	4.7	12.0	10.0
Car	2002/03	4.3	0.4	1.6
	2008/09	5.0	0.6	1.8
	<i>change</i>	0.7	0.2	0.3
Motorbike	2002/03	2.3	0.7	1.2
	2008/09	5.2	2.9	3.6
	<i>change</i>	2.9	2.2	2.4
Radio	2002/03	54.9	41.5	45.5
	2008/09	47.7	44.9	45.8
	<i>change</i>	-7.1	3.5	0.3
TV	2002/03	19.5	0.7	6.3
	2008/09	35.9	2.8	12.4
	<i>change</i>	16.4	2.1	6.1
Telephone	2002/03	13.1	0.5	4.3
	2008/09	53.7	11.4	23.7
	<i>change</i>	40.7	10.8	19.4
Bed	2002/03	62.1	22.3	34.2
	2008/09	64.1	28.8	39.0
	<i>change</i>	2.0	6.5	4.9
Fridge	2002/03	12.2	0.3	3.9
	2008/09	18.4	0.6	5.8
	<i>change</i>	6.2	0.3	1.9
Average	<i>change</i>	8.3	4.7	5.7

Source: Ministry of Planning and Development/DNEAP (2010) using data from the 2002/03 and 2008/09 budget surveys.

Figure 1: Average number of consumer goods (out of a maximum of eight) owned by households 2002/03 and 2008/09, by regions and rural/urban



Notes: Included goods are those listed in Table 3.

Source: Ministry of Planning and Development/DNEAP (2010) using data from the 2002/03 and 2008/09 budget surveys.

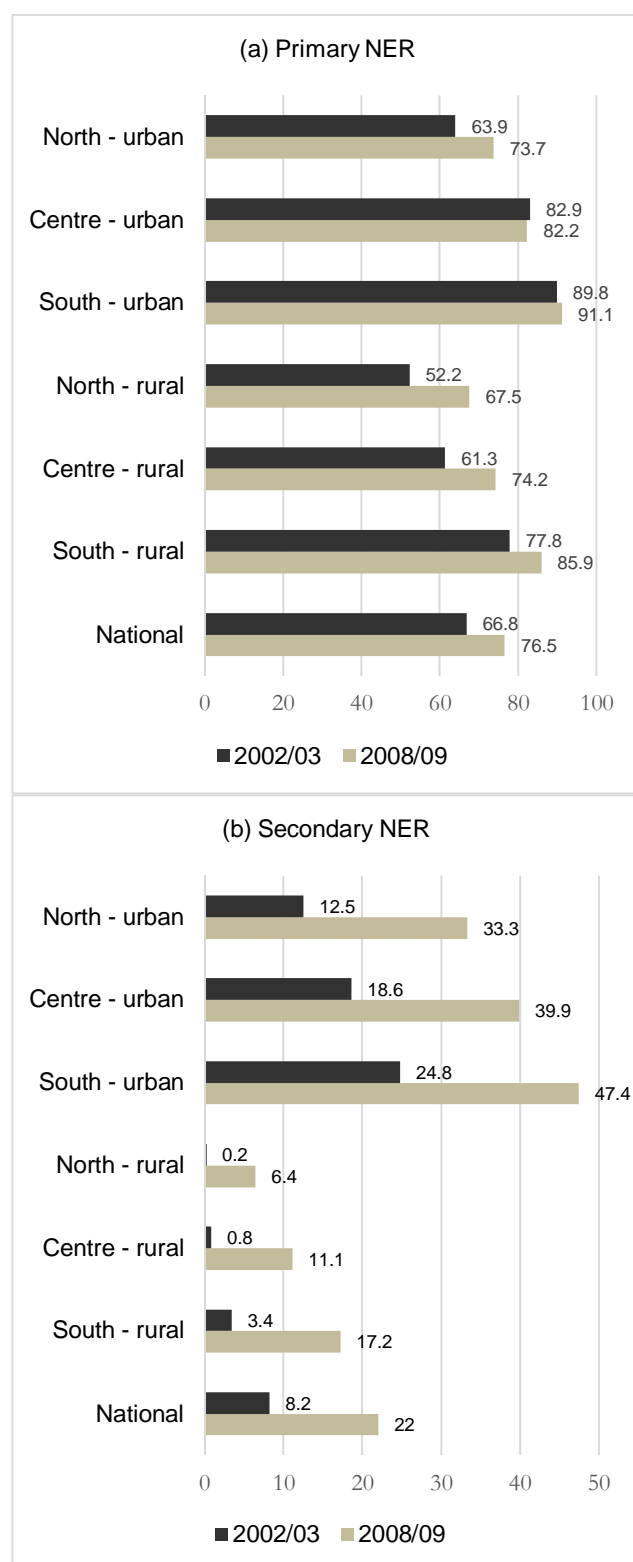
Access to education

As indicated in the Introduction, Mozambique has achieved significant gains in increasing citizens' access to basic public services, especially education. Trends in this domain can be assessed using the net enrolment rate (NER). This is defined as the share of all children of official school age³ who are enrolled in a school whose official age range corresponds to the child's age. The NER gives the share of children of a given official school age enrolled at their 'expected' level.

The NER for primary schooling is shown in panel (a) of Figure 2, distinguished by regions and urban/rural. The NER for secondary schooling is given in panel (b). The two panels show unambiguous increases for both ratios across virtually every region. At the national level, in 2008/09 we find that 76.5 per cent of all children aged 6-13 attended primary school, up from 66.8 per cent in 2002/03. Similarly, the secondary school NER more than doubled (from a relatively low base) to 22.0 per cent from 8.2 per cent. National level results mask even larger gains in specific areas. Access to primary schooling increased most where it was lowest, thereby reducing regional educational inequality. In the rural north the primary NER rose to 67.5 per cent compared to 52.2 per cent in 2002/03. Also, increases in the secondary NER were spectacular in rural areas; previously net enrolment rates were below 1 per cent in the rural north and centre and below 4 per cent in the south in 2002/93. In 2008/09 they stood at 6.4 per cent and 17.2 per cent, respectively. The conclusion is that expansion of the school network and access to education has been impressive.

³ Primary school ages are 6-13 years; secondary school ages are 14-18 years.

Figure 2: Net enrolment rates (NER), primary and secondary schooling by region 2002/03 and 2008/09



Notes: NER is defined as the share of all children of official school age (primary: 6-13 years; secondary: 14-18 years) who are enrolled in a school whose official age range corresponds to the child's age; secondary school includes technical schools.

