# The Distributional Patterns of Consumption Insurance: Evidence from Rural and Urban Uganda

ALBERT RODRÍGUEZ-SALA*

*Universidad de Cantabria*

October, 2025

Using nationally representative household panel data from Uganda, I study how consumption insurance against idiosyncratic income shocks varies across the economic distribution. I estimate insurance coefficients across quintiles of time-averaged consumption, income, and wealth, separately for rural and urban households. In rural areas, poorer households are better insured: the pass-through of income shocks into consumption is not statistically different from zero for the bottom three quintiles of consumption and wealth (0.7–3.3%), but rises to 6.3–9.5% for the top two quintiles. In contrast, the pattern reverses in urban areas, where households in the top quintile of income and wealth exhibit substantially lower pass-throughs (1.7–4.5%) than households in lower quintiles (8.1–14.5%). These contrasting gradients are consistent with subsistence concerns and informal insurance dominating in rural areas, and formal financial access playing a larger role in urban settings. Overall, the findings document a distributional trade-off between insurance and growth in predominantly rural economies.

*Keywords*: Insurance, Distribution, Consumption, Income, Wealth.

*JEL Classification*: D31, E21, O11, O12.

## 1   INTRODUCTION

Poverty implies living with low, erratic, and uncertain income together with lacking access to formal insurance or credit systems (Dercon 2005; Collins et al. 2009). Nevertheless, in developing countries, and even in the poorest rural areas, households are

not hand-to-mouth, but they are able to achieve relatively high levels of consumption insurance—e.g., Townsend (1994) or Udry (1994). In this paper, I study how consumption insurance is distributed across households at different points along the economic distribution in Uganda. Throughout the paper, households' position in the economic distribution is defined based on time-averaged measures of consumption, income, and wealth.

The relationship between economic status and consumption insurance is not a priori clear. Richer households generally have greater access to formal financial tools——such as credit markets, insurance products, and precautionary savings——that help mitigate the impact of income shocks. In contrast, poorer households might have larger access to informal insurance networks. Households close to subsistence face higher welfare losses from consumption fluctuations, making them more risk-averse and leading them to smooth consumption more aggressively (Chetty and Looney 2006). These contrasting mechanisms imply that consumption insurance could be stronger at either end of the distribution, depending on the relative strength of formal versus informal insurance, preferences, and constraints.

Despite its theoretical ambiguity, this distributional pattern of consumption insurance remains largely underexplored. Clarifying who insures more across the distribution can illuminate a broader set of trade-offs highlighted in the literature. At the micro level, informal insurance arrangements can impose economic costs by distorting decisions related to education (De Magalhaes, Koh, and Santaeulalia-Llopis 2019), health (Robinson and Yeh 2012), migration and marriage (Rosenzweig and Stark 1989), and labor, savings, and business decisions.[1] At the macro level, research documents a trade-off between insurance and growth across rural and urban areas (e.g., Munshi and Rosenzweig 2016) as well as across stages of development (Santaeulalia-Llopis and Zheng 2018). This paper investigates whether such distributional trade-offs observed across different economies also exist across households within the same economy.

To examine this, I estimate insurance coefficients across quintiles of Uganda's time-averaged distributions of consumption, income, and wealth. These time-averaged measures are computed by taking the household-specific means over time, allowing for a ranking that reflects approximately permanent consumption, permanent income, and more stable wealth positions. The analysis is conducted separately for rural and urban areas, as well as for the full national sample. Following the standard complete markets framework, which treats income as exogenous, this works interprets insurance as the extent to which idiosyncratic income shocks are not transmitted into consumption fluctuations.[2]

---

[1]In the context of Sub-Saharan Africa, where kinship networks are particularly strong, informal insurance which is associated with high redistribution pressures, disincentive labor supply, asset accumulation, and entrepreneurship activity—see Platteau (2009) for a discussion. Baland, Guirkinger, and Mali (2011) observe that households take out loans to signal themselves as liquidity-constrained and avoid sharing the accumulated wealth with relatives and friends.

[2]Among others, Morduch (1995) argues for the importance of taking into account income decisions

Following the approach in Mace ([1991](#)), I compute consumption insurance coefficients following two different econometric specifications. In the first, *CRRA specification*, under complete markets and households with identical time-invariant preferences characterized by a Constant Relative Risk Aversion (CRRA)—power utility—the growth rate of individual consumption should depend solely on the growth rate of aggregate consumption. Thus, the insurance level is measured by the coefficient from a regression of the household consumption growth rate on the growth rate of idiosyncratic household income. Under full insurance, this coefficient should be zero; in the total absence of insurance, it should be one.

In the second, *CARA specification*, assuming households with identical time-invariant preferences by a Constant Absolute Risk Aversion—exponential utility—changes in consumption are equalized across individuals. Thus, the insurance level is measured by the coefficient from a regression of log of household consumption on log of idiosyncratic household income controlling for fixed effects. Similarly, if full consumption insurance holds, household consumption should rely solely on aggregate consumption, meaning the coefficient on household income should be zero.

In terms of data, I use the Ugandan National Panel Survey (UNPS), a nationally representative household panel survey conducted under the World Bank's Living Standards Measurement Study and the Integrated Surveys on Agriculture (LSMS-ISA). The UNPS captures household consumption, income, and wealth dynamics, crucial for this analysis. Measuring income in poor countries is particularly challenging, especially because many households rely on subsistence farming. The ISA component of the survey accurately captures agricultural income, including production, costs, and farming assets, while the LSMS part provides detailed data on consumption, non-agricultural income, and wealth. This unique dataset allows for a detailed study of insurance levels across households at different economic levels in Uganda.

Under the CRRA specification, the empirical results reveal a clear pattern in rural Uganda: poorer households exhibit higher levels of consumption insurance than their richer counterparts. As households move up the consumption and wealth distributions, the coefficient capturing the transmission of idiosyncratic income shocks into consumption increases. For households in the bottom and middle of the consumption distribution (quintiles Q1–Q3), the null of full insurance cannot be rejected, with coefficient estimates between 0.015 and 0.039—indicating a pass-through of idiosyncratic income shocks to consumption of only 1.5 to 3.9%. In contrast, for households in the top quintiles (Q4 and Q5), the null is rejected, and the estimates are more than four times larger than those in the bottom quintiles. Across the income distribution, the pattern is a bit noisy: full insurance is not rejected in Q1 and Q3. For wealth, the results resemble those for consumption—coefficient estimates for Q1–Q3 are not sta-

---

to evaluate insurance. At the aggregate level, Donovan ([2021](#)) and Rodríguez-Sala ([2025](#)) show that completing financial markets when agricultural income is endogenous generates large income gains even in regions with a low transmission of income shocks to consumption.

tistically different from zero, while those for the top quintiles are significantly greater and nearly one order of magnitude higher.

Conversely, in urban areas, a contrasting pattern emerges: richer households—those in the top quintile of both the income and wealth distributions—exhibit higher levels of consumption insurance. While the pattern across the consumption distribution is hump-shaped, the insurance coefficient for the top income quintile (Q5) is not statistically different from zero and is nearly one order of magnitude lower than those for the lower quintiles. Similarly, in the wealth distribution, the null of full insurance is rejected in all quintiles except the top quintile, Q5.

Given that over 70% of Uganda's population resides in rural areas, the nationwide pattern is similar to the rural pattern. Under the CRRA specification, at the national level we cannot reject the hypothesis of full consumption insurance for households in the bottom three quintiles of the consumption distribution (Q1–Q3) and in the bottom and middle quintiles of the wealth distribution (Q1–Q3).

Under the CARA specification, the patterns of consumption insurance coefficients across distributions in both rural and urban areas are highly consistent with those obtained under the CRRA specification. This indicates that the previous results are robust to the choice of preference specification. In rural areas——as well as at the national level——poorer households exhibit higher levels of consumption insurance than richer ones across both the consumption and wealth distributions: full insurance cannot be rejected for the bottom quintile (Q1) in both cases, while coefficient estimates increase progressively across higher quintiles. In contrast, in urban areas, it is households in the top quintile (Q5) of the income and wealth distributions that exhibit the highest levels of insurance, with full insurance not rejected for these groups.

I assess the robustness of these findings to changes in the sample, the definition of shocks, and the outcome variable. The primary analysis uses a balanced panel to ensure consistent household tracking and fixed location status. While this yields a smaller urban sample, the key patterns hold strongly in a much larger unbalanced panel (2,903 rural and 771 urban households), confirming that the results are not driven by sample size. The findings are also robust to using residualized consumption and income, and to using food consumption to address concerns about consumption basket composition. Across these specifications, the central finding of a reversed insurance gradient between rural and urban areas remains clear.

By systematically documenting how consumption insurance varies across the economic distribution, this paper contributes to the literature on insurance in developing countries, particularly the strand concerned with the relationship between poverty and insurance.[3] In his seminal work, Townsend (1994) finds some evidence that land-

---

[3] Early studies such as Paxson (1993), Udry (1994), and Townsend (1994) find that household consumption responds little to idiosyncratic income shocks, indicating substantial—though imperfect—insurance in poor rural settings. Other work documenting similarly high but incomplete insurance includes Deaton (1992) Côte d'Ivoire, Ghana, and Thailand, De Magalhães and Santaeulalia-Llopis

less households exhibit lower levels of insurance than landowning households. Morduch (1999) and Ravallion and Chaudhuri (1997) argue that poorer households might face greater exposure to shocks and sharper consumption declines. Yet, as Chetty and Looney (2006) show, proximity to subsistence increases risk aversion and raises the value of smoothing consumption among the poor.

In rural Uganda, the evidence aligns more closely with the latter mechanism: poorer households experience less transmission of idiosyncratic shocks into consumption than richer ones, consistent with stronger incentives to avoid subsistence shortfalls. In a setting where access to formal insurance is limited throughout the distribution, the precautionary motive emphasized by Chetty and Looney (2006) appears to dominate. The findings highlight a distributional insurance–growth trade-off: rising economic status may weaken insurance in predominantly rural contexts.

In contrast, the pattern in urban Uganda reverses: richer households show higher levels of consumption insurance than poorer ones. This suggests greater exposure to shocks among the urban poor, in line with Ravallion and Chaudhuri (1997) and Morduch (1995). Broader access to formal financial markets in urban areas may explain why insurance increases with economic status. Moreover, the urban poor are generally farther from subsistence, reducing the strength of the precautionary channel highlighted by Chetty and Looney (2006).

These results contribute to a growing literature that highlights a trade-off between insurance and economic growth across regions and stages of development (Munshi and Rosenzweig 2016; De Magalhães and Santaeulalia-Llopis 2018; Santaeulalia-Llopis and Zheng 2018). This paper extends that insight by showing that, within a predominantly rural economy, households with higher permanent consumption and wealth exhibit weaker consumption insurance. As Munshi and Rosenzweig (2016) show, public safety nets can improve efficiency by relaxing the insurance–growth trade-off across rural and urban regions. Similarly, within rural areas, policies that strengthen formal insurance mechanisms could mitigate the decline in insurance as households move up the economic distribution, whereas interventions that raise incomes but inadvertently weaken informal insurance networks may be less effective. Taken together, the evidence provides descriptive guidance for policymakers: the effectiveness of anti-poverty and financial inclusion policies may depend on how they interact with the insurance–growth trade-off.

The paper is organized as follows: Section 2 discusses the data and the measurement of key variables. Section 3 presents the framework for testing consumption insurance across distributions, while Section 4 outlines the results. Finally, Section 5 evaluates the robustness of the findings, and Section 6 concludes the paper.

---

(2018) Malawi, Uganda, and Tanzania.

# 2  DATA

This study uses the first five waves of the Ugandan National Panel Survey (UNPS).[4] The UNPS is a nationally representative panel survey carried out by the Ugandan National Statistics and is part of the World Bank LSMS-ISA project. The Living Standards Measurement Study, LSMS, is a representative household survey with a focus on living standards and inequality. The Integrated Survey on Agriculture, ISA, are survey designed to capture all agricultural and livestock outputs, inputs, and wealth. The UNPS sample is approximately 3,200 households and it is currently the longest panel of the LSMS-ISA project. The first wave started in 2009–10, and its initial sample was visited for two consecutive years: 2009–10 and 2010–11. In the fourth wave, 2013–14, one-third of the initial sample was refreshed, and the fifth wave, 2015–16, uses the sample from 2013–14.

In this work, I mainly use the balanced panel, and hence, all households in the data are observed during the five waves. The balanced panel has a total of 988 households. To study insurance levels separately for urban and rural areas, I construct balanced panels for each of the locations. The rural panel includes households that resided in rural areas during all survey waves (773 households). Similarly, the urban panel includes households that resided in urban areas throughout all waves (88 households). In the balanced panel, 78% of households resided in rural areas in every wave, 9% in urban areas, and 13% migrated between rural and urban areas. For the unbalanced panel, the number of households rises to 4,081, with 2,903 rural and 771 urban households.

