EXPLAINING POVERTY EVOLUTION:

THE CASE OF MOZAMBIQUE

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Abstract: Measuring poverty remains a complex and contentious issue. This is particularly true in sub-Saharan Africa where poverty rates are higher, information bases typically weaker, and the underlying determinants of welfare relatively volatile. This paper employs recently collected data on household consumption in Mozambique to examine the evolution of consumption poverty with focus on the period 2002-03 to 2008-09. The paper contributes in four areas. First, the period in question was characterized by major movements in international commodity prices. Mozambique provides an illuminating case study of the implications of these world commodity price changes for living standards of poor people. Second, a novel 'backcasting' approach using a computable general equilibrium (CGE) model of Mozambique, linked to a poverty module, is introduced. Third, the backcasting approach is also employed to rigorously examine the poverty-growth-inequality triangle. Finally, various simple but useful and rarely applied approaches to considering regional changes in poverty rates are presented. We find that the national poverty rate in Mozambique stagnated between 2002/03 and 2008/09.

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Measuring poverty remains a complex and contentious issue. This is particularly true in sub-Saharan Africa where poverty rates are higher, information bases typically weaker, and the underlying determinants of welfare relatively volatile. Three recent publications exemplify the issues. Sala-I-Martin and Pinkovsky (2010) and Young (2010) employ separate approaches to argue that poverty rates are falling rapidly throughout Africa. The World Bank, who is the official scorekeeper for attainment of the Millennium Development Goal related to consumption poverty, is considerably more subdued (World Bank 2010).

This paper employs recently collected data on household consumption in Mozambique to examine the evolution of consumption poverty with focus on the period 2002-03 to 2008-09. The paper seeks to contribute in four areas. First, the period in question was characterized by major movements in international commodity prices. Mozambique provides an illuminating case study of the implications of these world commodity price changes for the living standards of poor people in Africa. Of particular interest are the interactions between domestic events and the world commodity price rises. Second, in order to accomplish the first objective in a consistent manner, a novel 'backcasting' approach using a computable general equilibrium (CGE) model of Mozambique, linked to a poverty module, is introduced. Third, the backcasting approach is also employed to rigorously examine the poverty-growth-inequality triangle of Bourguignon (2004). Finally, because the CGE modeling is national in scope, various simple but useful and rarely applied approaches to considering regional changes in poverty rates are presented. Overall, we provide a comprehensive and robust analysis of the evolution of poverty, which highlights the value of an economy-wide model to uncover underlying drivers of poverty outcomes. It also shows how a variety of disparate sources of data can be put to analytical use in a coherent framework.

We find that the national poverty rate in Mozambique stagnated between 2002/03 and 2008/09 at around 55% of the population rather than meeting the officially stated goal of 45% by 2009. With respect to causal factors, our analysis points to (i) the macroeconomic drag imposed by nearly continuous fuel price increases from 2002 to 2008 combined with (ii) low productivity growth in agriculture, a weather shock and high international food prices. Together, and in roughly equal parts, these two sets of factors explain essentially all of the stagnation in poverty rates at the national level. At the regional level, food scarcity, as measured by changes in relative prices, is shown to be strongly related to measured poverty.

This paper is structured as follows. Section 2 provides background, a discussion of data sources, and a brief review of the approach for measuring consumption poverty. Section 3 presents considers consumption poverty results. Section 4 begins the process of explaining these results by presenting data on evolution of the agricultural sector. Section 5 introduces the CGE model, which is used to decompose and explain observed poverty evolution. Section 6 presents CGE model simulations and results. Section 7 investigates changes in poverty rates at a regional level. Finally, section 8 summarizes and concludes that poverty incidence stagnated in the period under consideration.

Background, Data, and Methods

Since obtaining the unwanted moniker of 'poorest country in the world' in 1992, Mozambique has performed relatively well. Through at least 2003, growth was high and poverty reduction rapid. As a result of these achievements, Clément and Peiris (2008) labeled Mozambique an economic success story in sub-Saharan Africa. Based on available data, Arndt, Jones, and Tarp (2007) were similarly positive though they also warned of a "perplexing lack of attention to what appear to be priority needs" (p. 265) in the agricultural sector as well as inconsistent donor support to agriculture.

More recent data allows the opportunities to consider in detail whether the positive trends exhibited over the period 1992-2003 continued through 2008-09. Even though it is well recognized that poverty is a multi-dimensional phenomena, we focus in this article principally, but not exclusively, on the consumption dimension.

Data sources

The most recent information on consumption poverty comes from the 2008/09 household survey (IOF08) conducted by the National Statistics Institute (INE). Results from this latest survey are compared to those obtained in two previous survey rounds (2002/03 and 1996/97, labelled IAF02 and IAF96 respectively). Although there are some small differences in the designs of the questionnaires, the three surveys are comparable with regards to their main objective, which is to measure consumption poverty at a given point in time. Like the two previous surveys, the 2008/09 survey contains detailed information on expenditure and consumption of food items. The IOF08 sample, at 10,832 households, is somewhat larger than the earlier rounds (about 8700 households each). In all surveys, the sample is representative for the whole of Mozambique as well as for the rural and urban zones, and each of the ten provinces plus Maputo City. In addition, IAF02 and IOF08 are representative through time. For IOF08, data collection began in September 2008 and lasted for one year. The survey is designed to be representative by quarter.

The results for consumption poverty are triangulated using data from numerous sources. Data on the agricultural sector is particularly relevant. According to IOF08, 70% of households are located in rural areas and virtually all of these (96%) are engaged in agriculture in some way. Poverty rates are typically higher in rural areas meaning that about three out of four persons categorized as poor lives in a rural zone. Additionally, consumption of food items accounts for around three fourths of the total consumption of poor households. These figures suggest there is likely to be a strong relationship between trends in agriculture and aggregate trends in poverty reduction. On this basis, the series of Agricultural Surveys (TIAs), which were conducted in full or abridged form most years between 2002 and 2008 (the exception is 2004), provide an important complement to the household budget surveys.

Methods for determining consumption poverty

The methods employed to measure consumption poverty are those employed by Arndt and Simler (2010), who build upon the work of Ravallion (1994; 1998), Ravallion and Bidani (1994), and Tarp et al. (2002b). In brief, per capita consumption for each household in the survey is estimated using information on purchases and own consumption. In order to take into account geographic differences in costs of living and consumption patterns, Mozambique is divided into 13 relatively homogeneous spatial domains. Within each domain a poverty line is estimated. The poverty line contains two components: the food poverty line and the non-food poverty line. The food poverty line is obtained by deriving a bundle of food products that: (i) reflects consumption patterns of poor households within the spatial domain, (ii) provides sufficient calories, and (iii) passes a series of spatial and temporal revealed preference conditions that ensure comparability in the quality of the bundle across space (the 2008/09 bundle of domain A is not manifestly of higher quality than the 2008/09 bundle of domain B and vice versa) and through time (the 2002/03 bundle of domain A is not manifestly of higher quality than the 2008/09 bundle of domain A and vice versa).[1] Prices paid by the poor for the elements of the bundles are then calculated. The food poverty line is then simply the cost of the bundle.