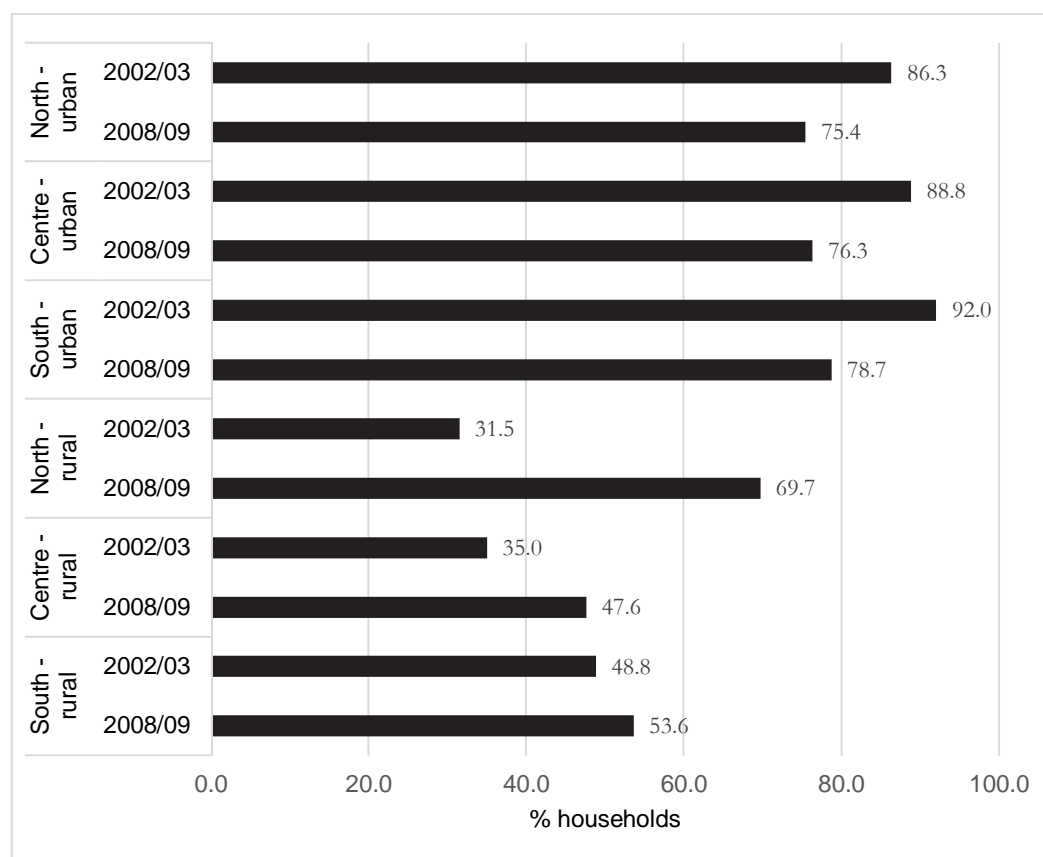
Source: Ministry of Planning and Development/DNEAP (2010) using data from the 2002/03 and 2008/09 budget surveys.

Access to health services and clean water

Here, we consider indicators of public health. Two indicators are employed here: (a) walking distance to the nearest primary health facility, measured in time taken; and (b) access to a safe water source, defined as potable water of some form. Figures 3 and 4 provide summary results for these two measures, respectively.

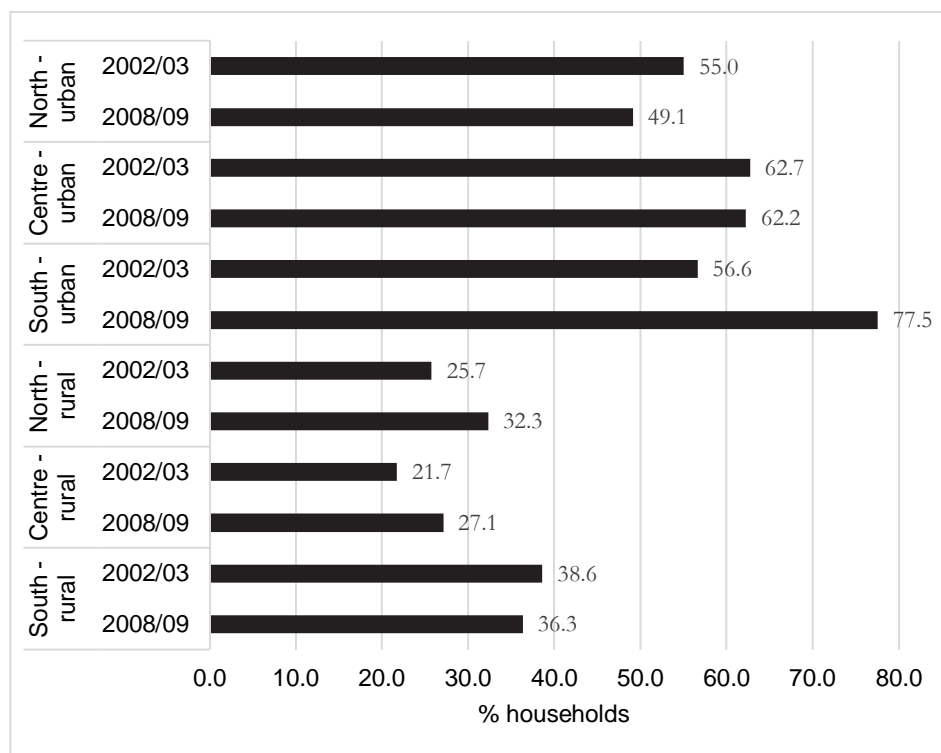
With respect to distance to the nearest primary health facility, the most important finding is a large improvement in rural areas. In 2008/09 in the rural north, 69.7 per cent of households could access such a facility within a 45-minute walk compared to only 31.5 per cent in 2002/03. Access in the rural centre and south also improved, though not quite so quickly. Interestingly, access in urban areas to primary health facilities appears to have worsened, as a slightly smaller share of households report they were able to reach a facility on foot within 45 minutes. This may be due to a number of factors such as urbanization, with higher population growth in the periphery of cities where access to public facilities is lower; and a greater reliance on hospitals and other medical facilities in urban areas, reducing demand for basic primary facilities.

Figure 3: Share of households with less than 45 minutes' walk to nearest primary health facility, 2002/03 and 2008/09



Sources: Ministry of Planning and Development/DNEAP using the 2008/09 and 2002/03 budget surveys.

Figure 4: Share of households with access to a safe water source, 2002/03 and 2008/09



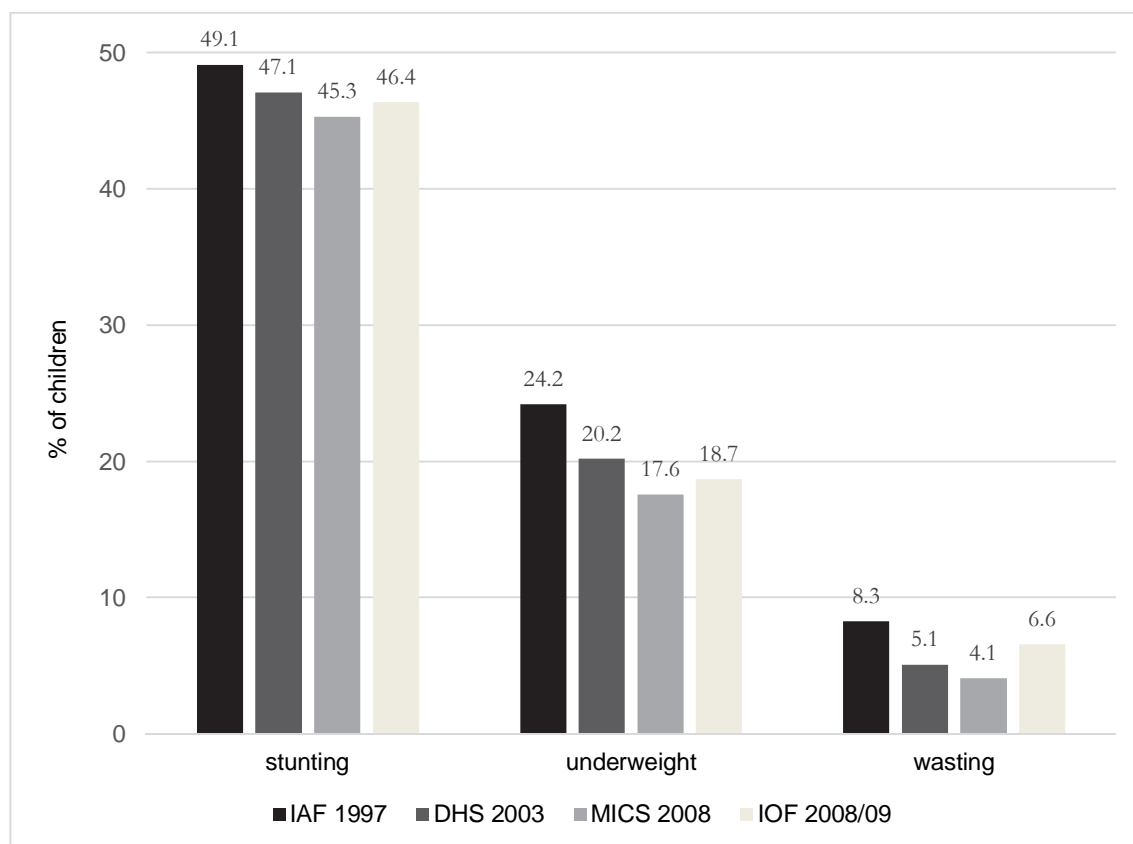
Source: Ministry of Planning and Development/DNEAP using the 2008/09 and 2002/03 budget surveys.