I choose the balanced panel as the main specification for two reasons. First, it ensures a consistent time series for calculating consumption and income growth rates, which is central to the tests under the CRRA specification. Second, it allows me to define location panels based on a fixed status over the entire period. By excluding households that migrate, the analysis separates distinct rural and urban environments without mixing households. The main limitation of the balanced panel is the small sample of urban households. Therefore, in Section 5, I perform the analysis with the unbalanced panel. The results are similar to the main specification, and in particular, the relationships for urban areas is preserved.

Performing consumption insurance tests requires precise measures of household income and consumption across different periods. Moreover, If we are interested in how these consumption insurance levels change across the wealth distribution, we also need a precise measure of household wealth. The main strength of the LSMS-ISA data is that it provides nationally representative panel household data from which we can recover these three key variables.[5]

---

[4]Uganda National Panel Survey, the World Bank.

[5]Monetary values are adjusted by the within-wave 12-months average of the Consumption Price

## 2.1 MEASURING CONSUMPTION

The UNPS has a detailed section on household consumption divided into 3 sections: food items (last 7 days), non-food and non-durable goods (last month), and durable goods (last year). For each item, households are asked for the value of consumption from purchases, from home production, and received in-kind or free. The consumption value from each item is the sum from the three sources. Then, I define household aggregate consumption as the sum of consumption value for all food items and non-durable items. For each wave, I trim total household consumption at the bottom and top one percent to avoid the presence of outliers.

## 2.2 MEASURING INCOME

Measuring household income in developing countries is difficult, see Deaton (2005). Common to developed countries, self-reported income in surveys tends to have important amounts of measurement error. Yet, in the case of developing countries, a series of extra difficulties arise. Notably, a large fraction of households are self-employed which for them is both conceptually and practically more difficult to report the true value of their income than for salary workers. Moreover, most of these self-employed households are in agriculture where measurement is more difficult——especially when a substantial part of its production is not devoted to the market. Finally, earnings for farmers, as well as non-farming entrepreneurs, and salaried workers are more erratic in developing countries. Seasonality is substantial, while job or business opportunities might arise for a short period of time, it is rarely the case that individuals have a unique permanent job.

One of the main strength of the LSMS-ISA surveys is to offer comprehensive household income information for several countries in Sub-Saharan Africa. Income information is provided from the household questionnaire (LSMS) and the agricultural questionnaire (ISA).

### 2.2.1 AGRICULTURAL INCOME

The ISA survey section captures agricultural production and inputs with detailed questions on crops and livestock, organized by plot and animal group. From this data, accurately calculating agricultural income involves making estimates, refinements, and modifications, which I will outline next.

*Units conversions to kilograms.* A first issue is to evaluate all crop production into a single and standard unit. Common in household surveys in the developing countries, households may report quantities in non-standard units ranging from sacks and dishes

---

Index in Uganda and converted to U.S. dollars using the 2014 Purchasing Power Parity (PPP) rate.

to pieces. Moreover, unit conversions can vary across crops and seasons. An advantage of the UNPS agriculture questionnaire is that it asks households to provide the conversion rate of their reported units to kilograms. Using this information, I calculate the median conversion rate for each unit, crop, and season combination.[6]

*The monetary value of unsold production.* In developing countries, a large part of agricultural production occurs at the subsistence level, with the production reserved for household consumption. In Uganda, more than 70% of agricultural production is not sold to the market but devoted to own consumption, stored, or gifted to other households.[7] Evaluating this unsold production is crucial for accurately measuring household income, yet assigning a price to it is difficult (Deaton 2019). One approach is to use selling prices from the households that did sell, but these prices may not reflect the true opportunity cost of production. Sold items often represent only part of the harvest, with unsold parts like stems, leaves, and roots used as fuel or animal feed. Moreover, selling prices are measured right after harvest, when supply is high and prices are at their lowest. Following the approach in De Magalhães and Santaeulalia-Llopis (2018), I use median consumption prices at the district level to value unsold agricultural production. In the LSMS-ISA survey, households report both the selling and consumption values and quantities. Consumption prices allow us to capture better the shadow value of not selling the crop. Prices, whether at the selling or for consumption, can vary significantly across Uganda. Urban areas generally have higher food prices, and supply and demand differ by location. To account for these differences, I use median crop prices of the district of the household.[8]

Following these steps, the computation of household's agricultural revenue is the sum of the self-reported value of sells plus the unsold production value measured with the adjusted kilograms production times district median consumption prices.[9]

### 2.2.2 BUSINESS, LABOR, AND OTHER EARNINGS

*Business earnings.* The UNPS asks whether any household member operated any non-agricultural enterprise, shop, trading business, or profession over the past 12 months. In the affirmative case, households are asked for the number of months the enterprise was in operation, and for these months, the average monthly gross revenues, wage ex-

---

[6]For crop-unit combinations with missing or extreme conversions, I use the median conversion rate from other seasons. While for the few cases that conversion rates cannot be computed, I apply direct unit-level conversion rates. For some units a reasonable approximations exist such as 100 kilograms sacks, 10 kilograms basket, etc.

[7]See Rodríguez-Sala (2025).

[8]Uganda has 135 districts, though not all are covered in every survey wave. If district-level prices are unavailable, I use regional or national median prices. For crops do not have a consumption price—such as cotton or export crops like coffee, tea, or tobacco—I use selling prices.

[9]For the waves 2013–14 and 2015–16 the self-reported sales values are unusually low indicating a measurement problem. To correct for that, instead of using each farmer's reported sell values, I compute their sell values by multiplying its kilogram sold production times the selling median district prices.

penditure, raw materials expenditure, and other operating expenses—fuel, kerosene, electricity. With this information, each enterprise's profits are computed by monthly gross revenues minus costs times the number of months the business was in operation. Total household business income is the sum across all businesses operated by household members.

*Labor earnings*. In terms of formal and informal labor,for all household members five years old and above, the questionnaire asks for the labor supply and remuneration for the main job and a secondary job. Regarding the remuneration, the survey asks for the last cash payment and/or estimated cash value of in-kind payments for both the main and secondary job and the time that such payment covers. From that, I recover a weekly salary and I compute for each job, and each individual, the yearly labor income by multiplying the weekly salaries by the number of weeks and months the individual was reported to work during the last 12 months.[10] Thus, household labor income is the sum across household members of the yearly labor payments for the main job and a second job if existent.

*Other Earnings*. In the agricultural questionnaire, households are asked for livestock ownership, sales, and buys, its outputs, inputs, and expenditure. The computation of livestock profits is given by the sum of net sales of animals, sells of meat, milk, and eggs, the value of unsold production, minus the costs: hired labor, feeding, access to water sources, vaccinations, deworming, insects treatment, curative treatment. The value of unsold production is estimated by the consumption value of livestock products coming from own production reported in the consumption section of the household questionnaire. Finally, the household questionnaire also asks for other sources of income which consists of property income, investments, transfers, and other benefits.[11] I trim household business profits, salary labor income, livestock, and other sources of income at 2.5% both tails because I found there tended to be more extreme values and the computation of such income sources entailed more assumptions. To be consistent with the model, I compute household total income as the sum of agricultural revenues, business profits, labor payments, livestock profits, other sources of income.

---

[10]To compute such averages, I assume that workers that reported payments in months worked four weeks in a month, those that reported in days worked 6 days a week, and those that reported in hours worked 60 hours per week. The last two numbers are based on the work of Tijdens (2012).

[11]Property income consists of net actual rents and royalties from buildings and land. Investments consist of interests received from bank accounts, shares, dividends, bonds, and treasury bills. Current transfers and other benefits consist of pension and life insurance benefits, remittances, income from the sale of assets (except livestock), and other transfers as inheritance, alimony, scholarships, and other unspecified income. 14housing and other buildings, non-agricultural land, furniture, household appliances, electronic devices, jewelry, vehicles, and other assets.

## 2.3 MEASURING WEALTH

Wealth is recovered both from the agriculture questionnaire and the household questionnaire. In the household questionnaire, interviewees are asked for the amount and estimated value of their household assets.[12] From the agriculture questionnaire, households are asked for the amount and the estimated value of farm infrastructure, machinery, and livestock. In terms of land, plot size is also asked for in all waves but the the value of plots is only asked in the first two waves—2009-10 and 2010-11.

*Land valuation.* In many regions of Africa, land markets might be missing or incomplete, see Gottlieb and Grobovšek (2019) or Chen, Restuccia, and Santaeulalia-Llopis (2023). Ownership of land is complex with an important role of traditional institutions, governments, and other non-market frictions. Under these circumstances, it might be difficult for households to have a good estimate of the market value of their land. Despite that, from the first two waves, the reported values of the plots do not seem unrealistic. In the survey, households are also asked how much they would get if they were to rent for one year the plot. The ratio of value versus rent seems to be coherent, with most values being between 5 and 75 meaning that a plot is valued from 5 up to 75 years of usage.

To value land for the rest of the waves, I compute per acre median prices of land given its characteristics and location from the second wave—2010–11. To do so, I first trim extreme observations on the size of the plot——at one percent——the per-acre price of the plot——at five percent——and the ratio of plot value and one year rent——at five percent. second, I compute median per-acre land prices grouping by counties and plot characteristics. In all waves, households are asked for the characteristics of each plot they hold in each season. They are asked for the location, ownership status, rights usage, and soil and water conditions of the plot. Given this set of categorical variables on plot characteristics, I obtain prices per each possible combination of them.[13]

With this set of land prices computed with the 2010–11 wave, I compute the value of the land of the households for the rest of the waves by multiplying each plot size times its matched price, adjusted by inflation, in terms of the location and characteristics of the plot.[14]

---

[12]Housing and other buildings, non-agricultural land, furniture, household appliances, electronic devices, jewelry, vehicles, and other assets.

[13]Uganda is divided in 167 districts, yet not all of them sampled in the UNPS. Distance to the plot: less than 15min, 15-30 min, 30-60 min, 1-2 hours, over 2 hours; tenure system: freehold, leasehold, Mailo (owned in perpetuity), customary; usage: own cultivated annual crops, own cultivated perennial crops, sub-contracted out, fallow, grazing, woodlot; land quality: good, fair, poor; water source: irrigated, rainfed, swamp/wetland; and topography: hill, plain, slope, valley. When a price for a category–combination does not exist, I use median prices computed at coarser levels: I first fill in with median prices computed at county-quality-usage level, then at county-quality level, county level, district level, and, finally, with the national median per acre price.

[14]To be more consistent across waves, for the 2009–10 and 2010–11 waves, instead of using the reported value of the plots, I follow the same procedure and use the matched prices to estimate land

The total wealth of Ugandan households is computed by the sum of the value of their household assets, land, livestock, and farm capital. I trim observations at the top one percent of the wealth.

## 2.4   A REVIEW OF CONSUMPTION, INCOME, AND WEALTH IN UGANDA

Table 1 presents per capita values for consumption, income, and wealth in Uganda, with breakdowns for the entire country (columns 2 to 4), rural areas (columns 5 to 7), and urban areas (columns 8 to 10). The Gini index, indicating inequality, is shown in parentheses.[15]

Uganda is a poor economy with the majority of households living on low levels of consumption and income. Across all survey waves, average per capita consumption is $866, and income is $926. The disparity between rural and urban households is stark: average per capita consumption in rural areas is $723, while in urban areas it is 104% higher at $1476. Income differences follow a similar pattern, with urban households earning significantly more. Although the average per capita wealth in Uganda is also low at $1798, the urban-rural wealth gap is smaller (urban households hold 17.7% more wealth) due to the relatively high value of farming land in rural areas.

Not only there are substantial differences between rural and urban households, but inequality within these areas is also pronounced. The national Gini index for income across waves is 0.62, while within rural areas is 0.61. However, consumption and wealth inequality are notable lower in rural areas, with Gini indices averaging 0.38 (0.32 and 0.34 for the last two waves) for consumption and 0.61 for wealth. In urban areas, consumption inequality is relatively high with a Gini of 0.41 and a wealth Gini of 0.69 across waves. Lastly, Uganda experienced significant economic growth during period covered by the first five waves of the UNPS (2009-2016). While consumption and income dipped in 2010-11, they rebounded in 2011-12 and continued an increasing trend in 2013-14 and 2015-16. Per capita consumption (excluding durable goods) rose by 4.6% between 2009-10 and 2015-16 while income rose by 9.2% between 2009-10 and 2013-14.[16]

Table 2 presents the composition of consumption, income, and wealth at the household level in Uganda, while Table 4 (Appendix) breaks this down by rural and urban

---

value. Using the 2010–11 computed prices, the estimated land value for the 2009–10 wave correlates 0.51 with the household reported land values, and it has a very similar distribution in terms of mean, variance, and percentiles.

