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Welfare and the depth of informality

Evidence from five African countries

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Abstract: This study explores the relationship between household poverty and depth of informality by proposing a new measure of informality at the household level. It is defined as the share of activities (hours worked or income earned) without social insurance for wage workers in the household. We apply cross-sectional regressions to five urban sub-Saharan African countries, showing that a household head informality dummy obscures a non-linear relationship between the depth of household informality and welfare outcomes. In some countries, a small share of income from formal jobs is associated with at least the same welfare as a fully formal portfolio. By assessing transitions between household portfolios with panel data for urban Nigeria, we also show that most welfare differences are explained by selection and that movements in and out of formality cannot sufficiently change welfare trajectories. The results call for better inclusion of informal profiles to social insurance programmes.

Key words: informality, measurement, poverty, social protection, sub-Saharan Africa

JEL classification: H55, I31, J46, J88

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1 Introduction

Informality is associated with risks, such as a lack of insurance against shocks, and therefore directly related to vulnerability to poverty. The dearth of protective measures in case of need either directly pulls people into poverty or keeps them poor by changing their behaviour to less risky and less profitable activities (Dercon 2002). An important risk-coping strategy for households is resource sharing so that the very trait of informality or related social protection coverage should not be considered solely for the individual but instead at the household level.

The measurement of informality is not straightforward, nor is information collected in a comparable manner that would allow for the same definition for different economic agents. For instance, at the individual level, standard definitions identify informality through the characteristics of the employment relationship in terms of access to health insurance or pension. At the firm level, the term implies generally an enterprise lacking a formal registration of its status or a contract with its workforce. At the household level, for simplicity of comparability, informality is reflected in the status of the household head's main occupation. However, the information of the household head alone does not sufficiently inform any anti-poverty policy (Brown and van de Walle 2020). The departing point of this study is the observation that empirical studies only consider the formality status of either an individual worker or a firm, sometimes both, but do not investigate the composition of formality statuses within a household and associated economic outcomes.

In this article we propose a continuous measure of depth of informality at the household level, defined either as the share of income from or share of labor input in informal activities, and we investigate how such informality portfolios relate to household welfare in low-income settings. At the global level, there exists an inverse U-shaped relationship between economic development and informality (Elgin and Birinci 2016). However, a reduction in informality at the country level is not always associated with a reduction in poverty (OECD and ILO 2019). Danquah et al. (2019) find income gains for individuals moving into formal employment. The present study therefore aims to shed light on this relationship at the household level by assuming that under income pooling, access to social protection via formal wage employment of some household members could improve overall household welfare.

The article first estimates in a cross-sectional analysis how household consumption or poverty is related to the depth of informality in five low-income countries. The data used are the nationally representative Living Standards Measurement Study—Integrated Surveys on Agriculture (LSMS-ISA) from Ethiopia, Malawi, Niger, Nigeria, and Tanzania. All countries have both sizeable informal sector participation and some form of social protection that, albeit fragmented, is an option to some occupational arrangements within and outside of public sector wage employment. We therefore focus on formality by wage employment and associated coverage of contributory schemes, such as health insurance or pension coverage, and do not inspect the comparative advantage to be or switch across wage and self-employment [see, for instance, Central America Alaniz et al. (2020)]. In a second step, we present results of a dynamic analysis for Nigeria testing the role of transitions between different states of informality portfolios for household welfare. We report the results solely for urban areas to reduce, at a maximum, possible confounding factors of wage employment availability. Building upon the labour economics literature that inspects the characterization of participation into activities (like unionization or contracting), we compare changes in the employment composition (between fully formal, mixed, and fully informal) in a traditional dynamic setting between status 'switchers' versus 'stayers' in the same portfolio as, for example, Bertrand et al. (2004). To overcome remaining concerns of selection bias, we apply a double difference strategy of early and late switchers, as proposed by Goodman-Bacon (2018).