Evidence concerning access to safe water is probably the least impressive of the non-monetary indicators. As Figure 4 shows, the only unambiguous increase in access to safe water occurred in the urban south, where access was already relatively good. In 2008/09, less than one-third of all households in the rural centre and rural north of the country had access to a safe water source.

Anthropometric measures of well-being

This sub-section examines the well-being of the population from the point of view of the nutritional status of children under five years old. The risks and implications of poor nutrition are particularly critical for young children, as nutritional deficiencies can exert a strong influence on their subsequent growth and development. Assessing the nutritional status of children is a first step in fighting against malnutrition and is an important broad indicator of well-being. In addition to the 2008/09 household survey, a number of previous studies provide useful information about the nutritional status of children. These include: (a) the 1996/97 household budget survey (IAF96), which included a survey of anthropometric data; (b) the 2003 Demographic and Health Survey (DHS03); and (c) the 2008 Multiple Indicator Cluster Survey (MICS08). In general, these studies indicate that the prevalence of malnutrition in Mozambique decreased slowly over time; yet remains high in absolute terms. These trends are illustrated in Figure 5.

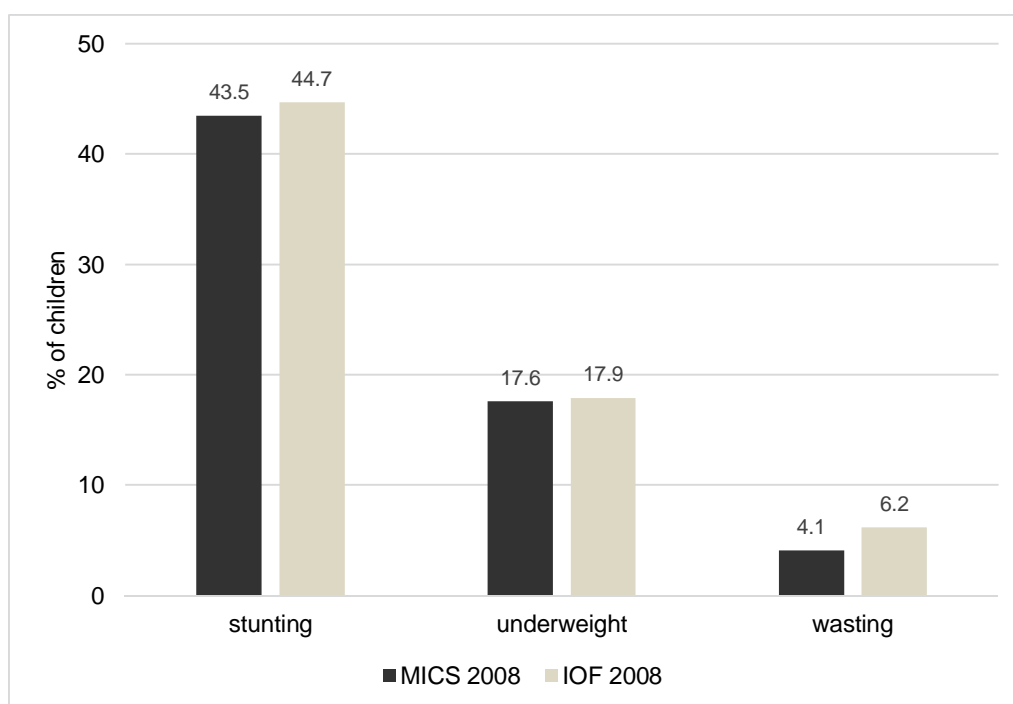
Figure 5: Trends in malnutrition across surveys, % infants (1996/97 – 2008/09)



Source: Ministry of Planning and Development/DNEAP (2010) using data from the 1996/97 and 2008/09 budget surveys as well as 2003 Demographic and Health Survey (National Institute of Statistics 2005) and the 2008 Mixed Indicators Cluster Survey (MICS) (National Institute of Statistics 2009).

The jump in malnutrition between the MICS08 and the IOF08 is notable even though portions of the two surveys were in the field contemporaneously. The increase might be indicative of a generally less well-off sample selected in IOF2008/09, which might help explain the stagnation in consumption poverty rates discussed above. To test this, we consider only households surveyed during the same period of 2008 (the MICS was conducted between September and November 2008 while IOF ran from September 2008 to August 2009). The results are shown in Figure 6. It indicates much smaller differences between the national averages for the three indicators. While the full sample stunting rate for IOF08 is 46.4, the rate for the comparable sample period is 44.7. If the September to November 2008 malnutrition indicators from IOF08 are lower than the full sample average, this implies that the December 2008 to August 2009 malnutrition indicators must be higher than the full sample average.

Figure 6: Comparison of malnutrition in IOF08 and MICS08 for survey overlap period, % infants



Source: Ministry of Planning and Development/DNEAP (2010) using data from the 2008/09 budget survey and the 2008 Mixed Indicators Cluster Survey (National Institute of Statistics 2009).

3 Macroeconomic consistency

3.1 Basic accounts

A principal concern is whether the story that emerges with respect to trends in consumption poverty can be squared with other macroeconomic variables. As discussed, the official statistics point to economic growth and a steady distribution of consumption in combination with no poverty reduction. The fundamental issues can be considered using two basic macroeconomic accounting identities.

$$C + I + G + X - M = GDP \quad (1)$$

$$Abs = C + I + G = GDP + M - X \quad (2)$$

The standard GDP identity using an expenditure optic shown in equation (1) can be reformulated to illustrate the definition of absorption. This is the broadest-based measure of economic welfare in the economy. Thinking in real terms, the identity in Equation (2) states that real use of goods and services (*Abs*=absorption) divides itself into three components: consumption (*C*), investment (*I*), and government (*G*). The sum represents total usage of goods and services in the economy, which must equal the amounts available. Goods and services are produced domestically (*GDP*) and imported (*M*). Exports (*X*) are subtracted from this total.