[15]Monetary variables in this work are in 2014 PPP US dollars. All sample statistics and econometric analyses are computed using survey weights. Wave statistics as in Table 1 use the cross-section weights, while panel statistics and econometric analysis use the panel weights. For household-level statistics, see Table 3 in the Appendix.

[16]The cumulative growth of income including the last wave is especially high, 50.11%. This large increase is mainly driven by the top distribution of households in urban areas. The cumulative growth in rural areas till 2015-16 was 34.6% while for urban was a 93%.

Table 1: Per Capita Household Consumption, Income, and Wealth in Uganda

| | National | | | Rural | | | Urban | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cons ($) ([0,1]) | Income ($) ([0,1]) | Wealth ($) ([0,1]) | Cons ($) ([0,1]) | Income ($) ([0,1]) | Wealth ($) ([0,1]) | Cons ($) ([0,1]) | Income ($) ([0,1]) | Wealth ($) ([0,1]) |
| 2009-2010 | 871 (0.44) | 836 (0.62) | 1722 (0.65) | 723 (0.4) | 730 (0.61) | 1698 (0.63) | 1476 (0.41) | 1267 (0.6) | 1817 (0.73) |
| 2010-2011 | 751 (0.45) | 717 (0.63) | 1483 (0.63) | 641 (0.41) | 646 (0.62) | 1454 (0.62) | 1481 (0.45) | 1189 (0.59) | 1681 (0.67) |
| 2011-2012 | 895 (0.44) | 908 (0.61) | 1696 (0.67) | 818 (0.44) | 824 (0.61) | 1630 (0.66) | 1264 (0.39) | 1306 (0.56) | 2010 (0.69) |
| 2013-2014 | 899 (0.36) | 913 (0.6) | 1979 (0.6) | 787 (0.32) | 788 (0.59) | 1906 (0.58) | 1324 (0.38) | 1388 (0.59) | 2256 (0.66) |
| 2015-2016 | 911 (0.39) | 1255 (0.65) | 2108 (0.6) | 774 (0.34) | 983 (0.6) | 2021 (0.56) | 1511 (0.42) | 2456 (0.67) | 2490 (0.7) |
| Average | 866 (0.41) | 926 (0.62) | 1798 (0.63) | 749 (0.38) | 794 (0.61) | 1742 (0.61) | 1411 (0.41) | 1521 (0.6) | 2051 (0.69) |

*Notes:* Household average (in 2013 US$) and Gini index within parenthesis. the measurement of consumption, income is described in the text. Wealth represents total household wealth including farm capital and land value. *Source:* UNPS: 09/10–15/16.

areas. Each wave reports household's average and the percentage of households in consumption categories (food and non-food items), income sources (agriculture, business, livestock, and labor), and wealth components (household assets, land, livestock, and farm capital).

Food dominates consumption, accounting for 64% of total expenditure——67% in rural areas and 55% in urban.Agriculture remains the primary income source, with 80.4% of Ugandan households engaged in self-employed farming, earning an average of $1,815. The lowest average agricultural earnings were $1,486 in 2010-11, rising to $2,113 in 2015-16. Livestock income, earned by 20% of households, averages $132 annually.

Table 2: Composition Consumption, Income, and Wealth in Uganda

| Wave | Consumption | | Income | | | | Wealth | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Food | Nofood | Agric | business | Lvstk | Labor | Assets | Land | Lvstk | farmK |
| | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) |
| | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) |
| 2009-10 | 2403 | 1584 | 1602 | 963 | 134 | 1104 | 3810 | 4688 | 399 | 0 |
| | 100% | 91% | 80% | 47% | 18% | 45% | 99% | 65% | 18% | 0% |
| 2010-11 | 2429 | 1340 | 1486 | 904 | 115 | 1010 | 3786 | 4452 | 481 | 45 |
| | 100% | 99% | 81% | 45% | 19% | 42% | 100% | 66% | 20% | 81% |
| 2011-12 | 2663 | 1395 | 1967 | 1074 | 138 | 1039 | 4219 | 5033 | 704 | 35 |
| | 100% | 100% | 73% | 40% | 17% | 39% | 99% | 64% | 18% | 74% |
| 2013-14 | 2704 | 1505 | 1907 | 1236 | 130 | 876 | 4871 | 4632 | 483 | 39 |
| | 100% | 100% | 86% | 43% | 23% | 35% | 100% | 77% | 24% | 88% |
| 2015-16 | 2474 | 1361 | 2113 | 1243 | 141 | 1491 | 4340 | 4516 | 532 | 37 |
| | 102% | 102% | 82% | 44% | 23% | 32% | 102% | 78% | 24% | 85% |
| Average | 2535 | 1437 | 1815 | 1084 | 132 | 1104 | 4205 | 4664 | 520 | 31 |
| | 100% | 98% | 80% | 44% | 20% | 39% | 100% | 70% | 21% | 66% |

*Notes:* Average value ($) and proportion of households (%) with positive observations. *Food*, expenditure of bought and non-bought food items; *Nofood* expenditure non-food and non-durable goods. Income: *Agric*, earnings from sold and non-sold agricultural production; *Business*, profits from non-agricultural enterprises; *lvstk*, profits from livestock; *Labor* salary earnings from formal and informal work. Wealth: *Assets*, value of household assets; *Land*, estimated value of farming land; *lvstk*, value owned livestock; *FarmK*, value farming capital. *Source:* UNPS: 09/10–15/16.

Despite agriculture's prominence, income sources are diversified: 44% of households earn from non-agricultural business activities, and 39% from wage labor. In rural areas, 89% of households report earnings from self-employed farming (averaging $2,065), but non-agricultural business (41%, averaging $860) and wage labor (34%, averaging $806) also contribute significantly. Urban households primarily rely on business activities (56%, averaging $2,061) and wage labor (55%, averaging $2,456), yet a substantial share (41%) also engage in agriculture, with average earnings of $716. Overall, both urban and rural households exhibit high income diversification, with most earning from two or more sources.

Wealth is primarily concentrated in household assets (averaging $4,205 across all households) and land (averaging $4,664 for 70% of households). While 82% of households own farm capital, the value of farming capital in Ugandan households is low, averaging only $39 per household. In rural areas, land (owned by 78% of households) and household assets dominate wealth, with average land values of $5,305 and housing assets of $3,413. In contrast, urban households hold more wealth in household assets, averaging $7,780.

## 3 CONSUMPTION INSURANCE TESTS

In the standard complete-markets framework, if markets are complete and there are no preference shocks or demographic changes, then household consumption should be fully insured against individual income fluctuations, responding only to aggregate movements in the economy (Mace 1991; Townsend 1994).[17] This framework provides a benchmark for testing the extent of consumption insurance: under full insurance, individual consumption should track aggregate consumption, with no significant response to individual income shocks once aggregate risk is accounted for.

There are two main full consumption insurance tests performed in the literature. The first test considers agents have Constant Relative Risk Aversion (CRRA) with a utility function taking a power form. The second test provides the full consumption-insurance test when agents have Constant Absolute Risk Aversion (CARA) so that the utility form of the agents takes a exponential form. Mace (1991) performs both types of tests with consumption and income data in the US. Townsend (1994) also performs both type of specifications. In this paper, all insurance tests are performed for both cases to determine whether patterns hold under different utility assumptions.

Under both scenarios I assume the standard assumptions in full-insurance tests.

---

[17]Mace (1991) derives this implication from a complete-markets model and tests it using U.S. consumption data under both power and exponential utility assumptions. Cochrane (1991) arrives at similar testable implications using a different approach, focusing on the orthogonality between consumption growth and idiosyncratic income shocks. Townsend (1994) extends these tests to village economies in India and adjusts for demographic differences by using adult-equivalent consumption.

Namely, I assume households have homogenous and constant preferences on a single consumption good, income is stochastic and exogenous to household's decisions, there are not preferences or demographic changes, and if individuals value leisure this comes additively in the utility function.

I perform all the insurance tests on three population groups: rural, urban, and the entire population of Uganda. Existing literature finds notable differences in insurance between rural and urban populations in developing countries. In rural areas, consumption insurance tends to be higher than in urban areas. Moreover, Moll, Townsend, and Zhorin (2017) highlights that the underlying financial frictions differ between rural and urban settings.

Much of the insurance literature in developing countries evaluates insurance at the village level. In that context, full insurance implies that household consumption moves in tandem with the village average and is independent of household-specific shocks. In this study, I define aggregates shocks at the regional level. the UNPS is representative of the four main administrative regions (Northern, Western, Eastern, and Central Uganda) as well as rural, urban, and national populations, but not at the village level. Second, village-level aggregation could obscure whether richer or poorer households have better insurance, since village-level differences could confound the results. Therefore, in this work, if full insurance holds, household consumption should respond only to regional aggregate shocks and not to idiosyncratic shocks.[18]

## 3.1 TWO TESTS

*Test 1: CRRA specification (growth rates).* Assuming households have homogeneous preferences with CRRA utility on a single non-durable good, full insurance implies that the growth rate of household consumption should only respond to the growth rate of aggregate consumption (Mace 1991). The derivation of this result is detailed in Appendix (A). This implication can be tested empirically by estimating the following equation and assessing whether $\beta = 0$:

$$\Delta lnc_{it} = \alpha \Delta C_{tr} + \beta \Delta lny_{it} + u_{it} \tag{1}$$

Under full insurance, individual consumption growth should be independent of individual income growth, conditional on aggregate consumption growth.

To examine how consumption insurance varies across the economic distribution, I estimate equation (1) separately for each quintile group $Q_j$, where $j \in \{1, 2, 3, 4, 5\}$, defined by the time-averaged distributions of consumption, income, and wealth. Specif-

---

[18]Measuring insurance at the regional level can offer a more accurate picture of households' capacity to buffer consumption against shocks. Households in the same village may face common shocks—such as climate events, pest infestations, or price fluctuations—that can obscure the true extent of consumption smoothing.

ically, I test whether $\beta_j = 0$ and analyze the pattern of the estimated $\beta_j$ coefficients across quintiles using the following equation:

$$\Delta \ln c_{it} = \alpha \Delta \ln C_{tr} + \beta_j \Delta \ln y_{it} + \gamma \Delta S_{it} + e_{it} \qquad \forall i \in Q_j, \quad j = \{1, \ldots, 5\} \qquad (2)$$

Here, $\Delta \ln C_{tr}$ is the growth rate of aggregate consumption between waves $t - 1$ and $t$ in region $r \in \{Northern, Western, Eastern, Central\}$. $\Delta \ln c_{it}$ and $\Delta \ln y_{it}$ are the growth rates of consumption and income, respectively, for household $i$ between waves $t - 1$ and $t$. Household $i$ belongs to quintile $Q_j$ of the time-averaged consumption, income, or wealth distribution. $\Delta S_{it}$ denotes the change in household size, and $e_{it}$ is the error term.

If $\beta_j$ is not statistically different from zero in a given quintile, full consumption insurance cannot be rejected for that group. Larger values of $\beta_j$ indicate a stronger transmission of idiosyncratic income shocks into consumption, implying lower levels of consumption insurance.

*Test 2: CARA specification (levels).* Assuming households have homogeneous preferences and CARA utility over a single non-durable good, full insurance implies that the level of household consumption should respond only to the level of aggregate consumption. This can be tested by estimating the following equation and evaluating whether $\beta = 0$:

$$\ln c_{it} = \alpha C_{tr} + \beta \ln y_{it} + F_i + u_{it} \qquad (3)$$

Following this approach, I test for consumption insurance separately in each quintile group $Q_j$ of the consumption, income, and wealth distributions by estimating:

$$\ln c_{it} = \alpha C_{tr} + \beta_j \ln y_{it} + S_{it} + F_i + e_{it} \qquad \forall i \in Q_j, \quad j = \{1, \ldots, 5\} \qquad (4)$$

The variables are defined analogously to those in the CRRA case, except that observations are in levels rather than first differences, and a household fixed effect $F_i$ is included to control for time-invariant unobserved heterogeneity.

The results from estimating equations (2) and (4) across quintiles and regions are presented in the following section.

## 4 RESULTS

Figure 1 displays the estimates of $\beta_j$ from equation (2), CRRA specification, broken down by quintile groups ($j$)——ranging from the bottom quintile (Q1) to the top quintile (Q5)——across the three time-averaged distributions: consumption (column 1), income (column 2), and wealth (column 3). The results are presented for rural Uganda (1a) and urban Uganda (1b). In each figure, squared dots indicate the point estimates of $\beta_j$, while the vertical lines represent the 95% confidence intervals, calculated using

clustered standard errors at the household level. *N* denotes the total number of observations.

