The Consumption, Income, and Wealth of the Poorest: An Empirical Analysis of Economic Inequality in Rural and Urban Sub-Saharan Africa for Macroeconomists

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An Empirical Analysis of Economic Inequality in Rural and Urban Sub-Saharan Africa for Macroeconomists*

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Abstract

We provide new empirical insights on the joint distribution of consumption, income, and wealth using cross-sectional and panel data from three of the poorest countries in the world—Malawi, Tanzania, and Uganda—all located in Sub-Saharan Africa (SSA). While income inequality in SSA is similar to that of the United States, consumption and wealth inequality are substantially lower in SSA. This gives rise to our two main findings for SSA: (i) a low transmission from income inequality to wealth inequality related to a low ability to accumulate wealth; and (ii) a low transmission from income inequality to consumption inequality related to a high ability to insure consumption. These results reveal a negative relationship—and potentially a trade-off—between accumulation and consumption insurance for SSA. Our results are more salient in rural areas than in urban areas.

JEL: O10; O55; I32; E21

Keywords: Macroeconomy, Consumption, Income, Wealth, Sub-Saharan Africa, Inequality, Cross-Sectional Data, Panel Data

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1 Introduction

Facts on the distributions of consumption, income, and wealth (CIW) are readily available for a large set of modern industrialized economies (Krueger et al., 2010; Díaz-Giménez et al., 2011; Piketty, 2014). These facts have been extensively used to build and test macroeconomic theories that incorporate heterogeneous household behavior with some degree of market incompleteness for the study of, almost invariably, rich economies.[1] To understand whether these macroeconomic frameworks are useful also for poor countries they need to be fully contextualized and informed by the behavior of households in these countries. In this paper we provide a careful and systematic dissection of the CIW behavior of rural and urban households in three of the poorest countries in the world—Malawi, Tanzania, and Uganda. To this end we use new and unique nationally representative data from the Integrated Surveys of Agriculture (ISA). Unlike most of the previous Living Standards Measurement Studies (LSMS), ISA not only includes cross-sectional data but also a panel dimension that we exploit.[2]

To gain perspective on the relative poverty of the countries in this study, note that their average income per capita per day is close to US$1 (annually, US$359 in Malawi, US$524 in Tanzania, and US$471 in Uganda in 2010).[3] The rural population, where the overwhelming majority lives (84% in Malawi, 71% in Tanzania, and 85% in Uganda), has even lower levels of income per capita. In comparison, the poorest country studied in Krueger et al. (2010) is Mexico, which has an income per capita in 2010 of US$8,920 and a rural population that is 22% of the total. In Thailand, a country extensively investigated in the development literature, these figures are respectively US$4,802 and 56% in 2010.

The main contribution of this paper is to exploit the rare availability of the triplet CIW and use the variation across rural and urban areas in Sub-Saharan Africa (SSA), and across SSA and the US, to establish the coexistence of two main findings that has not been previously emphasized in the literature: (i) a low transmission from income to wealth and (ii) a low transmission from income to consumption. These two findings together imply that the greater ability to contain the dispersion of consumption must occur through insurance mechanisms other than self-insurance (i.e., savings). In other words, there is a negative relationship—and potentially a trade-off—between wealth accumulation (i.e., growth) and consumption insurance. Such potential trade-off is of particular importance for rural areas in SSA where wealth accumulation is unambiguously

[1] See a recent review in Quadrini and Ríos-Rull (2015) and an earlier overview in Ríos-Rull (1995).

[2] The panel data are available in two waves for Malawi (2010/11 and 2013), four waves for Uganda (2005/6, 2009/10, 2010/11 and 2011/12), and two waves for Tanzania (2008 and 2010).

[3] Indeed, Malawi is consistently ranked among the poorest countries in the World. Using GNI per capita from the World Development Indicators (data retrieved in 2010) Malawi is actually the poorest.

low and consumption insurance is unambiguously strong.

Our first main finding is a large and widespread inability to accumulate wealth in both rural and, to a lesser extent, urban areas of the three countries that we study in Sub-Saharan Africa (SSA).[4] We provide cross-sectional evidence of this phenomenon in four different ways. First, we look at the ratio of wealth inequality to income inequality. We find a much larger ratio in the US (4.5 in variance of logs) than in SSA (1.5), and a ratio that is higher in urban areas than in rural areas of SSA. These results hold for alternative measures of inequality. Second, we explore the correlation of income and wealth. This correlation is higher in the US (0.57) than in SSA (0.29), and higher in rural areas than in urban areas of SSA. Our third form of evidence is the lifecycle profile of wealth accumulation. While in the US wealth increases by a factor of 20 from age 25 to its peak, in urban SSA wealth increases by a much smaller factor: respectively 6 and 1.5 in urban and rural SSA. The main component of household wealth, land holdings, largely explains this behavior with a lifecycle growth between age 25 and its peak of roughly a factor of 1.5. The component of wealth that shows the strongest accumulation is livestock with a growth over the lifecycle by a factor of 4, a reminiscent of Rosenzweig and Wolpin (1993) for India.[5] Fourth, we look at the wealth distribution conditional on income. Whereas the top 1% income-richest in the US hold 26% of total household wealth, the top 1% income-richest in urban SSA hold 11% of urban wealth. In rural areas the top 1% income-richest barely hold 4% of total rural wealth.

Our second main finding is a high level of consumption insurance in SSA, particularly in rural areas (Townsend, 1994; Kinnan, 2014). We provide cross-sectional evidence of this phenomenon in four different ways. First, we look at the ratio of consumption inequality to income inequality as a first pass to measure consumption insurance (Krueger and Perri, 2006; Morten, 2013). We find a much larger ratio in the US (0.81 in variance of logs) than in SSA (0.43). Second, we look at the correlation between income and consumption. This correlation is higher in the US(0.63) than in SSA (0.53), and higher in urban SSA (0.67) than in rural SSA (0.37). Our third form of evidence is the lifecycle behavior of consumption. As previously reported for other regions (Deaton and Paxson, 1994; Attanasio et al., 1999; Storesletten et al., 2004), the pattern of lifecycle consumption shows a hump shape in SSA. Indeed, the hump shape observed in urban areas is not dissimilar to that of the US. However, the peak is twice larger in urban areas than in rural areas of SSA. This suggests a larger ability to smooth consumption over the lifecycle in rural areas. Fourth, we look at the distribution of consumption conditional on income and wealth. We

[4]For brevity, we will refer to the three countries that we study in the text as SSA. When we report a precise number for SSA, that number relates to Malawi. Tanzania and Uganda show similar insights with details in the Appendix.

[5]However, despite this accumulation, livestock remains below 20% of total household wealth at age 65 while this proportion is 40% for land.

find that the consumption distribution conditional on income (or wealth) is more evenly distributed in SSA than in the US. An example that makes this point clear is the distribution of consumption conditional on land in rural areas. The bottom 20% of the land distribution accounts for 20% of total consumption and the top 20% accounts for 25% of total consumption. This finding suggests that land is likely to serve as an ex-ante redistribution mechanism that helps achieve the degree of consumption insurance suggested by the data.

Our analysis with panel data corroborates and extends our cross-sectional findings. First, whether we use cross-sectional data to compute the statistics in the previous two paragraphs or treat as cross-sectional data the household averages of our panel data, our findings regarding relative inequality and joint dynamics of CIW explained above do not change. Second, given that the top of the income distribution show relatively large positive savings rates in SSA, comparable to the ones in the US, this begs the question of why the top income-rich households in SSA are unable to accumulate wealth at the US levels. To explore this question we turn to our panel data. It turns out that income-rich households in SSA are not income-rich for long enough, compared with their US counterparts, to accumulate wealth. There is substantially more income mobility in SSA than in the US. This result arises from both income mobility matrices and the predicted income ranking of households. Both methods show larger upward as well as larger downward mobility in SSA than in the US. Analogously, within SSA there is larger income mobility in rural areas than in urban areas. This lower persistence in rural areas helps explain the lower ability to accumulate wealth in rural areas compared with urban areas. Third, using the joint panel of household-level consumption and income we compute insurance tests à la Townsend.[6] These panel-based tests show higher consumption insurance in rural areas than in urban areas of SSA. In particular, we cannot reject the hypothesis of complete markets in rural areas when we define consumption as caloric intake, while this hypothesis is strongly rejected in urban areas.

The higher ability to insure in rural areas is also apparent from self-reported information about shocks, coping strategies, and ability to formally borrow. Among rural households 71% report being hit by a shock in the past 12 months (most commonly weather-related shocks) and among urban households 39% report a shock (most commonly high food prices). Despite the higher occurrence of shocks in rural areas, 51% of the rural households that report a shock have some form of insurance to cope with the shock, while this figure is somewhat smaller in urban areas, 40%. That is, there is a larger self-reported access to insurance mechanisms in rural areas than in urban areas, conditional on needing insurance. Households that self-report "mutual insurance" as a coping strategy tend to be at the bottom of the income distribution, while those that report

[6] These are literally complete markets tests that focus on capturing the movements in consumption strictly due to insurance against income shocks, as opposed to consumption redistributions due to permanent productivities.

"self-insurance" populate the top of the income distribution. This is consistent with our results on the larger ability to accumulate wealth in the top of the income distribution than in the rest of the economy. The ability to insure consumption can also depend on the ability to formally borrow. In this case, conditional on needing a loan, urban households show higher application rates, 40%, than rural households, 27%.[7] While this differential in the ability to borrow suggests urban households might be better able to self-insure, we note that this formal borrowing is actually used 3.6 times more often as start-up capital (e.g., open a business) than for consumption in urban areas, while this ratio is 1.6 in rural areas. That is, formal borrowing, which is more prominent in urban areas, is mainly used for investment in potentially risky production activities rather than for consumption insurance purposes.

Our paper relates to a vast literature in growth and development economics. First, the patterns of low wealth accumulation in SSA relative to the US, which we study using micro data, are also present using aggregate data (Klenow and Rodríguez-Clare, 1997; Caselli, 2005). From a micro perspective, the facts that we document on the inability to accumulate wealth in SSA are directly related to the experimental work in Dupas and Robinson (2013a,b) for Kenya and in Brune et al. (2015) for Malawi. Both studies provide specific evidence of saving constraints that prevent accumulation. Second, the notion that the poor have strong institutions that preserve the ability to insure consumption is well-understood (Rosenzweig and Stark, 1989; Townsend, 1994; Attanasio and Ríos-Rull, 2000). We contribute to this literature by providing novel cross-sectional and panel evidence of a weaker transmission from consumption to income inequality in the rural areas than in the urban areas of SSA. The phenomenon of differential ability to insure consumption in rural areas versus urban areas has been previously explored (Harris and Todaro, 1970; Morten, 2013; Bryan et al., 2014; Munshi and Rosenzweig, 2016; Santaeulàlia-Llopis and Zheng, 2016). Finally, our paper relates to a growing literature that uses micro data to understand macro development (Hsieh and Klenow, 2009; Buera and Shin, 2011; Lagakos and Waugh, 2013; Gollin et al., 2014; Lagakos et al., 2016). Our contribution is to empirically study the joint behavior of the distributions of CIW in a manner that we hope is informative to discipline heterogeneous agent versions of macroeconomic models of growth and development (Galor and Weil, 1999; Hansen and Prescott, 2002; Gollin et al., 2002; Herrendorf et al., 2014).

In Section 2, we describe the data construction of household consumption, income, and wealth as well as a wide range of unavoidable measurement issues from household survey data (e.g., conversion units, deseasonalization, unsold production, underreporting of income, recall bias, etc). In Section 3, we study the transmission from income to wealth and from income to

[7] As we discuss below, these figures deal directly with self-selection as households are asked whether they needed a loan and whether they applied or not, independently of the need. For example, some households choose not to apply because of "not knowing any possible lender" and "having no collateral".

consumption separately for rural and urban areas in SSA. We also establish comparisons between SSA and the US. We investigate the univariate distributions of CIW in Section 3.1, the joint distributions in Section 3.2, the lifecycle behavior in Section 3.3 and the behavior of the top and bottom of the distributions in Section 3.4. We provide detailed insights from panel data studying income mobility and consumption insurance tests in Section 4. We also investigate self-reported risks, insurance mechanisms, and formal borrowing. We conclude in Section 5.

2 ISA Data and Measurement Issues

The Integrated Surveys on Agriculture (ISA) allow us to recover — for any practical purpose — the entire deseasonalized budget constraint of a household in the poorest countries of SSA.[8] The budget constraint offers a simple way to organize the data for the study of CIW inequality,

$$c + k' = y_a + y_l + y_b + y_k + k + t_a + t_m, \tag{1}$$

where c is consumption, y_a is agricultural production, y_l is labor income, y_k is capital income, y_b is business income, t_a are food transfers, t_m are monetary transfers, k represents wealth today and k' wealth tomorrow.[9] All this information regarding CIW is fully available in our data set, an availability that is very scarce even in rich countries.[10]

Due to the economic structure of the poor countries that we study, caution should be exercised in some aspects of our analysis, in particular, related to the income data. In this direction, we discuss in detail important measurement issues such as unit conversion of in-kind items, deseasonalization, and the value of unsold agricultural production, as well as the implications of potential data limitations (e.g., underreporting and recall bias) on our main results.

[8] See a comprehensive introduction to ISA in Appendix A.

[9] Note that we can write capital income y_k as rk where r is the net return to capital (which can incorporate depreciation), then collapse the remaining sources of income into a single non-capital income y_{nk}, and proceed analogously for transfers, which yields a familiar budget constraint $c + k' = y_{nk} + (1 + r)k + t$, or a further simplified version $c + s = y + t$ where $s = k' - k$ are savings and $y = y_{nk} + rk$ is total income.

[10] The availability of consumption, income, and wealth (CIW) in one single dataset is a rarity in the US and other rich countries. For example, in the US, the consumption expenditure survey (CEX) is widely used to study the joint dynamics of consumption and income (but without wealth data) (Krueger and Perri, 2006) and the Survey of Consumer Finances (SCF) is commonly used to study the joint dynamics of income and wealth (but without consumption data) (Díaz-Giménez et al., 2011). Since year 2000 the Panel Survey of Income Dynamics (PSID) extends its collection of household consumption data (beyond food) capturing a larger basket, which together with their income and wealth data allows study the joint dynamics of CIW in the US (Krueger et al., 2017). Another notable exception is the Italian Survey of Household Income and Wealth (Krueger and Perri, 2011).

2.1 Data quality

The Integrated Surveys on Agriculture (ISA) are conducted under the umbrella of the Living Standards Measurement Study (LSMS). The LSMS are representative household surveys with a particular focus on recovering the distribution of living standards and inequality (Grosh and Deaton, 2000). The current ISA builds on extensive experience of the World Bank in data collection and improves previous LSMS data. For example, Grosh and Glewwe (2000) propose a substantial set of improvements to the early LSMS conducted in the 1980s and 1990s that ISA has incorporated. One particular concern of previous LSMS work was the estimation of agricultural income—the main source of household income in poor Sub-Saharan Africa households—and assets. The ISA component is specifically constructed to address this issue (Carletto et al., 2010). ISA incorporates a new and comprehensive agricultural module questionnaire that has been created to keep track of all crops produced and inputs used per plot separately and for each crop season. For example, for the case of Malawi this is separately recorded for the rainy season, the dry season (dimba) and for permanent crops. This information is collected for each and all plots cultivated by each household.[11] The first LSMS-ISA data set made available to the public is the Malawi household survey conducted in 2010-2011 and made public in 2013. Most of the discussion of this paper focuses on this survey.

Other recent improvements of the LSMS beyond ISA are described in the special issue of the Journal of Development Economics for the Symposium on Measurement Survey and Design published in 2012. These include improvements in the three economic dimensions that we study: consumption (Beegle et al., 2012b), income (Deininger et al., 2012; Beegle et al., 2012a), and wealth (Carletto et al., 2013). The high quality of the data can be seen in the response rate of the Malawi 2010-11 survey. The response rate is 99.9% (i.e., a total of 12,271 households). Of those 12,271 households, only 6% of households are replacements.[12] Only a handful of these 12,271 households did not complete the full income, consumption, and wealth sections of the questionnaire that we require to be included in our analysis. This high response rate largely mitigates nonresponse biases (e.g., the concern that richer individuals may be reluctant to take part in the survey). Finally, it is also important to note that the ISA data are not top coded. This helps us capture the very rich in these poor countries, subject to the caveat of potential underreporting, in particular of income, which we discuss below at length.

[11] Most rural households represent small-scale farms that sell none or only a small fraction of what they produce in the open market.

[12] The main reason for replacement was that no household member was found when the survey team arrived to the household location. Only 14 households actually refused to answer the survey.

2.2 Units Conversion of In-Kind Items: From Pails to Kilograms

In household surveys from poor countries, it is standard to report amounts of consumption (including from own production), production (mainly agricultural) and additional sources of income (e.g., gifts and transfers) in units that are not necessarily harmonized across time or space. For example, in the Malawi ISA, households are asked to report the amount they produce of a given item in any unit they wish, and this varies from bags, dishes, bunches, and pails, to kilograms (kg). It is then necessary to deal with the measurement issue of converting all these reported units into a single unit, say kilograms.

We used a simple price-unit conversion method separately for production and consumption. In terms of production, this method uses the information on prices from households that produce and sell the same item in different units.[13] We use the median unit price for a given sold item in a given region, residential area, and season to generate household-specific conversion rates. We merge all household-specific conversion rates from all regions, residential areas, and seasons for 2004-05 and 2010-11. Then, we pick the median conversion rate (if there are at least 7 household specific conversion rates) for each item-unit pair (i.e., conversion rates are household- and item-specific). With the resulting conversion rates, items are first converted into the modal unit, and then into kilograms. In terms of consumption, we proceed similarly, using the information on prices from households that consume and bought quantities of the same item in different units. Finally, we need to attribute prices to both unsold production and consumption from home production. We use the median consumption prices in a given season-region separately for rural and urban areas.[14]

2.3 Household Income

The main resource in rural areas is agricultural production. Production is reported by crops per plot and by season (rainy season, dry season, and permanent crop). We can construct a measure of the entire agricultural production, sold and unsold, in monetary terms, which is household agricultural income. In our computations, we use net measures of income and subtract the full

[13] In the Appendix B we show that this price-unit conversion method is able to recover more item-unit pairs and has similar precision as the standard market surveys conducted on the field that weighs produce in local markets to obtain physical-unit conversion. All prices are deflated using consumer price indexes (CPI) for food and non food items separately for urban and rural areas — CPI available at the National Statistics Office of Malawi. See also Ecker and Qaim (2011) for a similar methodology using prices.

[14] Deaton (1988) argues as reasonable the use of regional prices at the cluster (villages or enumeration areas) to measure inequality across regions, but not necessarily to use these prices within cluster because the quality of items purchased can differ by household. This has potential implications for the measurement of inequality. In the case of Malawi with maize being the main consumption item this does not seem to be a big issue; see the discussion of unsold agricultural production in the next Section.

set of production costs from intermediate inputs (seeds and fertilizers), rental cost of plots, rental costs of capital equipment and structures, hired labor, and transportation costs associated with inputs purchases and production sales.[15] Note that in net agricultural income we include the contribution of household labor to agricultural production.[16] Livestock sales and animal produce are also reported for the past 12 months, and we include this in agricultural income after netting out their associated costs (e.g., animal feed, vaccinations, veterinary services, and hired labor).

Unsold Agricultural Production In agricultural economies such as the ones we study, assigning a monetary value to unsold agricultural production is essential to the measurement of household income. Unsold production represents the majority of total household production. We use maize in Malawi to illustrate this issue. First, we convert maize production into the same unit to find that maize represents 69% of the total agricultural production in kilograms. Most households produce maize as their main source of food and calorie intake,[17] but few sell it. Of the 9,280 households in the Malawi survey who report producing maize, only 1,618 (17%) report selling any maize and this proportion grows with income. Among the top 20% of the income distribution in rural areas, 30% of households report selling maize; among the bottom 20%, only 6% sell maize. It is noteworthy that even the rich keep their own production for consumption. Moreover, sales among the poor may indicate desperation rather than a good business strategy (Manda, 2010).