From Equation (2), one can identify a series of possible reasons why the poverty, growth, and inequality triangle of Bourguignon (2004) might not hold for Mozambique based on published data. They include:

- (a) GDP growth is not as rapid as stated in national accounts. There are actually fewer goods to distribute.
- (b) GDP growth is not translating proportionally across the components of absorption. So, consumption, government, and investment are growing at different rates. Rapid GDP growth might be translating into even more rapid growth in investment and government and consequently less growth in consumption.
- (c) The real trade-balance shifts such that the volume of imports declines relative to the volume of exports. A decline in the terms of trade would have this effect.
- (d) The inequality estimates are incorrect. The distribution of consumption is in fact worsening.
- (e) The poverty estimates are incorrect. There should be more poverty reduction than the estimates suggest.

3.2 Consumption poverty headcount estimates

Let us begin with the last of the possible explanations—the consumption poverty rate estimates should be lower in 2008/09 and/or higher in 2002/03. A great deal of effort has been expended in examining the relevant consumption data in order to corroborate (or not) the official estimates cited above. As illustrated by Alfani et al. (2012), it is possible to employ a method for estimating poverty that generates a decline in poverty over the 2002/03 to 2008/09 period. However, the fundamental result of a rapid decline in poverty rates between 1996/97 and 2002/03 and then a substantial slowdown in the 2002/03 to 2008/09 period remains. In addition, the regional pattern of the slowdown, particularly measured increases in poverty rates in rural provinces in the centre of the country, are present in all analyses conducted to date. We now turn to the remaining four possibilities listed above to consider whether those factors alone can explain the observed stagnation in poverty rates over the more recent 2002/03 to 2008/09 period.

3.3 GDP growth

Issues with GDP growth calculations begin with agriculture. Before going to growth, it is important to highlight the importance of agricultural production for the well-being of the majority of Mozambican households. According to the 2008/09 budget survey, 70 per cent of households are located in rural areas and virtually all of these (96 per cent) are engaged in agriculture in some way, with the vast majority of these pointing to agriculture as their principal livelihood. As shown in Jones and Tarp (2013), agriculture represents the principal occupation of a plurality of *urban* households. Additionally, consumption of food accounts for two-thirds or more of total consumption of poor households. These figures are essentially unchanged compared to 2002/03 and suggest a strong relationship between trends in agriculture and aggregate trends in poverty reduction.

On this basis, the series of Agricultural Surveys (*Trabalhos de Inquérito Agrícola*, TIAs) provides an important complement to the household budget surveys (Ministry of Agriculture/DE 2010). Official estimates from the series of TIAs have been published by the Ministry of Agriculture. The TIAs are based on outcomes as reported by large, representative samples of households. As such, they represent the most consistent and rigorous database of production by agricultural households over time. Full TIAs were conducted in 1996, 2002, 2005, and 2008. They attempt to estimate total household income for the production year. Limited TIAs, which focus on agricultural production, were conducted focusing on the harvests of 2003, 2006, and 2007.

For the period 2002 to 2008, four main findings from the TIAs can be highlighted. First, the TIAs confirm the continued importance of agriculture for households' well-being. From 2002 to 2008 the number of small- and medium-sized farms grew by 19 per cent, consistent with

population growth, and the area under cultivation grew by 34 per cent. Importantly, however, the vast majority of farms are small—the *average* size is around 1.5 hectares, with many farms operating on one hectare or less. Second, all indicators concerning access to and use of productivity-enhancing inputs, such as pesticides and fertilizers, are at very low levels and show no unambiguously positive trends. From 2002 to 2008 the share of farming households receiving extension information declined from 13.5 per cent to 8.3 per cent. Similarly, use of pesticides fell from 6.8 per cent to 3.8 per cent. The point estimate for the share of farms using chemical fertilizer rose slightly from 3.8 per cent in 2002 to 4.1 per cent in 2008. Only about one in 35 farm households received credit of any sort (Ministry of Planning and Development/DNEAP 2010) with no discernible trend over the period. In short, all productivity indicators were at best stuck at very low levels over the period with some showing negative trends.

Third, consistent with stagnation in technology trends, agricultural production shows only weak growth on aggregate. Per capita production of all the principal staple crops (for example, maize, sorghum, cassava, rice) was lower in 2008 compared to 2002 (Ministry of Planning and Development/DNEAP 2010). Table 4 provides aggregated figures for staple food crop production, calculated using caloric values of the individual crops as weights.⁴ These caloric values remain constant over time and can be used to derive a total production index. When calculated on a per capita basis, the total calorie value of staple crop production has been at best stagnant and possibly falling. For example, total calorie availability per person per day was 2000 calories in 2008 compared to 2135 in 2002 (based on national agricultural production alone). These mild declines in per capita staple food production are highly consistent with the national picture of stagnant rural poverty over the same period.

Table 4: Aggregate production trends for food crops

Aggregate measures (using calories)						Change		Coeff. of variation
	2002	2003	2005	2006	2007	2008	2008-'02	
Total production index	100.0	124.2	111.3	140.9	128.6	113.8	13.8	12.1
Productivity (kcal/ha)	2,307	2,643	1,935	2,424	2,189	1,961	-15.0	12.2
Calories per person/day	2,135	2,583	2,103	2,717	2,422	2,000	-6.3	12.5

Source: Ministry of Planning and Development/DNEAP (2010).

An additional point is one of production volatility. The last column of Table 4 reports the coefficient of variation, which is the standard deviation of the annual row values divided by their mean. It indicates the expected change per year as a percentage of the average value. Total calorie availability (per person/day) can be expected to vary by 12 per cent from one year to the next. Production volatility is much larger at the regional level given that differential regional performances offset each other to some extent, leading to smoother national trends. Large variability in agricultural production is an indicator (among many) of the high level of vulnerability of rural populations.

Despite these repeated findings from the TIA surveys and despite the massive weight of the family sector and food in overall agricultural production, national accounts estimated growth in agricultural value added (agricultural GDP at factor cost) at 7.9 per cent per annum from 2003 to 2009. Outside observers can be excused for falling into massive confusion over this statistical disconnect. Table 5 provides some insights into the issues by illustrating comparisons of maize production statistics between TIAs, which have recently been the official source for agricultural

⁴ The caloric values are the same as those used in the household survey analysis and are based on internationally recognized benchmarks.

production data as published in the *Statistical Yearbook* and an international data site, in this case FAOStat.

In a nutshell, up until about 2008, official agricultural statistics relied upon data obtained from the food security unit located within the Ministry of Agriculture. This unit was set up in the immediate post-war period and essentially employed rapid appraisal-type techniques to estimate agricultural production. These data became the official source of data for agriculture by force of the fact that there was no alternative. From 1996, these data coexisted with data from the TIAs for the years when the TIAs went into the field. From about 2002, reasonably regular TIA surveys began to take place. In 2005, production data from the TIA showed a widescale drought. This finding diverged massively from the estimations of the food security unit, which found a normal year and continuation of rapid agricultural growth. A careful examination of these competing data sources in general and the 2005 crop year in particular by Kiregyera et al. (2008) shone a harsh light on the then official data source. The food security unit had completely missed a massive drought, and the TIA was highlighted as a far more reliable data source for production statistics.