Figure 1: Consumption Insurance Tests across Quintiles, CRRA Specification
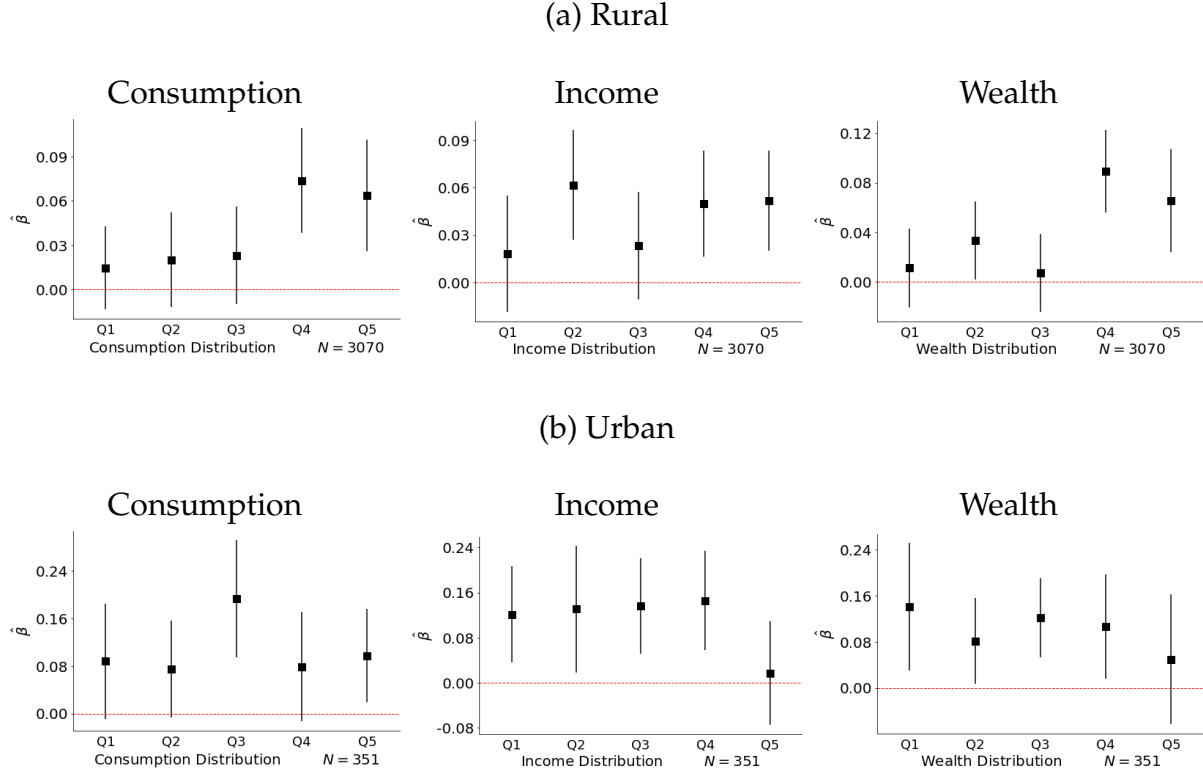
(a) Rural



(b) Urban



*Notes:* OLS estimates of $\beta_j$ in $\Delta lnc_{it} = \alpha \Delta lnC_{tr} + \beta_j \Delta lny_{it} + \gamma \Delta s_{it} + e_{it}$ for each quintile group $j$—x-axis—of the consumption, income, and wealth distributions averaged across waves. $c_{it}$, $y_{it}$, and $s_{it}$ denote consumption, income and household size, of household $i$ at period $t$, $C_{tr}$ denotes aggregate regional consumption. *N* denotes the total number of observations while the red dotted-line marks full consumption insurance. Standard errors clustered at the household level. *Source:* UNPS: 09/10–15/16, balanced panel.

In rural areas (Figure 1a), a broad pattern emerges: poor households exhibit higher levels of consumption insurance than rich ones. For the bottom and middle of the consumption distribution (Q1–Q3), the hypothesis of full insurance cannot be rejected. The pass-through of idiosyncratic income shocks to consumption for these groups is minimal, at 1.4%, 2.0%, and 2.3%, respectively, and statistically not different from zero. In contrast, for the top two quintiles (Q4 and Q5), full insurance is rejected, with pass-through rates rising substantially to 7.3% and 6.3%. The pattern across the income distribution is noisier, with the lowest pass-throughs in Q1 and Q3 (1.8% and 2.3%, not significant) and the highest in Q2 (6.2%, significant). Across the wealth distribution, the pattern is strong and clear: poorer households show significantly lower pass-through. The estimates for Q1–Q3 are 1.1%, 3.3%, and 0.7%, respectively, while for the top quintiles (Q4 and Q5), the pass-through is nearly an order of magnitude higher, at 9.5%

and 7.0%. Under the CRRA specification, poorer rural households consistently show higher consumption insurance, with full insurance typically holding for the bottom and middle of the distribution but not for the top.

In urban areas (Figure 1b) this pattern is reversed. For the consumption distribution, the relationship is hump-shaped, with the Q3 showing the highest coefficient (19.3%). In contrast, both the income and wealth distributions show a positive pattern between economic levels and insurance, with higher economic levels corresponding to lower coefficient's estimates. For income, the pass-through for quintiles Q1 to Q4 ranges from 12.1% and 14.5%, while for the top quintile (Q5) is 1.7% and full insurance cannot be rejected. Similarly, in the wealth distribution, households in Q5 have a pass-through of 4.9%, while the lower quintiles (Q1 to Q4) have much higher rates, ranging from 8.1% to 14.0%.

Consistent with previous research, the average level of consumption insurance is substantially lower in urban areas. The pass-through of idiosyncratic income shocks is about 10.6% in urban settings—more than 2.5 times higher than the 4.1% pass-through observed in rural areas.

Given that most of the population in Uganda lives in rural areas, at the national level the patterns of insurance and economic levels tend to follow the patterns in rural areas—see Figure 3 in Appendix B displaying the results at the national level. across the consumption distribution, The insurance coefficient for the bottom quintile (Q1) is 1.5% and not statistically different from zero. The coefficients for Q2 and Q3 are similarly low (3.9% and 2.9%) with Q3 also insignificant. In contrast, households in Q4 have a pass-through of 9.8%, which is more than six times higher than that of the bottom quintile and statistically significant. The pattern across the income distribution is irregular, but the wealth distribution again shows a clear upward trend: while the bottom quintile has a pass-through of just 1.0% (insignificant), the top quintiles show rates of 7.4% (Q4) and 6.3% (Q5), rejecting full insurance.

Figure 2 shows the estimates of $\beta_j$ in equation (4), CARA specification. In rural areas, the upward trend persists. For the bottom quintiles of consumption and wealth, full insurance often cannot be rejected (e.g., 0.9% for Q1 in consumption, 1.6% for Q1 in wealth), while for the top quintiles, the pass-through is significantly higher (e.g., 7.8% for Q5 in consumption, 6.7% for Q5 in wealth). In urban areas, the reversed pattern is, if anything, more pronounced under the CARA specification. For the income distribution, the pass-through for the top quintile (Q5) is estimated at -0.0% and is not significantly different from zero, while lower quintiles show pass-throughs of 9.7% to 13.0%.

At the national level—Figure 2b) in Appendix B—the pattern is the same as in the CRRA case. There is a negative relationship between insurance (lower coefficients) and being consumption rich and wealth rich with the relationship across the income distribution being irregular. full-insurance is rejected for all the quintiles in the three distributions except for two quintiles: the bottom quintile (Q1) of the consumption

18

distribution (estimate of 1.8%) and the bottom quintile (Q1) of the wealth distribution (estimate of 2.4%).

Across both specifications, we observe a pattern in rural areas where poorer households show higher consumption insurance in the time-averaged consumption and wealth distributions—similar pattern at the national level. In urban areas, there is an opposite general pattern——particularly in the time-averaged income and wealth distributions——indicating higher insurance levels for richer households, specially for the ones in the top quintile. In the next section, I examine the robustness of these empirical results.

Figure 2: Consumption Insurance Tests across Quintiles, CARA Specification

(a) Rural Uganda



(b) Urban Uganda
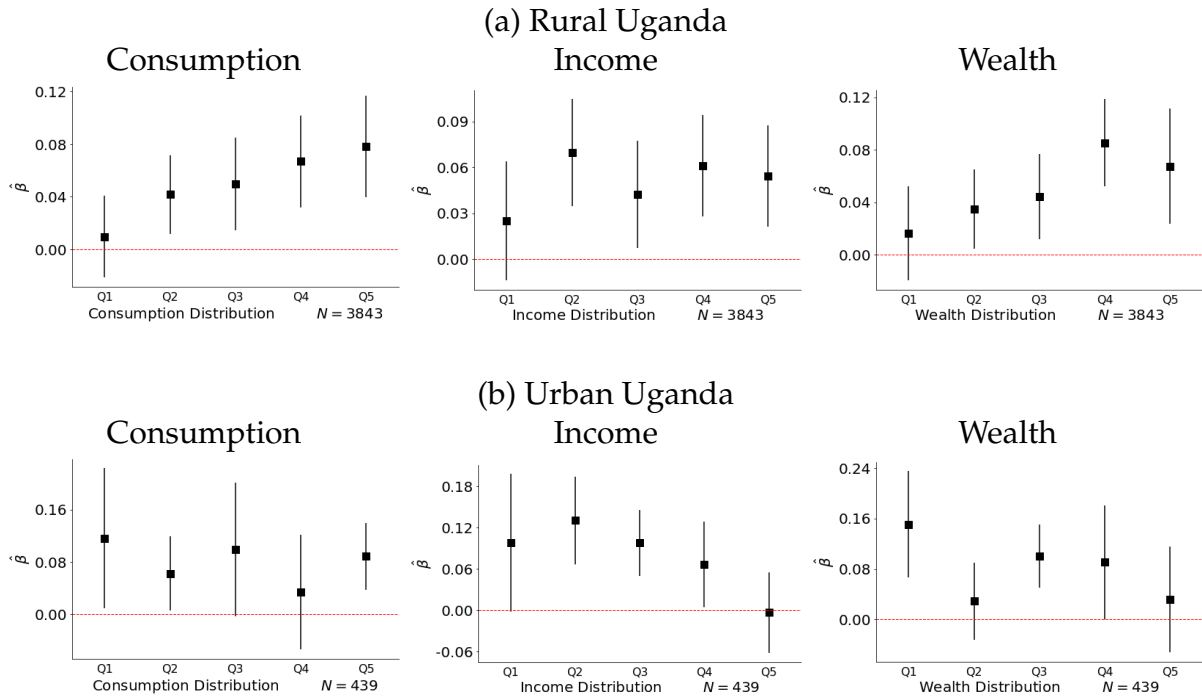


*Notes:* OLS estimates of $\beta_j$ in regression equation $lnc_{it} = \alpha C_{tr} + \beta_j lny_{it} + S_{it} + F_i + e_{it}$ for each quintile group $j$—x-axis—of the consumption, income, and wealth distributions. $c_{it}$ and $y_{it}$ denote consumption and income of household $i$ at period $t$, $C_{tr}$ denotes aggregate region consumption, $S_{it}$ and $F_i$ denote household size and fixed effects. Standard errors clustered at the household level. *Source:* UNPS: 09/10–15/16, balanced panel.

## 5  ROBUSTNESS

This section presents additional regressions to assess the robustness of the main findings. All figures are reported in the appendix. The relationship between consumption insurance and economic status observed in Section 4 remains largely consistent across these alternative specifications.

*Unbalanced panel.* The main analysis relies on the balanced panel, which tracks households across all five UNPS waves. This approach ensures consistent household time series for computing changes in income and consumption and allows a clear separation between rural and urban households by excluding migrants. However, the balanced panel includes only 988 households in total—773 rural and just 88 urban—limiting precision and representativeness. To assess whether the main findings are sensitive to these limitations, I replicate the analysis using the unbalanced panel. This broader sample covers 4,081 households nationwide—2,903 rural and 771 urban—of which 3,700 households are observed in at least two waves (the minimum requirement for the CRRA specification). Figures 4 and 5 report the estimated coefficients across quintiles of consumption, income, and wealth for the nationwide, rural, and urban samples.

Despite the substantial increase in sample size and the change in composition, the main patterns from the balanced panel persist. Under the CRRA specification, the negative relationship between insurance and consumption quintiles remains visible in rural and national samples. Full consumption insurance cannot be rejected for Q1–Q2 in rural areas and Q1 in the national sample, while higher quintiles show significantly greater pass-through. The income distribution remains noisier, with lower coefficients in Q1 and Q3. Along the wealth distribution, the negative gradient is weaker than in the balanced panel: full insurance is rejected for all quintiles, and coefficients converge across groups. In urban areas, the reversal of the rural pattern is preserved: richer households continue to exhibit higher insurance across consumption, income, and (less strongly) wealth, with full insurance not rejected for the top quintile in consumption and income distributions.