The results provide four main insights. First, the depth of informality measured by income and by labor input shares (in the form of full-time equivalents) present similar results. Thus, our measure can

be applied also in settings where only one of the two is possible to construct. Second, the welfare penalty for an informal household head is directly comparable with that of fully informal households as defined with our measure. Third, households with a mix of formal and informal income sources or activities show better welfare outcomes than fully formal households in some countries, or at least they are not worse off than fully formal ones and always better off than fully informal ones. It appears that households with a formally employed member fare even better if the household diversifies with additional income from informal activities. In some countries, an income or activity share in formal activities of less than half can already make the household relatively better off than a fully informal employment portfolio. Thus, the informal household head dummy obscures such income diversification effects. Fourth, our dynamic panel analysis suggests that the cross-sectional gap that we observed is almost entirely explained by the selection of households transitioning between statuses rather than by the final outcome of greater informality experienced. There is no evidence of a real gain in changing from a fully informal status to greater formality of the wage employment composition of a household portfolio. This gain does not materialize unless there is an underlying selection process that makes the material gain become massive in terms of consumption. Such a finding thus portrays the fact that employment spells in and out of informality may not be enough to change the well-being trajectory of a household, adding to the literature that analyses the relevance for poverty reduction of formalization into forms of wage employment. Applying a randomization inference (Young 2018), we confirm that our panel results are not caused by small sample sizes.

This article talks to a set of distinct literature. First, it speaks to the development literature that studies household well-being and the role of income pooling (Dercon 2002; Attanasio and Lechene 2002; De Weerdt and Dercon 2006). If informality is considered, it is often solely through binary classification. This article takes a more nuanced approach, and we find that a binary indicator for informality does not adequately capture the welfare nuances experienced by a household as a result of the composition of their employment portfolio. The second literature studies employment transitions [see, for example, Danquah et al. (2019); Maloney (1999); Gong et al. (2004)]. Our approach uses the lens of a household utility framework and thus contributes to our understanding about how changes in formality status are relevant to overall welfare (or vulnerability level) experienced not only by those people transitioning but by the whole household. Methodologically, we also inspect and explain why the choice of comparison groups matters to model the employment portfolio transitions. As a possible practise for analysing a (truncated) time period in a given labour market economy, we suggest using as a control (or reference group for the comparison) the status of those households already transitioning at the start of the panel, as proposed by Goodman-Bacon (2018). This comparison effectively deals with potential issues about the selection of unobservables and the plausibility of parallel trends.

The article is structured as follows. Section 2 follows a brief presentation of the policy framework for the countries under analysis. Section 3 presents the data and variables, and Section 4 captures some of the traits to answer the article objectives. Section 5 briefly proposes the estimation strategy of the cross-sectional regressions and its results. The model specification and results for the dynamic analysis in Nigeria are presented and discussed in Section 6. Finally, Section 7 concludes with a summary of the findings and some considerations for future analysis.

2 Expansion of social protection and contributory schemes in sub-Saharan Africa

Social protection in most countries of East, West, and Central sub-Saharan Africa (SSA) has been extended during the 2000s though various set ups, having had a stronger tendency to promote programmes providing a mix of poverty-based transfers (Niño-Zarazua et al. 2012). Social security systems have been experiencing a slow but visible change, moving the shift in focus from workers to citizens, visible by the trend over recent decades to extend income protection to the elderly, particularly the poor and

uncovered (Riedel 2007; ISSA 2019). Contributory schemes, however, are still the wider norm. They include forms of health insurance or other forms of benefits covering only a small share of the population (mostly public sector and larger companies). Albeit costly and non-holistic, they are considered a useful tool to protect individuals, but only a few studies to date look at the evolution of such policies, like the impacts of health insurance reforms (Degroote et al. 2019). Measures of this type tend to be part of formal contract arrangements, potentially including coverage or providing some security beyond the nominal beneficiaries. Where regulations of employment relations have not covered some forms of wage employment or provisions of services, they automatically make wage work informal. It is widely documented that informality beyond self-employed farm work is highly common in the region among wage workers [see, for example, Danquah et al. (2019) or OECD and ILO (2019)].