Following the publication of the Kiregyera et al. (2008) report, the National Institute of Statistics switched the official source of agricultural statistics to the TIA. As shown in the table, FAOStat applies the TIA data from 2002 to 2006. Curiously, FAOStat then reverts to another source (presumably the food security unit data) in 2007 and 2008. It is then unencumbered by any TIA data in 2009, 2010, and 2011. In 2012, it reverts back to exactly the data published in the *Statistical Yearbook*, the source for official data, before diverging from the official source once again in 2013.

Table 5: Total maize production by data source (thousands of tonnes)

	TIA/AE	FAOStat	% Difference
2002	1,115	1,115	0.0%
2003	1,181	1179	-0.2%
2004	NA	1060	
2005	942	942	0.1%
2006	1,396	1418	1.6%
2007	1,134	1582	39.5%
2008	1,214	1676	38.1%
2009	NA	1612	
2010	NA	2090	
2011	NA	2179	
2012	1177	1177	0.0%
2013	1207	1631	35.1%

Source: Ministry of Agriculture/DE (2010), National Institute of Statistics (2014, 2013, and 2012), and Food and Agriculture Organization (2015).

Two observations are pertinent here. First, many of the salient elements in the FAOStat series derive from movement between data sources. The production collapse from 2011 to 2012 is particularly striking. Second, and more relevant to the point in focus here, national accounts have been almost impossibly trapped with respect to estimating growth and value added in agriculture. The survey-based data are, even in positive circumstances, deeply inconvenient to use as they arrive well after the regular planning cycle for government. The national accounts department is obliged to provide GDP estimates for the cycle; hence, they are forced to use the more timely food security unit estimates. Worse, survey-based estimations of agricultural production do not

happen every year. The 2012 *Statistical Yearbook* provides maize production figures for 2008 (a number slightly greater than the one in Table 5) and for 2012 (exactly the number in Table 5). The years in between are pointedly blank (National Institute of Statistics 2013). So, just at the time that the official data source for production of major crops switched to a survey-based instrument, that instrument ceased to produce data for three years running.

Faced with this situation, national accounts have not yet moved from the old data series—which looks similar to FAOStat in trends—to the new official agricultural production series, which is vastly more credible. Note that, with FAOStat, maize production grows by 50 per cent from 2002 to 2008, or 7 per cent per year. With the more credible survey-based estimates, production of maize—the most important staple food in the country—is basically flat, which implies a mild decline on a per capita basis. As agriculture represents around 20 per cent of GDP, significantly slower growth in agriculture implies slower growth in overall GDP.

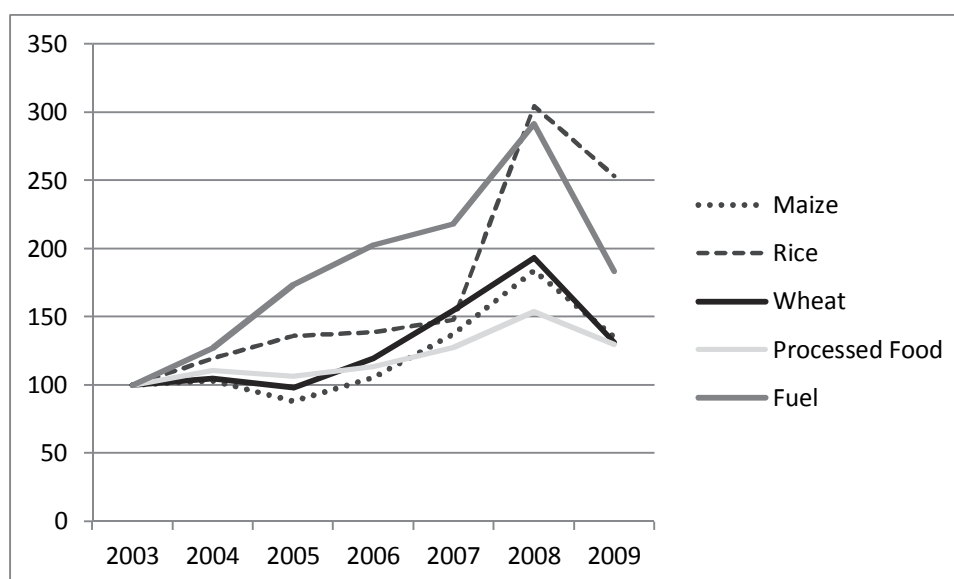
3.4 Components of absorption

This brings us to point ‘b’ in our list. A large reduction in the estimated growth rate of agriculture has strong implications for exactly one component of absorption, consumption (C). Increases in agricultural production are not likely to be absorbed by the government or investment accounts. Hence, reductions in the estimated rate of agricultural growth imply reductions in consumption (assuming the trade statistics are left alone, which is sensible).

3.5 Terms of trade

Point ‘c’ is also relatively straightforward. Over the period 2002/03 to 2008/09, a great deal was happening in international commodity markets as shown in Figure 7. World food prices spiked significantly in real terms, with the peak attained in mid-2008. During the 2008/09 survey period, world food prices declined to levels significantly below their peaks of mid-2008, but still well above levels registered in 2002 and 2003. In addition, fuel prices rose almost continuously from 2002 to a peak in mid-2008 that was nearly five times the average level observed in 2002/03. Like food, oil prices declined in the second half of 2008 and remained at levels well above those observed in 2002/03. Hence, the observed decline in per capita production of food crops in 2008 occurred essentially simultaneously with a very strong spike in international food prices. Increases in fuel prices raised the costs of: delivering food to Mozambique (even after the international food price had been paid); distributing imports within the country; and distributing whatever surplus domestic agricultural production that might have existed.

Figure 7: International real price indices



Source: International Monetary Fund (2011) and Council of Economic Advisers (2010).

All five of the items shown in Figure 7 are significant import items for Mozambique, with fuel particularly prominent in the import basket. As Mozambique did not enjoy similar price increases for its exports, its terms of trade declined nearly continuously over the 2002/03 to 2008/09 period. For a given level of foreign finance, Mozambique was forced to export more in order to import the same volume of goods (particularly fuels and food).

3.6 Inequality

Finally, with respect to point ‘d’, inequality, properly measured, appears to have increased as well. In most poverty assessments (including those conducted for Mozambique), inequality is calculated on the basis of nominal consumption or consumption adjusted by a spatial price index in order to take spatial variation in price levels into account. The spatial adjustment typically reduces inequality as it is normally less expensive to attain a minimum standard of food consumption and housing in rural areas. Hence, the typically more limited nominal consumption expenditures in rural areas have more real purchasing power per currency unit compared with urban zones. While accounting for spatial differences, the measures employed implicitly assume constant relative prices across the income distribution.