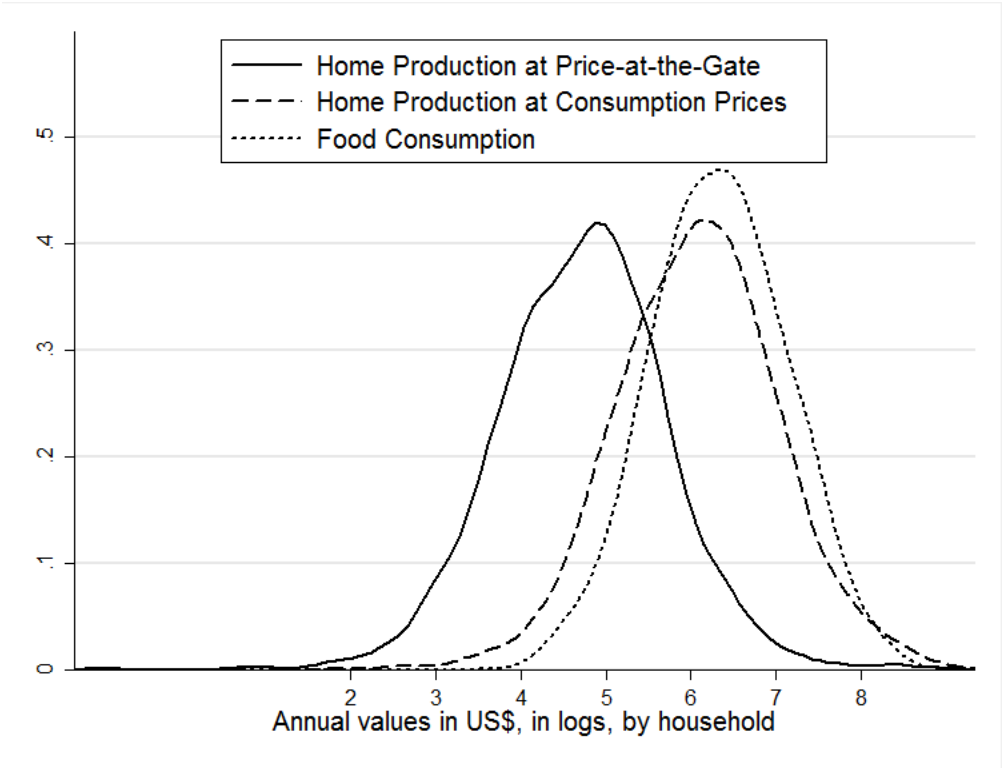
Second, we need to assign prices to unsold production. The price at the gate is normally used for this purpose (Deaton and Zaidi, 2002). For valuing maize, this implies using the price of shelled maize reported by households mostly in the immediate post-harvest season. There are two reasons this price underestimates the value of unsold production. The shelled maize is a different good than what farmers produce, as farmers use the cobs, husks, and stems for other intermediate purposes such as fuel, animal feed, and as cover to protect soil from erosion. Such uses have an important monetary value in subsistence households. Further, maize prices are lowest immediately after harvest (Kaminski et al., 2014), whereas consumption takes place throughout the year. While the storage facilities are limited (only 9% of households have a dedicated storage structure; most crops are stored in the house or in open drums or sacks) almost all households report storing some maize for their own use later. This suggests that maize has an additional value of being stored to be consumed when prices are high, and this option value is not captured

[15] In Malawi, the majority of households receive seed and fertilizer subsidies by the Farm Inputs Subsidy Program. We use the subsidized (coupon) prices reported by each household.

[16] This is innocuous for our purposes of measuring household income because the labor income generated by household members in agricultural production is also part of household income. Under some assumptions, this labor income can be separated from net profits, but this is beyond the scope of our paper.

[17] See the Malawi Bioenergy and Food Security country brief by the United Nations Food and Agriculture Organization.

Figure 1: Agricultural Production: Consumption Prices vs. Prices at the Gate



Note: The sample includes 4,385 households that sell neither maize nor tobacco and report producing a positive value of maize and consuming a positive value of home-produced maize. These households represent 36% of the entire sample and 45% of all rural households.

by the relatively low post-harvest price at the gate.

The underestimation of the value of production by the use of the price at the gate can be illustrated by focusing on rural households that sell neither maize nor tobacco, tobacco being the main cash crop.[18] These are the households closest to an autarkic model, in which the maize they consume is what they have produced. In this sample, the mean estimated quantity of maize produced is 124 kg and the mean estimated quantity of maize consumed is 130 kg.[19] Since the quantities of production and consumption are similar, it becomes clear that assigning prices at the gate to production and consumption prices to consumption can create an artificial wedge between their monetary values if these two prices differ. Indeed, the price of shelled maize at the gate for these households is approximately US$0.16 per kg, and the consumption price of green

[18]The sample includes 4,385 households that sell neither maize nor tobacco and report producing a positive value of maize and consuming a positive value of home-produced maize. These households represent 36% of the entire sample and 45% of all rural households.

[19]For the entire sample of rural households, these numbers are, respectively, 129 kg and 137 kg.

maize on the cob is approximately US$0.36 per kg.[20] If we use the price at the gate, the average estimated production value is US$22, which is less than half of the average consumption value, US$47. That is, the price at the gate underestimates the value of unsold production.

In Figure 1 we compare the distribution of the monetary value in dollars of household total food consumption in logs (dotted line) with the value of household agricultural production valued with consumption prices (dashed line) and valued with the price at the gate (solid line). Since we are focusing on households that sell neither tobacco nor maize and these are rural households close to subsistence, one would expect the distribution of agricultural production and food to overlap. This is actually the case in raw quantities and, hence, also the case if we value home production with consumption prices. However, if we value production with prices at the gate, the total value of food production is estimated to be considerably lower than food consumption. Even if we value production with consumption prices, the distribution of the value of food production is slightly shifted left in relation to consumption. This is to be expected as these households may have other sources of income, albeit small, such as informal labor or received food gifts. In light of our results, it is our view that the shadow price of unsold agricultural production is best captured by consumption prices.

Finally, the remaining issue is how to value the part of agricultural production that is actually sold on the open market. We have chosen to use the price at the gate to value sold production as sold items lose their storage value for the producer household, but this is of relatively small consequence given the low share of sold production in the sample. The estimated average per capita value of maize production for the sample of all rural households is US$101 under our preferred measure — that is, if we use consumption prices for the unsold production and prices at the gate for the sold production. This figure is US$109 if we use the consumption price for all production, sold and unsold.

Other Sources of Household Income: Labor, Business, Capital and Transfers Labor income is reported by occupation (main, secondary, and informal). For each activity there is information on the average hours worked per day, average days worked per week, and number of weeks worked per year. This allows for an estimate of yearly labor supply.[21] Wages are reported by activity but potentially in different units of time, mostly on a monthly basis for those with

[20] We use the following nominal exchange rates for 1US$ in March 2010: Malawi, 152; Tanzania, 1,350; and Uganda, 2,110.

[21] Previous LSMS datasets provide information on labor supply with the reference period of "the past 7 days". ISAs complement that information with recalled hours worked per day, week, and month over the past 12 months, which greatly facilitates the determination of the annualized labor supply. In particular, this avoids potential measurement error from labor supply seasonality. See Rosenzweig and Udry (2014) for a discussion on how wages are affected by seasonal weather patterns.

steady labor income (specially in urban areas), and on a weekly or daily basis for those working on *ganyu* or informal activities (e.g., landowners' seasonal labor supply outside their own farm in the lean season).[22] Wage payments include salaries plus additional allowances. These allowances could be in kind (mostly in maize) but are reported in monetary value. By combining the wages and the labor supply in a consistent unit of time we build an estimate for annual labor income for all individuals in the household. By summing individual labor income of all members within households we construct a measure of annual household labor income.

We define annual household business net income using information from all business owned by the household.[23] For each enterprise we compute net income as total annual sales minus costs. In the Malawi ISA, households report the average net income for a bad, standard, and good month. Households are then asked how many of each type of month occurred in the past year. In Uganda, households report both gross income and costs. In Tanzania households report net income directly.[24] Part of business income is from fishing activities. Fishing net income (by fish species) is also collected. These are provided separately for each of the two landing seasons in a year, high and low. We transform the total quantity per species in kilograms depending on the units reported and the form of packaging, which we use to value sold and unsold production. We net fishing income from intermediate input costs such as rented gears (e.g., mosquito nets, beach seine, long/hand line, gillnet, fish traps), rented boats/engines, fuel, oil, and maintenance, hired labor salaries and other in-kind payments.

Household annual capital income includes net interest income, pension income, rental income from nonagricultural land rental; apartment and/or house rental; shop and/or store rental; car and/or truck, other vehicle rental; capital gains (including sales) from real estate; nonagricultural asset sales; agricultural/fishing asset sales; and other income from inheritance, lottery, or gambling winnings. This information is available for the past 12 months. We include in capital income agricultural land rentals (per season) and income from renting fishing equipment (gears). As we describe in the next section, despite the level of detail, household capital income is negligible compared with other sources of income.

Finally, household annual net transfers are defined as income transfers/gifts received from rural areas/urban areas/other countries minus income transfers/gifts given in the past 12 months. We

[22] Informal labor (e.g., *ganyu* in Malawi) while important, is very seasonal and relative small compared to other sources of income (Goldberg, 2016).

[23] Privately held businesses per household (potentially more than one) include owned nonagricultural businesses that process/sell agricultural byproducts (e.g. flour, juice, beer, jam, oil, seed, and livestock by-products), sales of forest-based products, street or market trading businesses, taxi or pickup truck drivers, bar/restaurants, professional services (e.g., doctor, accountant, lawyer, and midwife) etc..

[24] As was the case for agricultural net income, business net income includes the contribution of household labor to household businesses.

add the value of received aid (e.g., free maize, other free food, food/cash-for-work programs such as Malawi Social Action Fund or Public Works Program) provided by social safety nets to transfers received. The survey also records remittances in cash received from children 15 years of age or older who no longer live in the household. Neither the Tanzania nor Uganda ISAs have a specific question on in-kind food transfers received by the household. The Malawi survey has such a question, but less than 20% of households report receiving in-kind food transfers in the past 12 months. Nevertheless, in the consumption questionnaire a much higher proportion of households report eating food gifts in the past 7 days. In this 7-day recall data, 62%, 41%, and 25% of households, respectively, in Malawi, Tanzania, and Uganda report consuming food gifts. We therefore include food gifts from the consumption questionnaire (deseasonalized and annualized) in our definition of disposable income. In Malawi, we can compare the contribution of this source of income with other reported transfers. Food gifts represent approximately 6% of total disposable income and dwarfs the 1% contribution of net (cash) transfers in Malawi.[25]

Underreporting of Income The underreporting of income is a recurrent issue in household surveys in both rich and poor countries (Deaton, 1997; Piketty, 2014). Tax avoidance is one reason for underreporting. This does not seem a major issue in the SSA countries that we study. For instance, in Malawi less than 10% of the population is actually eligible to pay income tax,[26] a similar figure to that of the US in the 1930s (Piketty, 2014). What is perhaps more relevant for our analysis is that the effect of the underreporting bias is well understood (e.g., Banerjee and Piketty (2005) for India, Alvaredo and Londoño (2013) for Colombia, and Heathcote et al. (2010) and Meyer et al. (2015) for the US). Any correction of the bias would simply increase the income of households at the top of the distribution. For example, Alvaredo and Gasparini (2013) compare the share of income accrued to the top 1% according to household-survey data and the tax records from actual register data. The share from tax records is higher than the share from household-survey data by a factor of 1.52 in Argentina, 1.74 in Uruguay, and 1.47 in Colombia.[27] In Malawi the top 1% earns 20% of total income, a share that increases to 31% if we apply the average correction estimated in Alvaredo and Londoño (2013) to Malawi. That is, corrections of underreporting imply a higher income inequality. This reinforces our argument in Section 3 for a low transmission from income inequality to consumption and wealth inequality.

We find it is reassuring that among rural households discussed above that we can categorize as autarkic (i.e, with no production sales) the reported agricultural production and the reported annualized consumption imply very similar quantities. That is, if we use the measure of food con-

[25] See further details on the computation of household income in the Appendix.

[26] See the Malawi Revenue Authority: http://www.mra.mw/.

[27] Precisely, the household survey and tax records shares of income accruing to the top 1% are respectively 8.8% to 13.4% in Argentina, 8.2% to 14.3% in Uruguay, and 13.9% ti 20.4% in Colombia.

sumption from own production as external validation for our measure of agricultural production, we find a small scope for measurement error. Furthermore, the survey design and implementation go a long way to mitigate the potential underreporting. The survey provides checks for internal consistency. For example, interviewees are asked about both total sales, and also sales by crop. The interviewer then must check in situ that the sum of the crops coincides with the total or otherwise re-interview. Also, as mentioned before, the response rate is 99.9% and only 6% are replacement households; none due to refusal of taking part in the survey. Moreover, the interviews are conducted in a private place—so there is no reason to underreport in order to hide true income from the community.

Underreporting of income is more likely to be present in the estimates of business income, for which the questionnaire is not as detailed as for agricultural income. Also, rich households for whom an income tax is applicable – approximately 10% of the population (overwhelmingly urban) – may have reasons to underreport income. Since the share of business income is also concentrated among the rich, the potential underreporting is likely to occur in the right tail of the income distribution. Again, corrections to this bias would increase income inequality and simply reinforce our arguments in Section 3.

2.4 Wealth and Its Portfolio

The underreporting of wealth is also potentially important, but perhaps less of a concern than the underreporting of income for three reasons. First, there are no taxes on assets or property in Malawi. Second, note that the two main assets held by these households are directly observable: (i) the dwelling is immediately seen by the surveyor and; (ii) the land holdings are measured by GPS. Third, one of the methodological improvements of the LSMS-ISA is the internal consistency checks (Carletto et al., 2010) that help further decrease measurement error in assets (e.g., GPS mapping, ability to sketch map of the plots, digital photography).[28]

Our definition of wealth (i.e., net worth) includes land, housing, livestock, agricultural equipment and structures (e.g., tools and barns), fishing equipment, other durables (e.g, cars, furniture, and household electrical appliances), minus debt.[29] The main difference between ISAs and previous LSMS surveys is that in ISAs the quality of capital and its depreciation is measured in a straightforward way by asking: *"How much would you get for this piece of equipment if you sold it now?"* This selling price accounts for capital quality and depreciation and avoids the alternative use of the age of the assets (with potential recall error) plus assumptions on the depreciation

[28] Carletto et al. (2013) show that the Gini indexes for self-estimated land size and for GPS-measured land size are extraordinarily similar: respectively 0.399 and 0.395 for Malawi.

[29] A detailed construction of our wealth measures is available in the Appendix.

factor to impute the current value of capital (Deaton, 1997). While the use of the selling price is preferred, this is not without potential measurement error, particularly for assets such as land, for which the market is largely underdeveloped. For example, in the 2010 survey in Malawi households are asked to provide an estimate of the value of their land and all households do so, but more than four-fifths of households live in areas where no market for land operates (Restuccia and Santaeulàlia-Llopis, 2017). This non-marketed land is either granted by a village chief, inherited, or obtained as bride price. These authors show that the correlation between land quality (at the plot level) and its price is positive and increasing with the amount of marketed land. For instance, for rural households that do not operate any plot obtained through the market, the effects of land quality on land price is a significant .116, while for rural households that operated purchased land (with title), this figure increases to .503.

The valuation of land is available for all three countries, Malawi, Tanzania, and Uganda. We find the price of land varies considerably across countries. In Malawi, the median and mean prices of an acre are, respectively, US$214 and 473. In Tanzania, the price distribution is much wider, the median and the mean are, respectively, US$136 and 1,762. In Uganda, prices are consistently higher; the median and mean are, respectively, US$582 and 1,811. Some of these differences in prices may be driven by differences in land quality. In Uganda and in the north of Tanzania, there are two rain-seasons, the territory is hillier, and there is access to Lake Victoria; the staple crops are also more varied. The average price of land in northern Tanzania, US$2,463 per acre, is similar to Uganda's. In south-west Tanzania the land and climate are similar to those in Malawi (e.g., there is one rain-season and the main crop is maize). The average price of land in southern Tanzania, US$255 per acre, is closer to Malawi's. It is reassuring that land quality and prices are correlated as this suggests that price differences tend to capture genuine variation. The difference in the reported price of land across countries might also be due, in part, to differences in market development. In 1998 the Uganda government enacted the Land Act with the explicit aim of turning dwellers on land held under customary tenure into freeholders. Even if the policy was not fully successful (McAuslan, 2003), the development of a land market in Uganda may help explain the disparity in valuations compared with Malawi. This issue deserves further attention beyond the scope of this paper. Nevertheless, we should keep the issue of land markets (or lack thereof) in mind when comparing the reported monetary value of land, hence, wealth — across poor countries.

One cause for potential concern is the lack of a direct question on total savings held at home or at a savings account. We believe this is not an important concern for three reasons. First, there is a specific question about whether the household retrieved savings or received any interest from savings in the last year and only 0.05% of rural households and 3% of urban households

replied yes. Second, Beck et al. (2008) report that in Malawi and Uganda checking account fees are more than 20% of household income which makes access close to prohibitive. Third, Brune et al. (2015) find that in a sample of tobacco sellers in Malawi average savings (bank account plus cash held at home) amounted to US$23. Tobacco sellers are a highly selected group as they only represent 13% of rural households and 68% of tobacco sellers are in top quintile of the rural income distribution. The average amount of savings in this selected group represents 1.8% of the average rural household wealth and 0.09% of the average wealth in the top income quintile. The small amount of saving and cash holdings compared to the value of other assets shows that our estimates of wealth inequality would change little by the inclusion of savings and cash holdings.

The information on debt from ISA data has the potential caveat that focuses on new loans (taken out in the last 12 months) rather than the total amount of outstanding debt. However, we do not think this is an important concern as the household debt that usually rolls over 12 months, such as mortgages and student loans which account for 90% of household debt in the US, are almost nonexistent in Malawi. This helps explain the low aggregate debt-to-income ratio in Malawi from ISA, 10.9. The debt-to income ratio in the US is roughly 10 times higher, 104, measured by the SCF (Bricker et al., 2014).[30]

Finally, we also note that the survey for Uganda does not report the value of outstanding debt, whereas the surveys for Malawi and Tanzania do so. While debt is a minor component of net worth in Malawi and Tanzania, Uganda's wealth measure is likely to be overestimated for this reason. Also, the survey for Tanzania does not report the value of housing and other durables; thus, the monetary value of wealth reported for Tanzania is clearly underestimated, particularly for urban areas.

2.5 Further Measurement Issues: Recall Bias and Trimming

Food consumption is the lion's share of household consumption in our settings and hence, this measurement is perhaps the most important aspect of consumption. The ISA collection of food consumption data is based on a 7-day recall questionnaire. These short-recall periods tend to yield better consumption measures (Beegle et al., 2012b),[31] but at a cost. Given that ISAs are spread over 12 months, the surveys will do a good job in recovering average food consumption in the population, but they will potentially do a poor job in measuring annual dispersion as part of this dispersion will be artificially due to seasonal variation that needs to be net out for our purposes. Indeed, Malawi, Tanzania, and Uganda have clearly demarcated lean and

[30] Separately in rural and urban areas of Malawi, we find that the debt-to-income ratio for debtors is respectively, 9.5 and 15.3.

[31] See also Gibson et al. (2014).

plenty seasons that largely determine food consumption. This shortcoming can easily be dealt with using standard deseasonalization techniques to recover monthly consumption dummies.[32] Measurement error for other types of consumption such durables (collected with 12 month recall) is still potentially present. We note, however, that durable consumption represents a minor share of total consumption (4% in rural areas and 6% in urban areas; see below).

Income is based on recall of the entire production per crop and plot for the past two harvests. The harvest referred to in the questionnaire may have taken place months earlier. We conduct robustness testing for potential recollection bias for production using measures of household income only for those households interviewed within 3 months after the rainy season harvest (which represents 93% of annual agricultural production) has been completed (May, June, July); the mean and median of total agricultural production in kilograms is virtually identical for these three months and for the yearly values.