Thanks to a mix of global effort to better include social protection programmes into national strategies, both political debates and institutional processes have given room for expansion to such policies in SSA countries. In addition to a new role that has taken the provision of social protection and particularly social security legislation to protect more workers and citizens (ISSA 2019), some researchers argue that political pressure over elections may have mattered for the introduction of flagship programmes, whether the subject has been endorsed by the incumbent or the contestant party. Taking as an example the most budget-constrained country under our analysis, Malawi, Hamer and Seekings (2017) suggest that ex-President Banda branded herself with the adoption of multiple social protection initiatives, specifically forms of social assistance, and the ineffectiveness of coverage was masked over the period 2012–14 (prior to the 2015–16 survey into analysis) until delivery during the following mandate.[1] Such a trend is also observed in Tanzania, where the proposal for the introduction of an old-age pension came within one year of a parliamentary and presidential election in October 2015 (Ulriksen 2016). However, the expansion of programmes may also come from sectoral- and local-level institutions, as in South Africa where agricultural workers were granted coverage under the labour law and the minimum wage provision, sparking side effects such as greater compliance in non-wage benefits (Bhorat et al. 2014).

We thus expect that the coverage of social protection measures in employment relations will be relatively low albeit significant, showing differential rates of coverage at individual and household levels according to the country and area under analysis.

3 Data and variables

3.1 Data

The data used for this study are the Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA) from five countries in SSA, namely Ethiopia, Malawi, Niger, Nigeria, and Tanzania.[2] The surveys were chosen for three reasons. First, the comparability of survey questionnaires allows construct of the same variables for all countries. Second, all household surveys are nationally representative and comprehensively cover both income from and labor input in various livelihood activities. This enables us to construct indicators of formality at the household level that go beyond simple headcounts of formal workers. Third, in contrast to, for example, Latin American countries, social protection policies remain sparse in SSA but are increasingly gaining attention in the policy debate. This

[1] The initial 'branding' eventually led to a rising significance of such policies in the national agenda that today is represented by the second round of the Malawi National Social Support Program II (MNSSP II, 2018–23), which aims to provide three forms of assistance: cash and in-kind transfers for household consumption, resilience packages, and measures linked to seasonal and humanitarian response to shocks (Government of Malawi 2018).

[2] The LSMS-ISA data sets are nationally representative, cross-sectional, and longitudinal surveys conducted by the World Bank in collaboration with the national statistical offices.

study thus aims to assess current reach and implications of existing formal social protection to guide policy discussions in the region. We focus on urban areas where the scarce opportunities of social protection through wage employment are most common. However, one main caveat should be highlighted: there are still limitations across countries in the identification of access to programmes and employment status or type because of differences in the content of questionnaires across countries. Such differences will be highlighted when applicable to assess the comparability between countries.

The full breakdown of urban households across each country survey is shown in Table 1.

Table 1: Surveys and urban sample size by country

Country	Survey year	Sample size (households)
Ethiopia	2015–16	1,682
Malawi	2016–17	2,272
Niger	2014	1,298
Nigeria	2014–15	1,281
Tanzania	2015–16	1,368

Source: authors' compilation based on LSMS-ISA data.

3.2 Variables

This section presents how the main variables of interest were constructed. Specifically, we aggregate formality at the household level in two ways: income and full-time equivalents of labour, all expressed as shares of the household total. Finally, outcome measures of interest are defined.

Formality

In a context where formality of labour is still rare and most activities can be considered informal, we choose to focus on identifying formal work activities, keeping informality as our base category of analysis. The definition applied is one of activities in an informal sector being broadly characterized by units engaged in the production of goods or services with the primary objective of generating employment and income to those engaged (OECD et al. 2002).[3] To draw meaningful conclusions for policy with the individual-level data on employment from the LSMS-ISA data, we focus on formality of wage employment, and we define formality in terms of the social protection status of workers. While we acknowledge that the majority of self-employed activities (independent work) in the countries we study is likely to be informal, we choose to look into wage employment. Formality of small or micro-enterprises is thus not the focus of this article. The latter may not be easily comparable because of livelihood traits (like the returns to capital, market exposure, or national availability of private or public schemes for protecting the self-employed) and the comparative advantage to be in or switch across these forms of employment (i.e. in terms of time availability to assist seasonal agricultural productions versus those in other forms of entrepreneurship).