Because it is much more difficult to define and price a reasonable bundle of non-food items consumed by the poor, an indirect method is used to calculate the non-food poverty line. Worldwide, poor people allocate a considerable share of their total consumption to non-food items. Thus, average non-food consumption is calculated for households whose total per capita consumption is close to the food poverty line (see DNEAP (2010) for details). This expenditure is viewed as a minimum budgetary allocation required to meet basic non-food needs and is defined as the non-food poverty line. The total poverty line is then obtained as the sum of the food poverty line and the non-food poverty line.

[1] See Arndt and Simler (2010) for a detailed description of the approach.

Consumption poverty rates

Using the approaches outlined about and treating data in a comparable manner, the data from the IOF08 household survey indicates that the consumption poverty rate remained essentially static between 2002/03 and 2008/09. As shown in Table 1, the national headcount ratio was 54.7% during the IOF08 survey period. In comparison, in the first comparable survey conducted in 1996/97, the headcount ratio was 69.4%. Poverty thus decreased 14.7 percentage points over the twelve-year period from 1996/97. The increase of 0.6 percentage points since 2002/03 is not statistically significant.[2] Thus, the rates obtained from IAF02 and IOF08 are appropriately viewed as being roughly equivalent.

Both rural and urban areas contributed to poverty reduction over the period 1996/97 to 2008/09. Over the more recent period (2002/03 to 2008/09), however, we find a moderate increase in rural poverty (from 55.3% to 56.9%) and a moderate reduction in urban poverty (from 51.5% to 49.6%). Neither of these changes is statistically significant. As expected, greater variation in changes in poverty rates is seen when we look at a more geographically disaggregated level. The stagnation in national and rural/urban poverty rates masks genuine variation at lower levels of aggregation. Changes in poverty rates at the regional level (North, Centre, South) are all statistically significant, as are seven of the 11 provincial measures (including Maputo City). Nevertheless, the lack of precision in the provincial poverty measures and differences through time, reflected in wide confidence intervals, is also noticeable.

The remainder of this paper seeks to explain and decompose these observations. We begin by looking at coherence at the national level and then proceed to analysis at more disaggregated levels. We start with data on agricultural sector performance in the next section.

[2] Standard deviations for poverty measures are calculated using the approach described in Simler and Arndt (2007).

Agricultural survey data

Table 2 summarises key trends in agriculture based on the TIA series. Four main findings 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%, consistent with population growth, and the area under cultivation grew by 34%. 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, show no unambiguously positive trends. From 2002 to 2008 the share of farming households receiving extension information appears to have declined from 13.5% to 8.3%. Similarly, use of pesticides fell from 6.8% to 3.8%. Even ignoring these trends, the absolute levels of these indicators are very low and point out that the vast majority of farming households continue to use almost no modern inputs or irrigation technologies to support production. Consequently these households are extremely exposed to the vagaries of climatic variation. On the positive side, however, the education level of heads of farming households shows a clear positive trend, which is consistent with the findings from the household consumption surveys.

Third, turning to Table 3, agricultural production shows only weak growth on aggregate. When adjusted to take into account either the expansion of cultivated area or rural population growth, the conclusion is that agricultural productivity has remained stagnant over time. This can be seen in a number of ways. For starters, the total production figures for 2008 year are broadly in line with past levels (panel A) even though both planted area and total rural population with engagement in agriculture have been growing. Panel B of the table shows that, with population growth, per capita production of all the principal staple crops (e.g., maize, sorghum, cassava, rice) was lower in 2008 compared to 2002. Panel C of the table provides aggregated figures for production of principal food crops, calculated using caloric values of the individual crops as weights.[3] These caloric values

[3] The caloric values are the same as those used in the household consumption survey analysis.

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 agricultural production has been at best stagnant and possibly falling. For example, total calorie availability per person per day was 2,000 calories in 2008 compared to 2,135 in 2002 (based on national agricultural production alone). This means that if the total volume of agricultural production were distributed equally across all rural households (without wastage), it would not be sufficient to meet the basic calorie needs defined by the food baskets. These declines in per capita food production are highly consistent with the national picture of stagnant rural poverty over the same period.

The final point is one of production volatility. The last column of Table 3 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. For individual crops the level of volatility appears large on this measure—ranging from a minimum of 12.7% to a maximum of 34.3% (panel A). This is repeated with the aggregate production indices in panel C, where total production and total calorie-availability (per person / day) can be expected to vary by 12% from one year to the next. Production volatility is likely to be much larger at the regional level given that differential regional performances are expected to offset each other to some extent, leading to smoother national trends. Large variability in agricultural production is indicative of a high level of vulnerability of rural populations, a point which supports the evidence of Table 2 concerning limited access to modern technologies, especially irrigation. More broadly, the evidence of production volatility supports some of the large regional changes in poverty rates observed in Table 1.

Macroeconomic Analysis

This section introduces a macroeconomic modelling approach to consider and decompose the principal causes of the stagnation in the national-level consumption poverty rates identified for the period 2002/03 to 2008/09. As noted above, a potential cause of poverty rate stagnation is weak growth in agricultural productivity combined with region-specific weather shocks to agricultural production in 2008. These factors led to a decline in per capita production of food crops between 2002 and 2008 (see Table 3).

At the same time as agricultural production was stagnating, a great deal was happening in international commodity markets. World food prices spiked significantly in real terms with the peak attained in mid-2008. During the IOF survey period, world food prices declined to levels significantly below their peak levels of mid-2008 but still well above levels registered in 2002 and 2003.[4] 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 but 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 production that might have existed.

While all the factors listed above are likely to increase poverty in the Mozambican context, it is not clear which factors are the most important. In order to consider the implications of these and other factors on the economy of Mozambique, we use a dynamic CGE model of the Mozambican economy, which is linked to a poverty module. Using the model as a simulation laboratory, we are able to estimate the strength of various factors in determining the national poverty rate as well as poverty rates by urban and rural zone. This modelling is also useful as a validation exercise at the national level. In particular, the CGE model can help determine whether the observed evolution of poverty over the 2002/03 to 2008/09 period can be plausibly reconciled with observed rates of economic growth and trends in inequality measures.

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[4] For example, the International Monetary Fund (IMF) food commodity price index registered a level during the IOF survey period of 53% in nominal terms (or about 40% in real USD terms) above the level observed during the IAF survey period (July 2002 to June 2003).