Results under the CARA specification are broadly consistent. The negative relationship between insurance and consumption levels is even sharper: coefficients rise from 0.016 for the bottom quintile nationwide (0.018 in rural) to 0.076 and 0.065 in the top quintiles nationwide, and to 0.065 and 0.042 in rural. This specification also highlights a clearer negative relationship along the income distribution. For wealth, the negative gradient persists but is less pronounced. Among urban households, the reversed pattern again holds: richer households consistently show higher insurance, with full insurance not rejected for the top quintile in consumption and income distributions, though the wealth gradient is weaker.

Overall, while the unbalanced panel introduces more noise—particularly in the wealth distribution—the central result remains robust: in rural areas, poorer households insure more, while in urban areas, richer households insure more.

*Residual consumption and residual income.* A common approach in recent literature is to test for consumption insurance using the residuals of consumption and income, rather than their levels. Following this method, I first regress log consumption and log income on household characteristics that may jointly affect both outcomes. I then use the estimated residuals to re-estimate the insurance tests across quintile groups, under

both the CRRA specification (Figure 8) and the CARA specification (Figure 9).[19]

Under both specifications, the estimated patterns of insurance coefficients closely resemble those reported in the main results. In rural areas and in the full sample, poorer households tend to exhibit higher levels of consumption insurance than richer ones. In rural areas, full insurance cannot be rejected for Q1, Q2, and Q3 of the consumption distribution (Q1 and Q2 in the CARA specification), and for Q1 and Q3 of the wealth distribution (Q1 under CARA). In contrast, the pattern across the income distribution remains noisy in both specifications. At the national level (Figure 10), full insurance cannot be rejected for the bottom quintile (Q1) of both the consumption and wealth distributions, under both CRRA and CARA assumptions.

In urban areas, the pattern is again reversed relative to rural areas. Insurance coefficients tend to be smaller (indicating higher insurance) for richer households. While the relationship is modest under the CRRA specification, it is more pronounced under the CARA specification, particularly for the wealth distribution.

*Food consumption.* The broad patterns show us that poor households in Uganda insure their consumption more than rich households. A possible explanation for this could be the composition of consumption: richer households spend a larger proportion of their income on non-food goods and services—such as clothing, education, and medical expenses—which may not need to be smoothed year over year. Some non-durable items, like clothing, can last beyond a year, while education and medical expenses may fluctuate based on factors unrelated to income, like the age of children or unexpected health shocks.

Here, I perform insurance tests only for food consumption. If from other items we should not necessarily expect a smoother process for utility maximization, in terms of food consumption, we should expect that if both poor and rich households can fully insure, then, their food consumption should not vary across years given idiosyncratic income fluctuations.

Figure 7 and Figure 11 display the insurance coefficients for food consumption across the consumption, income, and wealth distributions under the CRRA and standard specifications, respectively. The key takeaway is that the patterns of food consumption insurance closely mirror those of total consumption insurance. Additionally, the results show that insurance for food consumption tends to be higher than for total consumption. On average, the coefficients are smaller, and in particular, we find more evidence of full insurance for food consumption.

---

[19]Specifically, I estimate the following regression on consumption and income, $\ln x_{it} = \gamma_1 \text{age}_{it} + \gamma_2 \text{age}_{it}^2 + \gamma_3 \text{fem}_{it} + \gamma_4 \text{educ}_{it} + \gamma_5 s_{it} + \delta \text{REG}_{it} + u_{x,it}$ where *age*, *fem*, and *educ* denote the age, gender, and years of education of the household head, respectively. *s* is household size, and *REG* is a vector of regional dummies. The choice of control variables follows De Magalhães and Santaeulalia-Llopis (2018). The $R^2$ values of these regressions are 0.32 (consumption) and 0.21 (income). I then use the residuals $u_{c,it}$ and $u_{y,it}$ to estimate perform insurance tests across quintiles $Q_j$ in both the CRRA and CARA specifications.

Across the different robustness checks, the estimates of the insurance coefficients and their significance do fluctuate. However, the overall patterns remain consistent: higher economic levels are generally associated with lower insurance levels in both rural areas and nationwide. Likewise, the positive relationship between insurance and economic levels in urban areas persists across the various robustness specifications.

# 6 CONCLUSION

This paper documents the distributional patterns of consumption insurance in Uganda. In rural areas, as well as at the national level, I find a robust inverse relationship between households' position in the economic distribution and consumption insurance: poorer households experience little or no pass-through of idiosyncratic income shocks into consumption, while households higher in the distribution display significantly greater transmission. In contrast, the pattern reverses in urban areas, where households higher in the distribution face lower transmission of income shocks than poorer households, although the gradient is less pronounced.

These findings help clarify the theoretically ambiguous relationship between economic position and consumption insurance. In rural Uganda, where access to formal insurance mechanisms is limited throughout much of the distribution, subsistence concerns and precautionary motives appear to dominate, leading households with fewer economic resources to smooth consumption more aggressively. In urban areas, where access to financial markets is broader and subsistence constraints are relatively less binding, consumption insurance increases with economic resources, particularly wealth.

The evidence provides descriptive guidance for policymakers: the effectiveness of household-level interventions in rural areas might depend on whether they exacerbate or mitigate this trade-off. Policies that raise incomes or assets but weaken insurance may prove less effective, while policies that expand financial access or reduce exposure to shocks can complement income growth by easing this insurance–growth trade-off.

# REFERENCES

BALAND, JEAN-MARIE, CATHERINE GUIRKINGER, and CHARLOTTE MALI (2011). "Pretending to be poor: Borrowing to escape forced solidarity in Cameroon". In: *Economic Development and Cultural Change* 60.1, pp. 1–16.

CHEN, CHAORAN, DIEGO RESTUCCIA, and RAUL SANTAEULALIA-LLOPIS (2023). "Land misallocation and productivity". In: *American Economic Journal: Macroeconomics* 15.2, pp. 441–465.

CHETTY, RAJ and ADAM LOONEY (2006). "Consumption smoothing and the welfare consequences of social insurance in developing economies". In: *Journal of Public Economics* 90.12, pp. 2351–2356.

COCHRANE, JOHN H (1991). "A simple test of consumption insurance". In: *Journal of Political Economy* 99.5, pp. 957–976.

COLLINS, DARYL et al. (2009). *Portfolios of the Poor: How the World's Poor Live on $2 a Day*. Princeton University Press.

DE MAGALHAES, LEANDRO, DONGYA KOH, and RAUL SANTAEULALIA-LLOPIS (2019). "The costs of consumption smoothing: less schooling and less nutrition". In: *Journal of Demographic Economics* 85.3, pp. 181–208.

DE MAGALHÃES, LEANDRO and RAUL SANTAEULALIA-LLOPIS (2018). "The consumption, income, and wealth of the poorest: An empirical analysis of economic inequality in rural and urban Sub-Saharan Africa for macroeconomists". In: *Journal of Development Economics* 134, pp. 350–371.

DEATON, ANGUS (1992). "Household saving in LDCs: Credit markets, insurance and welfare". In: *The Scandinavian Journal of Economics*, pp. 253–273.

DEATON, ANGUS (2005). "Measuring poverty in a growing world (or measuring growth in a poor world)". In: *Review of Economics and Statistics* 87.1, pp. 1–19.

DEATON, ANGUS (2019). *The Analysis of Household Surveys (Reissue Edition with a New Preface): A Microeconometric Approach to Development Policy*. World Bank Publications.

DERCON, STEFAN (2005). "Risk, Poverty and Vulnerability in Africa". In: *Journal of African Economies* 14.4, pp. 483–488.

DONOVAN, KEVIN (2021). "The equilibrium impact of agricultural risk on intermediate inputs and aggregate productivity". In: *The Review of Economic Studies* 88.5, pp. 2275–2307.

GOTTLIEB, CHARLES and JAN GROBOVŠEK (2019). "Communal land and agricultural productivity". In: *Journal of Development Economics* 138, pp. 135–152.

MACE, BARBARA J (1991). "Full insurance in the presence of aggregate uncertainty". In: *Journal of Political Economy* 99.5, pp. 928–956.

MOLL, BENJAMIN, ROBERT TOWNSEND, and VICTOR ZHORIN (2017). "Economic development, flow of funds, and the equilibrium interaction of financial frictions". In: *Proceedings of the National Academy of Sciences* 114.24, pp. 6176–6184.

MORDUCH, JONATHAN (1995). "Income smoothing and consumption smoothing". In: *Journal of economic perspectives* 9.3, pp. 103–114.

MORDUCH, JONATHAN (1999). "Between the state and the market: Can informal insurance patch the safety net?" In: *The World Bank Research Observer* 14.2, pp. 187–207.

MUNSHI, KAIVAN and MARK R ROSENZWEIG (2016). "Networks and misallocation: Insurance, migration, and the rural-urban wage gap". In: *American Economic Review* 106.1, pp. 46–98.

PAXSON, CHRISTINA H (1993). "Consumption and income seasonality in Thailand". In: *Journal of Political Economy* 101.1, pp. 39–72.

PLATTEAU, JEAN-PHILIPPE (2009). "Institutional obstacles to African economic development: State, ethnicity, and custom". In: *Journal of Economic Behavior & Organization* 71.3, pp. 669–689.

RAVALLION, MARTIN and SHUBHAM CHAUDHURI (1997). "Risk and insurance in village India: Comment". In: *Econometrica: Journal of the Econometric Society*, pp. 171–184.

ROBINSON, JONATHAN and ETHAN YEH (2012). "Risk-coping through sexual networks evidence from client transfers in Kenya". In: *Journal of Human Resources* 47.1, pp. 107–145.

RODRÍGUEZ-SALA, ALBERT (2025). "The Impact of Incomplete Financial Markets on Crop-Choice, Agricultural Productivity, and Welfare". In: *Working paper, Universidad de Cantabria*.

ROSENZWEIG, MARK R and ODED STARK (1989). "Consumption smoothing, migration, and marriage: Evidence from rural India". In: *Journal of political Economy* 97.4, pp. 905–926.

SANTAEULALIA-LLOPIS, RAUL and YU ZHENG (2018). "The price of growth: consumption insurance in China 1989–2009". In: *American Economic Journal: Macroeconomics* 10.4, pp. 1–35.

TOWNSEND, ROBERT (1994). "Risk and insurance in village India". In: *Econometrica: Journal of the Econometric Society*, pp. 539–591.

UDRY, CHRISTOPHER (1994). "Risk and insurance in a rural credit market: An empirical investigation in northern Nigeria". In: *The Review of Economic Studies* 61.3, pp. 495–526.

## DATA AVAILABILITY:

Uganda Bureau of Statistics. Uganda National Panel Survey (UNPS) 2009–2016. Ref: UGA_2005-2009_UNPS_v02_M, ..., UGA_2015_UNPS_v02_M. Datasets freely available in the World Bank Microdata Library, UNPS 2009, 2010, 2011, 2013, and 2015. The replication code (in Python) is avaialable in this Github repository.

# A COMPLETE MARKETS TESTS DERIVATION

In this section I describe the derivation of the insurance tests used in this paper mainly following the results in Mace (1991). Under complete markets the Competitive Equilibria is equivalent to the pareto optimal solution. Agents are identical in preferences on a single consumption good while there are not preferences or demography changes. The economy has infinite time horizon and in each period a different state of the economy ($s_t$) is realized. $s^t$ denotes the history of realized states from time 0 to time $t$. The Social Planner problem is

$$\sum_i^N \omega_i \sum_t^\infty \sum_{s^t} \beta^t \pi(s^t) u(c_i(s^t)) \tag{5}$$

the Lagrangian is

$$\mathcal{L}(c_i(s^t)) = \sum_i^N \omega_i \sum_t^\infty \sum_{s^t} \beta^t \pi(s^t) u(c_i(s^t)) - \lambda_t \{ \sum_i^N c_i(s^t) - \sum_i^N y_i(s^t) \} \tag{6}$$

And the first order conditions are

$$\left[c_i(s^t)\right] : \omega_i \beta_t \pi(s^t) u_{c_i}(c_i(s^t)) = \lambda_t \tag{7}$$

$$\left[c_j(s^t)\right] : \omega_j \beta_t \pi(s^t) u_{c_j}(c_j(s^t)) = \lambda_t \tag{8}$$

$$[\lambda_t] : \sum_i^N c_i(s^t) = \sum_i^N y_i(s^t) \tag{9}$$

dividing (7) by (8):

$$\frac{u_{c_i}(c_i(s^t))}{c_j(c_j(s^t))} = \frac{\omega_j}{\omega_i} \tag{10}$$

full risk-sharing implies that the ratio of marginal utilities of consumption across agents remains constant over time and states of the world.
Taking logs on FOCS

$$ln\omega_i + ln\beta^t + ln\pi(s^t) + lnu_{c_i}(c_i(s^t)) = ln\lambda_t \tag{11}$$

aggregating over all individuals

$$\sum_i^n \{ln\omega_i + ln\beta^t + ln\pi(s^t) + lnu_{c_i}(c_i(s^t))\} = Nln\lambda_t \tag{12}$$

$$\overline{ln\omega} + ln\beta + ln\pi(s^t) + \overline{u_{c_i}(c_i(s^t))} = ln\lambda_t \tag{13}$$

equating (7) and (13) we get:

$$lnu_{c_i}(c_i(s^t)) + \overline{lnu_{c_i}(c_i(s^t))} = ln\omega_i - \overline{ln\omega} \tag{14}$$

this is the main equation to perform insurance tests.