Table 2 presents an overview of the definitions used in each country. A wage work activity is considered formal with respect to its social protection status if the employer contributes towards a pension scheme and/or health insurance. Alternative definitions of formality could be via the contract status of an employee, such as whether they have a signed contract or via employer characteristics (e.g., employer withholds taxes or has more than five employees). However, these definitions are less comparable across surveys and insufficiently capture the aspect of protection directly provided to the worker from which household members could benefit as well. Thus, the social protection definition is preferred and also

[3] Note that the informal sector should not be confused with forms of illegal production, domestic production for own final consumption, or underground activities [see OECD et al. (2002: 39)].

following the recommendations from the International Conference on Labour Statistics [see ICLS15 (1993); ICLS17 (2003)].

All formality definitions can only apply to those of legal working age, which is 16 in all countries. While it is likely that younger household members could work, they cannot access formal opportunities, so we only consider those 16 years and older for our analysis.

Table 2: Formality definition by country

Country	Social protection access
Ethiopia	If employer is government, state-owned firm, NGO/charity, or political party, employment comes with health insurance and pension
Malawi	If employer provides health insurance and/or pension
Niger	If employer provides health insurance and/or pension
Nigeria	If employer provides health insurance (and/or pension)*
Tanzania	If employer provides health insurance and/or offers maternity or paternity leave

Note: * only available for cross-sectional analysis. In the panel, we use only access to health insurance.

Source: authors' compilation based on LSMS-ISA data.

Formality at the household level

We create two measures of informality at the household level: a share of all informal full-time equivalents (FTEs) worked and a share of income from informal sources relative to all income-generating activities of the household.

FTE shares are computed in the following way. First, all hours worked annually in each activity are computed for each individual and assigned to be formal or informal. Then, these hours are divided by the FTE of hours worked in a year. Full-time work is assumed to be 12 months per year, 4.3 weeks per month, and 40 hours per week, resulting in 2,016 hours per year. All FTEs are replaced to 0 for those not engaging in any activity, and a maximum of 16 hours of work per day and 52 weeks per year are imposed. Despite these limits, it is still possible for an individual to have more than two FTEs in total because of multiple employment activities, so we re-scale these to be a maximum of two per individual but distributed across various activities in the same proportion as before the capping at two. FTEs are then summed up at the household level by formal and informal activities, and the share of formal FTEs over all FTEs of all household members is computed.

To get formal household income shares, we compute the income from each activity that is assigned as formal or informal and then aggregate these at the household level. The share of income from informal activities relative to total household income is computed.

Outcome measure

The outcome of interest is a measure of household welfare, measured with poverty status or expenditure.

The household consumption measure was calculated and converted to daily per capita expenditure. For comparability across countries, expenditures were expressed in purchasing power parity (PPP) in constant US dollars from 2011. This expenditure variable is expressed on a logarithmic scale to reduce the influence of outliers and express differences in terms of percentages. Poverty is defined with the international poverty line of US$1.90 consumption per person per day (Ferreira et al. 2016). In the dynamic analysis for Nigeria, we use the national poverty line for comparability reasons over time.

4 Summary statistics

This section presents summary statistics of the main variables, especially formality measured at the household level. While most labour market statistics focus on the share of formally employed workers among the economically active population, the LSMS-ISA data allow assessment of how many households directly or indirectly benefit from formal employment. Table 3 contrasts these two approaches. For each country, it shows not only the formal employment share but also the share of households with a formally employed household member.