Model description

Dynamic CGE models are often applied to issues of trade strategy, income distribution, and structural change in developing countries. They have features that make them suitable for such analyses. First, they simulate the functioning of a market economy, including markets for labor, capital and commodities, and provide a useful perspective on how changes in economic conditions are mediated through prices and markets. Second, they ensure that all economy-wide constraints are respected. This is critical discipline when substantial shocks are imposed. Shocks such as rises in world fuel prices have macroeconomic consequences in terms of, for example, the supply and demand for foreign exchange. CGE models track the balance of payments and require that a sufficient quantity of foreign exchange be available to finance imports. Finally, CGE models contain detailed sector breakdowns and provide a "simulation laboratory" for quantitatively examining how various impact channels influence the performance and structure of the economy.

In CGE models, economic decision-making is the outcome of decentralized optimization by producers and consumers within a coherent economy-wide framework. A variety of substitution mechanisms occur in response to variations in relative prices including substitution between: labor types, capital and labor, imports and domestic goods, and exports and domestic sales. The Mozambique CGE model contains 56 activities/commodities, including 24 agricultural and 7 food-processing sectors. Five factors of production are identified: three types of labor (unskilled, semi-skilled and skilled), agricultural land, and capital. This detail captures Mozambique's macroeconomic structure and influences model results.

Economic development and poverty reduction is in many ways about the accumulation of factors of production such as physical capital, human capital, and technology. These factors, combined with the necessary institutional frameworks to make them productive, determine the material well-being of both households and countries. The dynamic CGE model captures these accumulation processes. For the purposes of this analysis, growth rates of labor and land were exogenously imposed using data from other sources. Capital is accumulated by the conversion of savings into investment, with the destination of investment determined by relative rates of profitability across sectors.

The model is calibrated to a 2003 social accounting matrix (Thurlow, 2008), which provides a complete snapshot of the Mozambican macro-economy in 2003. In addition, a poverty module, based on the IAF02 data, permits one to consider how changes in economic conditions translate into changes in the rates of poverty. The poverty module functions by applying changes in commodity prices and factor returns, as reflected in household commodity consumption, derived from the CGE model. So, if, in the CGE model, commodity prices rise and factor returns decline or remain stagnant, households are forced to reduce consumption (assuming a budget constraint). These changes are imposed on the households in the IAF02 database. Once these changes are imposed, it is straightforward to calculate real consumption and projected poverty levels. A complete description of the model, including the poverty module, can be found in Arndt et al., 2010.

Scenarios

This section describes the various scenarios that are employed to consider poverty evolution. We present six successive scenarios labelled: 2003 Baseline, 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 2003 Baseline presents 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. The subsequent scenarios progressively add differences to this baseline with all previously imposed differences maintained. Thus, the Food scenario contains the new differences from the Baseline that comprise the Food scenario as well as the differences imposed in the Education and Agriculture scenarios. The final scenario, Weather, represents the total cumulative effect of all changes from the Baseline. In the following subsections, we present the shocks from each scenario.

2003 Baseline

In the 2003 Baseline scenario, the model is run from 2003 - 2009. The following principal assumptions related to factor accumulation, technical change, and world prices are imposed on the growth process.

- *Factors***:** Skilled, semi-skilled, and unskilled labor stocks are projected to grow at rates of 3.5, 2.75, and 2.25% per annum respectively. The stock of arable land, cleared and ready for planting, grows at 2% per annum.
- *Technology:* Agricultural productivity improves at a relatively rapid rate of approximately 5% per year for food crops.
- *World prices:* Prices for all imports and all exports are assumed to remain constant at the levels observed in 2002/03.

These three sets of assumptions are the most important for this analysis because they are changed in the five later scenarios. All other assumptions remain constant across all scenarios.

We are interested principally in the differences between scenarios. For example, what is the difference between the 2003 Baseline scenario presented here and the Weather scenario that contains all differences from the 2003 Baseline? Or, what are the implications of reduced agricultural productivity growth over the 2002/03 to 2008/09 period for poverty rates? Because we are focused mainly (but not exclusively) on differences across scenarios, the assumptions that remain constant are typically of lesser importance and typically have relatively minor implications for the differences across scenarios.

Nevertheless, some modelling choices are relevant. In all scenarios, the following closure rules apply. A balanced closure is applied to the macroeconomic aggregates. Specifically, consumption (C), government (G), and investment (I) remain at constant shares of total absorption (defined as C+I+G). Tax rates are fixed and the government deficit is variable. Saving rates of institutions (households and enterprises) adjust proportionately to equate savings with investment each year. Labor is fully employed and mobile across all activities. The capital stock is modelled in the putty-clay tradition meaning that allocated capital is sector-specific (i.e., immobile) but new investment can be directed to any sector. This new investment is allocated on the basis of factor returns in the previous year. The exchange rate is flexible and adjusts to equilibrate the supply and demand for foreign currency. Productivity growth for cash crops is set at about six percent per year. Non-agricultural productivity growth varies by sector and is chosen in order to reflect the sectoral growth rates recorded by national accounts between 2003 and 2008. Finally, for agriculture, because planting occurs in period *t* and harvest in period *t*+1, land allocation decisions are made on the basis of world prices that prevailed in period *t*. Similarly, farmers are not able to anticipate droughts.

Education

The share of children enrolled in school has increased markedly in all provinces. In addition, separate analysis by Arndt and Nhate (2009) shows that the efficiency with which students move through the education system has continued to improve rapidly. These changes have two effects. First, because children represent a large share of the population (the 7-17 age group represents more than a quarter of the population), a more pronounced tendency to remain in school has labor market effects. In particular, using data from IAF02 and IOF08, the supply of unskilled labor has been declining since 2002/03 at a rate of slightly less than 2.5% per year.[5] This contrasts with the baseline assumption of growth in the unskilled labor stock at a rate of 2.25% per year. Second, the profile of those who are working is rapidly becoming more skilled, albeit from a low base. The stock of semi-skilled labor more than doubled while the stock of skilled labor somewhat less than doubled. Compared with the rates of growth assumed in the baseline scenario, the growth in the stocks of semi-skilled and skilled labor has in reality been more rapid.

Even though the skilled labor stock is growing rapidly, the net effect of the tendency to remain in school over the period 2002/03 to 2008/09 was a relatively slow rate of growth

[5] Unskilled labor is defined as those without a complete primary school education, semi-skilled labor refers to those who completed primary school but did not complete secondary school, and skilled labor refers to those with complete secondary school or better.

in the total labor force. According to the IOF/IAF surveys, the labor force as a whole grew at about 0.4% per annum. This rate is significantly less than the rate of population growth and the assumed rate of growth of the labor force in the baseline scenario (both of which are about 2.5% per annum).