Finally, our trimming strategy consists of two steps that mitigate the presence of outliers. As a first step, we exclude households with zero calorie consumption or with an intake per person above the maximum daily of 10,000 Kcal. As a second step, we trim clear outliers after a visual inspection by subitems and then by aggregated measures. We finalize with an implied trimming of 2% of households for Malawi and Tanzania and 4% for Uganda.[33] The final samples for Malawi, Tanzania, and Uganda include, respectively, 12,015, 3,012, and 2,337 households.

2.6 Household Survey Data vs. National Accounts

It is important to compare household survey data versus national accounts as they potentially yield different estimates of consumption and income level and growth (Krueger et al., 2010). Table 1 compares our household survey data from ISAs with the national accounts data for 2010 from the World Development Indicators at the World Bank database. The national accounts figures are reported in panel (a), and the mean income and consumption per capita computed with the ISA household survey data adjusted as described in this Section are reported in panel (b). Focusing on Malawi, we find that the mean income per capita from our household survey data is US$343, which is very close to the national accounts number of US$359.

However, note that the composition of income as estimated by the household survey implies that agricultural output represents 43% of total income, while this figure is solely 29% in the national accounts. Further, also note that in Section 2.3 we showed that ISAs do an excellent job

[32] See our Appendix for further details. The lean season in Uganda stretches from March to July; in Malawi and Tanzania the lean season stretches from October to February.

[33] The 2010 surveys for Tanzania and Uganda are the second waves of panel surveys. Splitter households were dropped to compute the tables in this paper and are not accounted for in the percentage of trimming reported.

Table 1: World Development Indicators and LSMS-ISA (Current USD, 2010)

(a) Macro Data: World Development Indicators, 2010

	Malawi	Tanzania	Uganda	Thailand	Mexico	US
Income per capita	359	524	471	4,802	8,920	48,377
Agricultural share (% Income)	29	28	25	12	3	1
Consumption per capita	257	328	376	2,577	6,023	32,783
Rural population (%)	84	71	85	56	22	19
Life expectancy	53	59	57	73	77	79

(b) Micro Data: LSMS-ISA, 2010

	Malawi	Tanzania	Uganda
Income per household	1,384	1,625	1,623
	[1,314; 1,453]	[1,465; 1,786]	[1,358; 1,888]
Income per capita	343	378	509
	[328; 358]	[342; 414]	[335; 682]
Agricultural share (% Income)	43	34	23
Consumption per household	1,601	1,931	2,366
	[1,569; 1623]	[1,869; 1,994]	[2,240; 2,491]
Consumption per capita	416	456	589
	[407; 425]	[436; 475]	[545; 633]
Rural households (%)	82	69	77
Sample size	12,015	3,012	2,337

Notes: Statistics in panel (a) are provided by the World Development Indicators at the World Bank and are based on national accounts data - Gross National Income in current dollars (data retrieved in 2010). Statistics in panel (b) are produced from the ISA household surveys data provided by the World Bank and adjusted as described in Section 2. Brackets denote 95% confidence intervals.

of measuring unsold agricultural production. Combining these two findings suggests that national accounts underestimate agricultural income by 41% in Malawi. If national accounts were adjusted for this correction factor in agricultural production, the national accounts income estimate would be higher than the household survey estimate. This then also implies that, if the national accounts are doing a good job in measuring nonagricultural income, the household survey is potentially underestimating (or not observing) some component of nonagricultural income. For example, we already discussed that there may be some underreporting in business income and that the share of income accrued to the top 1% is on average higher by a factor of 1.5 if measured with tax receipts (Alvaredo and Gasparini, 2013); also, illegal income from the diversion of international aid (e.g., in the form of bribes) could potentially account for some of this discrepancy (Deaton, 2005).[34] Finally, while in Tanzania the household survey estimates of mean income are lower than those from the national accounts, in Uganda the household survey estimates and national accounts are not significantly different. Further, in Tanzania and Uganda the household survey measures of agricultural income are similar to the national accounts counterparts.[35]

The main disparity between the household survey and the national accounts estimates is found in consumption. The ISA estimates of consumption per capita are higher than the national accounts estimates for all three countries. This is consistent with other Sub-Saharan Africa countries (Deaton, 2005). For example, the national accounts are likely to underestimate the value of consumption from own agricultural production, which we estimate to be 20% of total consumption from the household survey data in Malawi. This suggests that national accounts might not only be underestimating consumption growth, as suggested in Young (2012), but also the level.[36] However, the ranking of consumption across countries is maintained in the macro and the micro data: Malawi is the poorest, followed by Tanzania, then Uganda.

2.7 Rural-Urban Differences in Levels

The rural-urban gap in consumption and income within countries is at least an order of magnitude larger than the country differences across Malawi, Tanzania, and Uganda. In urban Malawi, mean per capita consumption and income is, respectively, US$648 and US$618, while these figures are US$297 and US$245 in rural areas (Table 2). That is consumption per capita in urban areas is

[34] The reason is that international aid shows up in national accounts but not necessarily in household survey data. See, for example, the cashgate scandal covered by The Guardian, http://www.theguardian.com/global-development/2014/nov/11/malawi-official-jailed-cashgate-scandal-aid. This way, it is likely that the household survey will capture some, but not all, of the international aid, which according to WDI represents 26% of the total income in Malawi in 2010.

[35] The ratio between the agricultural income from the household survey and the national accounts is, US$378×0.34/US$524×0.28=0.87 for Tanzania and US$509×0.28/US$471×0.25=0.99 for Uganda.

[36] However, note that our measure of consumption is different from that in Young (2012), who uses the ownership durables (and other education and health measures) to proxy for real consumption.

Table 2: Rural and Urban Levels: Cross-Country Comparison (ISA 2010)

	Malawi		Tanzania		Uganda	
	Rural	Urban	Rural	Urban	Rural	Urban
Consumption	1,366	2,912	1,545	2,891	1,809	4,910
" (p.c.)	297	648	280	641	321	1,043
▷ Nondurables	1,272	2,561	1,466	2,615	1,254	3,205
▷ Durables	40	173	4	77	328	1,060
Income	1,131	2,781	1,225	2,610	1,268	3,217
" (p.c.)	246	618	221	578	225	676
▷ Agriculture	665	247	690	204	426	132
▷ Labor	212	1,630	248	1,390	183	846
▷ Business	128	1,052	178	800	534	1,843
Wealth	1,309	3,976	3,361	1,760	6,148	10,256
▷ Assets						
Land	575	401	2,341	1,588	4,421	4,774
House	404	2,690	*n.a.*	*n.a.*	1,190	4,336
Land (acres)	2.3	0.4	6.0	2.5	4.7	1.5
▷ Debt	5	37	11	22	*n.a.*	*n.a.*
Sample size	9,820	2,195	2,067	945	1,809	528

Notes: All variables except land acres are in current USD. The construction of the measures of household consumption, income, and wealth is discussed in Section 2, with further details in the Appendix. Per capita variables are computed dividing by total household size.

2.18 times higher than in rural areas, and income per capita in urban areas is 2.51 times higher than in rural areas. The magnitude of the difference between rural and urban areas is even higher for Tanzania and Uganda. Across rural areas, the largest difference in mean per capita consumption is between Tanzania (US$280) and Uganda (US$321) — a 15% difference[37]— while the mean per capita consumption in Malawi is US$297. The largest difference in mean income per capita in rural areas is between Tanzania (US$221) and Malawi (US$246) — a 11% difference.[38]

In terms of composition, and focusing on Malawi, we find that consumption in both rural and urban areas is dominated by nondurables that represent more than 95% of the total consumption basket.[39] In terms of income, the major components in rural areas are agriculture income and

[37]These two estimates are statistically different. The confidence intervals are, respectively, [US$271; US$290] and [US$299;US$343].

[38]The respective confidence intervals are [US$203; US$239] and [US$236; US$256].

[39]Food consumption is the main component of the consumption basket representing an average 65% of total consumption in rural areas and 51% in urban areas (De Magalhães and Santaeulàlia-Llopis, 2015)

labor income that respectively represent 60% and 19% of household income. In urban areas labor income represents 53% household income, while agriculture barely 10%. Business income represents 10% of household income in rural areas and 34% in urban areas. This proportions are similar for Tanzania and Uganda.

Finally, in terms of wealth, urban households hold 3.03 times more wealth than rural households in Malawi. In rural areas the main component is land, which represents 44% of household wealth, housing 30%, and livestock 13%. In urban areas the main component is housing, which represents 59% of household wealth, other durables 27%, and land 14%. A first pass to assess the ability to accumulate wealth, given income, is the wealth-to-income ratio. We find that for Malawi the wealth to income ratio is 1.2 in rural areas and 1.4 in urban areas, suggesting higher ability to accumulate wealth in urban areas. Nationwide, the wealth-to-income ratio from our household survey data is roughly 1.3 for Malawi, which suggests a much lower ability to accumulate wealth than in the US where this ratio is 6.6 using SCF data (Díaz-Giménez et al., 2011).[40]

3 An Empirical Analysis of Consumption, Income, and Wealth Inequality in Rural and Urban Sub-Saharan Africa

Whether distributional differences in consumption, income, and wealth exist across rural and urban areas is a lesser-understood phenomenon. That is the focus of our study. For the sake of brevity and, given that Malawi has the largest and arguably the highest quality data set, we focus on Malawi in the main text and relegate most of the results for Tanzania and Uganda to the Appendix.[41]

3.1 Consumption, Income, and Wealth Inequality

In SSA, wealth inequality is larger than income inequality and, income inequality is larger than consumption inequality. In Malawi these numbers are (in variance of logs): 1.95 for wealth, 1.09 for income and 0.49 for consumption. This ordering also holds within urban and rural areas and for other measures of inequality (Table 3). Furthermore, we find that for consumption, income, and wealth, inequality is higher in urban areas than in rural areas. This can also be observed in Figure 2; the densities for wealth are flatter than those for income, and the densities for

[40] For Tanzania and Uganda the wealth-to-income ratio is, respectively, 1.7 and 4.1. However, note that this is likely to be a lower bound for Tanzania given that we lack of housing wealth for this country, and the ratio for Uganda is likely to be an upper bound for Uganda as we lack of debt data for this country.

[41] Malawi has a sample size that is roughly three times larger than Uganda and Tanzania, and has more detailed and comprehensive information for the triplet CIW as discussed in Section 2.

Table 3: Cross-Sectional Inequality: Rural and Urban Malawi (ISA 2010)

(a) Variance of Logs

	Malawi			U.S.		
	Rural	Urban	Full	SCF	PSID	CEX
Consumption	0.40	0.57	0.49	–	0.79	0.35
Income	0.98	1.56	1.09	0.99	0.97	0.55
Wealth	1.48	4.51	1.95	4.53	2.11	–
Inequality Ratios:						
▷ C/I	0.41	0.37	0.43	–	0.81	0.64
▷ W/I	1.51	2.89	1.77	4.58	2.18	–

(b) Gini

	Malawi			U.S.		
	Rural	Urban	Full	SCF	PSID	CEX
Consumption	0.36	0.44	0.39	–	0.41	0.32
Income	0.53	0.70	0.58	0.58	0.44	0.38
Wealth	0.60	0.84	0.67	0.82	0.79	–
Inequality Ratios:						
▷ C/I	0.68	0.63	0.67	–	0.93	0.84
▷ W/I	1.13	1.20	1.16	1.41	1.80	–

Notes: All variables are in current USD. For Malawi, all computations are done by the authors. The inequality ratios divide a measure of inequality for the variable in the numerator by the same inequality measure for the variable in the denominator. The measures of inequality that we study are the variance of logged variables (panel (a)) and the Gini index (panel (b)). For the US, we compare three data sources. First, we simply borrow the 2007 SCF estimates from Díaz-Giménez et al. (2011); second, we compute the 2006 PSID statistics using data kindly provided by Krueger et al. (2017); and, third, we compute the CEX statistics using the data publicly available from Krueger et al. (2010). Note that the CEX consumption and income data are top coded, which helps explain its lower dispersion. The construction of the measures of household consumption, income, and wealth is discussed in Section 2, with further details in the Appendix.

consumption are more concentrated that those of income in both rural and urban areas.[42]

In rural areas wealth and income inequality is respectively 1.48 and 0.98 (in variance of logs) and 4.51 and 1.56 in urban areas (panel (a) Table 3). Thus, the ratio of wealth-to-income inequality is 1.51 in rural areas and 3.05 in urban areas which suggests that, for a given amount of income dispersion, there is a larger ability to generate wealth dispersion in urban areas than in rural areas. Comparing SSA with US inequality, we find that income dispersion transmits much less into wealth dispersion in SSA than in the US. Precisely, in terms of household income, the US has a log variance of 0.99 for the year 2010, as reported in Díaz-Giménez et al. (2011) using the Federal Reserve's Survey of Consumer Finances (SCF), and the variance of logs in income in SSA is roughly the same, 1.09 in Malawi. In contrast, in terms of wealth the US has a log variance of 4.53, which is more than twice larger than that of Malawi, 1.95.[43] That is, given roughly the same income dispersion, the US is able to generate 2.3 times more wealth dispersion than SSA.[44]

This lower transmission from income to wealth inequality in SSA compared with the US is present in both rural and urban SSA. Rural Malawi has income inequality similar to that of the US, with a variance of logs of 0.99, while wealth inequality in rural Malawi is 1.49, i.e., one-third of the US wealth inequality. That is, with roughly the same income dispersion as rural Malawi, the United States is able to generate three times the wealth dispersion of rural Malawi. Also, the US is able to generate the same amount of wealth dispersion as urban SSA with about 60% of its income dispersion. This is perhaps the first indication of a larger inability to accumulate wealth in rural SSA compared with urban SSA, and in the SSA compared with the US. Similar insights arise if we look at Gini indexes (panel (b) Table 3).

Focusing on consumption, inequality in rural areas is smaller than in urban areas with variance

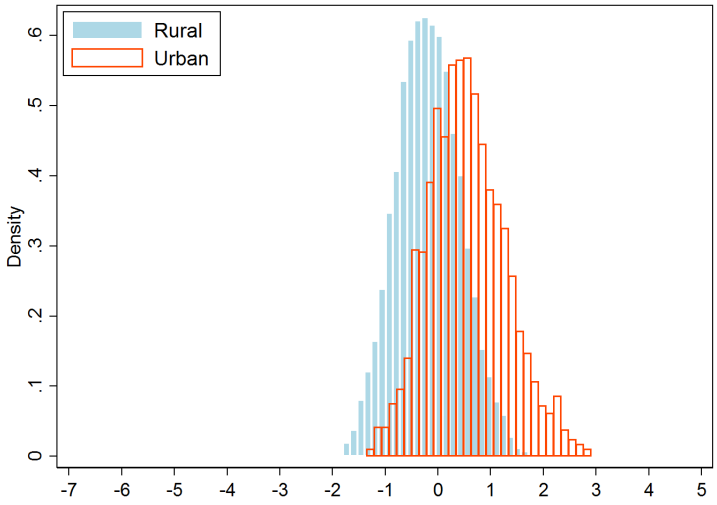
[42]The distributions of CIW are not symmetric with skewness statistics different from zero. The asymmetry is larger for wealth than for income, and for income than for consumption. All distributions are skewed to the right, and more skewed in rural areas than in urban areas. In rural areas, the skewness values are 3.9, 18.6 and 19.9 for consumption, income, and wealth respectively. In urban areas, the skewness values are 2.9, 7.9, 9.1 for consumption, income, and wealth respectively. The CIW distributions also have heavier tails than the normal distribution as shown by the high kurtosis values in rural areas (34.4, 580.3 and 662.4. for consumption, income, and wealth respectively) and in urban areas (13.9, 86.9 and 95.1 for consumption, income, and wealth respectively). In logs, the distributions resembles the normal distribution (i.e., skewness zero and a kurtosis value of three). In rural areas CIW have respective skewness values of 0.23, -0.18, -0.67 and kurtosis values of 3.2, 4.9, and 5.9. In urban areas CIW have respective skewness values of 0.22, 0.27, -0.31 and kurtosis values of 3.5, 4.4, and 3.4.

[43]The figures for Tanzania and Uganda are similar, see Appendix C.

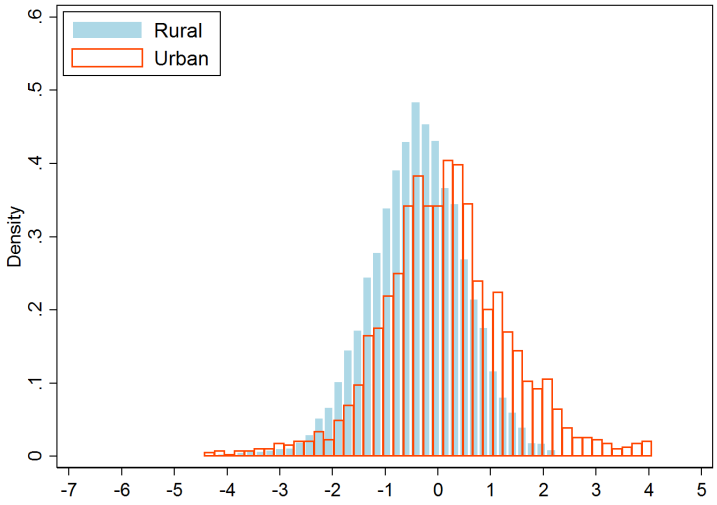
[44]Using PSID data to compute the variance of wealth we find an estimate of 2.11 for the US, also larger than its counterpart in Malawi. The lower variance in wealth in the PSID data compared with the SCF data is explained by the inability of the PSID to recover the top of the wealth distribution which SCF does oversampling rich households (Krueger et al., 2017).

Figure 2: Density of Consumption, Income, and Wealth in Rural and Urban Malawi (ISA 2010)

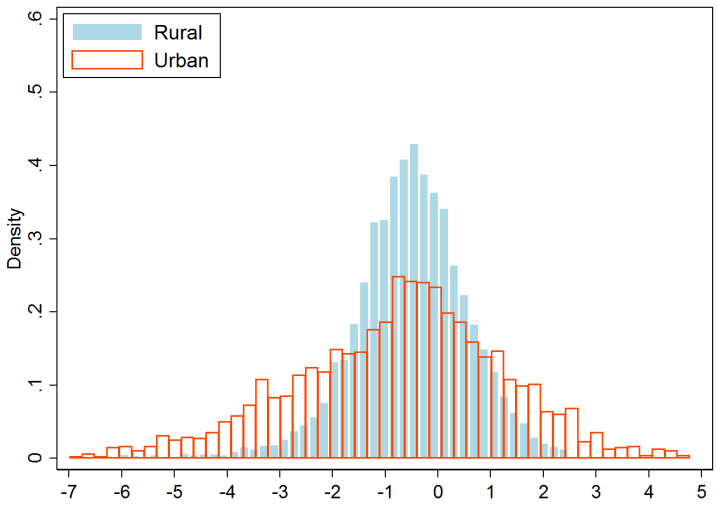
(a) Consumption



(b) Income



(c) Wealth



Notes: The construction of household consumption, income, and wealth is described in Section 2. All variables have been logged.

of logs of respectively 0.40 and 0.57 (panel (a) Table 3). That is, consumption is more unequal in urban areas than in rural areas by roughly a factor of 1.4 for Malawi. Urban and rural areas share a similar ratio of consumption-to-income inequality; a ratio that has been used as a first pass to understand consumption insurance (Krueger and Perri, 2006; Morten, 2013). However, Aguiar and Bils (2011) argue that there is a higher underlying consumption inequality than that inferred from consumption surveys with long recall due to a loss of quality data from goods that are mostly purchased by rich people.[45] In the SSA countries that we study this is more likely to occur in urban areas than rural areas, as non-food consumption (with a longer recall period than food) is more predominant for rich households in urban areas. Thus, any corrected measure of consumption would likely break the apparent tie in the ratio of consumption-to-income inequality between rural and urban areas. This tie breaking would be in the direction of a larger transmission from income to consumption in urban areas then in rural areas. Regardless of any correction, there is an already clear distinction between the ratio of consumption-to-income inequality between SSA and the US which is, respectively 0.43 and 0.81. That is, the consumption-to-income inequality ratio is much larger in the US than in Malawi.[46] This represents our first evidence suggesting lower transmission from income to consumption (i.e., higher consumption insurance) in poor SSA than in the US. Similar results are obtained with Gini indexes (panel (b) Table 3).