Setting Pareto weights equal across agents and assuming a CRRA utility function identical across agents, $u(c_i(s^t)) = \frac{c_i(s^t)^{1-\theta}}{1-\theta}$, then, the marginal utility is $u_{c_i}(c_i(s^t)) = c_i(s^t)^{-\theta}$ and (14) becomes

$$ln(c_i(s^t)^{-\theta}) - N^{-1}\sum_i^N ln(c_i(s^t)^{-\theta}) = 0 \tag{15}$$

$$ln(c_i(s^t) = \overline{ln(c(s^t)} \tag{16}$$

finally, substrating previous consumption we get:

$$\Delta ln(c_i(s^t) = \Delta\overline{ln(c(s^t)} \tag{17}$$

therefore, with the previous equation and using panel data, we can test complete markets test with the following regression equation

$$\Delta ln(c_i(s^t) = \alpha\Delta\overline{ln(c(s^t)} + \beta\Delta lny_i(s^t) \tag{18}$$

in which complete markets implies $\alpha = 1$ and $\beta = 0$.

## B   FIGURES

## Figure 3: Consumption Insurance Tests across Quintiles, Nationwide Uganda
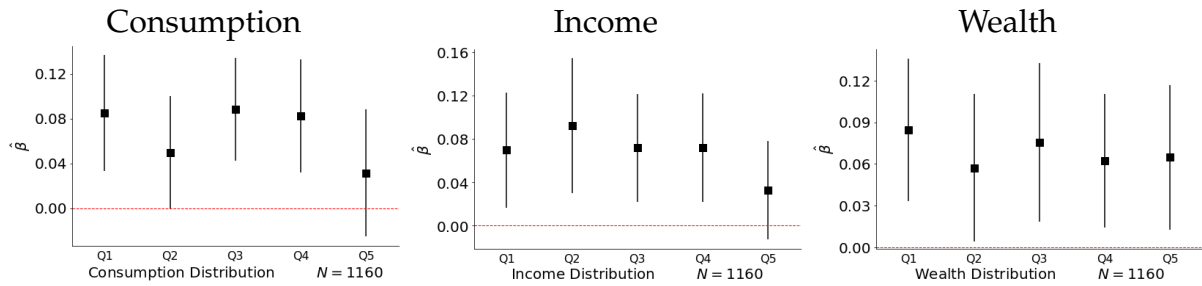
### (a) CRRA Specification
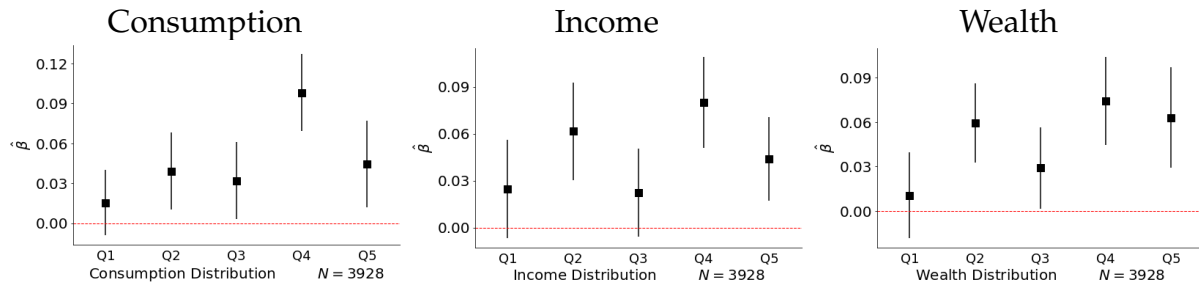


### (b) CARA Specification
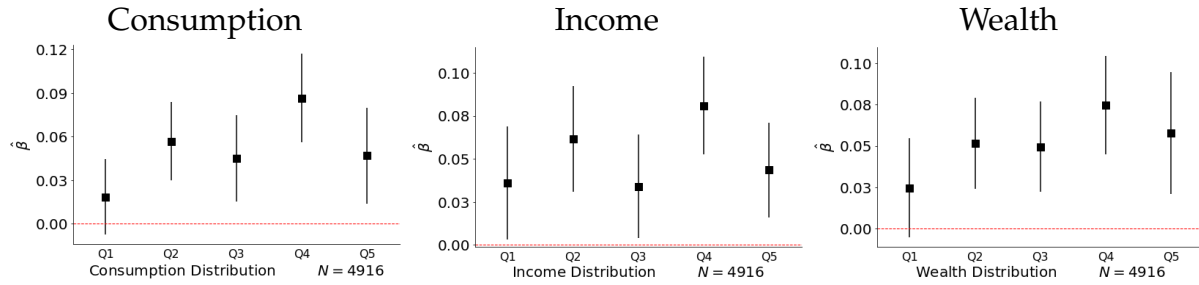


*Notes:* a) OLS estimates of $\beta_j$ in $\Delta lnc_{it} = \alpha \Delta lnC_{tr} + \beta_j \Delta lny_{it} + \gamma \Delta s_{it} + e_{it}$ for each quintile group $j$—x-axis—of the consumption, income, and wealth distributions averaged across waves. Similarly, in b) OLS estimates of $\beta_j$ in equation $lnc_{it} = \alpha C_{tr} + \beta_j lny_{it} + S_{it} + F_i + e_{it}$. Contains the whole sample of Ugandan Households. Standard errors clustered at the household level. *Source:* UNPS: 09/10–15/16, balanced panel.

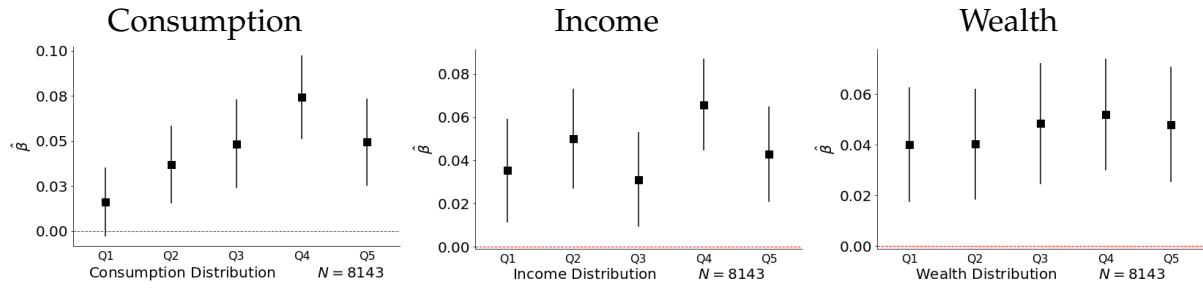# Figure 4: Robustness Check: Unbalanced Panel, CRRA Specification

## (a) Rural Uganda
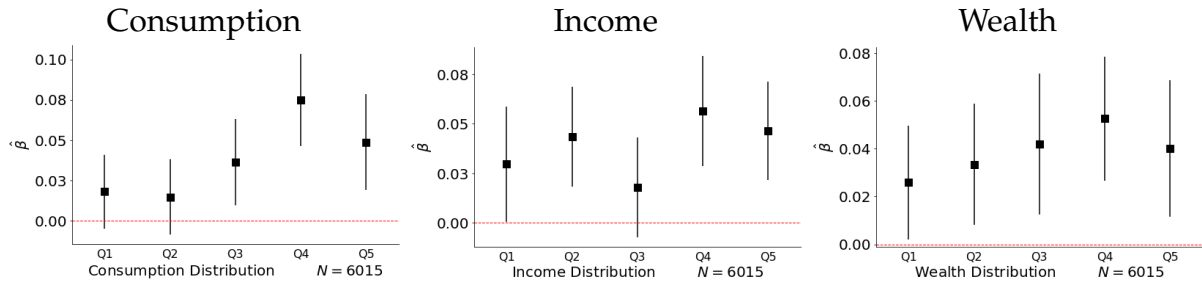


## (b) Urban Uganda



*Notes:* OLS estimates of $\beta_j$ in $\Delta ln c_{it} = \alpha \Delta ln C_{tr} + \beta_j \Delta ln y_{it} + \gamma \Delta s_{it} + e_{it}$, using the unbalanced panel containing all households at least observed in two continuous waves. *Source:* UNPS: 09/10–15/16, unbalanced panel.

## Figure 5: Robustness Check: Unbalanced Panel, CARA Specification
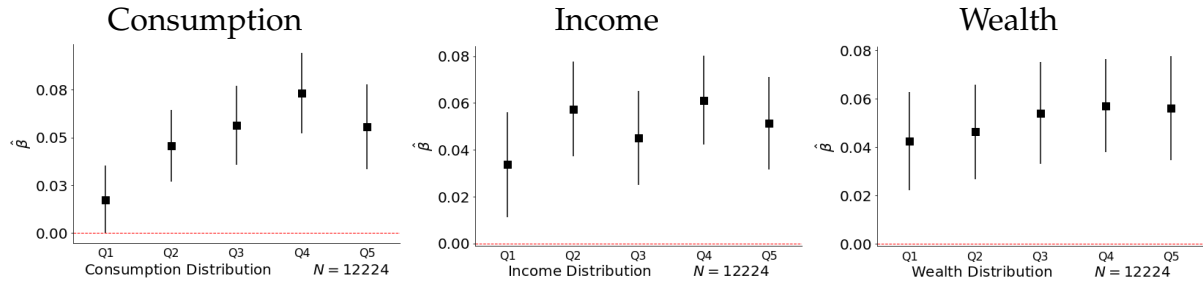
### (a) Rural Uganda
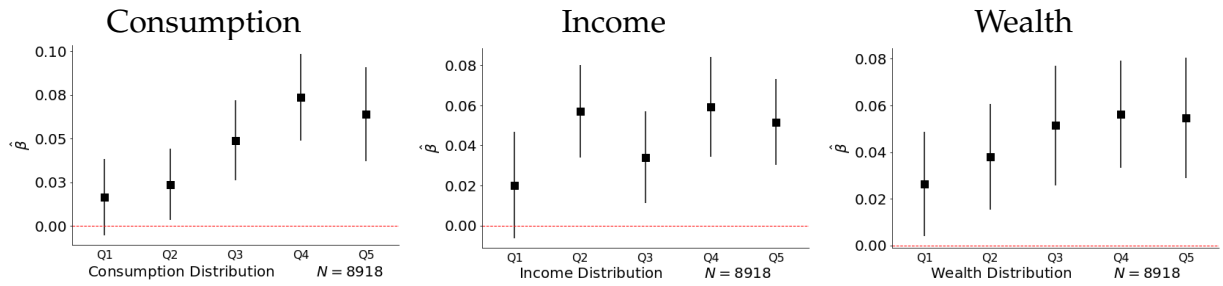


### (b) Urban Uganda
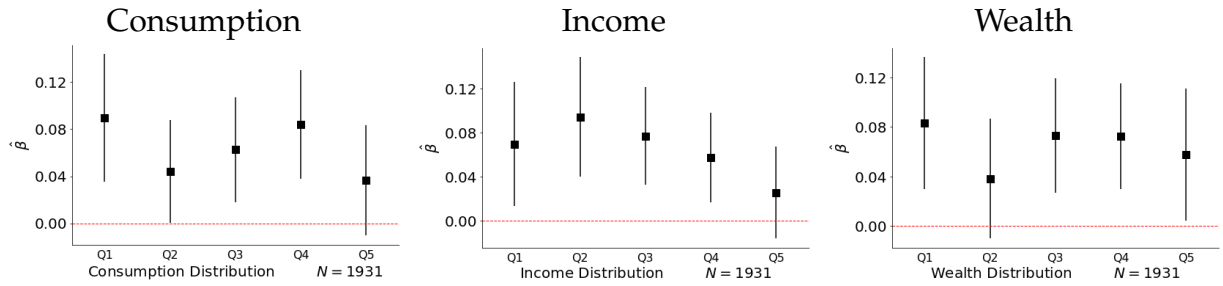


*Notes:* OLS estimates of $\beta_j$ in $lnc_{it} = \alpha lnC_{tr} + \beta_j lny_{it} + \gamma s_{it} + e_{it}$ using the unbalanced panel. *Source:* UNPS: 09/10–15/16, unbalanced panel.