Agriculture and Weather

As shown in Table 3, production of food crops was highly variable over the 2002-08 period. This volatility is taken to be due principally to weather. In addition, there was very little evidence of technical advance. In the Agriculture scenario, we reduce the rate of underlying technical advance to zero. Separately, in the Weather scenario, we introduce weather shocks that reduce or increase per capita food production in accordance with TIA data. TIA data are not available for 2004 and 2009. For the years where data are lacking, no weather shock is applied.[6]

Food and Fuel Prices

Figure 1 provides indices of real international prices for selected import commodities. Real values are calculated by deflating prices by the United States GDP deflator. As can be seen in the figure, prices for crucial imports rise dramatically. In the Food and Fuel scenarios, import and export prices for food and fuel commodities, with a published international price, are changed in line with changes in world markets. This is done for each year from 2004-2009. In order to separate the effects, only food prices are changed in the Food scenario. Changes in fuel prices are added in the Fuel scenario.

Modeling results

Table 4 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 CGE model for the final cumulative scenario Weather. This last scenario is designed to be the one that most closely simulates actual

[6] No weather shocks are applied in 2007 as well due to lower confidence in the data.

evolution of the Mozambican economy. 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, for reasons discussed in more detail below, the projected rate of growth of agriculture is substantially lower than the rate estimated by national accounts. Overall GDP growth differs between the estimations of national accounts (7.6% per annum) and the projections of the model (6.5% per annum). About 90% 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.

Since about 1996, two sources of information on agricultural production have been maintained. The first relies principally on the Early Warning System, while the second relies on the TIA survey. As emphasized in Kiregyera et al. (2008), these two sources of information provide very different perspectives on the evolution of the agricultural sector over the past eight years. Kiregyera et al. also make clear that the TIA provides a more reliable source of information. Recently, these and other observations led the government to switch the principal official source of information on agriculture to the TIA. The switch leads to a very considerable revision of the performance of the agricultural sector both in terms of levels and trends.[7] Overall, the Early Warning System data indicate both larger production levels and more rapid growth in agriculture than TIA.

While the Statistical Yearbook has switched from the Early Warning System to TIA as the principal (but not only) source of information on agricultural production levels, the same is

[7] For example, the 2005 Statistical Yearbook estimates that 1.38 million metric tonnes of maize were produced in 2005. This figure came from the Early Warning System. The 2008 Statistical Yearbook indicates that only 0.94 million metric tonnes of maize were produced in 2005. This figure came from TIA. In other words, relative to TIA, the Early Warning System overestimated maize production in 2005 by nearly 50 percent.

not true of national accounts. National accounts through 2009 still reflect agricultural production levels as provided by the Early Warning System. As a result, the growth rate of the agricultural sector, as estimated by national accounts, is overstated. The final column of Table 4 illustrates the estimated growth rate of agriculture using data from TIA as inputs into the CGE model. The growth rate of agriculture in this scenario is considerably slower (3.4% per annum versus 7.9%). This decline in the rate of growth of agriculture reduces overall GDP growth by about one percentage point per annum over the period 2003 to 2009.

Even with this correction to the estimated overall GDP growth rate, per capita GDP is still estimated to have grown by about 4% per annum (6.5% GDP growth rate minus about 2.5% annual population growth rate) over the period 2003 to 2009. Table 4 illustrates that 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 annum in total or about 2% per annum per capita. This value, about two percent per annum per capita, represents our current best estimate of real private consumption growth. Can this real growth in personal consumption be reconciled with stagnation in consumption poverty rates?

Table 5 illustrates that it can. The table compares poverty rates derived from IOF08 with projected poverty rates using the CGE model. Before comparing the rates, it is helpful to note that the CGE model is annual while IOF survey spans 2008 and 2009. To deal with this issue, we assume that the first semester of IOF results correspond to the model year 2008 while the second semester of IOF results corresponds to the model year 2009. When comparing the full IOF database with the model results, we take the simple average of results for 2008 and 2009.

Model results are strikingly close to the estimates from IOF08. At the national level and for the full survey period, the IOF survey estimates 54.7% of the population consumes below the poverty line. The corresponding model estimate is 54.3% of the population. 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 and IOF08 are the first semester in urban zones. The difference between these two rates is about six percentage points.[8] Overall, the IOF08 results appear to be very consistent with the evolution of macroeconomic variables.

A significant advantage of CGE models is that they allow one to decompose complex phenomena, such as evolution of poverty rates through time, in order to provide insights on 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 subsection. Figure 2 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 labor force by skill class.

A number of useful observations emerge from Figure 2. First, the goal of a 45% poverty rate by 2009 appears to have been a reasonable one. As discussed above, the 2003 Baseline scenario provides a projection of poverty rates based on information available in 2004. In this scenario, the labor 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% is attained in 2009. This is essentially the same as the level targeted by government and external partners.

When the principal differences between the 2003 Baseline scenario and actual evolution of key external variables are applied to the model, the estimated poverty rate increases in every case. The scenario Education illustrates that, over the period 2003 to 2009, the contraction in the growth of the labor force due to increased school enrolments increases poverty. Over time, the more rapid growth in skilled and semi-skilled labor that this expansion in enrolments implies is expected to reduce poverty. However, in the near term,

[8]The lower rates observed in IOF08 in urban zones in the first semester compared to the model may reflect an ability on the part of urban consumers to consumption smooth.

education is an investment that implies a small contraction in consumption (and hence a slight increase in poverty).

The principal impacts on poverty derive from: (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 at their peak, fuel prices contributed 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; Arndt et al., 2005).[9] Net imports of fuel and derived products represent a substantial share of total imports—about 18% in 2003. Because fuel use is difficult to economize on, particularly over relatively short time periods, 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.

[9] Arndt et al. (2008) report relatively mild impacts from the food price increases of 2008 with these negative effects concentrated in urban zones. Two factors contribute to making the world food price increases more powerful than the previous analysis suggested. First, the Arndt et al. (2008) analysis is static and based on a 2003 social accounting matrix for Mozambique while the current analysis is dynamic and runs from 2003 to 2009. Second, as shown in Table 3, per capita production of food crops declined between 2003 and 2008. Information on 2008 food production was not available at the time of the analysis conducted by Arndt et al. (2008); hence per capita food production levels were left at base values. In the current analysis, the reduced agricultural production levels in 2008 imply much less marketable surplus in rural areas. As a result, many more rural households are net food purchasers and experience first order welfare declines as a result of food price increases.

Earlier analysis by Arndt et al. (2008) illustrates that policy choices have some impact on poverty. For example, fuel subsidies can reduce the poverty impact of fuel shocks. However, fuel subsidies only partially offset the impact and come at the cost of reducing investment (and increasing future poverty rates assuming the investment is effective). In addition, fuel subsidies increase the burden of macroeconomic adjustment. Fuel subsidies imply (by definition) lower fuel prices and hence greater fuel consumption. This means that exports must increase more or imports of other items must decline by more than in the no-subsidy case. For these reasons, Mozambican authorities have largely, though not completely, allowed international fuel prices to pass through to higher domestic fuel prices. In the model simulations, the international fuel price increases are assumed to be passed through to the economy.

Changes in fuel prices then influence relative prices throughout the economy. In Mozambique, 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., 2002a). The costs of distributing imported products, especially food, which is bulky and relatively low value, increases. Finally, direct transport costs, which are often particularly important for urban residents, also tend to rise.