A recurrent theme in the inequality literature is the bias from the underreporting of income, in particular, from rich households (see Section 2.3). However, the correction of such bias simply implies an increase in income inequality (Banerjee and Piketty, 2005; Alvaredo and Londoño, 2013; Heathcote et al., 2010; Meyer et al., 2015). That is, it is important to recognize that the correction of the underreporting income bias simply strengthens our results by making income even more unequal than consumption and wealth in SSA. Corrections to the underreporting of income bias in Malawi would increase income inequality and, hence, lower the transmission from income to consumption and wealth in Malawi compared with the US.

Finally, the fact that we use cross-sectional data (Malawi, ISA 2010) to describe inequality patterns helps preserve a consistent comparison with previous studies in developed countries (Díaz-Giménez et al., 2011; Krueger et al., 2017), but it comes with caveats. In particular, it might be that part of the dispersion that we report with cross-sectional data is not all genuine variation (see our discussion on measurement error, underreporting, and recall bias in Section 2 and the

[45] Attanasio et al. (2007) argue that these differences in CEX data arise from interview data (monthly recalls) versus diary data (7-day recalls).

[46] This ratio for the US is 0.64 if we use CEX data in our computations. That is, CEX also implies a larger transmission from income to consumption in the US than in Malawi. An important difference between CEX and PSID data is that CEX data are top coded which can help explain why CEX tends to provide lower inequality measures (0.35 and 0.55 for the log variance of consumption and income respectively) than PSID data (0.79 and 0.97 for the log variance of consumption and income respectively).

references therein). It is important to note that these problematic measurement issues are also acknowledged and relevant in the context of rich-country data (Heathcote et al., 2010; Aguiar and Bils, 2011; Meyer et al., 2015). In addition, there is also the potential issue that part of the facts that we report on inequality might be transitory in nature. In order to explore this question, we treat household averages across our panel as cross-sectional data. That is, we use the available panel data for Malawi (the 2010/11 wave and the 2013 wave) to compute household-specific averages of consumption, income, and wealth and, then, we re-compute Table 3 with these measures. This implies measures of consumption, income, and wealth that are more permanent in nature. Our insights do not change with this panel-based analysis (see Appendix). Under these new panel-based variables it is still the case that income inequality is larger than consumption inequality and lower than wealth inequality within rural and urban areas. It is also the case that urban inequality is significantly larger than rural inequality by a similar factor. Similar insights arise from the Uganda panel and the Tanzania panel (see Appendix C).

3.2 The Joint Cross-Sectional Behavior of Consumption, Income, and Wealth

A more direct measure of the transmission from income to wealth can be extracted from the joint densities. The correlation between income and wealth is lower in rural areas, 0.17, than in urban areas, 0.34 (panel (a) and (b), Table 4). This implies a stronger transmission from income to wealth in urban areas than in rural areas which is suggestive of a larger inability to accumulate in rural areas. In rural areas the correlation is stable throughout the income distribution, whereas in urban areas we find a slightly opened L-shaped joint density (Figure 3). For the bottom 80% of the income distribution the correlation between income and wealth is 0.06, while this correlation is 0.30 for the top 20% of income earners. Thus, only the income-rich households in urban areas seem able to accumulate wealth. For the whole sample there is a weaker link between income and wealth in SSA, where the correlation of these two variables is 0.29, than in the U.S., where this correlation is almost twice larger, 0.57 (panel (c) and (d), Table 4).[47]

The correlation of consumption and income is also lower in rural areas 0.37 than in urban areas, 0.62 (Table 4). This suggests a lower transmission from income to consumption, i.e., more consumption insurance, in rural areas than in urban areas in SSA.[48] The correlation between income and consumption is fairly stable across the income distribution (Figure 3). Finally, notice that this correlation is smaller in SSA than in the US, respectively, 0.53 and 0.68 (Table 4).

[47] This correlation between income and wealth is even smaller in Tanzania and Uganda than in Malawi, respectively 0.06 and 0.20. Note that the ISA wealth data for Tanzania and Uganda is not as ideal as that for Malawi, see our Section 2.

[48] In Tanzania, this correlation is 0.25 for urban households and 0.28 for rural households. For Uganda, the numbers are respectively 0.37 and 0.58.

Table 4: Correlation Matrix of Consumption, Income, and Wealth (ISA 2010)

(a) Rural Malawi

	C	I	W
Consumption (C)	1.00	–	–
Income (I)	0.37	1.00	–
Wealth (W)	0.31	0.17	1.00

(b) Urban Malawi

	C	I	W
Consumption (C)	1.00	–	–
Income (I)	0.62	1.00	–
Wealth (W)	0.43	0.34	1.00

(c) Malawi

	C	I	W
Consumption (C)	1.00	–	–
Income (I)	0.53	1.00	–
Wealth (W)	0.40	0.29	1.00

(d) United States

	C	I	W
Consumption (C)	1.00	–	–
Income (I)	0.68	1.00	–
Wealth (W)	0.20	0.57	1.00

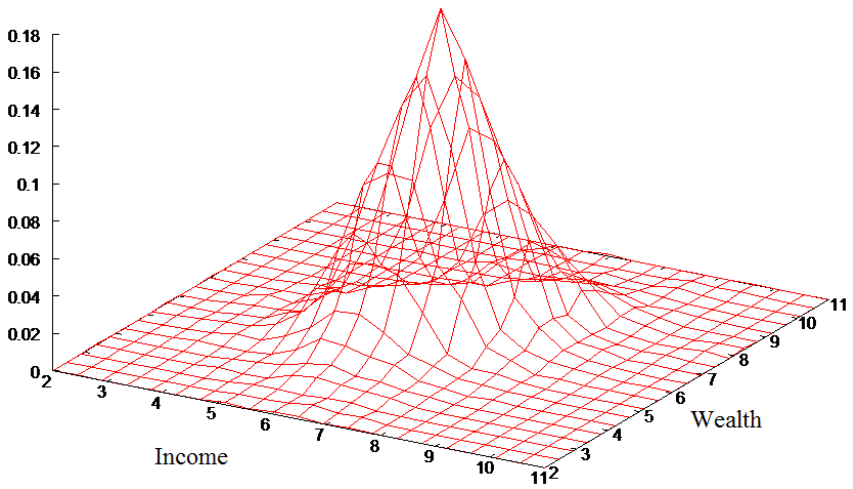
Notes: All variables are in current USD. For Malawi, all computations are done by the authors. For the US, the correlation between income and wealth is directly borrowed from (Díaz-Giménez et al., 2011) that use 2007 SCF data; we use CEX data publicly available from Krueger et al. (2010) to compute the correlation between consumption and income; and the correlation between consumption and wealth is directly borrowed from (Krueger et al., 2017) using 2006 PSID data. The construction of the measures of household consumption, income, and wealth is discussed in Section 2, with further details in the Appendix.

Again, this suggests a larger ability to insure consumption in SSA than in the US.

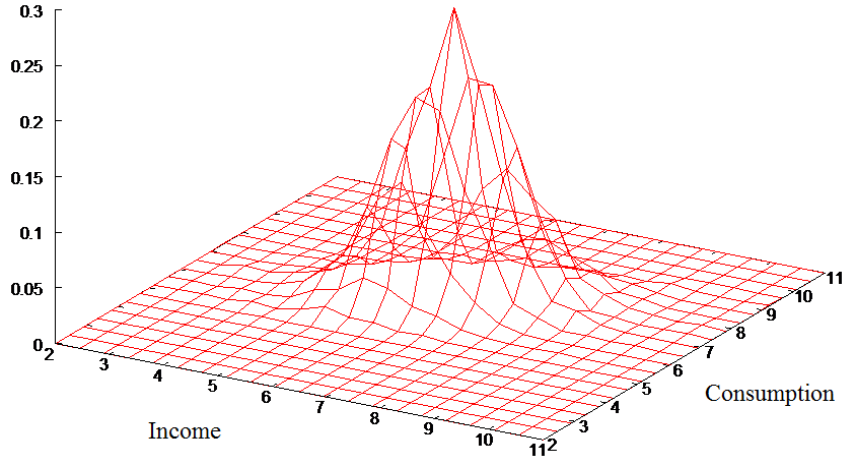
Finally, note that in both rich and poor countries if we summarize the transmission from wealth to consumption with their correlation, this transmission is lower than from income to consumption (panel (c) and (d) Table 4). While merely indicative, a stronger relation between income and consumption than between wealth and consumption suggest that shocks to wealth have potentially a lesser effect on consumption than income shocks. This is also the case for rural and urban areas in Malawi where the correlation between wealth and consumption is 0.31 and 0.43, respectively (panel (a) and (b) Table 4). That is, this correlation is lower in rural areas than in urban areas pointing to a large ability to insure consumption in rural areas independently of the type of shock (income or wealth) compared with urban areas.[49]

[49] In the Appendix we recompute Table 4 using panel data for Malawi (the 2010/11 wave and the 2013 wave) to construct household-specific averages of consumption, income, and wealth across waves. Our results do not change under these panel-based variables: the correlation of consumption and income is lower in rural areas than in urban areas, and the correlation between income and wealth is lower in rural areas than in urban areas.

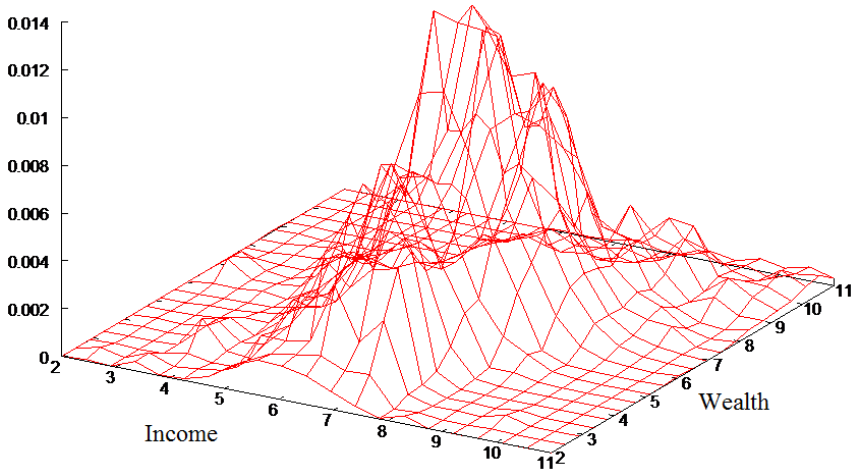
Figure 3: Joint Densities of Consumption, Income, and Wealth in Rural and Urban Malawi (ISA 2010)



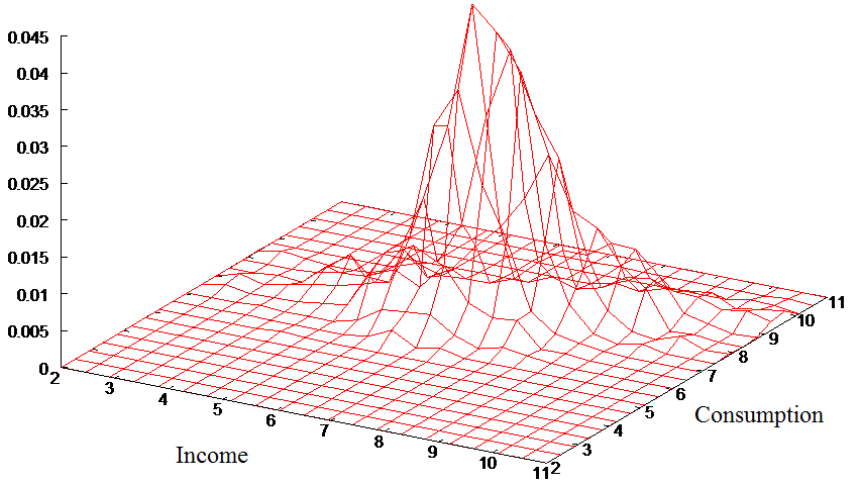
(a) Income and Wealth, Rural



(b) Income and Consumption, Rural



(c) Income and Wealth, Urban



(d) Income and Consumption, Urban

Notes: The construction of household consumption, income, and wealth is described in Section 2. All variables have been logged.

3.3 Consumption, Income, and Wealth Over the Life Cycle

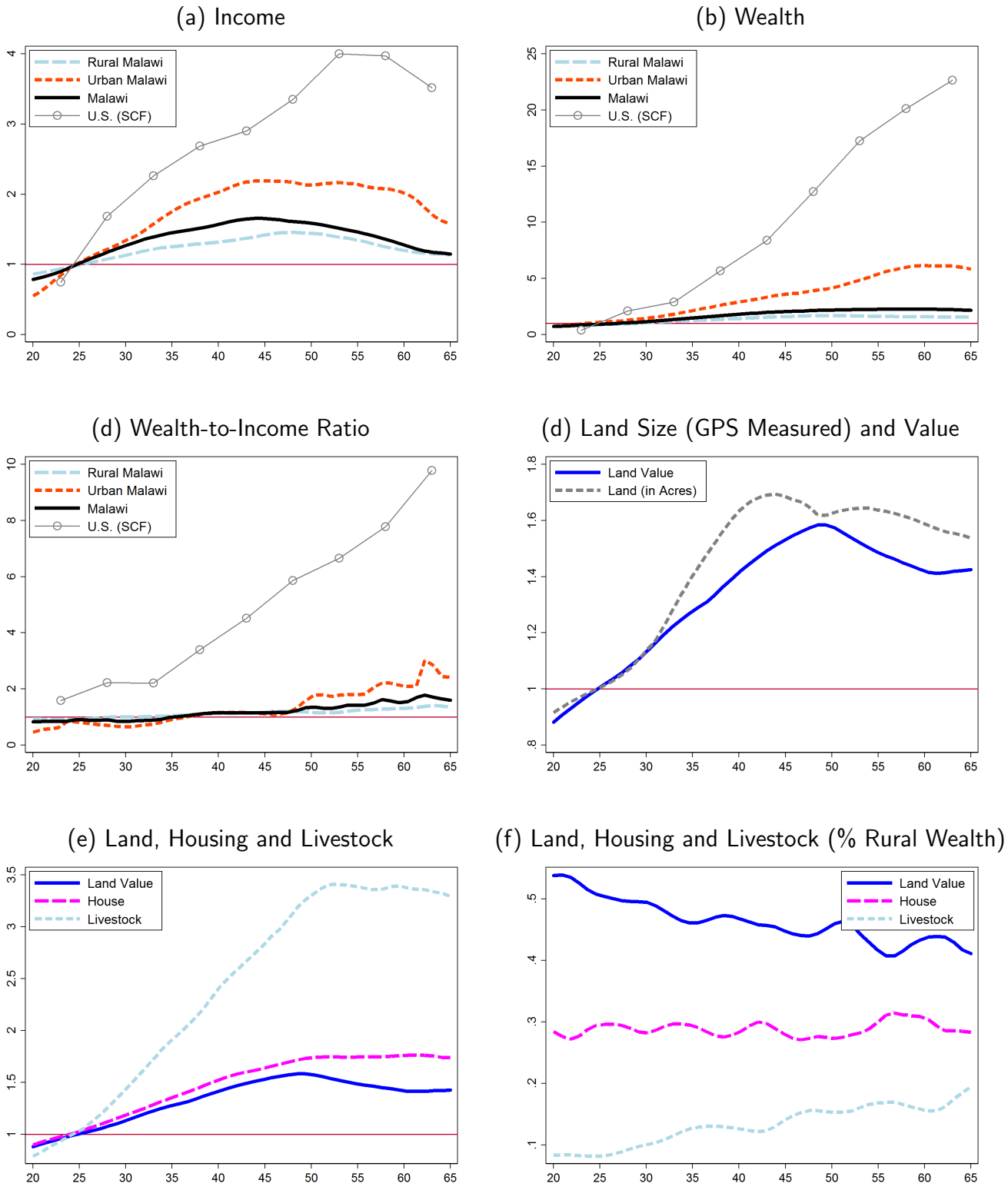
To gain a better understanding of accumulation we describe lifecycle behavior of income and wealth. We plot the life cycle profiles of income normalized to 1 at age 25 (panel (a), Figure 4).[50] The age profile of income in Malawi shows a hump in both rural and urban areas that peaks around age 45. The hump is less salient in rural areas. In rural areas income is about 1.5 times larger at its peak than at age 25, while in urban areas income is about twice as large at its peak than at age 25. This implies a nationwide income age profile for Malawi that is roughly 1.75 times larger at its peak than at age 25. With non top-coded income data from the SCF, Díaz-Giménez et al. (2011) find that income in the US grows over the lifecycle by a factor of 4. This implies that household income grows roughly four times less over the lifecycle in SSA than in the US. This way, flatter nationwide life cycle profiles of income in SSA countries may be the result of a composition effect driven by a larger share of rural households in SSA than in rich countries, which indeed have flatter age profiles, and balance the steeper age profiles of urban households.[51]

The differentials in the accumulation of wealth over the lifecycle are more sizable than the differentials of income. In the rural areas of SSA, as it is the case of income, wealth accumulates less over the lifecycle than urban areas (panel (b), Figure 4). Rural wealth peaks at the age of 50 with a value that is less than 1.5 times the rural wealth at age 25. This implies that, relative to income, wealth accumulates roughly at the same pace as income grows in rural areas. This is consistent with a relatively constant lifecycle wealth-to-income ratio in rural areas. Indeed, wealth-to-income ratio remains roughly equal to one across all ages (panel (c), Figure 4) which suggests a substantial inability to accumulate wealth in rural areas. In contrast, relative to income, wealth in urban areas rises more rapidly than income suggesting an ability to accumulate wealth given income. In urban areas, wealth shows a peak at age 60 that is roughly 6 times higher than the urban wealth at age 25. This implies that the urban wealth-to-income ratio grows by roughly four times from a ratio of 0.5 at age 25 to a ratio of 2 at age 65. Nationwide, the wealth-to-income ratio in Malawi grows from 1 at age 25 to 1.5 at age 65, which implies a lifetime growth of roughly 50%. Instead, the wealth-to-income ratio in the US grows from 2 at age 25 to 10 at age 65, which implies a lifetime growth of 400%. That is, the wealth-to-income ratio grows

[50] To preserve the comparison with the non-top coded cross-sectional lifecycle profiles of income and wealth in Díaz-Giménez et al. (2011), we first focus on reporting age profiles for the ISA 2010 cross-sectional data only. Although not reported here, our results stand robust to additionally controlling for time effects and cohort effects using the three currently available waves of Malawi ISA data (2004/05, 2010/11 and 2013). Our study of household consumption over the lifecycle presented here isolates age from both time effects and cohort effects.

[51] Our results for income relate to those in Bils and Klenow (2000) and Lagakos et al. (2016) that document flatter age profiles for wages in poor countries than in rich countries. Note that we focus on household total income to take into account that in the SSA countries that we investigate there is a large rural population (approximately 80%) for whom own agricultural production (rather than wages) is the main source of income.

Figure 4: Lifecycle Household Income and Wealth in Rural and Urban Malawi (ISA 2010)



Notes: The construction of household income and wealth (and its subitems) is described in Section 2. All variables have been normalized to 1 at age 25, except for the wealth-to-income ratio in panel (c) and the share of rural wealth in panel (f). Panel (d), panel (e), and panel (f) refer to the rural areas only. We discuss these results in Section 3.3. The graph shows estimated age dummies after controlling for time and cohort effects (see De Magalhães et al. (2017) for details). For the case of Malawi the three currently available waves of ISA data have been used 2004/05, 2010/11 and 2013.

roughly eight times more in the US than in SSA over the lifecycle. This suggests that the ability to accumulate wealth (relative to income) is eight times larger in the US than in Malawi, or two times larger in the US than in urban Malawi.

The inability to accumulate assets over the lifecycle is particularly strong in rural areas of SSA. This is consistent with most of rural wealth being land holdings together with the fact that land barely grows over the lifecycle by a factor of 1.5. This is true whether we use land value or GPS-measured land size (panel (d), Figure 4). The low accumulation of land over the lifecycle is perhaps not surprising given the low amount of available marketed land (Restuccia and Santaeulàlia-Llopis, 2017). The component of wealth that shows the strongest accumulation is livestock, which is a reminiscent of Rosenzweig and Wolpin (1993) for India. In Malawi, livestock grows by a factor of four over the lifecycle (panel (e), Figure 4). However, despite this accumulation, livestock remains below 20% of total household wealth at age 65 while this proportion is 40% for land (panel (f), Figure 4).