# Figure 6: Robustness Check: Unbalanced Panel, Nationwide Uganda
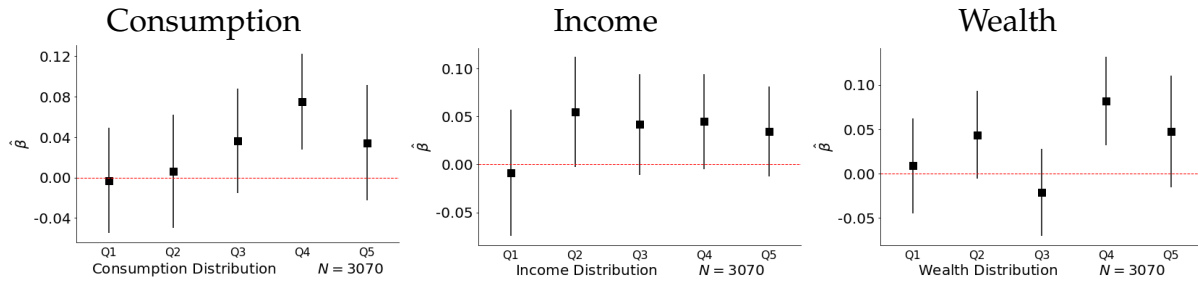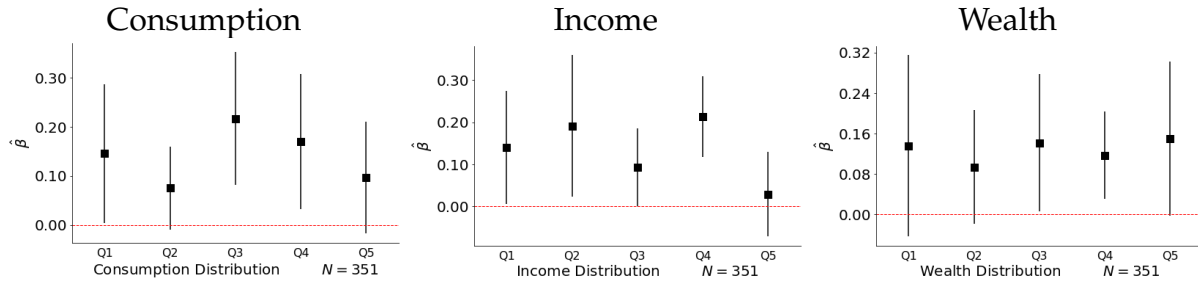
## (a) CRRA Specification



## (b) CARA Specification



*Notes:* OLS estimates of $\beta_j$ in $\Delta lnc_{it} = \alpha \Delta lnC_{tr} + \beta_j \Delta lny_{it} + \gamma \Delta s_{it} + e_{it}$ using the unbalanced panel. Nationwide sample of households. *Source:* UNPS: 09/10–15/16, unbalanced panel.

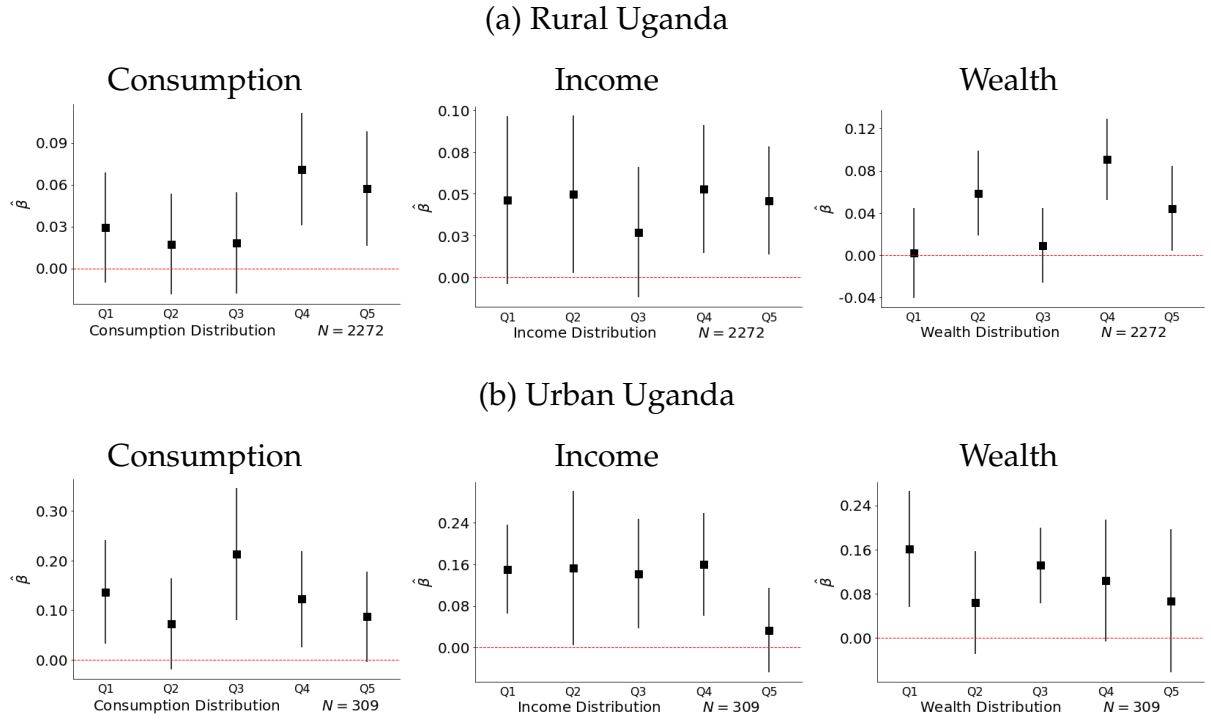# Figure 7: Robustness Check: Food Consumption, CRRA Specification

## (a) Rural Uganda



## (b) Urban Uganda



*Notes:* OLS estimates of $\beta_j$ in $\Delta lnfood_{it} = \alpha\Delta lnC_{tr} + \beta_j\Delta lny_{it} + \gamma\Delta s_{it} + e_{it}$. $food_{it}$ denotes food consumption both from purchases and self-production. *Source:* UNPS: 09/10–15/16, balanced panel.

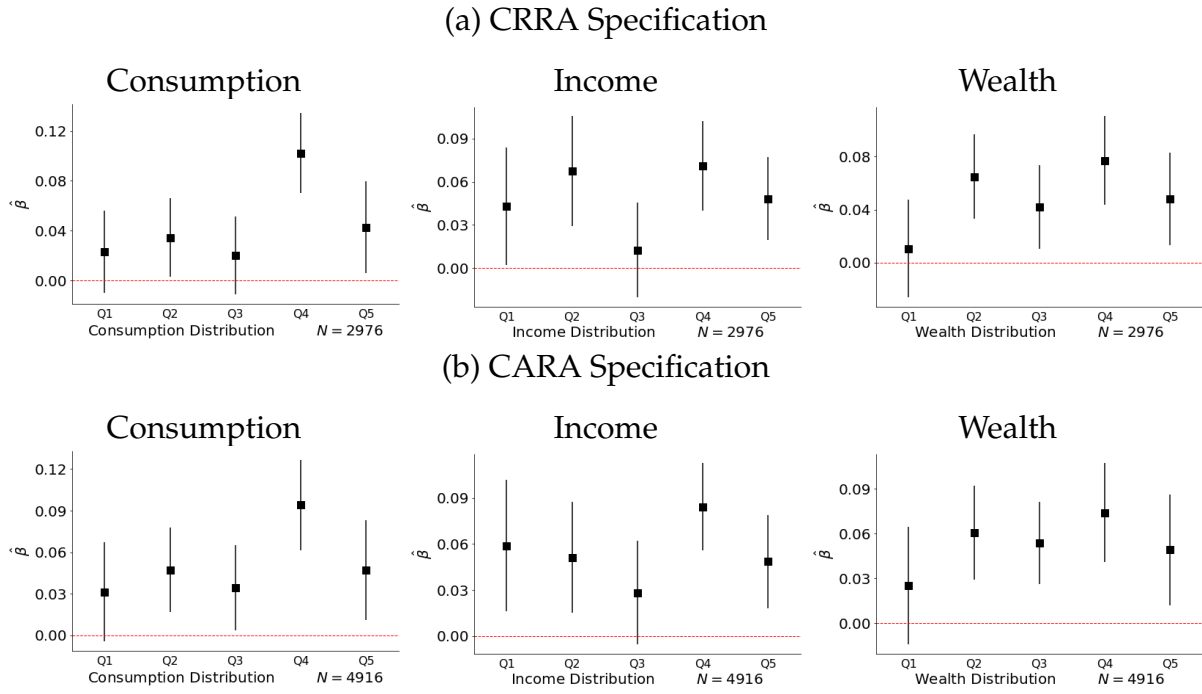# Figure 8: Robustness Check: Consumption and Income Residuals, CRRA specification

## (a) Rural Uganda



## (b) Urban Uganda



*Notes:* OLS estimates of $\beta_j$ in regression equation $\Delta\hat{u}^c_{it} = +\alpha\Delta C_{tr} + \beta_j\Delta\hat{u}^y_{it} + e_{it}$ for each quintile $j$ group—x-axis—of the consumption, income, and wealth distributions. In which $\hat{u}^c_{it}$ ($\hat{u}^y_{it}$) are the estimated OLS residuals of log consumption (income) on household variables: age, gender, and education of the household head, household size and household location (regions). Standard errors clustered at the household level. *Source:* UNPS: 09/10–15/16, balanced panel.

# Figure 9: Robustness Check: Consumption and Income Residuals, CARA specification

## (a) Rural Uganda



## (b) Urban Uganda
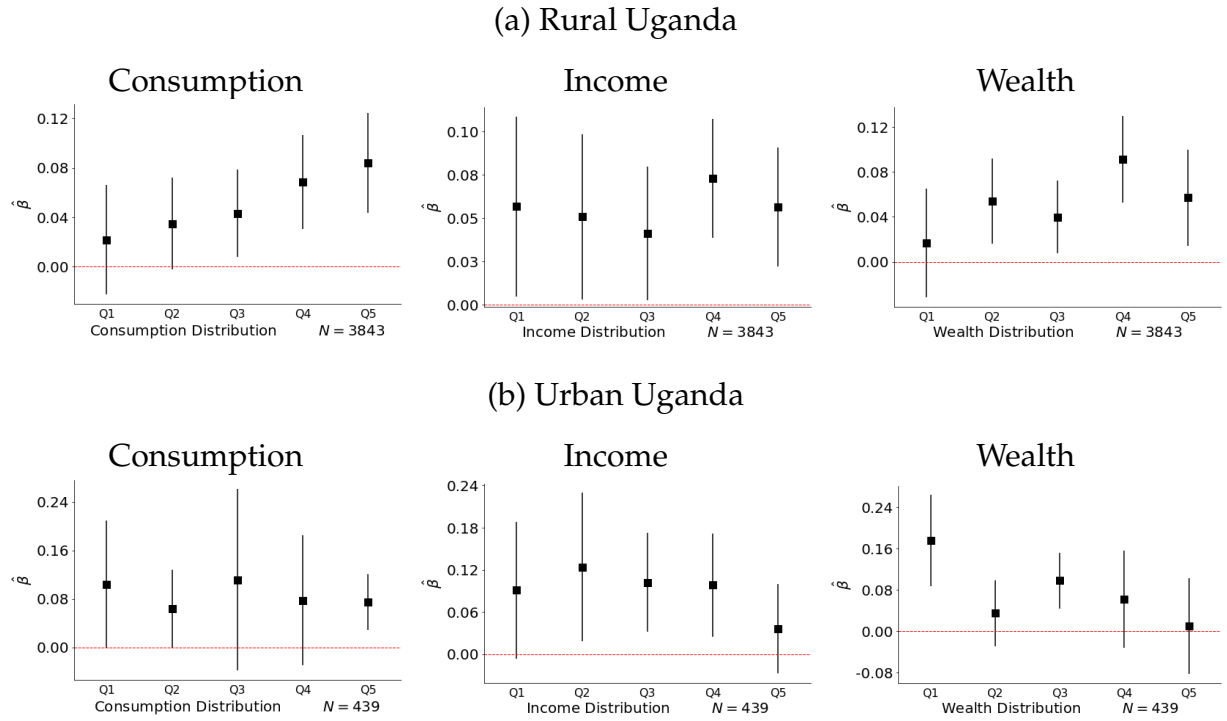


*Notes:* OLS estimates of $\beta_j$ in regression equation $u_{it}^c = +\alpha C_{tr} + \beta_j u_{it}^y + e_{it}$ for each quintile $j$ group—x-axis—of the consumption, income, and wealth distributions. In which $\hat{u}_{it}^c$ ($\hat{u}_{it}^y$) are the estimated OLS residuals of log consumption (income) on household variables: age, gender, and education of the household head, household size and household location (regions). Standard errors clustered at the household level. *Source:* UNPS: 09/10–15/16, balanced panel.