To finish this section, we consider the links between consumption growth, poverty, and inequality set forth by Bourguignon (2004). In the model, consumption is growing and poverty is essentially static (up in 2008 and down in 2009). Therefore, one expects inequality to rise, though not dramatically, as the rate of consumption growth is not particularly rapid. This is indeed the case in the model. The Gini coefficient, derived from microsimulation results for 2008 and 2009, rises to about 43.5, or about two points higher than the estimate from 2002-03. In contrast, the point estimate for inequality from the IOF08 survey points to no change relative to 2002/03. Nevertheless, the change in the Gini coefficient estimated by the model falls well within the estimated confidence interval for the change in the Gini coefficient between 2002/03 and 2008/09.[10] We conclude that cross reference with other sources and appoaches points to an increase in inequality of about two points.

Regional poverty rates

Agricultural price data

An additional source of information concerning trends in prices is contained in the Agricultural Markets Information System (SIMA). The SIMA data provide price information for a range of core agricultural products in 25 urban markets (cities and towns) covering all provinces in Mozambique. It has a much wider geographical coverage than the price database used for the construction of the consumer price index (CPI), which is restricted to the three principal urban centers. While the spatial coverage is better, the SIMA data cover a relatively small number of agricultural goods. Nevertheless, these products tend to be important elements in the consumption baskets of poor people.

Table 6 compares provincial measures of price inflation constructed from the SIMA series with survey-based measures of food price inflation (the ratio of the food poverty lines in the first column). Two price series are calculated from the SIMA, from which inflation is then derived. The first is based on a simple average of prices across all relevant SIMA products for each of the 12-month periods covered by the IAF (July 2002 to June 2003) and IOF (September 2008 to August 2009) household surveys. The ratio of these two averages measures cumulative food price inflation between the two periods. The second SIMA price series is a weighted measure, where the weights are estimated so as to

[10] In calculating the Gini coefficient from the survey data, real consumption is determined using the poverty lines. Evidence from the consumer price index points to an increase in the price of basic goods, particularly basic foods consumed by the poor, relative to manufactures, services, and processed foods, which comprise a large share of consumption of upper income Mozambicans. Preliminary analysis indicates that accouting for these differential price trends across income classes results in increases in measured inequality. This is an important topic for future research.

correspond to the weights of the same items in the food poverty baskets estimated from IAF02.

The poverty line-based price indices and the SIMA-derived price indices are not perfect comparators. Discrepancies exist due to the more restricted number of products in the SIMA dataset as well as differences in geographical coverage. Nevertheless, the trends in the SIMA-derived measures of inflation are highly consistent with those derived from the household surveys. At the national level, the SIMA dataset suggests cumulative food price inflation has been in the order of 134% between 2002/03 and 2008/09 (weighted price series), which is almost exactly the same as that estimated from the household survey data. At the provincial level the trends are also very consistent—e.g., the correlation between these sets of provincial inflation measures is 0.82.

Continuing with the SIMA price series, Table 7 presents the distribution of prices across provinces in 2002/03 (IAF) and 2008/09 (IOF) relative to the national average. A score above (below) one indicates a price premium (discount) relative to the national average for a province in a given period. Of interest are changes in relative prices over time. Taking the preferred weighted price series, one notes a fall in the relative price premium of the Northern and Southern provinces (e.g., Niassa from 1.50 to 1.19) and a rise in the relative prices of Central provinces (e.g., Zambézia from 0.68 to 0.88). This is indicative of more acute price increases in the Central provinces relative to the rest of the country.

A strong relationship exists between these changes in relative prices and changes in the survey-based poverty headcount rates. The correlation coefficient between these two series (shown in the final row of the table) is 0.825 for the weighted SIMA price series and 0.654 for the unweighted series. The largest changes (positive and negative) in poverty rates correspond to the largest changes in relative prices. In the case of the two most Northern provinces, a slower rate of price increase (from a higher base) has been associated with substantial poverty reduction. In contrast, many of the Central provinces have seen the most rapid rate of price increases (from a lower base), and an increase in the poverty headcount. These relative price trends very likely reflect shifts in supply conditions by province. Relatively more rapid growth in supply is expected to induce a decline in relative prices.

As a final exercise, we use the weighted SIMA calculated rates of growth in prices depicted in Table 6 to inflate the 2002/03 poverty lines to 2008/09 values. We then recalculate poverty rates in 2008/09. On this basis, Figure 3 gives a scatter plot of the actual and predicted poverty levels for 2008/09 as well as the changes relative to 2002/03. The results are very consistent. The correlation between the two sets of poverty *levels* is 0.912 and between the two sets of poverty *changes* is 0.907. Furthermore, the standard deviation of the changes in poverty across the 13 spatial domains is 17.3 for the SIMA predictions compared with 14.2 in IOF.

Food-based poverty indicators

We consider two additional indicators of well-being in 2002/03 and 2008/09, both of which are food based. They are: (i) the average daily number of meals per person; and (ii) the share of food in total consumption, where households with a food share higher than a pre-determined threshold are classified as poor. Data for these alternative measures are presented in Table 8. The last two rows of the table give the correlation between changes in monetary poverty at the regional level (not shown in the table) and changes in the corresponding alternative measure.

With respect to the change in the reported average number of meals per capita consumed between the two surveys, it is important to highlight that the number of meals per day is a separate question posed to the household head in the QUIBB (Core Welfare Indicators Survey) section of the questionnaire. It is not obtained from the commodity-by-commodity consumption information used to estimate the consumption aggregate, and in that sense it is an independent indicator of the short-term consumption level. The changes in the number of meals declared per day exhibits a negative correlation of 0.60 with the change in poverty. Hence, provinces with increases (decreases) in poverty are those provinces with fewer (more) meals consumed per day. For example, rural Niassa and Cabo Delgado record an 11.3% increase in the average number of meals consumed and a 27.7 percentage point fall in headcount poverty. In contrast, rural Sofala and Zambézia record a large increase in headcount poverty, which corresponds to a fall in the average of the declared number of meals consumed.

Second, following from Engel's Law, the share of food in household consumption is a useful proxy for well-being. Thus, a decline in the food share over time is likely to be indicative of improvements in living standards. This insight informs the "food share" poverty measure shown in the table. Specifically, for each spatial domain, we find the food share threshold that replicates the 2002/03 poverty rates. These thresholds are held fixed and then applied to the food shares observed in the 2008/09 survey. Households with food shares above this threshold (in either round) are deemed to be poor. Once again, the correlation between changes in this measure and the headcount poverty rate are good, at 0.58 (or 0.71 excluding Maputo City), thereby confirming the broad pattern of changes in monetary poverty over time.

Conclusions

We conclude that the incidence of consumption-based poverty did not fall between 2002/03 and 2008/09. Trends were positive from 2002/03 to 2008/09 in Northern Mozambique, which registered important advances in combating poverty; the same goes for the Southern region to a slightly lesser extent. In contrast, Central Mozambique saw increases in consumption poverty.