Lastly, it is important to note that this large inability to grow wealth over the lifecycle coexists with a large ability to smooth consumption over the lifecycle. First, lifecycle consumption is flatter in rural areas than in urban areas of SSA, suggesting a higher ability to smooth consumption in the rural areas of SSA than in the urban areas. Although not reported here, this is true for both total expenditure and food consumption measured in caloric intake (De Magalhães et al., 2017).[52] Second, compared with the US, consumption profiles are smoother in SSA than in the US. These results also stand after controlling for household structure à la Deaton and Paxson (1994). The smoother lifecycle consumption profiles in SSA than the in US convey the presence of powerful mechanisms that help better insure consumption over the lifecycle in rural Malawi compared to urban Malawi, and better in SSA compared to the US. Again, this result adds evidence to a relatively large ability to preserve consumption over the lifecycle in poor countries, in particular rural areas of poor countries, with respect to the US.

To summarize, there is a substantial inability to accumulate wealth over the lifecycle in SSA compared with the United States. This coexists with a larger ability to smooth lifecycle consumption in SSA compared with the United States. The inability to accumulate wealth over the life cycle combined with a strong ability to smooth consumption over the lifecycle is an important feature of the rural areas of SSA. Urban of SSA areas show a lifecycle behavior of consumption, income, and wealth that is relatively closer to that in the US.

[52] In De Magalhães et al. (2017) we investigate these lifecycle patterns of consumption in more detail, and associate this ability to smooth consumption to an increase in self-farm production in old age which comes at the cost of less children schooling and lower nutrient quality for households with elderly heads.

3.4 The Top and Bottom of the Consumption, Income, and Wealth Distributions

There is a growing interest in the behavior of the top (and bottom) of the distributions of income and wealth in particular (Piketty, 2014). For the case of poor countries, such as those in SSA, it is also interesting to study consumption given the importance of informal redistribution mechanisms that determine welfare (Kinnan, 2014). Recent macroeconomic studies on welfare in developed countries also incorporate consumption (of wealth-poor households) to the discussion of inequality (Krueger et al., 2017).[53]

The marginal distributions are consistent with the measures of inequality reported earlier. Urban areas are more unequal than rural areas, and there is less inequality in consumption than in income, and less inequality in income than in wealth (Table 5). Ranking households by consumption, the top 10% of the distribution consumes 22% of the total consumption in rural areas (panel (a1), Table 5) and 36% in urban areas (panel (b1), Table 5). The top 1% consumes 7% and 9% in rural and urban areas, respectively. In terms of income, the top 10% of the income distribution earns 43% and 62% of the total income in rural and urban areas, respectively. The top 1% of the income distribution earns 14% and 25% of total income in rural and urban areas, respectively. In terms of wealth, we find that the top 10% of the wealth distribution holds 49% of total wealth in rural Malawi and 73% in urban areas. Further, the top 1% of the wealth distribution holds 17% and 32% of total wealth in rural and urban areas, respectively.

Nationwide, the marginal distribution of income in Malawi (panel (c1), Table 5) is strikingly similar to that of the US (panel (d1), Table 5). In Malawi, the top 20% of the income distribution earn 62% of total income, while this is 61% in the US. In the same direction, the top 10% and 1% of the income distribution earn respectively 50% and 20% of total income in Malawi and 47% and 21% in the US (Díaz-Giménez et al., 2011). Despite the similar inequality in income in Malawi than in the US, wealth dispersion is higher in the US. The top 10% and top 1% of the wealth distribution in the US hold, respectively, 71% and 34% of total wealth (Díaz-Giménez et al., 2011). These shares are lower for Malawi, respectively, 58% and 25%. This wealth differential is larger when we look at the rural areas of Malawi where 85% of the population lives and where the top 10% and top 1% of the wealth distribution hold, respectively, 40% and 17% of total rural wealth, i.e., almost half of its US counterparts. This suggests a much lower transmission from income to wealth in Malawi than in the US.

[53] Note that we discuss issues related to the underreporting of income and its biases, which are particularly relevant for the top of the distribution, in Section 2.3. This issue is notoriously present in both poor and rich economies (Alvaredo and Gasparini, 2013).

Table 5: Shares of Total Consumption, Income, and Wealth by Rural and Urban Residency, Malawi (ISA 2010)

(a) Rural Malawi

	Bottom(%)			Quintiles					Top(%)			All
(a1) Marginal Distributions:	0-1	1-5	5-10	Q1	Q2	Q3	Q4	Q5	10-5	5-1	1	0-100
				Shares of Total (%)								
Consumption	0	1	1	6	11	15	22	46	10	15	7	100
Income	0	0	1	3	7	12	20	57	11	18	14	100
Wealth	-0	0	0	2	6	10	18	63	11	21	17	100
(a2) Income Partition:												
				Shares of Total (%)								
Consumption	1	2	3	12	15	19	22	33	8	10	3	100
Wealth	0	2	2	10	13	15	22	39	9	14	4	100

(b) Urban Malawi

	Bottom(%)			Quintiles					Top(%)			All
(b1) Marg. Dist.:	0-1	1-5	5-10	Q1	Q2	Q3	Q4	Q5	10-5	5-1	1	0-100
				Shares of Total (%)								
	0	1	2	7	9	13	20	51	10	18	9	100
	0	0	0	2	5	8	14	72	11	26	25	100
	-0	0	0	0	1	4	10	84	12	29	32	100
(b2) Inc. Part.:												
				Shares of Total (%)								
	1	2	3	12	13	15	19	41	9	15	6	100
	1	1	1	5	13	10	12	59	10	28	11	100

(c) Malawi

	Bottom(%)			Quintiles					Top(%)			All
(c1) Marginal Distributions:	0-1	1-5	5-10	Q1	Q2	Q3	Q4	Q5	10-5	5-1	1	0-100
				Shares of Total (%)								
Consumption	0	1	1	6	10	15	21	48	10	6	9	100
Income	-0	0	1	3	7	11	18	62	10	20	20	100
Wealth	-0	0	0	1	5	8	15	70	11	22	25	100
(c2) Income Partition:												
				Shares of Total (%)								
Consumption	1	2	3	12	14	17	21	37	8	12	6	100
Wealth	1	1	2	9	11	13	18	49	9	15	13	100

(d) U.S.

	Bottom(%)			Quintiles					Top(%)			All
(d1) Marg. Dist.:	0-1	1-5	5-10	Q1	Q2	Q3	Q4	Q5	10-5	5-1	1	0-100
				Shares of Total (%)								
	0	1	1	5	11	16	23	45	11	12	6	100
	-0	0	1	3	5	11	18	61	10	16	21	100
	-0	-0	-0	-0	1	5	11	84	11	27	33	100
(d2) Inc. Part.:												
				Shares of Total (%)								
	0	1	2	8	13	17	24	38	9	9	4	100
	1	1	0	4	5	8	14	70	11	23	26	100

Notes: All variables are averages in current USD. The construction of the measures of household consumption, income, and wealth is discussed in Section 2, with further details in the Appendix. The numbers for the US are results directly borrowed from Díaz-Giménez et al. (2011) who use the 2007 SCF for the study of income and wealth, and whenever consumption is involved (its marginal distribution and its joint distribution with income) we show our results from the 2006 PSID data kindly provided by Krueger et al. (2017).

Table 6: Cross-Country Comparison: Top of the Income and Wealth Distributions (2010)

	Micro Data						Macro Data
	Income		Wealth		W-to-I Shares Ratio		Inc. (USD)
Countries	Top 1%	Top 10%	Top 1%	Top 10%	Top 1%	Top 10%	WDI
Sub-Saharan Africa:							
Malawi	20	50	24	57	1.3	1.2	359
Tanzania	15	51	24	72	1.6	1.4	524
Uganda	31	65	28	69	0.9	1.1	471
Average:	*22*	*55*	*26*	*66*	*1.2*	*1.2*	451
Piketty (2014):							
US	20	48	34	71	1.7	1.5	48,377
Britain	15	42	28	70	1.9	1.7	38,363
France	9	33	24	62	2.7	1.9	40,706
Sweden	7	28	20	59	2.9	2.1	52,076
Average:	*12*	*37*	*27*	*66*	*2.3*	*1.8*	44,880

Notes: The construction of the micro measures of household income and wealth for all SSA countries is discussed in Section 2, with further details in the Appendix. The figures for rich and emerging countries are retrieved from Piketty (2014). All numbers refer to 2010, except for Argentina, which refers to 2005. The macro measures of income per capita in current USD retrieved directly from the World Development Indicators (WDI)

An additional measure of the transmission of income inequality to wealth inequality is the ratio between the share of total income held by the top 10% of the income distribution and the share of total wealth held by the top 10% of the wealth distribution. This ratio is not ideal as it has the caveat of not necessarily using the same set of households—an issue that we resolve below by studying the conditional distributions for Malawi and the US for which the joint distributions are available—but has the advantage that we can compute it for a larger set of countries for which only marginal distributions are available from Piketty (2014).[54] We show the top 1% and top 10% of the income and wealth distributions for our SSA countries and a set of rich countries in Table 6.[55] Taking the ratio of the share of total wealth held by the top 10% of the wealth distribution to the share of the total income earned by the top 10% of the income distribution we find a ratio of 1.2 in Malawi, 1.4 in Tanzania, and 1.1 in Uganda. This implies an average ratio for our SSA countries of 1.2. Because we lack housing wealth in Tanzania (which is more equally distributed than non-housing wealth) the ratio for Tanzania is likely to be an upper bound. In any case the ratios for the top 10% of the marginal distributions of wealth and income in SSA

[54] Comparing this ratio across regions or countries explicitly abstracts from region/country-specific wealth-to-income ratio which would further increase the difference between poor and rich regions/countries, as poor regions/countries display lower wealth-to-income ratios.

[55] Piketty (2014) also provides top income shares for a set of emerging countries, but top wealth shares are not available for those countries which implies that we cannot compute these ratios for these countries.

countries are lower than those in rich countries: 1.5 in the US, 1.7 in Britain, 1.9 in France, and 2.1 in Sweden. It is interesting to note that the largest ratios are in France and Sweden, instead of the US and Britain. This is because even though France and Sweden have lower wealth inequality than the US and Britain they also have an even lower inequality of income which suggests more transmission from income to wealth in France and Sweden than in the US and Britain. Focusing on the comparison between Malawi and the US, there is (1.5-1)/(1.2-1)=2.5 times more transmission from income to wealth in the US than in Malawi. On average, the ratio for rich countries is 1.8 which compared to 1.2 in SSA implies that there is four times more transmission from income to wealth in rich countries than in SSA using the top 10% of the marginal distributions of income and wealth. Focusing on the top 1%, the marginal distributions imply that the transmission from income wealth in rich countries is more than six times larger in rich countries than in SSA.

The transmission from income to wealth can be important for aggregate development (Galor and Moav, 2004). If high levels of wealth inequality are a necessary part of the growth process at early stages of aggregate development, then it seems that none of the three SSA countries that we study is ready to experience a growth takeoff yet. To see this, note that the current concentration of wealth at the top of the distribution in the SSA countries that we study is much lower than that attained by developed countries when these economies were experiencing growth takeoffs and industrialization. In 1810 Britain the top 10% and top 1% of the wealth distribution held 82% and 53%, respectively, of the total wealth; in 1810 France these figures were 80% and 46%, and in 1810 Sweden 83% and 57% (Piketty, 2014).

As noted earlier, the inference from the marginal distributions is limited by the fact that households at the top of the consumption, income, and wealth distributions are not necessarily the same. To overcome this caveat we study the wealth distributions conditional on the income distribution. We find that the top 10% income-rich households hold 27% of total wealth in the rural areas of Malawi and 49% in the urban areas (panel (a2) and (b2), Table 5). In contrast, the top 10% of the income distribution holds 60% of total wealth in the United States (Díaz-Giménez et al., 2011). This implies a substantial difference in the ability to accumulate wealth, given income, between Malawi and the United States, particularly for rural Malawi. This differential is largest for the top 1% income-rich households, who hold 26% of total wealth in the United States, but merely 4% of total wealth in rural Malawi and 11% in urban Malawi which implies a nationwide average of 5% for Malawi. This way, the top income-richest 1% households in Malawi hold a share of total wealth that is one-fifth of its US counterpart. This implies that the transmission from income to wealth is five times larger in the US than in Malawi, a number that is twice the one we obtained earlier using the ratio of top 10% shares of income and wealth

Table 7: Consumption by Wealth and Land Partitions, Malawi (ISA 2010)

	Bottom(%)			Quintiles					Top(%)			All
	0-1	1-5	5-10	Q1	Q2	Q3	Q4	Q5	10-5	5-1	1	0-100
(a) Cons. by Wealth Partition:				Shares of Total (%)								
Malawi: ▷ Rural	1	3	4	15	16	18	21	31	7	10	2	100
▷ Urban	2	1	3	11	14	17	19	39	9	14	4	100
▷ Nationwide	1	3	4	15	14	16	19	35	8	11	5	100
US	1	3	3	11	12	17	22	37	9	8	3	100
(b) Cons. by Land Partition (Rural):				Shares of Total (%)								
Unconditional	16	-	-	20	16	19	20	25	6	7	2	100
If Land>0	1	3	4	16	16	19	21	27	6	8	2	100

Notes: All variables are averages in current USD. The construction of the measures of household consumption, income, and wealth is discussed in Section 2, with further details in the Appendix. The results for the US quintiles are directly borrowed from Krueger et al. (2017) using 2006 PSID data, and we added our results for the top and bottom 10% of the wealth distribution using their data.

from the marginal distributions.

Regarding the joint distribution of consumption and income. The behavior of the top 10% income-rich households account for 21% of total consumption in rural Malawi (panel (a2), Table 5), while the top 10% income-rich households account for 30% of total consumption in urban Malawi (panel (b2), Table 5). Similar insights arise if we focus on the top 1% of the income distribution which account for 3% of total consumption in rural areas and 6% of total consumption in urban areas, respectively. That is, again, using the top shares of the income distribution, we find evidence of less transmission from income to consumption in rural Malawi than in urban Malawi.

Finally, an important aspect to assess the distribution of welfare in developed countries is that while the wealth-poor households barely contribute to aggregate savings, they hold a large share of total consumption (Krueger et al., 2017). We find that this is also the case in SSA countries. In SSA, the distribution of consumption conditional on wealth is even less dispersed than in the US (panel (a), Table 7). The top (bottom) 20% of the wealth distribution consume 35% (15%) of total consumption in Malawi and 37% (11%) in the US. Focusing on the bottom 40% of the wealth distribution, who barely hold any wealth in Malawi and the US (Table 5), we find that they consume 29% of total consumption in urban Malawi, a similar share than the 23% obtained for the US. In rural Malawi, the wealth-poor (the bottom 40%) consume an even larger

share of consumption, 31%. Indeed, we find a strikingly uniform distribution of consumption conditional on land, the main asset in rural areas (panel (b), Table 7), with the bottom 40% of the land distribution accounting for 36% of total consumption. This is true whether we condition on positive land assets or not. This suggests that the ex-ante distribution of nonmarketed land is likely to be used to partly mitigate consumption inequality.

To summarize, while the disparities between the top and bottom of the income distributions are large in SSA and indeed are similar to those previously documented for the United States and Europe, we find that these income disparities do not translate into wealth or consumption inequality in SSA as they do in the United States and Europe. The inability of high-income households to either accumulate more wealth or consume more in SSA suggests powerful redistributive arrangements, particularly in rural areas. This largely mitigates the transmission from income inequality to wealth inequality, and from income inequality to consumption inequality.[56]

4 Further Insights

First, using panel data, we study whether the current patterns of income mobility can help explain the inability to accumulate wealth in SSA, in particular in rural areas. Second, we use the consumption and income panel data to conduct consumption insurance tests in rural and urban areas. Third, we provide direct empirical evidence of informal ex-post redistribution mechanisms that are stronger in rural areas than in urban areas through food gifts and self-reported copying strategies. We also discuss the ex-ante redistribution of land as consumption insurance mechanism. Fourth, we show the availability of more formal borrowing in urban areas than in rural areas. Formal borrowing is largely devoted to productive activities (e.g., start a business) rather than for consumption insurance purposes.

[56] It is relevant to note that the studies of income and wealth inequality typically use non-top coded data from the SCF (Díaz-Giménez et al., 2011) (that excludes the FORBES 400) or administrative data Piketty (2014). While our data is not top-coded, the LSMS-ISA sampling strategy does not oversample the rich households and might be missing the very rich of the income distribution. In this context, it is important to note that a resolution to this potential caveat (e.g., à la Alvaredo and Gasparini (2013)) would simply increase income inequality in the SSA countries that we study and hence reinforce our results of a lower transmission from income to consumption and wealth in SSA (see Section 2.3).

Table 8: Income Mobility Matrices: Rural and Urban Malawi ISA 2010-2013

(a) Rural Malawi 2010-13

t \ t+1	Q1	Q2	Q3	Q4	Q5	Full
Q1	33.88	30.03	16.25	13.77	6.06	100
Q2	25.69	20.99	23.76	19.34	10.22	100
Q3	17.63	19.01	25.34	24.24	13.77	100
Q4	14.09	17.96	19.89	23.48	24.59	100
Q5	8.84	11.88	14.92	19.06	45.30	100

(b) Urban Malawi 2010-13

t \ t+1	Q1	Q2	Q3	Q4	Q5	Full
Q1	34.58	25.23	22.43	14.02	3.74	100
Q2	24.53	34.91	24.53	13.21	2.83	100
Q3	21.50	26.17	30.84	17.76	3.74	100
Q4	15.09	9.43	16.98	37.74	20.75	100
Q5	4.72	3.77	5.66	16.98	68.87	100

(c) Malawi 2010-13

t \ t+1	Q1	Q2	Q3	Q4	Q5	Full
Q1	35.55	28.69	15.38	14.76	5.61	100
Q2	23.28	24.74	26.20	17.88	7.90	100
Q3	19.33	21.41	25.16	21.62	12.47	100
Q4	14.55	15.80	21.21	26.61	21.83	100
Q5	7.28	9.36	12.06	19.13	52.18	100

Notes: Income data are divided by quintiles with 1st denoting the poorest quintile and 5th the richest. Our 2010-2013 Malaiwi ISA panel has a size of 2,405 households, with 1,812 in rural areas and 532 in urban areas. The discrepancy between the sum of rural and urban households and the total is driven by migrants.

4.1 Insights from Income Mobility

We have seen that the top 10% income earners hold 39% of total wealth in rural Malawi and 59% in urban Malawi, which yields a nationwide average for Malawi of 49%. This figure is much larger, 70%, in the US (Díaz-Giménez et al., 2011). The savings rate for the top 10% of income earners, computed as one minus the expenditure rate of disposable income, is 30% in rural Malawi and 35% in urban Malawi, which is similar to the saving rate for the top 20% of income earners in the US, 37.5% (Krueger et al., 2017). In this context, why are the top income earners in SSA not able to accumulate wealth despite high saving rates? Note that wealth accumulation is the result of past saving behavior and, hence, at saving rates similar to those of the US, the top

income earners in SSA will accumulate sizable wealth only if they remain at the top for a period of time comparable with their US counterparts. This implies that the study of income mobility can help, at least partially, reconcile these two facts—high saving rates but relatively low wealth accumulation for the top income earners in SSA.