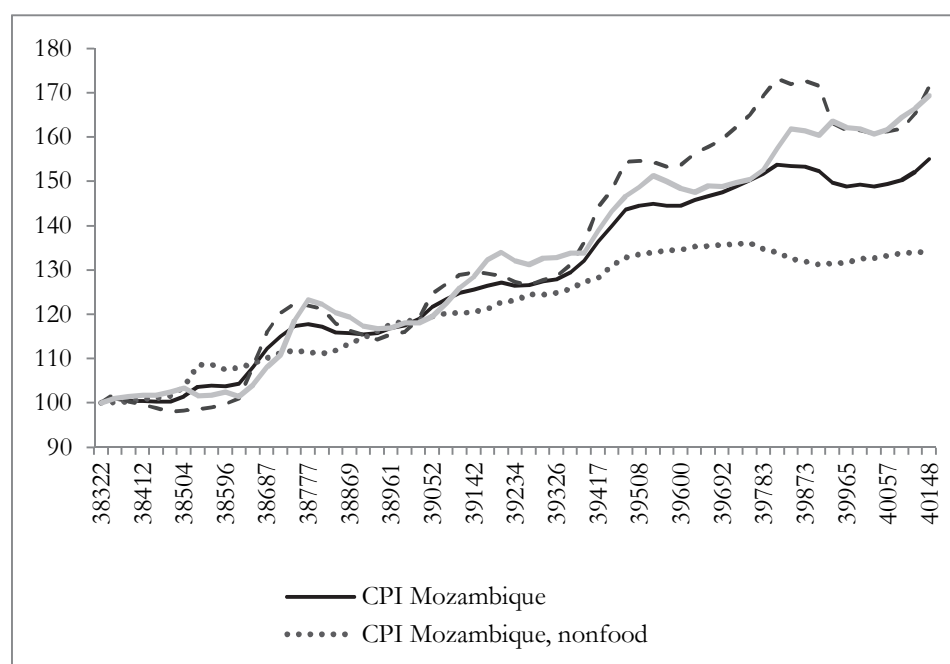
When this constant relative price assumption does not hold, inequality can be affected. As stated by Muellbauer (1974: 32), if ‘the prices of “luxuries” and “necessities” move differently, then different groups are differently affected’. In Mozambique as in other poor countries, lower-income consumers dedicate about half their overall budget to basic or core food products. Non-foods account for about one-third of expenditure. The remaining budget share, about 15 per cent, is allocated to a catch-all food category—non-core foods—which include processed foods and other more expensive items that would not be considered as core sources of calories or other nutrients.

At the upper end of the consumption scale, consumption patterns differ. Upper-income consumers purchase a much lower share of basic foods, a much higher share of non-core foods, and a much higher share of non-foods (Arndt et al. 2014). If the relative prices for goods in these categories shift, there are potential implications for real consumption inequality.

Figure 8 illustrates the trajectory of sub-components of the consumer price index (CPI) for Mozambique divided between core foods, non-core foods, and non-foods over the period 2004 to 2009. The figure shows that, coincident with the world price spike of 2007 and 2008, the price of foods had risen substantially relative to the price of non-foods. For Mozambique, the CPI data are limited to three major urban zones. Arndt et al. (2014) extend the analysis (to the extent possible) to rural zones and to the full time frame between 2002/03 and 2008/09 using the price data available for the household budget survey combined with existing CPI data. They find even greater separation than shown in Figure 8. Specifically, prices of core food, non-core foods, and non-food rise 2.34, 1.92, and 1.51 times, respectively from 2002/03 to 2008/09.

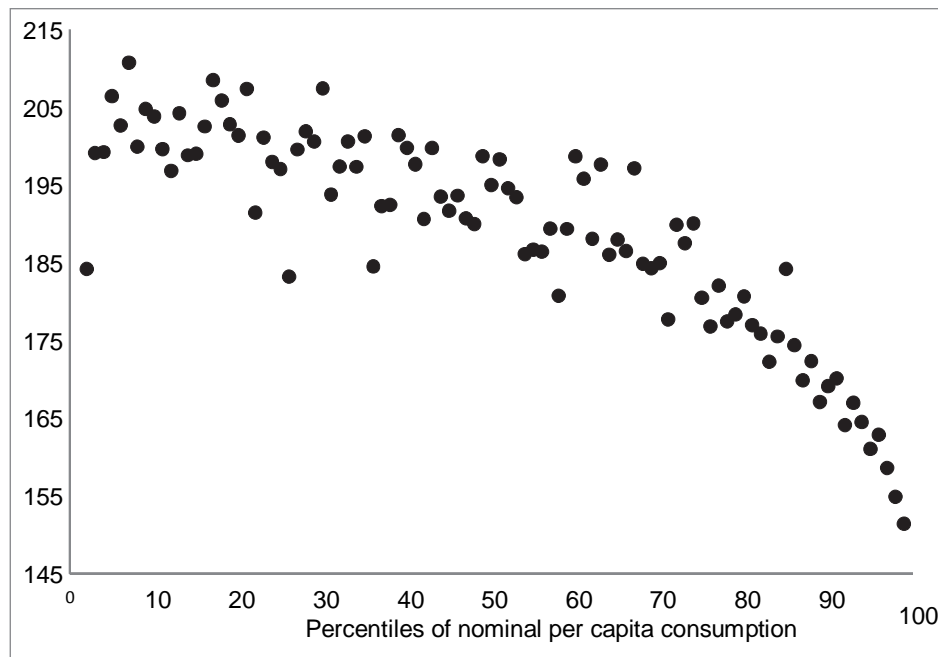
Arndt et al. (2014) use these three price indices combined with consumption share information for the three categories of expenditure for each household in the consumption surveys to construct a household-specific price index. The resulting household-specific price indices, averaged per percentile of nominal consumption, are shown in Figure 9. The figure shows that the cost of living increased substantially more for lower-income consumers (who consume more basic foods) than for upper-income consumers (who consume more non-food). When this household-specific deflator is used to deflate nominal consumption in 2008/09, measured inequality increases by about 2.5 Gini points from 2002/03 to 2008/09. This inequality increase holds whether or not one deflates nominal consumption to account for spatial differences in the cost of living.

Figure 8: Components of the Mozambique CPI



Source: Authors' calculations.

Figure 9: Percentile-specific price indices by percentiles of nominal per capita consumption



Note: Percentile-specific price indices were obtained computing the median of household-specific price indices (HPIs) for each percentile of nominal per capita consumption. The 1st and 100th percentiles are excluded from the figure. The HPI takes a value of 100 in 2002/03.

Source: Authors' calculations.

3.7 Formal assessment of macroeconomic factors

While all the factors listed above are likely to increase poverty in Mozambique, it is not clear which factors are the most important or whether they combine to result in stagnant poverty rates. To assess this, Arndt et al. (2012) used a dynamic economy-wide model of the Mozambican economy linked to a poverty module. They begin with a baseline scenario, labelled 2003 Baseline, and present a projection of economic growth and poverty rates in 2008/09 using assumptions that would have reasonably pertained had the projection been made in early 2004. Hence, they use standard assumptions for growth in the labour force (near the population growth rate), an optimistic projection of agricultural productivity growth, and constant world prices for imports and exports.

They then present five successive scenarios labelled: Education, Agriculture, Food, Fuel, and Weather. The scenarios are cumulative with each new scenario adding a particular set of changes to the earlier one. The changes bring the projection in line with what actually happened over the period. The Education scenario relates to the increased tendency for children to remain in school. As a result, the labour force as a whole grew at about 0.4 per cent per annum. This is significantly less than the rate of population growth and the assumed rate of growth of the labour force in the baseline scenario (both of which are about 2.5 per cent per annum).⁵ Agricultural productivity growth was in fact close to zero (Agriculture scenario). As noted above, world prices diverged dramatically. This is divided between two scenarios, Food and Fuel, corresponding to their respective price increases. The final scenario, Weather, incorporates

⁵ The composition of the labour force does shift towards more skilled labour.

shocks to agricultural production related to weather, and represents the total cumulative effect of all changes from the 2003 Baseline.