Three basic sets of reasons were identified as the main drivers of the disappointing performance in the consumption-based measure of poverty. These are:

- Very slow or zero growth rates in agricultural productivity, reflected in weak growth in the production of food crops;
- Weather shocks that impacted the harvest of 2008, particularly in the Central provinces; and
- Declining terms of trade due to large increases in international food and fuel prices. Fuel prices, in particular, rose substantially over the period 2002/03 to 2008/09.

An important policy message to draw from this analysis is that a principal missing element in the current development process in Mozambique – as elsewhere in Africa – is sustained productivity growth in the family agriculture sector. Getting agriculture moving is a serious challenge in the struggle against absolute poverty. Without stimulating the agricultural sector, particularly but not exclusively the family sector, widespread poverty among the large numbers of food-producing small and medium-sized farmers simply is unlikely to go away in the foreseeable future. This is especially so given the vulnerable nature of African economies where the importance of exogenous shocks can have very real impact on poor people as shown in this paper. While little can be done – at least in the short to medium-term – to change external conditions, domestic policy can address the need for stimulating the agricultural sector head-on.

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Table and Figures

Table 1: Estimated consumption poverty rates

	2002/03		2008/09			Confidence		
Region	Headcount	SE	Headcount	SE	Difference		interval	
National	54.1	1.7	54.7	1.8	0.6	±	4.9	
Urban	51.5	2.6	49.6	2.2	-1.9	±	6.6	
Rural	55.3	2.1	56.9	2.3	1.6	±	6.1	
Northern	55.3	3.2	46.5	3.2	-8.8	±	8.8	*
Central	45.5	2.8	59.7	2.9	14.2	±	7.9	*
Southern	66.5	1.7	56.9	2.9	-9.6	±	6.6	*
Niassa	52.1	5.5	31.9	4.8	-20.2	±	14.3	*
Cabo Delgado	63.2	3.7	37.4	5.2	-25.8	±	12.5	*
Nampula	52.6	4.8	54.7	3.8	2.1	±	12.0	
Zambézia	44.6	5.0	70.5	4.2	25.9	±	12.8	*
Tete	59.8	4.2	42.0	4.6	-17.8	±	12.3	*
Manica	43.6	4.1	55.1	5.6	11.5	±	13.6	
Sofala	36.1	3.5	58.0	4.9	21.9	±	11.9	*
Inhambane	80.7	2.4	57.9	4.5	-22.8	±	10.0	*
Gaza	60.1	3.5	62.5	4.2	2.4	±	10.8	
Maputo Province	69.3	3.0	67.5	3.8	-1.8	±	9.6	
Maputo City	53.6	3.2	36.2	3.3	-17.4	±	9.0	*

Notes: A * (last column) indicates a statistically significant difference in the poverty rate between 2002/03 and 2008/09. The confidence interval is the confidence interval for the difference. The standard error (SE) of the difference in poverty rates is the square root of the sum of the squares of the standard errors in 2002/03 and 2008/09. Because the distribution of the poverty rate is unknown, confidence intervals are defined as plus or minus twice the standard error. Confidence intervals on the levels can be obtained via simple calculation.

Source: Author's estimates based on IOF08 and IAF02.

Table 2: Agriculture and agricultural technology

	2002	2003	2005	2006	2007	2008	Change 2002 - '08
Cultivated area ('000 hectares)	4,185	4,535	5,552	5,612	5,672	5,602	33.9
No. small and medium sized farms ('000)	3,127	3,210	3,333	3,396	3,619	3,725	19.1
Average farm size (ha.)	1.3	1.4	1.7	1.7	1.6	1.5	12.4
Household size (average)	5.0	5.0	5.3	5.1	4.9	5.1	2.0
Rural population (millions) [adjusted]	12.4	12.7	14.0	13.7	14.0	15.1	21.5
Household heads with 4th grade education (%)	31.1	32.9	36.4	36.2	36.6	42.3	36.0
Receipt of extension info. (% farms)	13.5	13.3	14.8	12.0	10.1	8.3	-38.5
Use of chemical fertilizer (% farms)	3.8	2.6	3.9	4.7	4.1	4.1	7.9
Use of pesticides (% farms)	6.8	5.3	5.6	5.5	4.2	3.8	-44.1
Use of irrigation (% farms)	10.9	6.1	6.0	8.4	9.9	8.8	-19.3
Receipt of credit (% farms)	-	2.9	3.5	2.9	4.7	2.6	-10.3

Note: Cultivated area in 2006 is not available. It is estimated as the average of area in 2005 and 2007.

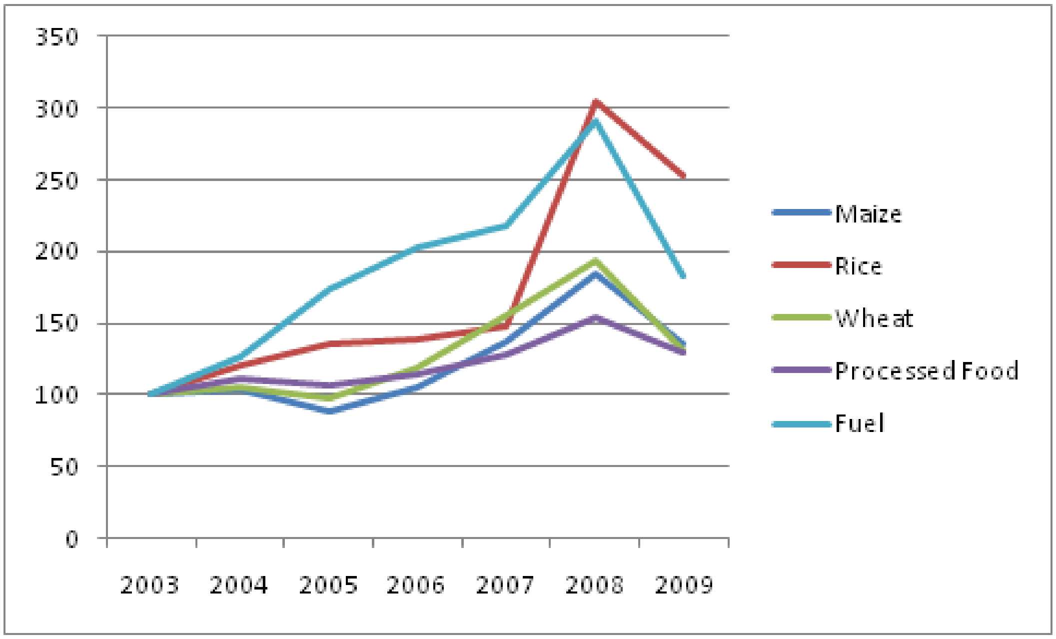
Source: Author's estimates from TIA databases.