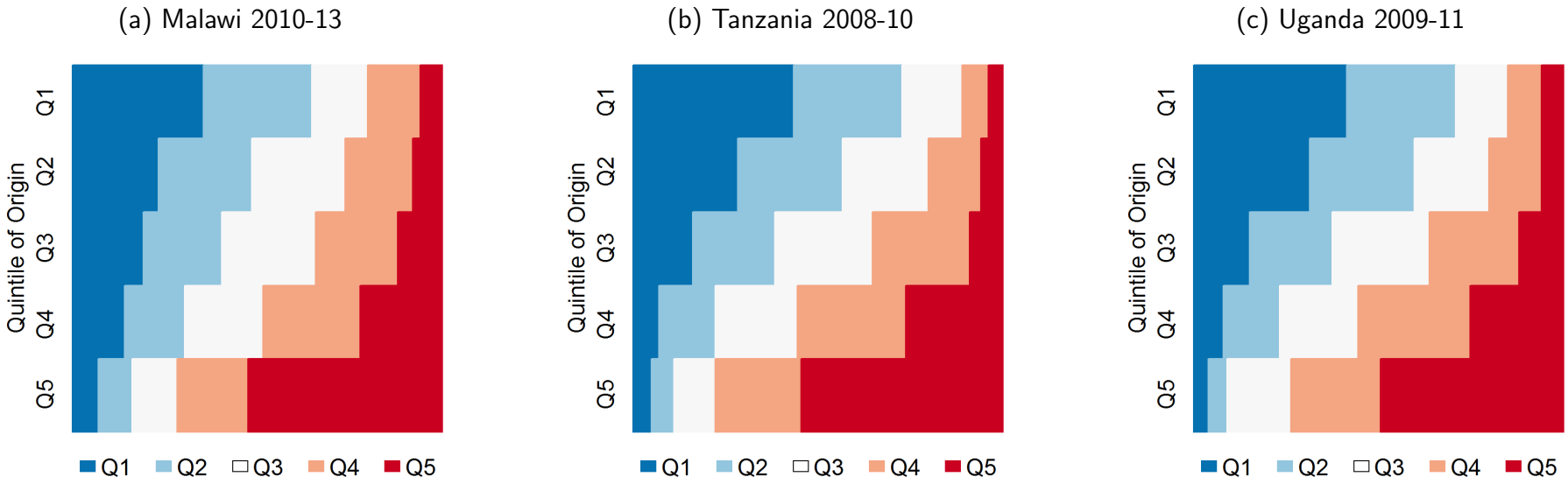
We show the Malawi income mobility matrix from quintiles in 2010/11 to quintiles in 2013 in Table 8 using the panel dimension of LSMS-ISA for which we have information in those two years. Focusing on the top (i.e, fifth) quintile of the distribution, we find larger persistence in urban areas (panel (b), Table 8) than in urban areas (panel (a), Table 8) 68.87% of the population in the top quintile of the distribution in 2010/11 remain in the top quintile of the distribution in 2013 in urban areas, while this figure is 45.30% in rural areas. This way, roughly 31% of households leave the top quintile in urban areas and 55% in rural areas, implying a higher downward mobility in rural areas. Indeed, the chances that a household in the top quintile drops to the bottom quintile are not trivial in urban areas 3.74%, and almost twice as large in rural areas 6.06%. The higher persistence of income in urban areas than in rural areas along the entire income distribution is evident from the behavior of the diagonal elements in the mobility matrix, except for the bottom quintile of the distribution. Focusing on the bottom (i.e., first) quintile of the distribution, we find similar levels of persistence in rural and urban areas, 33.88% and 34.58% respectively. However, conditional on leaving the bottom quintile of the distribution there is larger upward mobility in rural areas than in urban areas as 8.84% of those who leave the bottom quintile in rural areas move to the top quintile, while this figure is almost half 4.72% in urban areas. We compute the income mobility matrix for the entire Malawi in panel (c) (Table 8). We find that roughly one third of the households in the bottom quintile remains in that quintile after three years, and roughly half of the households in the top quintile remains in that quintile after three years.[57]

An isomorphic representation of the income mobility matrix for Malawi is in the conditional transition probabilities depicted in panel (a) Figure 5. The vertical axis refers to the quintile of origin in the transition and the horizontal axis shows the conditional transition probability to a destination quintile identified with the colors labeled at the bottom of each figure. We provide analogous mobility matrices for Tanzania (2008-2010) in panel (b) and for Uganda (2009-2011) in panel (c) of Figure 5. Despite the slight year span difference, the three countries show similar insights: there is larger persistence at the top of the income distribution than at the bottom. Roughly 40% of households in the bottom quintile remain in that quintile after 2-3 years in all countries, and roughly 50% of households in the top quintile remain in the top quintile.[58]

[57] In the Appendix we also show the analogous income mobility matrices for Tanzania and Uganda.

[58] The Malawi ISA 2010-13 panel sample has 2,405 households, the Tanzania ISA 2008-10 panel sample has 2,838 households and the Uganda ISA 2009-2011 panel sample has 1,397 households.

Figure 5: Income Transition Probability Plots: Malawi, Uganda and Tanzania



Notes: In each panel-year, income data are divided by quintiles with Q1 denoting the poorest quintile and Q5 the richest. In all panels the vertical axis refers to the quintile of origin in the transition and the horizontal axis shows the conditional transition probability to a destination quintile identified with the colors labeled at the bottom of each figure. The Malawi ISA 2010-13 panel sample has 2,405 households, the Uganda ISA 2009-2011 panel sample has 1,397 households, and the Tanzania ISA 2008-10 panel sample has 2,838 households.

We compare SSA income mobility to the US in Table 9. The SSA sample pools the panel data from three countries: ISA data for Malawi 2010-13, Tanzania 2008-10, and Uganda 2009-11. Before pooling the data we divide each country-year sample by its sample mean. This implies a total sample of 6,640 households for SSA. The bottom panels (b) refer to the US. The US sample is the 2004-06 PSID with a size of 5,649 households. There are several findings to note. First, there is substantially more persistence at the top of the income distribution in the US than in SSA with 76.17% of households in the top quintile remaining in that quintile after 2 years in the US and 52.41% in SSA. That is, the chances of remaining at the top quintile of the income distribution after two years are roughly 50% higher in the US than in SSA. There is also larger downward mobility in SSA than in the US with 4.52% of households in the top quintile moving to the bottom quintile in SSA, and barely 0.62% in the US. That is, the chances of moving from the top to the bottom quintile of the income distribution are roughly 6 times larger in SSA than in the US. Second, there is substantially more persistence in the bottom of the income distribution in US than in SSA as 73.19% of households in the bottom quintile remain in that quintile after years in USA while this figure is 41.87% in SSA. That is, the chances of remaining at the bottom of the income distribution after two years are roughly 75% higher in the US than in SSA. There is also larger upward mobility in SSA than in the US with 5.27% of households in the bottom quintile moving to the top quintile in SSA, and barely 0.18% in the US. That is, the chances of moving from the top to the bottom quintile of the income distribution are almost 30 times larger in SSA than in the US. Focusing on the diagonal elements of the transition matrix SSA and the US both show an inverted-U shaped pattern. There is an asymmetry: the top 20% are more persistent than the bottom 20% in both SSA and the US That is, there is more upward mobility than downward mobility in both economies and this feature is more salient in SSA than in the US.

The larger sample size allows to look more closely to the mobility of the top and bottom 10% and 1% of the distribution in both SSA and the US. In SSA, 25.76% of households at the top 1% of the income distribution remain at the top 1% after two years, while this figure is more persistent, 51.79%, in the US. Chances of moving from the top 1% to the bottom quintile are also larger in SSA (4.55%) than in the US (1.79%), suggesting again larger downward mobility in SSA than in the US. The top 10% of the income distribution shows similar insights, higher persistence in the US and larger downward mobility in SSA. Focusing on the bottom of the distribution, 2.99% of households at the bottom 1% of the income distribution remain at the bottom 1% after two years, while this figure is much more persistent, 22.81%, in the US. Chances of moving from the bottom 1% to the top quintile are also larger in SSA (11.94%) than in the US (3.51%), suggesting again a larger upward mobility in SSA than in the US. The top 10% of the income distribution also shows higher persistence in the US and larger downward mobility in SSA.

Table 9: Income Mobility Matrices: Sub-Saharan Africa vs. the US

(a) Sub-Saharan Africa

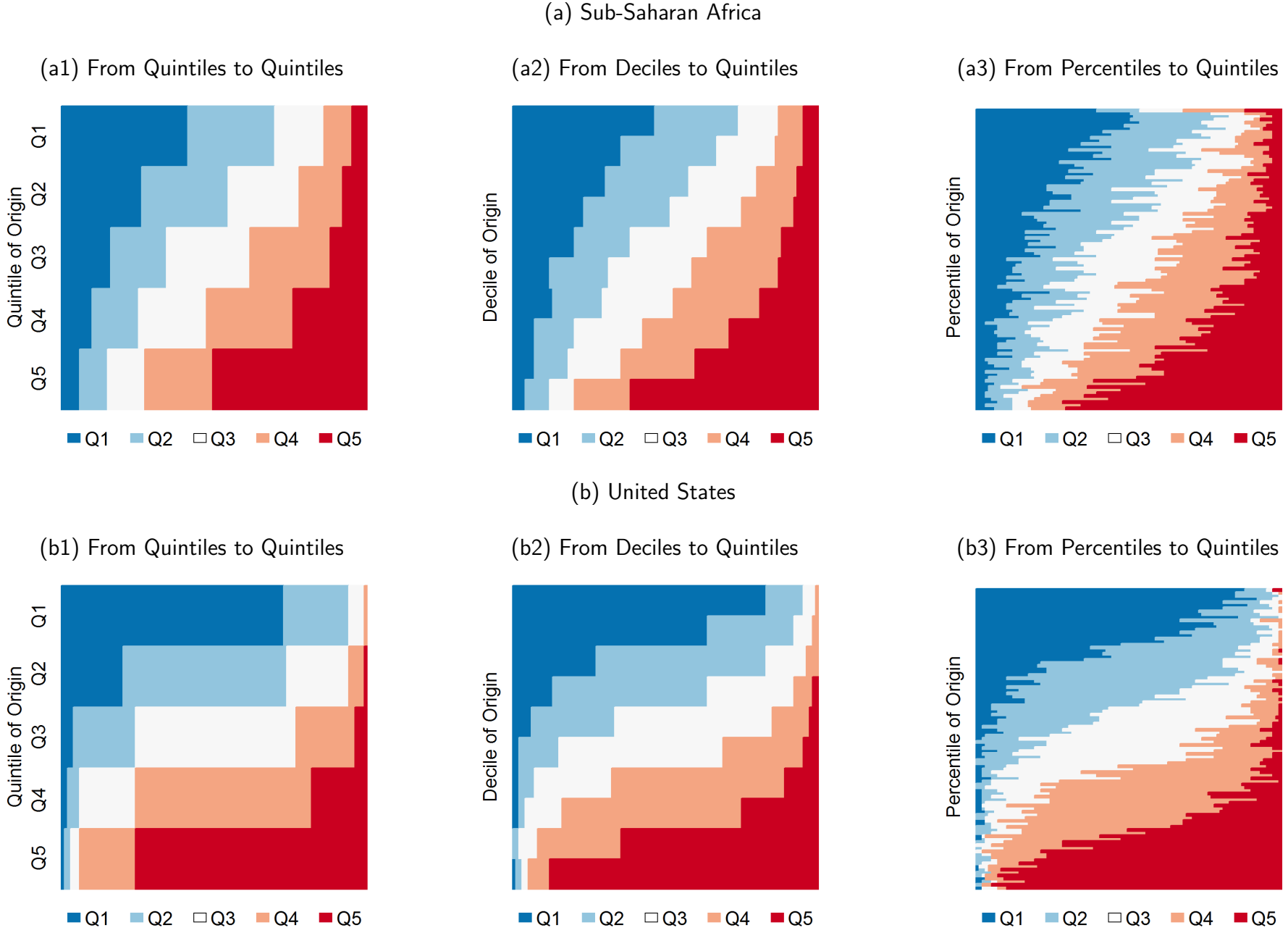
	Bottom		Quintiles					Top	
t \ t+1	0-1	0-10	Q1	Q2	Q3	Q4	Q5	90-100	99-100
0-1	2.99	29.85	34.33	20.90	17.91	14.93	11.94	2.99	0.00
0-10	1.36	26.05	46.39	24.25	13.10	10.69	5.57	2.11	0.15
Q1	1.43	23.95	41.87	26.51	15.81	10.54	5.27	2.03	0.23
Q2	1.13	11.60	25.98	27.71	23.64	15.89	6.78	2.11	0.15
Q3	1.13	8.28	17.7	21.31	26.51	23.12	11.37	4.22	0.23
Q4	0.90	3.99	9.94	16.64	21.54	27.71	24.17	10.02	0.30
Q5	0.45	2.18	4.52	7.83	12.5	22.74	52.41	31.63	4.07
90-100	0.30	1.81	3.16	5.42	9.49	18.83	63.10	45.18	7.23
99-100	0.00	4.55	4.55	3.03	13.64	12.12	66.67	60.61	25.76

(b) U.S.

	Bottom		Quintiles					Top	
t \ t+1	0-1	0-10	Q1	Q2	Q3	Q4	Q5	90-100	99-100
0-1	22.81	75.44	87.72	7.02	1.75	0.00	3.51	3.51	0.00
0-10	6.90	61.24	82.83	12.39	3.89	0.53	0.35	0.35	0.00
Q1	3.81	41.59	73.19	20.53	4.78	1.33	0.18	0.18	0.00
Q2	0.88	6.02	20.35	53.27	20.18	5.13	1.06	0.53	0.00
Q3	0.18	1.68	4.07	20.27	52.57	18.85	4.25	1.50	0.18
Q4	0.00	0.35	1.77	3.89	18.58	57.43	18.32	4.16	0.09
Q5	0.18	0.35	0.62	2.04	3.90	17.27	76.17	43.58	4.69
90-100	0.18	0.35	0.89	1.95	2.30	7.45	87.41	69.86	8.69
99-100	1.79	1.79	1.79	0.00	3.36	3.57	89.29	83.93	51.79

Notes: The top panel (a) refers to SSA. The SSA sample pools panel data from three countries: the ISA data for Malawi 2010-13, Tanzania 2008-10, and Uganda 2009-11. Before pooling the data we divide each country-year sample by its sample mean. This implies a total sample of 6,640 households for SSA. The bottom panel (b) refer to the US. The US sample is the 2004-06 PSID with a size of 5,649 households.

Figure 6: Income Transition Probability Plots: Sub-Saharan Africa vs. the US

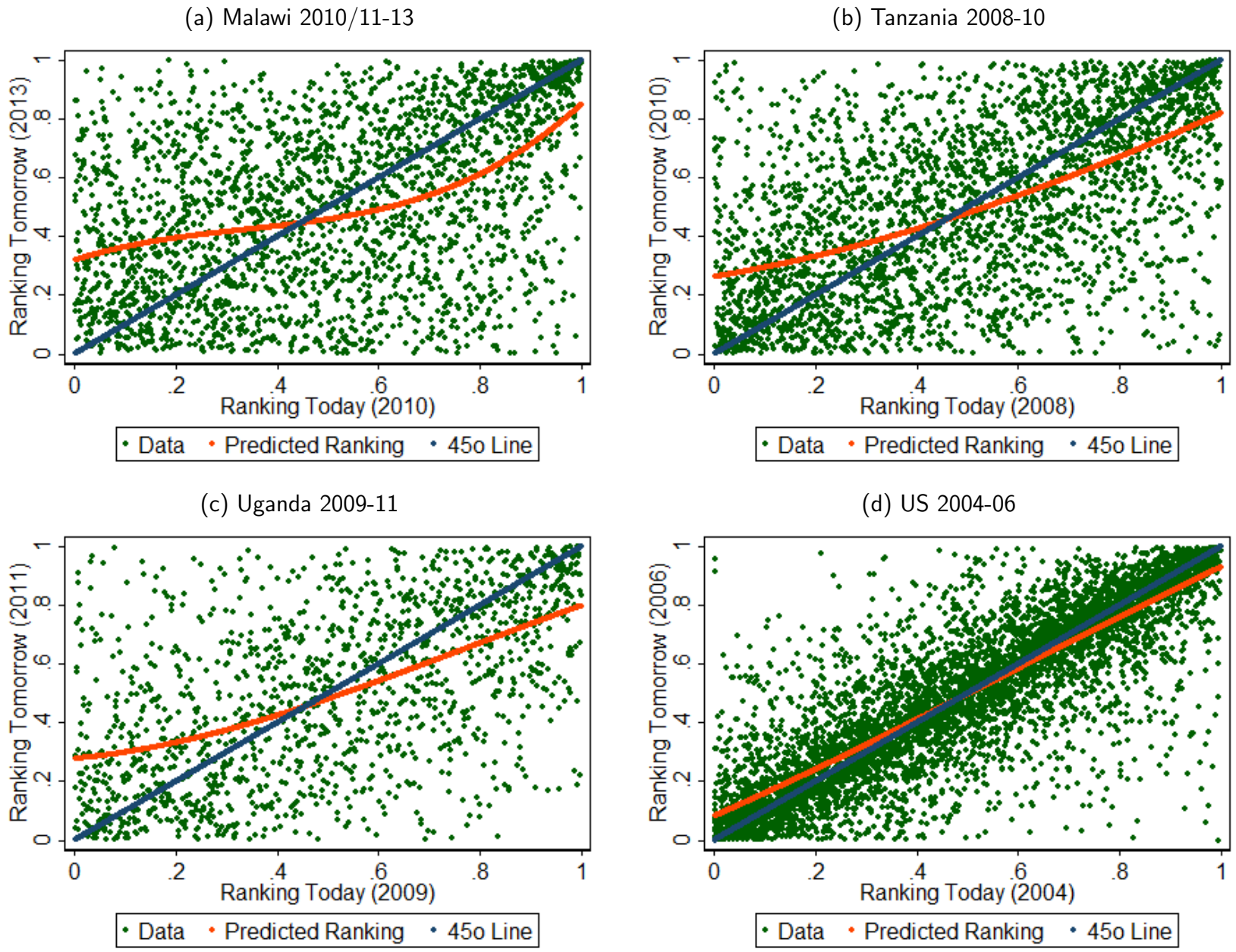


Notes: The top panels (a) refer to SSA. The SSA sample pools the panel data from three countries: ISA data for Malawi 2010-13, Tanzania 2008-10, and Uganda 2009-11. Before pooling the data we divide each country-year sample by its sample mean. This implies a total sample of 6,640 households for SSA. The bottom panels (b) refer to the US. The US sample is the 2004-06 PSID with a size of 5,649 households. The vertical axis refers to the quintile of origin in panels (a1) and (b1), the decile of origin in panels (a2) and (b2), and the percentile of origin in panels (a3) and (b3). In all panels the horizontal axis shows the conditional transition probability to each destination quintile identified with the colors labeled at the bottom of each figure.

The conditional transition probabilities of moving to each quintile of the income distribution are depicted in Figure 6. The left panels show the transition probabilities using the quintiles of the income distribution as origin, the center panels use the deciles of the income distribution as origin, and the right panels use the percentiles as origin. The top panels refer to SSA and the bottom panels to the US. In all cases there is clearly more income persistence in the US than in SSA across the entire income distribution. For example, the chances of being in the bottom quintile of the income distribution after two years (identified with the blue color in all panels) are more skewed to the top of the original distribution of income in SSA than in the US. That is, there is a nontrivial chance of ending up in the bottom quintile from the entire origin distribution of income in SSA (roughly 5% from the top decile, 10% from the median of the distribution, 40% from the bottom decile, and 45% from the bottom 5%), while these transitional probabilities are much smaller for the US from the top of the original distribution of income (less than 0.5% from the top decile, less than 1% from the median of the distribution) and much larger from the bottom of the original distribution of income (85% from the bottom decile, and 90% from the bottom 5%). The opposite occurs for the chances of being at the top quintile of the income distribution after two years (identified with the red color in all panels) as the conditional probability is more skewed to the bottom of the original distribution of income in SSA than in the US.

Finally, Figure 7 shows the predicted future income ranking of households given the current income ranking. The ranking is normalized between position 0 (lowest income) and 100 (highest income). In all panels the horizontal axis shows the income ranking of households today, and the vertical axis the ranking of the same households tomorrow. Each panel household observation is a dot in those graphs. If our observations align with the 45 degree line this would imply that there is absolutely no mobility across these two years. In contrast, if our panel household observations align with a 120 degree line this would imply that the income ranking of households is fully reversed across these two years. The orange line shows the predicted income ranking tomorrow as the outcome of regressing the income ranking tomorrow on a cubic polynomial of the income ranking today. Several observations are in order. Focusing on Malawi (panel (a), Figure 7), households ranked today at the bottom of the income distribution, position 0, are predicted to rank at roughly at position 35 of the income distribution tomorrow. At the same time, households ranked today at the top of the income distribution, position 100, are predicted to rank roughly at position 80 of the income distribution tomorrow. Tanzania (panel (b)) and Uganda (panel (c)) show similar insights. Instead, the US shows sharp differences, panel (d). In the US, households ranked today at the bottom of the income distribution, position 0, are predicted to rank roughly at position 5 of the income distribution tomorrow. At the same time, households ranked today at the top of the income distribution, position 100, are predicted to rank roughly at position 95 tomorrow. That is, again, there is a higher degree of income mobility in SSA than in the US.