We begin with macroeconomic outcomes from this final weather scenario. Table 6 illustrates the growth in the components of GDP from both a production and an expenditure perspective by sector between 2003 and 2009 as (i) published in national accounts and (ii) projected by the dynamic computable general equilibrium (CGE) model for the final cumulative scenario Weather. The table also illustrates the shares of each sector in value added as well as expenditure shares in 2003. Sectors are divided between the broad categories of agriculture, industry, and services.

We note that, for industry and services, actual growth in value added is reasonably close to the growth in value added projected by the CGE model; however, the projected rate of growth of agriculture is substantially lower than the rate estimated by national accounts. Consequently, overall GDP growth differs between the estimations of national accounts (7.6 per cent per annum) and the projections of the model (6.5 per cent per annum). About 90 per cent of the difference in the overall GDP growth rate is due to the difference in the growth rate of agriculture, particularly food crops, which represented more than two-thirds of agricultural value added in 2003.

Even with this correction to the estimated overall GDP growth rate, per capita GDP is still estimated to have grown by about 4 per cent per annum (6.5 per cent GDP growth rate minus about 2.5 per cent annual population growth rate) over the period 2003 to 2009. However, the rate of private consumption growth is lower than GDP growth in both the model and in national accounts. Real consumption is growing in the model at about 4.5 per cent per annum in total or about 2 per cent per annum per capita. Hence, returning to our list of factors that might cause measured poverty to stagnate despite real GDP growth, we have accounted for the first two factors 'a' and 'b'. Do these two factors, combined with terms of trade effects, result in stagnant poverty?

The answer is 'yes'. Table 7 compares poverty rates derived from the 2008/09 survey with projected poverty rates using the economy-wide model. Before comparing the rates, it is helpful to note that the CGE model is annual while the household survey spans 2008 and 2009. To deal with this issue, we assume that the first semester of the survey corresponds to the model year 2008 while the second semester of the survey corresponds to the model year 2009. When comparing the full 2008/09 survey with the model results, we take the simple average of results for 2008 and 2009.

Table 6: Growth in components of GDP 2003/2009 for national accounts and for model

	2003 Share	National Accounts	Model
GDP	100	7.6	6.5
<i>Production optic</i>			
Agriculture	26	7.9	3.4
Industry	23	6.3	7.8
Services	51	8.3	7.4
<i>Expenditure optic</i>			
Consumption	89	5.9	4.5
Investment	22	4.5	5.8
Government	13	7.7	8.5
Exports	26	11.0	10.2
Imports	-50	4.7	5.2

Source: Arndt et al. (2012). Reproduced under Creative Commons license terms.

Table 7: Actual and projected poverty rates

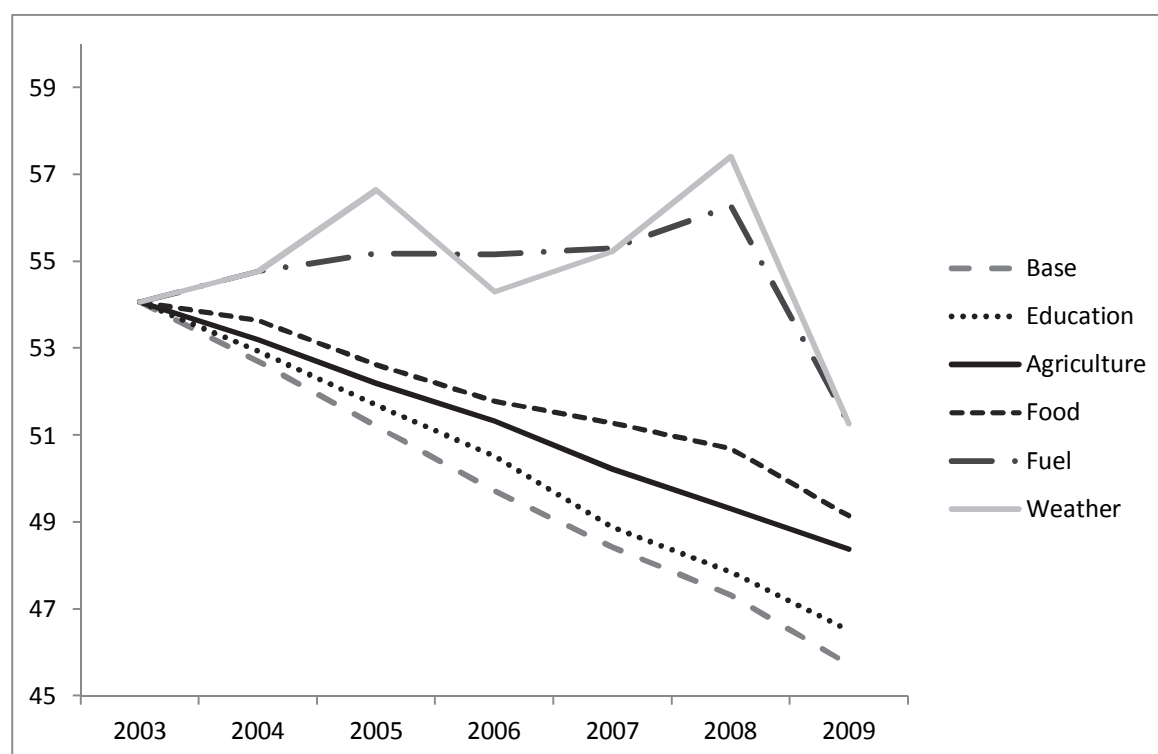
	National		Rural		Urban	
	Actual	Model	Actual	Model	Actual	Model
Aggregate	54.7	54.3	56.6	55.3	49.6	52.3
Semester 1	57.3	57.4	60.1	57.8	50.5	56.5
Semester 2	52.3	51.3	53.8	52.8	48.6	48.0

Source: Arndt et al. (2012). Reproduced under Creative Commons license terms.

The model results are strikingly close to the estimates from the survey. At the national level and for the full survey period, the 2008/09 budget survey estimates 54.7 per cent of the population consumes below the poverty line. The corresponding model estimate is 54.3 per cent of the population. The model results are also very close to IOF estimated rates in rural zones both for the full survey period and by semester. The only rates that do not lie very close to one another between the model projection (based on the 2002/03 survey and the CGE model) and the 2008/09 survey are the first semester in urban zones. The difference between these two rates is about six percentage points. Overall, the 2008/09 survey results appear to be fully consistent with the evolution of macroeconomic variables.

A significant advantage of economy-wide models is that they allow the analyst to decompose complex phenomena, such as the evolution of poverty rates through time, in order to provide insights into the driving forces behind results. So far, we have considered only results from the final scenario, Weather, which includes all of the effects discussed in the preceding sub-section. Figure 10 shows the evolution of poverty rates through time for each of the scenarios: 2003 Baseline, Education, Agriculture, Food, Fuel, and Weather. Recall that the scenarios are cumulative. Hence, the scenario Agriculture differs from the 2003 Baseline both in terms of rates of productivity growth in agriculture and the rate of growth of the labour force by skill class.