Table 3: Production trends for food crops

Crop	2002	2003	2005	2006	2007	2008	Change 2008-'02	Coeff. of variation
(A) Prodution Total (million KGs)								
Maize	1,115	1,181	942	1,396	1,134	1,214	8.9	12.7
Rice	93	118	65	98	103	88	-5.9	18.7
Sorghum	138	191	115	202	167	126	-8.6	22.8
Millet	12	22	15	22	25	15	19.7	27.5
Large groundnuts	38	44	27	25	31	31	-17.5	21.4
Small groundnuts	64	44	58	60	70	71	10.9	16.5
Butter bean	36	41	50	50	55	53	47.1	15.5
Cowpea	54	64	49	71	62	62	15.5	13.1
Bambara groundnut	23	18	9	12	20	13	-44.0	34.3
Pigeon pea	32	43	36	62	72	64	101.6	32.2
Cassava	3,446	4,782	4,782	5,481	4,959	4,055	17.7	15.7
Sweet potato	456	610	509	678	862	610	33.7	22.9
(B) Prodution per person (KGs)								
Maize	90.0	92.9	67.3	101.7	80.7	80.7	-10.4	14.0
Rice	7.5	9.2	4.6	7.1	7.3	5.8	-22.5	22.7
Sorghum	11.2	15.0	8.2	14.7	11.9	8.4	-24.8	25.5
Millet	1.0	1.7	1.1	1.6	1.8	1.0	-1.5	27.9
Large groundnuts	3.0	3.4	2.0	1.8	2.2	2.1	-32.1	27.3
Small groundnuts	5.2	3.4	4.2	4.4	5.0	4.7	-8.7	14.2
Butter bean	2.9	3.2	3.6	3.6	3.9	3.5	21.0	10.1
Cowpea	4.3	5.0	3.5	5.2	4.4	4.1	-5.0	13.9
Bambara groundnut	1.8	1.4	0.6	0.8	1.4	0.8	-53.9	39.3
Chickpea	2.6	3.4	2.6	4.5	5.1	4.3	65.9	28.2
Cassava	278.2	376.1	341.7	399.5	353.0	269.4	-3.2	15.6
Sweet potato	36.8	48.0	36.4	49.4	61.4	40.5	10.0	21.0
(C) Aggregate measures (using calories)								
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
Productivity index	100.0	114.6	83.9	105.1	94.9	85.0	-15.0	12.2
Calories per person / day	2,135	2,583	2,103	2,717	2,422	2,000	-6.3	12.5

Sources: Author's estimates from TIA databases.

Figure 1: International price indices



Source: International Monetary Fund (2010) and Council of Economic Advisors (2009).

Table 4: Growth in components of GDP 2003-2009 for national accounts and for model

	2003 Share	National Accounts	Model
GDP	100	7.6	6.5
Production Optic:			
Agriculture	26	7.9	3.4
Industry	23	6.3	7.8
Services	51	8.3	7.4
Expenditure Optic:			
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

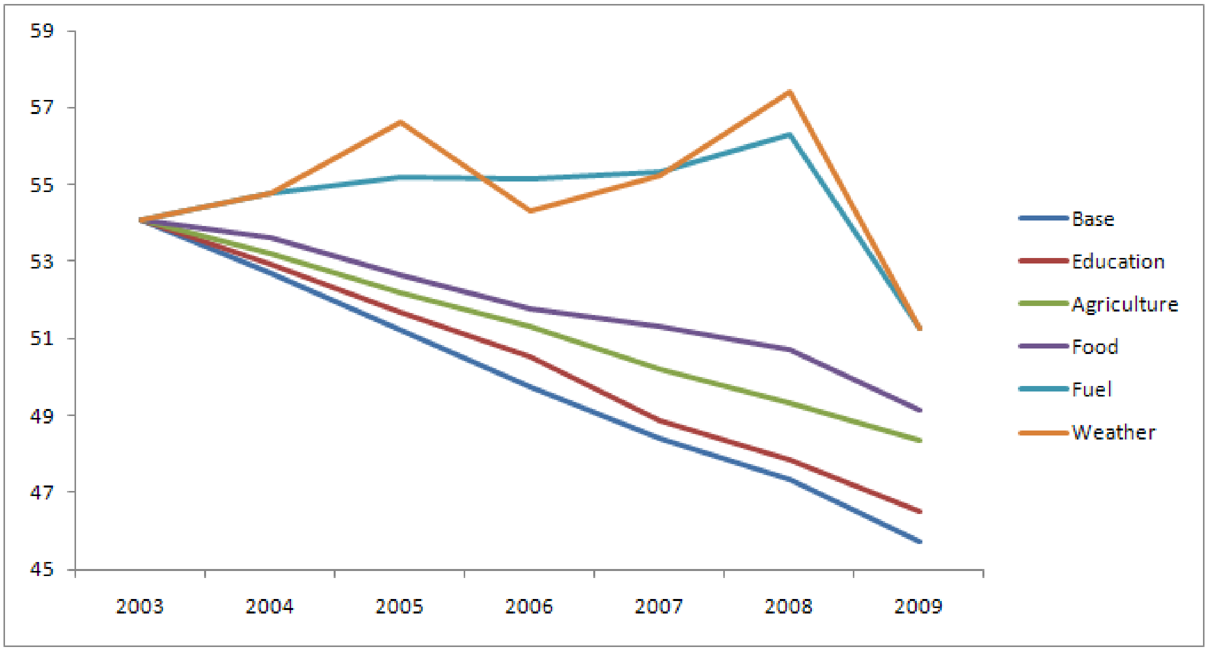
Source: Authors' calculation and national accounts.

Table 5: 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: Authors' estimates.

Figure 2: Evolution of poverty rates by scenario



Source: Authors' estimates.

Table 6: Comparison of market information system (SIMA) and survey-based measures of food price trends

	Food poverty line ratio	SIMA price ratios		Ratio difference	
		Unwtd.	Wtd.	Unwtd.	Wtd.
Niassa	1.98	1.98	1.85	0.00	-0.13
Cabo Delgado	1.98	1.77	2.00	-0.20	0.02
Nampula	2.29	2.11	2.24	-0.18	-0.04
Zambezia	2.68	2.15	3.05	-0.54	0.36
Tete	2.69	2.14	2.37	-0.56	-0.32
Manica	2.54	2.26	2.63	-0.29	0.09
Sofala	2.52	2.14	2.70	-0.38	0.18
Inhambane	2.37	2.06	2.23	-0.31	-0.13
Gaza	2.37	2.05	2.05	-0.32	-0.32
Maputo City	1.97	2.05	2.03	0.09	0.07
Overall	2.35	2.08	2.34	-0.27	0.00

Notes: Given the SIMA prices are calculated as 12 month averages (corresponding to the full periods of the household surveys), the food poverty lines do not include a temporal price adjustment; weighted SIMA prices are based on weights of food items in food poverty baskets; final two columns give the % difference between the survey-based inflation estimate (the food poverty line ratio) and the weighted and unweighted inflation estimates from the SIMA database. Maputo province is not included as it is not covered by the SIMA series; overall prices are calculated as weighted averages, with weights based on corresponding survey-based provincial population shares (also excluding Maputo province).