Figure 10: Robustness Check: Consumption and Income Residuals, Nationwide Uganda

(a) CRRA Specification



(b) CARA Specification



*Notes:* OLS estimates of $\beta_j$ in regression equation $\Delta u_{it}^c = +\alpha \Delta C_{tr} + \beta_j \Delta u_{it}^y + e_{it}$ (CRRA) and $u_{it}^c = +\alpha C_{tr} + \beta_j u_{it}^y + e_{it}$ (CARA). Nationwide sample of households. *Source:* UNPS: 09/10–15/16, balanced panel.

## Figure 11: Robustness Check: Food Consumption, CARA Specification
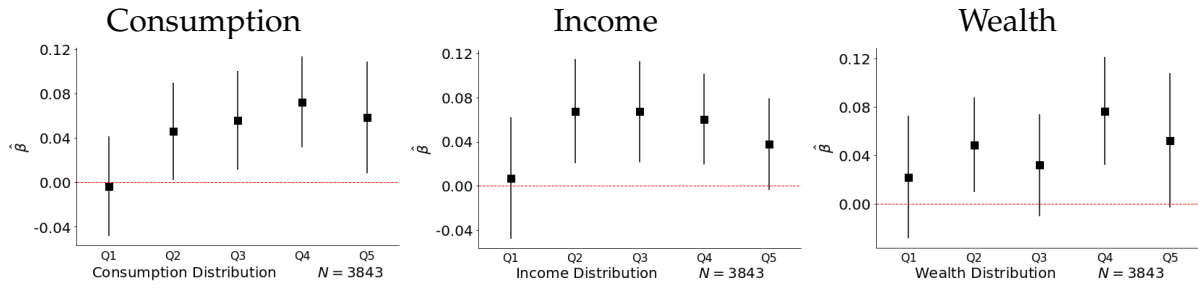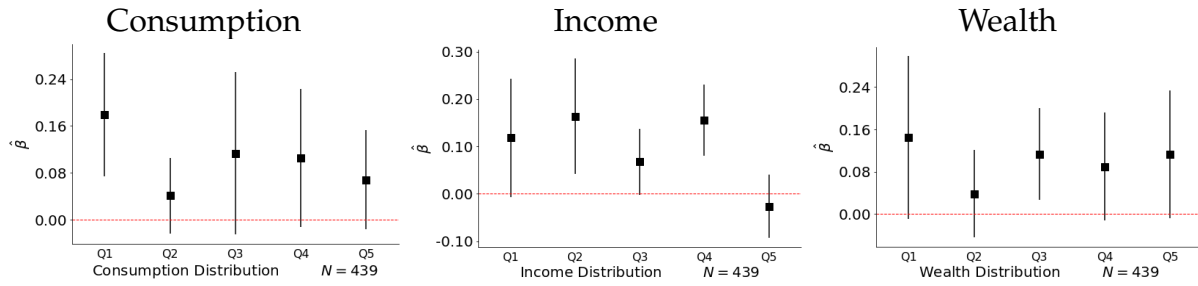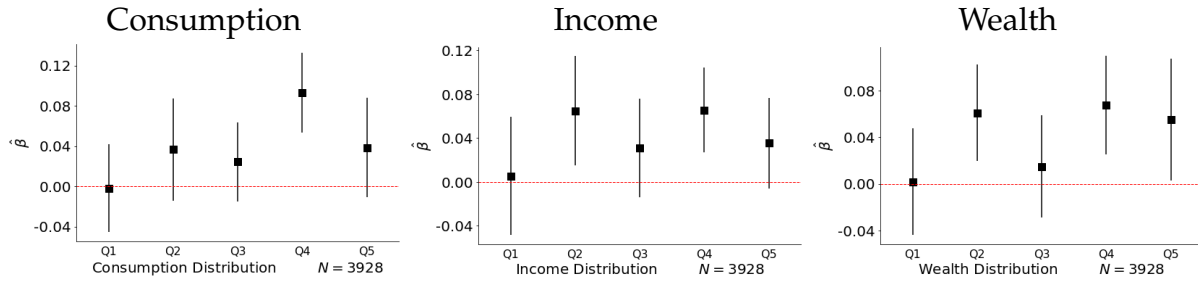
### (a) Rural Uganda



### (b) Urban Uganda



*Notes:* OLS estimates of $\beta_j$ in regression equation $lnfood_{it} = \alpha C_{tr} + \beta_j lny_{it} + \gamma s_{it} + F_i + e_{it}$. $food_{it}$ denotes food consumption both from purchases and self-production. Nationwide sample of households. *Source:* UNPS: 09/10–15/16, balanced panel.

## Figure 12: Robustness Check: Food Consumption, Nationwide Uganda
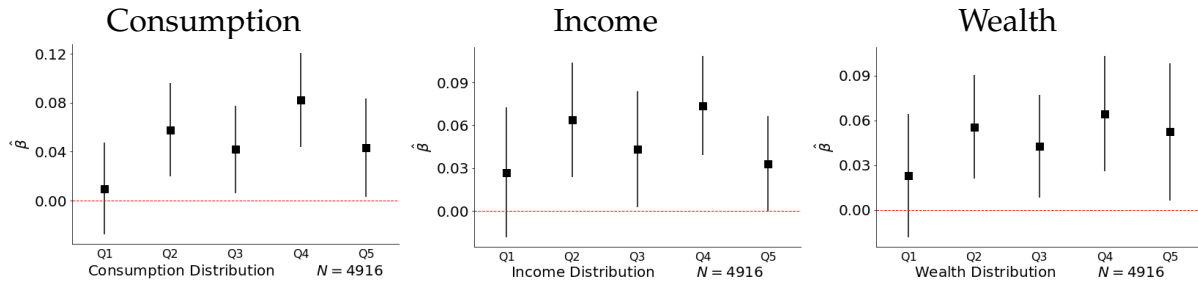
### (a) CRRA Specification



### (b) CARA Specification



*Notes:* OLS estimates of $\beta_j$ in $\Delta lnfood_{it} = \alpha\Delta lnC_{tr} + \beta_j\Delta lny_{it} + \gamma\Delta s_{it} + e_{it} food_{it}$ denotes food consumption both from purchases and self-production. Nationwide sample of households. *Source:* UNPS: 09/10–15/16, balanced panel.

# C  TABLES

Table 3: Household Consumption, Income, and Wealth in Uganda

| | National | | | Rural | | | Urban | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cons ($) ([0,1]) | Income ($) ([0,1]) | Wealth ($) ([0,1]) | Cons ($) ([0,1]) | Income ($) ([0,1]) | Wealth ($) ([0,1]) | Cons ($) ([0,1]) | Income ($) ([0,1]) | Wealth ($) ([0,1]) |
| 2009-2010 | 3986 (0.39) | 3802 (0.59) | 8897 (0.66) | 3592 (0.39) | 3658 (0.6) | 8996 (0.63) | 5434 (0.36) | 4332 (0.56) | 8534 (0.74) |
| 2010-2011 | 3769 (0.39) | 3516 (0.58) | 8765 (0.64) | 3378 (0.37) | 3260 (0.58) | 8595 (0.63) | 6153 (0.35) | 5073 (0.54) | 9804 (0.72) |
| 2011-2012 | 4058 (0.35) | 4217 (0.57) | 9991 (0.69) | 3809 (0.35) | 4051 (0.58) | 9726 (0.68) | 5250 (0.33) | 5018 (0.5) | 11265 (0.73) |
| 2013-2014 | 4209 (0.31) | 4150 (0.56) | 10025 (0.59) | 3918 (0.3) | 3837 (0.56) | 10030 (0.57) | 5317 (0.3) | 5341 (0.53) | 10007 (0.65) |
| 2015-2016 | 3839 (0.3) | 5101 (0.59) | 9425 (0.57) | 3617 (0.3) | 4703 (0.59) | 9421 (0.54) | 4802 (0.28) | 6840 (0.56) | 9443 (0.68) |
| Average | 3972 (0.35) | 4157 (0.58) | 9421 (0.63) | 3663 (0.34) | 3902 (0.58) | 9353 (0.61) | 5391 (0.32) | 5321 (0.54) | 9811 (0.7) |

*Notes:* Household average (in 2014 PPP $) and Gini index within parenthesis. the measurement of consumption, income in the text. Wealth represents total household wealth including farm capital and land value. Using survey weights. *Source:* UNPS: 09/10–15/16.

Table 4: Composition of Consumption, Income, and Wealth. Rural and Urban Uganda

**Panel A: Rural Uganda**

| Wave | Consumption | | Income | | | | Wealth | | | |
|------|------|------|------|------|------|------|------|------|------|------|
| | Food | Nofood | Agric | business | Lvstk | Labor | Assets | Land | Lvstk | farmK |
| | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) |
| | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) | (%) |
| 2009-10 | 2272 | 1321 | 1894 | 730 | 162 | 872 | 2982 | 5534 | 481 | - |
| | 100% | 93% | 91% | 44% | 21% | 42% | 99% | 76% | 22% | - |
| 2010-11 | 2293 | 1086 | 1668 | 728 | 127 | 737 | 3054 | 4958 | 534 | 50 |
| | 100% | 99% | 89% | 43% | 21% | 39% | 100% | 74% | 22% | 89% |
| 2011-12 | 2583 | 1227 | 2142 | 939 | 152 | 818 | 3448 | 5418 | 823 | 37 |
| | 100% | 100% | 79% | 39% | 19% | 34% | 99% | 70% | 20% | 80% |
| 2013-14 | 2606 | 1312 | 2180 | 886 | 151 | 619 | 4059 | 5367 | 561 | 42 |
| | 100% | 100% | 94% | 39% | 27% | 31% | 100% | 86% | 27% | 95% |
| 2015-16 | 2439 | 1173 | 2442 | 1018 | 157 | 985 | 3522 | 5247 | 609 | 43 |
| | 102% | 102% | 92% | 40% | 26% | 28% | 102% | 88% | 27% | 95% |
| Average | 2,439 | 1,224 | 2,065 | 860 | 150 | 806 | 3,413 | 5,305 | 602 | 43 |
| | 100% | 98% | 89% | 41% | 22% | 34% | 100% | 78% | 23% | 89.75% |

**Panel B: Urban Uganda**

| Wave | Consumption | | Income | | | | Wealth | | | |
|------|------|------|------|------|------|------|------|------|------|------|
| | Food | Nofood | Agric | business | Lvstk | Labor | Assets | Land | Lvstk | farmK |
| 2009-10 | 2884 | 2550 | 530 | 1816 | 28 | 1958 | 6854 | 1580 | 100 | - |
| | 100% | 82% | 38% | 58% | 7% | 56% | 99% | 24% | 7% | - |
| 2010-11 | 3264 | 2889 | 377 | 1976 | 44 | 2677 | 8255 | 1369 | 161 | 19 |
| | 100% | 98% | 31% | 57% | 6% | 62% | 100% | 19% | 8% | 33% |
| 2011-12 | 3047 | 2203 | 1126 | 1723 | 71 | 2098 | 7926 | 3181 | 133 | 25 |
| | 100% | 100% | 44% | 46% | 7% | 61% | 99% | 37% | 7% | 45% |
| 2013-14 | 3075 | 2242 | 866 | 2570 | 51 | 1853 | 7961 | 1833 | 187 | 26 |
| | 100% | 100% | 56% | 58% | 10% | 50% | 100% | 40% | 10% | 59% |
| 2015-16 | 2624 | 2178 | 680 | 2219 | 75 | 3696 | 7902 | 1332 | 198 | 12 |
| | 103% | 103% | 40% | 62% | 13% | 49% | 103% | 35% | 13% | 46% |
| Average | 2979 | 2412 | 716 | 2061 | 54 | 2456 | 7780 | 1859 | 156 | 16 |
| | 100% | 96% | 41% | 56% | 8.6% | 55.60% | 100% | 31% | 9% | 36% |

*Notes:* For each wave and category, table presents the household average ($) and proportion of households (%) for each category. *Food*, value of bought and non-bought food items; *Nofood* consists of non-food and non-durable goods. Income: *Agric*, agricultural revenues including sold and non-sold production; *Business*, profits from non-agricultural business and enterprises; *lvstk*, net income from livestock; labor income from salary labor (formal and informal). Wealth: *Assets*, value of household assets; *Land*, estimated value farming land; *lvstk*, value of own livestock; *FarmK*, value of farming capital. *Source:* UNPS: 09/10–15/16.