Figure 7: Predicted Income Ranking: From t to $t+2$



Notes: In all panels the horizontal axis shows the income ranking of households today, and the vertical axis the income ranking of the same households tomorrow. That is, each dot is a household observation. In all panels, the blue line denotes the 45 degree line. In all panels the orange line shows the predicted ranking tomorrow as the outcome of a regressing the ranking tomorrow on a cubic polynomial of the ranking today. The Malawi ISA 2010-13 panel sample has 2,405 households (panel (a)), the Tanzania ISA 2008-10 panel sample has 2,838 households (panel (b)) and the Uganda ISA 2009-2011 panel sample has 1,397 households (panel (c)). The 2004-06 PSID sample has 5,649 households (panel (d)).

To summarize, the fact that the income rich remain rich and the income poor remain poor is more a feature of the United States than of SSA; there is larger economic mobility in SSA. These findings arise from the behavior of income mobility matrices as well as the predicted income ranking of households. This suggest that the fact that top income earners in SSA are not able to transform their current savings into accumulated wealth at the rate that US households do can be explained, at least partially, by a relatively lower persistence at the top of the income distribution in SSA compared with the US. That is, income rich households in SSA do not stay long enough (as income rich) in order to accumulate wealth. Similarly, the lower persistence of income in rural areas compared with urban areas of SSA can help explain the lower wealth accumulation and inequality in rural areas.

4.2 Complete Markets Tests

Panel data on consumption and income allows for the computation of insurance tests à la Townsend. In particular, we can test the idea that there is more consumption insurance in rural areas than in urban areas. Therefore supporting the cross-sectional evidence in Section 3. To this end, we conduct complete markets tests, as proposed in Townsend (1994), using the following econometric specification: $\Delta lnc_{it} = \beta \Delta lny_{it} + \Theta x_{it} + \varepsilon_{it}$, where consumption growth is the log difference $\Delta lnc_{it} = lnc_{it+1} - lnc_{it}$, income growth is $\Delta lny_{it} = lny_{it+1} - lnc_{it}$, and x_{it} includes a wide range of household controls such as age, dummies for education, regions, sex, marital status, and household size. The idea is that if the Townsend-β is significantly different from zero, we reject the hypothesis of complete markets, and accept it otherwise. Our results are in Table 10.

First, we use growth in total nondurable consumption as the endogenous variable for urban and rural areas respectively in Columns (1) and (2). In both cases, urban areas and rural areas significantly violate complete markets. This feature is more salient in urban areas than in rural areas as 12.3% of income growth translates into consumption growth in urban areas and 9.8% in rural areas. Quantitatively, it is not clear what it means that one Townsend-β is larger than the other, besides suggesting that rural areas are closer to complete markets (hence, full insurance) than urban areas. Second, our measure of household nondurable consumption can mask the presence of insurance as it includes variation in prices as well as non-food items that are perhaps harder to measure correctly. To help overcome this difficulty the last four columns (3)-(6) use growth in caloric intake as the endogenous variable. In this case 5.1% of income growth significantly transmits to caloric intake growth in urban areas when we use the full sample of households, Column (3). In sharp contrast, we cannot reject complete markets in rural areas with a nonsignificant transmission of 0.5% from income to caloric intake, Column (4). That is, rural

Table 10: Complete Markets Tests: Insurance in Rural and Urban Areas, Malawi ISA 2010-13

	Nondurables		Calories		Calories ($< p_{50}$)	
	Urban	Rural	Urban	Rural	Urban	Rural
Consumption Growth:	(1)	(2)	(3)	(4)	(5)	(6)
Income Growth (β)	0.123***	0.098***	0.051***	0.005	0.105***	-0.020
Household Controls	✓	✓	✓	✓	✓	✓
Observations	515	1,767	550	1,808	270	885

Notes: Columns (1) and (2) use growth in total nondurable consumption as endogenous variable separately for urban and rural areas, respectively. The last four columns (3)-(6) use growth in caloric intake as endogenous variable where columns (3) and (4) use the full sample, and columns (5) and (6) use only the sample of households where income growth is less than its median growth. Our econometric specification is $\Delta lnc_{it} = \beta \Delta lny_{it} + \Theta x_{it} + \varepsilon_{it}$, where consumption growth is the log difference $\Delta lnc_{it} = lnc_{it+1} - lnc_{it}$ and income growth is $\Delta lny_{it} = lny_{it+1} - lnc_{it}$. The household controls include age, dummies for education, regions, sex, marital status, and household size. We denote significance at 1% level with ***, 5% with **, and 10% with *.

households seem to be able to perfectly insure caloric intake against idiosyncratic income risk. This result is even starker if we focus on the most vulnerable households defined as those where income growth is less than median growth. In this case 10.5% of income growth significantly transmits to caloric intake growth in urban areas (Column (5)), while again we cannot reject complete markets in rural areas.

Our results add value to the notion that there is more consumption insurance in rural areas than in urban areas in poor countries, which is not new in other settings. For example, this is consistent with the idea that migrating the city implies a loss of insurance due to higher unemployment risk as in Harris and Todaro (1970) or the loss of casts networks as in Munshi and Rosenzweig (2016). Recently, Santaeulàlia-Llopis and Zheng (2016) also find higher levels of consumption insurance in rural areas than in urban areas in growing China. To the best of our knowledge, our results are the first showing empirical evidence of higher consumption insurance in rural areas than in urban areas in SSA countries. In particular, we cannot reject the presence of complete markets in rural areas when we define consumption in terms of caloric intake.

4.3 Informal Redistribution Mechanisms

We study two types of informal redistribution mechanisms, ex-post and ex-ante. First, we study self-reported copying strategies (mutual insurance versus self-insurance) in response of adverse income shocks. Second, we study the distribution of land in rural areas which is achieved through non-market channel and can be interpreted as an ex-ante redistribution mechanism.

4.3.1 Ex-Post Redisbribution: Food Gifts and Self-Reported Insurance

During the 12 months of the Malawi survey, in rural areas, 43% of households have suffered an aggregate shock, 6% an idiosyncratic shock, and 22% both types of shocks, leaving 29% of the population without shocks. The most common aggregate shock in rural areas is rain, 43% of households report a rain shock (too little or too much), followed by agricultural costs (33%) and food prices (26%) (see panel A1 in Table 11).[59] In urban areas, 15% of households have suffered an aggregate shock, 13% an idiosyncratic shock, and 11% both types of shocks in the past 12 months, leaving 61% of the population without shocks (basically twice as much as in rural areas). The most common aggregate shock in urban areas is unexpected high food prices, reported by 18% of households, which highlights the tight link between rural and urban areas (see panel B1 in Table 11). In both rural and urban areas, health shocks are the most important idiosyncratic shocks, followed by death and theft. In general, households that report suffering shocks (in particular, rain in rural areas) are poorer in consumption and income compared with those that report no shock (see panels A2 and B2 in Table 11). However, households have the same average wealth and land holdings independently of having self-reported a shock or no shock.

Table 12 shows the self-reported insurance mechanisms used to cope with shocks conditional on having received a shock. We group insurance mechanisms into "no insurance", "self-insurance", and "mutual insurance".[60] We focus on what households declared as their main coping strategy. The items "no insurance", "mutual insurance", and "self-insurance" do not sum to 100%; instead, they sum up to the percentage of households that reported having a shock (see Table 11). Precisely, in rural areas, where 71% of households reported suffering a shock: 35% of total rural households reported using no insurance to deal with that shock, 28% reported some form of self-insurance, and 7% reported some form of mutual insurance. In urban areas, where 39% of households reported suffering a shock: 22% of total urban households report using no insurance, 15% reported some form of self-insurance, and 2% reported some form of mutual insurance. That is, in rural areas, 35/71=49% of households report not using an insurance mechanism conditional on having reported a shock, while this figure is slightly higher (22/39=56%) in urban areas. This is suggestive, again, of a worse ability to provide insurance in urban areas

[59] Here we define rain as a type of aggregate shock, but we acknowledge there is rainfall dispersion across households. If we redefine rain as an idiosyncratic shock, then we find that in rural areas 14% of households have suffered only an aggregate shock, 25% only an idiosyncratic shock, and 31% both types of shocks in the past 12 months. The planting of maize needs to be timely. Rains that come too early or too late are as problematic as droughts and floods. Our measure of shock includes all these possibilities.

[60] Self insurance includes savings, dietary restrictions, market labor, own labor (working in the family-owned farm), credit and selling of assets. Mutual insurance is almost exclusively family/friends help within the village; the percentage of households that report receiving mutual insurance from children living elsewhere or from government and nongovernmental organizations (NGOs) is negligible in both rural and urban areas.

Table 11: Risk and Inequality, Malawi (ISA 2010)

(A) Rural Residency

(A1) Population Shares (%) by Risk

	No. of Shocks				Idiosyncratic Shocks			Aggregate Shocks		
	No shock	Both	Ind.	Agg.	Sick	Theft	Death	Rain	AgriC	FoodP
Population 2010	29	22	6	43	12	6	5	43	33	26

(A2) Averages US$ by Risk:

	No. of Shocks				Idiosyncratic shocks			Aggregate Shocks (Agg.)		
	No shock	Both	Ind.	Agg.	Sick	Theft	Death	Rain	AgriC	FoofP
Consumption	1369	1346	1773	1315	1468	1751	1234	1193	1451	1229
Income	1213	1013	1549	1032	1082	1426	811	928	1157	1006
Wealth	1166	1259	1639	1315	1362	1965	1073	1192	1384	1033
▷ Land	506	622	575	578	715	810	482	541	638	469

(B) Urban Residency

(B1) Population Shares (%) by Risk

	No. Shocks				Idiosyncratic shocks			Aggregate Shocks		
	No shock	Both	Ind.	Agg.	Sick	Theft	Death	Rain	AgriC	FoodP
Population 2010	61	11	13	15	6	6	3	9	9	18

(B2) Averages US$ by Risk

	No. Shocks				Idiosyncratic shocks			Aggregate Shocks		
	No shock	Both	Ind.	Agg.	Sick	Theft	Death	Rain	AgriC	FoodP
Consumption	3169	2017	2933	2122	2323	3132	2469	1999	2164	1977
Income	2763	1846	2525	1751	1618	2218	1303	1619	1995	1653
Wealth	3743	1959	2947	1296	2059	3678	3061	1923	2243	1410
▷ Land	364	629	637	285	844	663	475	493	791	378

Notes: "AgriC" stands for costs of agricultural inputs and "FoodP" stands for the price of food. All variables are averages in current USD. The construction of the measures of household consumption, income, and wealth is discussed in Section 2, with further details in the Appendix.

than in rural areas.

The results in previous sections imply that only those at the top of the income distribution have some ability to accumulate wealth. This suggests that only those households will be able to use their savings or accumulated wealth to smooth shocks as a form of self-insurance. Indeed, we find that households that report report self-insurance are better off in CIW than those that report no insurance or some form of mutual insurance (see panel A2 and B2 in Table 12).[61] In contrast, households that resort to mutual insurance in the event of a shock are the worst off in terms of CIW. This seems to suggest that those that report not having used insurance mechanisms are self-

[61] In particular, note from panel B2 Table 12 that urban households that report using "savings" as their main coping strategy are the only ones with a positive saving rate of 0.12. Udry (1995) provides evidence of the use of savings as an insurance mechanism to smooth consumption in northern Nigeria.

Table 12: Insurance Mechanisms and Inequality, Malawi (ISA 2010)

(A) Rural Residency

(A1) Population Shares (%) by Insurance Mechanisms

		Self-Insurance						Mutual Insurance			
	No Insurance	Save	Diet	Mkt. L.	Own L.	Credit	Sell	Fam.	Gov	NGO	Child.
Population 2010	35	19	2	2	2	1	2	7	0	0	0

(A2) Averages US$ by Insurance Mechanism

		Self-Insurance						Mutual Insurance			
	No Insurance	Save	Diet	Mkt. L.	Own L.	Credit	Sell	Fam.	Gov	NGO	Child.
Consumption	1318	1583	1136	1135	992	1388	1558	1160	1529	941	1135
Income	983	1351	902	719	972	1088	1365	770	1752	1198	1005
Wealth	1343	1512	1089	711	862	1228	1461	1022	1687	535	2189
▷ Land	609	631	588	358	428	638	630	509	454	248	1079

(B) Urban Residency

(B1) Population Shares (%) by Insurance Mechanism

		Self-Insurance						Mutual Insurance			
	No Insurance	Save	Diet	Mkt. L.	Own L.	Credit	Sell	Fam.	Gov	NGO	Child.
	22	9	3	0	1	1	1	2	0	0	0

(B2) Averages US$ by Insurance Mechanism

		Self-Insurance						Mutual Insurance			
	No Insurance	Save	Diet	Mkt. L.	Own L.	Credit	Sell	Fam.	Gov	NGO	Child.
Consumption	2362	2751	1717	2063	3027	1787	2454	1911	1032	1253	1620
Income	1982	3124	772	1862	1722	1291	1529	1268	289	911	586
Wealth	2096	2443	969	3264	2278	1876	1330	1706	599	469	132
▷ Land	669	346	111	305	522	566	344	393	0	42	55

Notes: All variables are averages in current USD. In types of self-insurance: "Save" refers to household own savings, "Diet" referes to dietary restrictions, "Mkt. Lab." is market labor, "Own L." is own farm labor, "Credit" refers to asking for credit, "Sell" refers to selling of assets. In types of mutual insurance: "Fam." includes family and friends, "Gov" refers to government, "NGO" stands for nongovernmental organizations, and "Child" refers to sending the child to leave elsewhere.

Table 13: Self-Made vs. Inherited Land, Rural Malawi (ISA, 2010)

	Bottom (%)			Quintiles					Top (%)			All
	0-1	1-5	5-10	Q1	Q2	Q3	Q4	Q5	10-5	5-1	1	0-100
						Wealth Quintiles						
Land Ownership (%)	1	18	63	60	89	93	96	95	94	95	95	87
Source (% of Land Value):												
Inherited	0	83	85	84	81	80	82	80	82	79	75	81
Chief Granted	100	09	12	11	13	14	13	14	13	14	19	13
Bride Price	00	02	01	02	03	03	02	01	01	01	00	02
Purchased	00	05	02	02	02	02	03	04	04	05	05	03
Rented-In	00	00	00	00	00	00	00	00	00	00	00	00
Other	00	00	00	00	00	00	00	00	00	00	00	00
▷ Nonmarketed Land	100	95	98	98	98	98	97	96	96	95	95	97

Notes: Our definition of land ownership is unconditional on agricultural use and includes all land either owned or rented-in. Regarding with the sources of land ownership we report the share of the total value of household land holdings that has been declared to be acquired as inheritance, granted by local chiefs, allocated as brideprice, purchased in the market, rented with a short term agreement, and 'other' (i.e, leases, tenants, borrowed, squats, assigned by employers). This share is conditional on owning land. The nonmarketed land groups the land that is inherited, granted by chiefs, and received as a bride price. The marketed land is purchased, rented-in, or other.

selected; that is, the households that report no insurance are possibly not in bad enough shape to resort to mutual insurance. Indeed, among the bottom of the income distribution, self-insurance (mainly "savings") is less common as a coping strategy and mutual insurance dominates. The opposite occurs for the top of the income distribution where self-insurance is the predominant coping strategy and mutual insurance less common for rural areas.[62]

4.3.2 Ex-Ante Redistribution: Acquired vs. Inherited Land

The somewhat uniform distribution of consumption conditional on land in rural areas (Section 4.1) suggests that the distribution of land helps reduce consumption inequality. Here we investigate the origins of the distribution of land and its implications for wealth accumulation. If the wealth-rich are land-rich, then limitations to accumulate wealth at the top of the distribution (Section 3.4) are potentially mirrored by limitations to accumulate land. For example, the ability to accumulate wealth can be limited by access to land markets. Thus, it is important to distinguish between land that is acquired through the market, and land that is distributed outside the market, i.e., through inheritance or other mechanisms.[63] ISA provides information on how each plot owned

[62] For this decomposition of insurance over the entire CIW distributions see Table 15 in the longer version of this paper (De Magalhães and Santaeulàlia-Llopis, 2015)

[63] Restuccia and Santaeulàlia-Llopis (2017) find that land markets are related to the degree of misallocation. If determined by markets, the allocation of land is several times more efficient than otherwise.

by households was acquired (e.g., purchased, rented, inherited, granted by the chief, etc.). We report our results across the wealth distribution in rural Malawi in Table 13.

The share of the rural population that owns land is 87%. This number increases with wealth from 60% for the bottom quintile of the wealth distribution to 95% for the top quintile. That is, the wealth-rich are indeed land-rich. Conditional on owning land, we find that the share of land value that has been inherited represents 81% of the total value of land holdings. This figure is similar to the proportion of inherited wealth in the total wealth for France in the nineteenth century (Piketty, 2014). This proportion barely declines as we move from the bottom quintile of the wealth distribution, 84%, to the top 1%, 75%. The low amount of marketed land at the top of the wealth distribution suggests that merit plays little role on the accumulation of land (and wealth) in SSA. Similar insights arise if we focus on a broader measure of nonmarketed land that includes inherited land, land granted by the chief, and land acquired as bride price. The proportion of nonmarketed land represents 97% of the total value of land (i.e., only 3% of land is bought or rented in the market). This proportion barely changes with wealth, from 98% in the bottom quintile of the wealth distribution to 95% at the top 1% of the wealth distribution. This is a key mechanism that prevents households to accumulate wealth in SSA: the main source of household wealth, land, is simply not for sale.[64]

4.4 Formal Borrowing, Need and Self-Selection

In addition to informal redistribution arrangements, an alternative mechanism to insure consumption is formal borrowing (e.g loans). The idea is that formal borrowing can help reduce the transmission from income inequality to consumption inequality. However, this argument strictly depends on whether households use loans to insure consumption. In contrast, if loans are used to finance risky investments/growth (e.g., start a business), then the effects of formal borrowing on consumption insurance are less obvious.

The information that we have available on the ability to borrow in ISA is the following. First, households are asked whether they have applied or not applied for a loan in the past year. Second, households are asked whether they succeeded in receiving the loan and the amount borrowed. Third, households are asked whether or not a loan was needed. This allows us to construct direct measures of how many household are credit constraint (households that were turned down after applying for a loan) controlling for self-selection (households that did not apply for a loan, even

[64]For Tanzania and Uganda this also appears to be the case. In Tanzania there is a question on whether the household holds any documentation of ownership for their dwelling (not specifically land): 75% have no document, 25% do but these include inherited property, traditional occupancy, and allocation by village chief as well as property bought in the market. In Uganda the government encouraged the formalization of ownership, but this is not widespread as discussed in McAuslan (2003).

Table 14: Formal Borrowing, Need and Self-Selection (ISA, 2010)

(A) Rural Residency

(A1) Population Shares (%) by Ability to Borrow

	Applied to Loan		Not Applied	
	Success	Denied	Needed	No need
Population 2010	13	7	56	25

(A2) Averages US$ by Ability to Borrow

	Applied to Loan		Not Applied	
	Success	Denied	Needed	No need
Consumption	1635	1391	1237	1481
Income	1390	1085	912	1358
Wealth	1566	1200	1089	1573

(B) Urban Residency

(B1) Population Shares (%) by Ability to Borrow

	Applied to Loan		Not Applied	
	Success	Denied	Needed	No need
Population 2010	20	7	40	33

(B2) Averages US$ by Ability to Borrow

	Applied to Loan		Not Applied	
	Success	Denied	Needed	No need
Consumption	2884	2179	2145	3781
Income	2933	1299	1359	3682
Wealth	3333	1888	1509	5117

Notes: All variables are averages in current USD. The construction of the variables is discussed in Section 4.4.

when needing one, because they thought they would not get it).