Figure 10: Evolution of poverty rates by scenario



Notes: Base is the Baseline 2003. Education applies observed labour force growth rates. Agriculture applies low productivity growth rates. Food applies world price shifts in food products to exports and imports. Fuel applies world price shifts in fuels and related products (plastics and fertilizers). Weather applies shocks to agricultural production related to weather events.

Source: Arndt et al. (2012). Reproduced under Creative Commons license terms.

A number of useful observations emerge. First, the goal, established in 2004, of a 45 per cent poverty rate by 2009 was reasonable. As discussed above, the 2003 Baseline scenario provides a projection of poverty rates based on information available in 2004. In this scenario, the labour force grows at plausible rates, agricultural productivity growth is relatively rapid, world prices are held constant, and no weather events occur. Under this scenario, a poverty rate of 45.7 per cent is attained in 2009.

The principal factors driving the observed stagnation in poverty are: (i) the combination of low productivity growth in agriculture—particularly food crops—substantial increases in world food prices, and a weather shock in 2008; and (ii) the nearly continuous increase in fuel prices over the 2003/2009 period. In 2008, when fuel prices were at their peak, they contributed the most to the increases in poverty above the 2003 Baseline scenario. In 2009, with the decline in fuel prices but relative firmness of food prices, the combination of low agricultural productivity growth and food price increases contributed the most to the increase in poverty.

The strength of the fuel price effect merits further mention. This effect is consistent with earlier analysis (Arndt et al. 2008). Net imports of fuel and derived products represent a substantial share of total imports—about 18 per cent in 2003. Because fuel use is difficult to economize on, particularly in the short run, fuel price increases imply a need to either increase exports or reduce imports for any given level of foreign exchange availability from external sources. This terms of trade loss amounts to a reduction in the quantity of goods available to the economy.

Changes in fuel prices then influence relative prices throughout the economy. Mozambique is a large dispersed country with relatively low population density. Driven in part by this geography,

the existence of large differences between farm-gate agricultural prices and consumer prices is well established. Transport costs, of which fuel is a substantial component, account for a large share of this difference. Other things being equal, higher fuel prices simultaneously lower farm-gate prices and increase consumer prices because they expand the marketing wedge between producers and consumers (Tarp et al. 2002). The costs of distributing imported products—especially food, which is bulky and relatively low value—increases. Finally, direct transport costs such as for buses or minibuses, which are often particularly important for urban residents, also tend to rise.

The model can also be used to assess inequality. Because the model contains household groups by income quintile, it will capture (some of) the differential impact of the observed shifts in relative prices across the income distribution. In the model, the Gini coefficient, looking across results for 2008 and 2009, rises to about two points higher than the estimate from 2002/03. This is in the same range as the 2.5 point increase estimated in Arndt et al. (2014).

In summary, a coherent story emerges. At the macroeconomic level, the stagnation observed in absolute poverty rates is consistent with the best available data on agricultural production, corrected GDP growth, and world price shifts.⁶

4 Current perspectives

Due to the current absence of sufficient data to conduct a detailed assessment beyond 2009, the best approach is to extrapolate forward on the basis of the trends observed up to 2008/09 and new factors entering the calculus. On this basis, both optimists and pessimists have items to point to. On the positive side, optimists can point to the following:

- While consumption poverty rates did not decline, a number of related welfare measures registered improvement including the quality of the housing stock and ownership of durable goods. While still at very low levels, some accumulation processes are in place in Mozambique.
- Education investments should begin to pay off. As discussed in Section 3, the net effect of retaining children in school (reduction in the labour force where labour force is defined as economically active individuals over 14 years old) outweighed the positive effect of increased levels of human capital over the 2002/03 to 2008/09 period. Over time, the impacts of education should tilt decisively towards benefits from a better-educated population. This assumes that the education sector is actually conferring skills of value; and available cross-section evidence indicates that, while returns to education have declined somewhat, particularly for low levels of education, they are still firmly positive (Ministry of Planning and Development/DNEAP 2010).
- Other enhancements to human capital are being registered. Child malnutrition remains alarmingly high and is declining at a slow rate; however, it has been declining over time. People should also benefit from improved access to health posts and safe water.
- In contrast to the period leading up to 2008/09, there is a growing sense of at least pockets of rapid growth in small-scale commercial agriculture. Credible national level statistics are scarce; however, Smart and Hanlon (2014), for example, document the

⁶ Space constraints prevent a complete exposition of how changes in poverty observed by region correlate with other observables; see Ministry of Planning and Development/DNEAP (2010) for such detail.

emergence of a viable poultry sector value chain with links back to local feedstock producers.

- Importantly, the persistent terms of trade declines experienced over the 2002/03 to 2008/09 period have ceased. Some of these, notably oil prices, have recently reversed themselves.
- As noted in the Introduction, recent major natural resource finds open both new possibilities for growth as well as new risks. As with existing large investments in Mozambique, natural resource exploitation, which is concentrated in coal, natural gas, and hydropower, is expected to be highly capital-intensive in nature with very substantial foreign ownership. Once in operation, a principal linkage to the domestic economy will be government revenue. Substantial and reasonably regular revenues from royalties and income taxes are only likely to kick in ten years or more into the future. However, during the ongoing investment phase, linkages to the domestic economy are clearly visible as natural resource exploitation companies set up operations. This includes extensive investment in rail and port infrastructure.

On the negative side, pessimists can point to the following:

- The survey-based agricultural production data for major food crops remains disconcerting, at least through 2013. And, use of improved technologies by the family sector remains very low.
- Job creation by the enterprise sector has also been disappointing. As a consequence, job opportunities tend to be strongly concentrated in agriculture and services, where productivity is often very low.
- Social fissures remain. In the first half of 2014, the principal opposition party RENAMO, retreated into the bush and actively sought to split the country in two by closing traffic on the main north/south road through military means. Fortunately, an agreement was reached and RENAMO participated in the general elections held in November 2014. Nevertheless, these events can hardly be taken as a positive sign either from the perspective of evaluating recent performance or looking forward.

Overall, and despite poor performance on some key welfare metrics during the 2002 to 2009 period, we conclude that while poverty reduction in Mozambique was temporarily sidelined in the 2000s, development is not fundamentally off-track. Rather, a series of shocks, especially the fuel and food price crisis of 2008, combined with poor underlying productivity growth in the family agricultural sector and a weather shock in 2008 contributed substantially to undermining progress in these key areas. As most of these shocks have ceased or gone into reverse, we expect measured progress in consumption poverty reduction to resume.

At the same time, these shocks also exposed genuine weaknesses in development strategies and programmes as implemented. These weaknesses persist, and it is evident that the new Mozambican government that took office in January of 2015 is faced with many complex challenges. Prominent policy challenges include that poverty remains very high; and future prospects in smallholder agriculture and the informal sector will be of fundamental importance to achieving rapid and sustained poverty reduction.

Looking further ahead, the existing pattern of employment creation indicates that the infrastructure and business environment remain weak and skewed against labour-intensive manufacturing exports and household firms. Meanwhile, Mozambique has to 'run' just to keep up due to the existing demographic dynamics. Nearly half the population is under 15 years of age. How they will be absorbed into the labour market in a productive manner will be critical to

the success or failure of the Mozambican socioeconomic transformation process in the years to come. In sum, there is little doubt that Mozambique has the potential to achieve rapid and broad-based economic and social progress. With key reforms and success in maintaining peace and stability, it will.

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