Sources: Authors' estimates using IOF, IAF and SIMA databases.

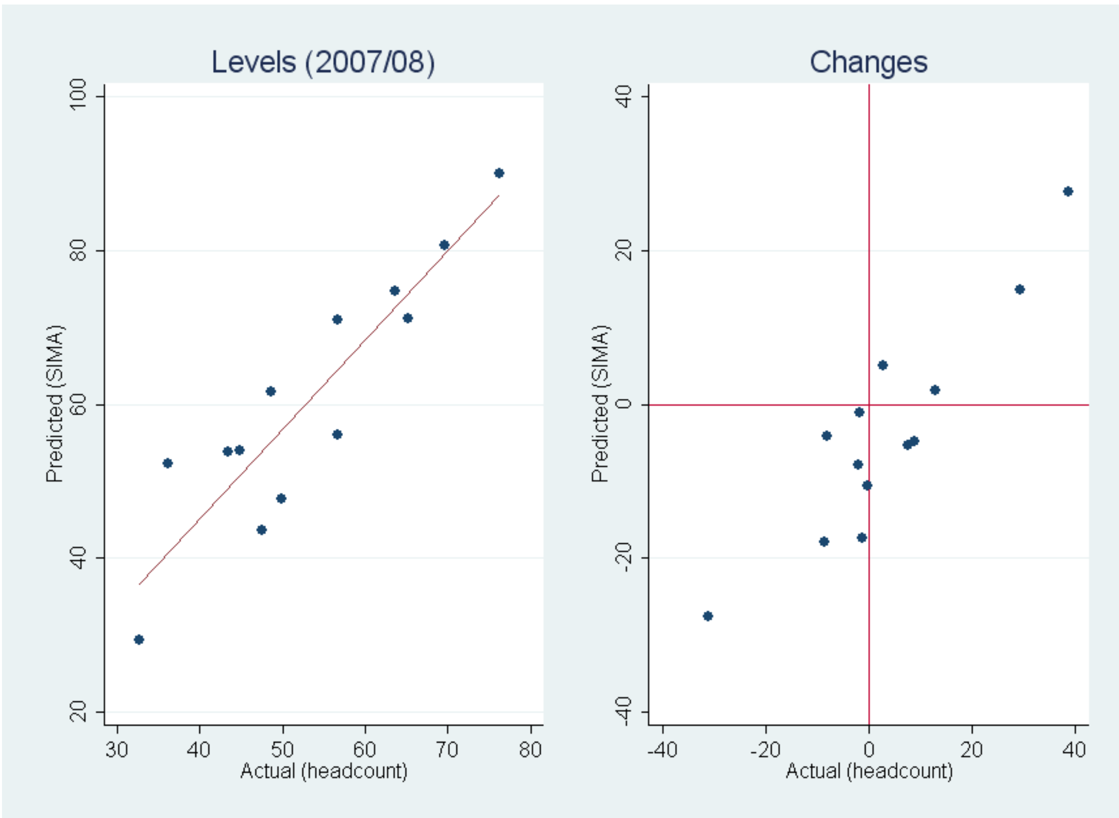
Table 7: Comparison of market information system (SIMA) relative prices versus poverty headcount changes (2002/03 versus 2008/09)

	Headcount change	SIMA relative prices (unweighted)			SIMA relative prices (weighted)		
	IOF-IAF	2002-03	2008-09	% change	2002-03	2008-09	% change
Niassa	-20.16	1.20	1.15	-4.82	1.50	1.19	-21.17
Cabo Delgado	-25.80	1.14	0.97	-14.75	1.22	1.04	-14.80
Nampula	2.08	0.94	0.95	1.31	0.95	0.91	-4.30
Zambezia	25.94	0.90	0.93	3.35	0.68	0.88	30.07
Tete	-17.77	1.01	1.04	2.91	1.05	1.07	1.20
Manica	11.49	0.98	1.06	8.60	1.01	1.13	12.23
Sofala	21.93	1.01	1.05	3.11	0.93	1.07	15.25
Inhambane	-22.75	1.07	1.06	-0.88	1.13	1.08	-4.67
Gaza	2.38	1.08	1.06	-1.40	1.19	1.04	-12.35
Maputo City	-17.45	0.98	0.96	-1.25	1.10	0.96	-13.24
Overall	0.97	1	1	0	1	1	0
Correl. w. headc. change	1.000			0.654			0.825

Notes: The overall change in the headcount is different from because Maputo Province is not included.

Sources: Authors' estimates using IOF08, IAF02 and SIMA databases.

Figure 3: Scatter plot of poverty rate levels in 2008/09 and changes (2002/03 to 2008/09) using actual results and predicted IAF poverty lines inflated using SIMA price indices, by spatial domain



Note: IOF poverty changes are depicted on the horizontal axis while IAF/SIMA changes are depicted on the vertical axis.

Table 8: Food-based indicators of poverty and well-being

	Number of meals			"Food share" poverty (%, pp)		
	2002/03	2008/09	change, %	2002/03	2008/09	change
Niassa & Cabo Delgado – rural	2.05	2.28	11.3	60.4	57.5	-2.9
Niassa & Cabo Delgado – urban	2.31	2.29	-0.9	53.9	52.0	-1.9
Nampula – rural	2.24	2.16	-3.6	57.8	62.3	4.5
Nampula – urban	2.24	2.29	1.9	44.9	57.2	12.3
Sofala & Zambezia – rural	2.47	2.28	-7.7	42.1	59.5	17.5
Sofala & Zambezia – urban	2.59	2.41	-6.7	41.7	46.7	5.0
Manica & Tete – rural	2.41	2.30	-4.8	51.6	45.6	-6.0
Manica & Tete – urbana	2.60	2.53	-2.8	54.1	58.0	3.9
Gaza & Inhambane – rural	2.04	2.11	3.7	73.1	72.0	-1.2
Gaza & Inhambane – urban	2.44	2.31	-5.2	62.7	66.6	3.9
Maputo Province – rural	2.31	2.42	4.6	81.2	81.2	0.0
Maputo Province – urban	2.38	2.46	3.5	61.8	75.3	13.5
Maputo City	2.45	2.47	1.0	53.6	64.4	10.8
National	2.33	2.29	-1.6	54.1	59.5	5.3
Correl. with headcount (all)			-0.597	1.000	0.516	0.579
Correl. with headcount (ex. Maputo)			-0.602	1.000	0.600	0.709

Notes: Food share poverty is calibrated to replicate IAF02 results based on food shares, these are held fixed and applied to IOF08 survey data (see text for further details).

Sources: Author's estimates using IOF08 and IAF02 databases.