Our findings are in Table 14. Only a small proportion of total households receive a loan: 13% in rural areas and 20% in urban areas. This unconditional success rate is larger in urban areas than in rural areas. At the same time, the large majority of households do not even try to obtain a loan. The unconditional application rates are 13+7=20% in rural areas and 20+7=27% in urban areas. Once we condition on the households that formally apply for a loan, the success rate is much higher: 13/20=65% in rural areas and 20/27=74% in urban areas. However, this high success rates (conditional on applying) potentially mask the important fact that many households already self-select into not applying for a loan, even when needing one.

Indeed, a large part of the population is in need of loans with a slightly higher percentage of households reporting needing a loan in rural areas, 75%, than in urban areas, 67%. The main reasons for not applying for a loan when needing one are "not knowing any possible lender" and "having no collateral". The application rate conditional on needing a loan is 20/(20+56)=26% in rural areas and 40% in urban areas. Accordingly, the success rate conditional on needing a loan are 17% in rural areas and 30% in urban areas. This way, the ability to borrow, proxied with success rates conditional on need, is roughly twice larger in urban areas than in rural areas.

We can compare these figures to the US. The SCF in the US asks two similar questions to ours in ISA that help control for self-selection: first, households are asked if they are denied credit, and, second, they are asked if they did not apply for a loan for fear of being turned down (Bricker et al., 2014). The fraction of households that say "yes" to one or both of these questions is 27% percent in 2013 in the US while this figure is 63% in rural Malawi and 47% in urban Malawi. This indicates that there are roughly twice as many households credit constraint in Malawi as in the

US. The composition is also very different. In the US there are 19% of households that report not applying for fear of being turned down, while this is 56% in rural Malawi and 40% in urban Malawi. Moreover, 16% of households in the US report being turned down for a loan, while this figure is 7% in both rural and urban Malawi.

In terms of CIW, households that obtain a loan behave similarly to households that claim not to need a loan in rural areas (panel A2, Table 14). These two types of households, which are in principle less credit constrained, show higher CIW than those households who were denied a loan or who did not apply but needed one. Within the credit constrained households, those who were denied a loan do better than those that did not apply but needed one. This suggests that selection into applying already denotes differences in economic performance. If we use household wealth as a proxy for ability to borrow (Zeldes, 1989), we find the same ordering. Households that do not need a loan or applied for a loan and got it are the least constrained, with wealth values of $1,573 and $1,566. Households that applied for a loan but did not get it have an average wealth of $1,200; households that needed a loan but did not apply have an average wealth of $1,089. We find similar results in urban areas with perhaps a larger difference between the least constrained households (panel B2, Table 14). Households that do not need a loan own wealth worth $5,117; households that applied for a loan and got it, $3,333; households that applied for a loan and did not get $1,888; and households that needed a loan but did not apply $1,509.

To summarize, the larger ability of urban households to borrow does not necessarily imply more consumption insurance in urban areas than in rural areas. To link credit to consumption insurance we must look into the reasons for borrowing. In the ISA survey there are 3.6 times more loans acquired for start-up capital than for consumption in urban areas. This ratio is much less, 1.6, in rural areas. This suggests that households formal borrowing is mostly used to target production activities rather than for consumption insurance, and this feature is more salient in urban areas than in rural areas.

5 Conclusion

From a macroeconomic perspective, the inequality and joint behavior of consumption, income, and wealth in the very poor countries that we study can be summarized by two findings: (i) a low transmission from income to wealth and (ii) a low transmission from income to consumption. These properties are stronger in the rural areas than in the urban areas of SSA. We have reached this conclusion using cross-sectional and panel data for three of the world poorest countries, all in SSA. First, we relate the low transmission from income to wealth to a large inability to save and accumulate wealth in rural SSA compared with urban SSA, and in SSA compared with other world

regions. Second, the low transmission from income to consumption suggests that despite being unable to persistently save—and hence, self-insure—SSA households are able to insure their consumption relatively well. Such a phenomenon requires the presence of powerful insurance arrangements, particularly in rural areas. For example, using caloric intake to proxy consumption we cannot reject the complete markets hypothesis in rural areas, while this is clearly rejected in urban areas. The coexistence of these two findings (i)-(ii) reveals a negative relationship—and potentially a trade-off—between accumulation and insurance for SSA. In particular, it raises the question of whether the process of accumulation and growth potentially requires the disruption of consumption insurance for SSA.

A natural next step is to understand the causes and implications of this negative relationship between accumulation and consumption insurance along the growth path. In particular, a careful quantitative assessment could benefit from incorporating the dynamics of consumption, income, and wealth inequality that we document in macroeconomic models of poor countries. To this end, we hope that our empirical study is informative to discipline heterogeneous agent versions of macroeconomic models of growth and development (Galor and Weil, 1999; Hansen and Prescott, 2002; Gollin et al., 2002; Herrendorf et al., 2014).

Whether these models can jointly incorporate the low transmission from income to wealth and the low transmission from income to consumption that we document is an open question. This task faces some important challenges. We highlight three here. First, in contrast to standard macroeconomic models with heterogeneous agents that focus on explaining the observed high concentration of wealth in rich countries (Castaneda et al., 2003; deNardi, 2004; Quadrini, 2000),[65] our study documents much lower wealth concentration for SSA, in particular, in its rural areas. Mechanisms that prevent accumulation (e.g., no land markets) can help explain this lower concentration. Second, the degree of consumption insurance provided in poor countries, in particular in rural areas, is larger than what is typically achieved in standard incomplete markets models with self-insurance (Carroll, 1997; Kaplan and Violante, 2010). In addition, our evidence suggests that self-insurance (i.e., own savings) is not a major force at play. A natural alternative model would incorporate endogenously incomplete markets. Such models are typically used to assess mutual insurance in economically poor settings. However, these models fall short in replicating the consumption and income (hence wealth) distributions of village economies (Ligon et al., 2002). In this context, it is important to note that matching these distributions, in particular that of wealth, is crucial to provide valid macroeconomic inference on variables such as aggregate savings (Krusell and Smith, 1998) as well as assess macroeconomic social insurance

[65] The high concentration of wealth is a puzzle for the typical Aiyagari-Bewley-Hugget-Imrohoruglu economies as these models imply lower shares of total wealth at the top of the distribution than what is observed in the data.

policy (Conesa et al., 2009). Third, the study of heterogeneous-agent economies with uncertainty along the transition path is always computationally challenging (Buera and Shin, 2011). To this computational difficulty, we need to add the fact that the degree of market incompleteness is likely to change over the aggregate stage of development as growing economies become less rural and more urban.[66]

References

Aguiar, M. A. and Bils, M. (2011). Has Consumption Inequality Mirrored Income Inequality? NBER Working Papers 16807, National Bureau of Economic Research, Inc.

Alvaredo, F. and Gasparini, L. (2013). Recent trends in inequality and poverty in developing countries. *Handbook of Income Distribution*, 2:697–805.

Alvaredo, F. and Londoño, J. (2013). High incomes and personal taxation in a developing economy: Colombia 1993-2010. *Commitment to Equity working paper*, (12).

Attanasio, O., Banks, J., Meghir, C., and Weber, G. (1999). Humps and Bumps in Lifetime Consumption. *Journal of Business and Economic Statistics*, 17:22–35.

Attanasio, O., Battistin, E., and Ichimura, H. (2007). What Really Happened to Consumption Inequality in the United States? In *Hard-to-Measure Goods and Services: Essays in Honor of Zvi Griliches*, NBER Chapters, pages 515–543. National Bureau of Economic Research, Inc.

Attanasio, O. and Ríos-Rull, J.-V. (2000). Consumption Smoothing in Island Economies: Can Public Insurance Reduce Welfare ? *European Economic Review*, 44:1225–1258.

Banerjee, A. and Piketty, T. (2005). Top indian incomes, 1922–2000. *The World Bank Economic Review*, 19(1):1–20.

Beck, T., Demirgüç-Kunt, A., and Peria, M. S. M. (2008). Banking services for everyone? barriers to bank access and use around the world. *The World Bank Economic Review*, 22(3):397–430.

Beegle, K., Carletto, C., and Himelein, K. (2012a). Reliability of recall in agricultural data. *Journal of Development Economics*, 98(1):34–41.

Beegle, K., De Weerdt, J., Friedman, J., and Gibson, J. (2012b). Methods of household consumption measurement through surveys: Experimental results from tanzania. *Journal of Development Economics*, 98(1):3–18.

Bils, M. and Klenow, P. J. (2000). Does Schooling Cause Growth? *American Economic Review*, 90(5):1160–1183.

Bricker, J., Dettling, L.-J., Henriques, A., Hsu, J.-W., Moore, K.-B., Sabelhaus, J., Thompson, J., and Windle, R. A. (2014). Changes in U.S. Family Finances from 2010 to 2013: Evidence from the Suvery of Consumer Finances. *Federal Reserve Bulletin*, 100(4).

[66] Along these lines, and focusing on a one-sector model transition for the US, Krueger and Perri (2006) propose a model in which consumption insurance improves with aggregate output.

Brune, L., Giné, X., Goldberg, J., and Yang, D. (2015). Facilitating savings for agriculture: Field experimental evidence from malawi. Technical report, National Bureau of Economic Research.

Bryan, G., Chowdhury, S., and Mobarak, A. M. (2014). Underinvestment in a Profitable Technology: The Case of Seasonal Migration in Bangladesh. *Econometrica*, 82:1671–1748.

Buera, F. J. and Shin, Y. (2011). Self-insurance vs. self-financing: A welfare analysis of the persistence of shocks. *Journal of Economic Theory*, 146(3):845–862.

Carletto, C., Savastano, S., and Zezza, A. (2013). Fact or artifact: the impact of measurement errors on the farm size–productivity relationship. *Journal of Development Economics*, 103:254–261.

Carletto, G., Beegle, K., Himelein, K., Kilic, T., Murray, S., Oseni, M., Scott, K., and Steele, D. (2010). Improving the availability, quality and policy-relevance of agricultural data: The living standards measurement study-integrated surveys on agriculture. In *Third Wye City Group Global Conference on Agricultural and Rural Household Statistic. Washington, DC*, pages 24–25.

Carroll, C. (1997). Buffer-stock saving and the life cycle/permanent income hypothesis. *The Quarterly Journal of Economics*, 112(1):1–55.

Caselli, F. (2005). Accounting for Cross-Country Income Differences. In Aghion, P. and Durlauf, S., editors, *Handbook of Economic Growth*, volume 1 of *Handbook of Economic Growth*, chapter 9, pages 679–741. Elsevier.

Castaneda, A., Diaz-Gimenez, J., and Rios-Rull, J.-V. (2003). Accounting for the u.s. earnings and wealth inequality. *Journal of Political Economy*, 111(4):818–857.

Conesa, J. C., Kitao, S., and Krueger, D. (2009). Taxing Capital? Not a Bad Idea after All! *American Economic Review*, 99(1):25–48.

De Magalhães, L., Koh, D., and Santaeulàlia-Llopis, R. (2017). The Costs of Consumption Smoothing: Less Schooling and Less Nutrition. BGSE Working Paper.

De Magalhães, L. and Santaeulàlia-Llopis, R. (2015). The Consumption, Income, and Wealth of the Poorest: Cross-sectional Facts of Rural and Urban Sub-Saharan Africa for Macroeconomists. Policy Research Working Paper Series 7337, The World Bank.

Deaton, A. (1988). Quality, quantity, and spatial variation of price. *The American Economic Review*, pages 418–430.

Deaton, A. (1997). *The Analysis of Household Surveys. A Microeconometric Approach to Development Policy*. Johns Hopkins University Press.

Deaton, A. (2005). Measuring Poverty in a Growing World (or Measuring Growth in a Poor World). *The Review of Economics and Statistics*, 87(1):1–19.

Deaton, A. and Paxson, C. (1994). Intertemporal Choice and Inequality. *Journal of Political Economy*, 102(3):437–467.

Deaton, A. and Zaidi, S. (2002). Guidelines for Constructing Consumption Aggregates for Welfare Analysis. Living Standards Measurement Study, Working Paper No. 135, Washington, D.C.: World Bank.

Deininger, K., Carletto, C., Savastano, S., and Muwonge, J. (2012). Can diaries help in improving agricultural production statistics? evidence from uganda. *Journal of Development Economics*, 98(1):42–50.

deNardi, M. (2004). Wealth inequality and intergenerational links. *Review of Economic Studies*, 71:743–768.

Díaz-Giménez, J., Glover, A., and Ríos-Rull, J. V. (2011). Facts on the Distributions of Earnings, Income, and Wealth in the United States: 2007 Update. *Federal Reserve Bank of Minnepolis Quarterly Review*, 34(1):2–31.

Dupas, P. and Robinson, J. (2013a). Saving Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya. *American Economic Journal: Aplied Economics*, 5(1):163–192.

Dupas, P. and Robinson, J. (2013b). Why Don't the Poor Save More? Evidence from Health Savings Experiments. *American Economic Review*, 103(4):1138–71.

Ecker, O. and Qaim, M. (2011). Analyzing nutritional impacts of policies: an empirical study for malawi. *World Development*, 39(3):412–428.

Galor, O. and Moav, O. (2004). From Physical to Human Capital Accumulation: Inequality and the Process of Development. *Review of Economic Studies*, 71(4):1001–1026.

Galor, O. and Weil, D. N. (1999). From Malthusian Stagnation to Modern Growth. *American Economic Review*, 89(2):150–154.

Gibson, J., Beegle, K., De Weerdt, J., and Friedman, J. (2014). What Does Variation in Survey Design Reveal About the Nature of Measurement Errors in Household Consumption? *Oxford Bulletin of Economics and Statistics*.

Goldberg, J. (2016). Kwacha Gonna Do? Experimental Evidence about Labor Supply in Rural Malawi. *American Economic Journal: Applied Economics*, 8(1):129–149.

Gollin, D., Lagakos, D., and Waugh, M. E. (2014). Agricultural Productivity Differences Across Countries. *The American Economic Review*, 104(5):165–170.

Gollin, D., Parente, S. L., and Rogerson, R. (2002). The Role of Agriculture in Development. *American Economic Review*, 92(2):160–164.

Grosh, M. and Deaton, A. (2000). *Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 Years of the Living Standards Measurement Study*, volume 17, chapter Consumption. Washington, DC: World Bank.

Grosh, M. and Glewwe, P. (2000). *Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 Years of the Living Standards Measurement Study, Volume 2*. Washington, DC: World Bank.

Hansen, G. D. and Prescott, E. C. (2002). Malthus to Solow. *American Economic Review*, 92(4):1205–1217.

Harris, J. R. and Todaro, M. P. (1970). Migration, Unemployment and Development: A Two-Sector Analysis. *American Economic Review*, 60(1):126–142.

Heathcote, J., Perri, F., and Violante, G. L. (2010). Unequal we stand: An empirical analysis of economic inequality in the united states, 1967–2006. *Review of Economic dynamics*, 13(1):15–51.

Herrendorf, B., Rogerson, R., and Valentinyi, k. (2014). Growth and Structural Transformation. In *Handbook of Economic Growth*, volume 2 of *Handbook of Economic Growth*, chapter 6, pages 855–941. Elsevier.

Hsieh, C.-T. and Klenow, P. J. (2009). Misallocation and Manufacturing TFP in China and India. *The Quarterly Journal of Economics*, 124(4):1403–1448.

Kaminski, J., Christiaensen, L., and Gilbert, C. L. (2014). The End of Seasonality? New Insights from Sub-Saharan Africa. Policy Research Working Paper, World Bank.

Kaplan, G. and Violante, G. L. (2010). How much consumption insurance beyond self-insurance? *American Economic Journal: Macroeconomics*, 2(4):53–87.

Kinnan, C. (2014). Distinguishing Barriers to Insurance in Thai Villages. Working Paper, Northwestern.

Klenow, P. and Rodríguez-Clare, A. (1997). The Neoclassical Revival in Growth Economics: Has It Gone Too Far? In *NBER Macroeconomics Annual 1997, Volume 12*, NBER Chapters, pages 73–114. National Bureau of Economic Research, Inc.

Krueger, D., Mitman, K., and Perri, F. (2017). Macroeconomics and Heterogeneity, Including Inequality. *Handbook of Macroeconomics*, 2B.

Krueger, D. and Perri, F. (2006). Does Income Inequality Lead to Consumption Inequality? Evidence and Theory. *Review of Economic Studies*, 73:163–193.

Krueger, D. and Perri, F. (2011). How do households respond to income shocks. Working Paper, Penn.

Krueger, D., Perri, F., Pistaferri, L., and Violante, G. L. (2010). Cross Sectional Facts for Macroeconomists. *Review of Economic Dynamics*, 13(1). Special Issue, January 2010.

Krusell, P. and Smith, A. (1998). Income and wealth heterogeneity in the macroeconomy. *Journal of Political Economy*, 106:867–896.

Lagakos, D., Moll, B., Porzio, T., Qian, N., and Schoellman, T. (2016). Life-Cycle Human Capital Accumulation Across Countries: Lessons From U.S. Immigrants. NBER Working Papers 21914, National Bureau of Economic Research, Inc.

Lagakos, D. and Waugh, M. E. (2013). Selection, Agriculture, and Cross-Country Productivity Differences. *American Economic Review*, 103(2):948–80.

Ligon, E., Thomas, J. P., and Worrall, T. (2002). Informal Insurance Arrangements with Limited Commitment: Theory and Evidence from Village Economies. *Review of Economic Studies*, 69(1):209–244.

Manda, E. L. (2010). *Price Instability in the Maize Market in Malawi*. PhD. Thesis, School of International Development Studies - University of East Anglia.

McAuslan, P. (2003). A Narrative on Land Law Reform in Uganda. Lincoln Institute of Land Policy - Conference Paper.

Meyer, B. D., Mok, W. K., and Sullivan, J. X. (2015). Household surveys in crisis.

Morten, M. (2013). Temporary Migration and Endogenous Risk Sharing in Village India. Working Paper, Stanford.

Munshi, K. and Rosenzweig, M. (2016). Networks and Misallocation: Insurance, Migration, and the Rural-Urban Wage Gap. *American Economic Review*, 106(1):46–98.

Piketty, T. (2014). *Capital in the Twenty-First Century*. Belknap Press of Harvard University Press, Cambridge, MA.

Quadrini, V. (2000). Entrepeneurship, saving and social mobility. *Review of Economic Dynamics*, 3.

Quadrini, V. and Ríos-Rull, J.-V. (2015). Inequality in Macroeconomics. *Handbook of Income Distribution*, 2:1229–1302.

Restuccia, D. and Santaeulàlia-Llopis, R. (2017). Land Misallocation and Productivity. Working Paper 23128, National Bureau of Economic Research.

Ríos-Rull, J. V. (1995). Models with heterogeneous agents. In Cooley, T. F., editor, *Frontiers of Business Cycle Research*, chapter 4. Princeton University Press.

Rosenzweig, M. and Wolpin, K. (1993). Credit Market Constraints, Consumption Smoothing, and the Accumulation of Durable Production Assets in Low-Income Countries: Investment in Bullocks in India. *Journal of Political Economy*, 101(2):223–244.

Rosenzweig, M. R. and Stark, O. (1989). Consumption Smoothing, Migration, and Marriage: Evidence from Rural India. *Journal of Political Economy*, 97(4):905–26.

Rosenzweig, M. R. and Udry, C. (2014). Rainfall Forecasts, Weather and Wages over the Agricultural Production Cycle. NBER Working paper 19808.

Santaeulàlia-Llopis, R. and Zheng, Y. (2016). The Price of Growth: Consumption Insurance in China 1989-2009. European University Insititute, Working Paper.

Storesletten, K., Telmer, C. I., and Yaron, A. (2004). Consumption and risk sharing over the life cycle. *Journal of Monetary Economics*, 51:609–633.

Townsend, R. M. (1994). Risk and Insurance in Village India. *Econometrica*, 62(3):539–91.

Udry, C. (1995). Risk and Saving in Northern Nigeria. *American Economic Review*, 85(5):1287–1300.

Young, A. (2012). The African Growth Miracle. *Journal of Political Economy*, 6(120):696–739.

Zeldes, S. P. (1989). Consumption and Liquidity Constraints: An Empirical Investigation. *Journal of Political Economy*, 97(2):305–346.