Table 3: Share of population covered through formal employment, by country

Country	Share of economically active population with formal wage job	Share of households with formal wage income
Ethiopia	0.21	0.26
Malawi	0.14	0.22
Niger	0.11	0.18
Nigeria	0.16	0.19
Tanzania	0.11	0.18

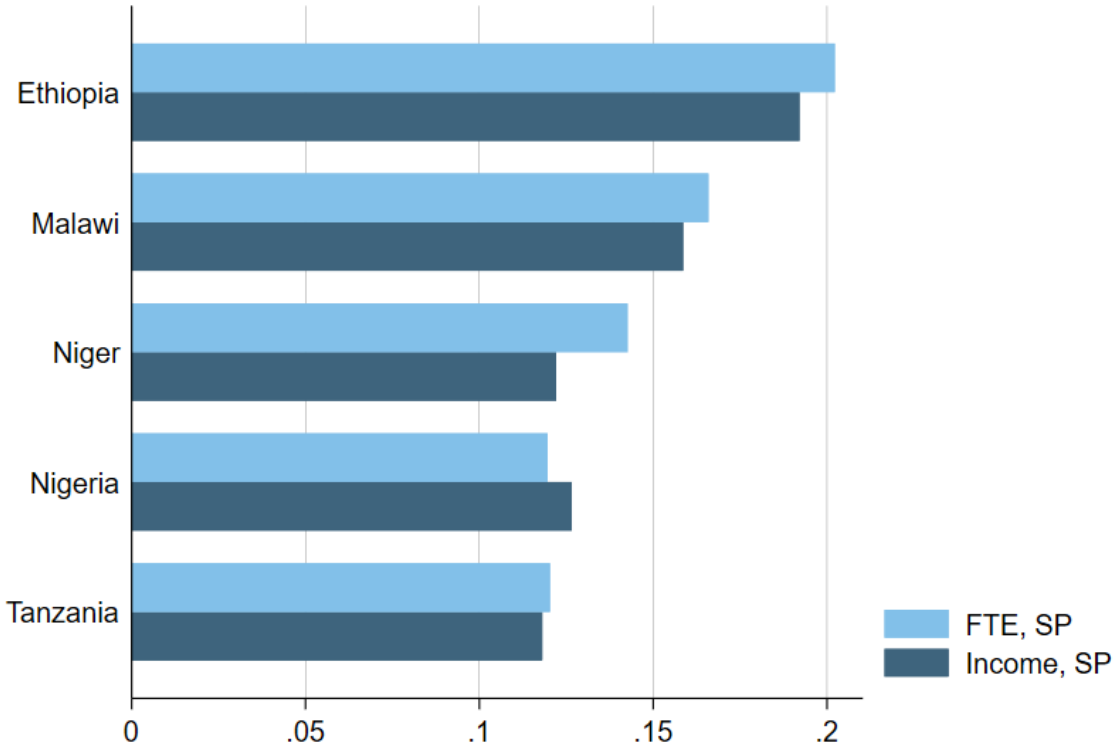
Note: population weights applied to cross-sections for Ethiopia (2015–16), Malawi (2016–17), Niger (2014), Nigeria (2015–16), and Tanzania (2014–15).

Source: authors' compilation based on LSMS-ISA data.

While levels of formality vary across countries, the share of households with formal workers is higher than the simple formal employment share in all countries. If considered at the household level, formality is more prevalent than if only considered among workers. Formally employed workers are most common in urban Ethiopia followed by urban Nigeria with 21 and 16 per cent, respectively. In the less economically transformed countries, formal job opportunities remain sparse with just 11 per cent of the economically active population in urban areas in such employment. Yet, in Niger and Tanzania, 18 per cent of urban households, respectively, have a member with formal employment.

Figure 1 presents the shares of formal FTEs or income at the household level for each country. Formality is defined via the provision of social protection through wage employment. All measures are conditional on at least one household member having a wage income. The light and dark blue bars show the population mean of the share of FTEs in a household that are formal, once defined by FTEs (light blue) and once by income shares (dark blue). The largest formal share can be found in Nigeria for income shares, while in all other countries, FTE shares tend to be slightly larger. However, FTE and income shares are always at a comparable level.

Figure 1: Formality shares of work effort (FTE) and income at household level, population means by country



Note: SP: social protection; FTE: full-time equivalent; population weights applied. Source: authors' compilation based on LSMS-ISA data.

5 Depth of informality in a cross-sectional setting

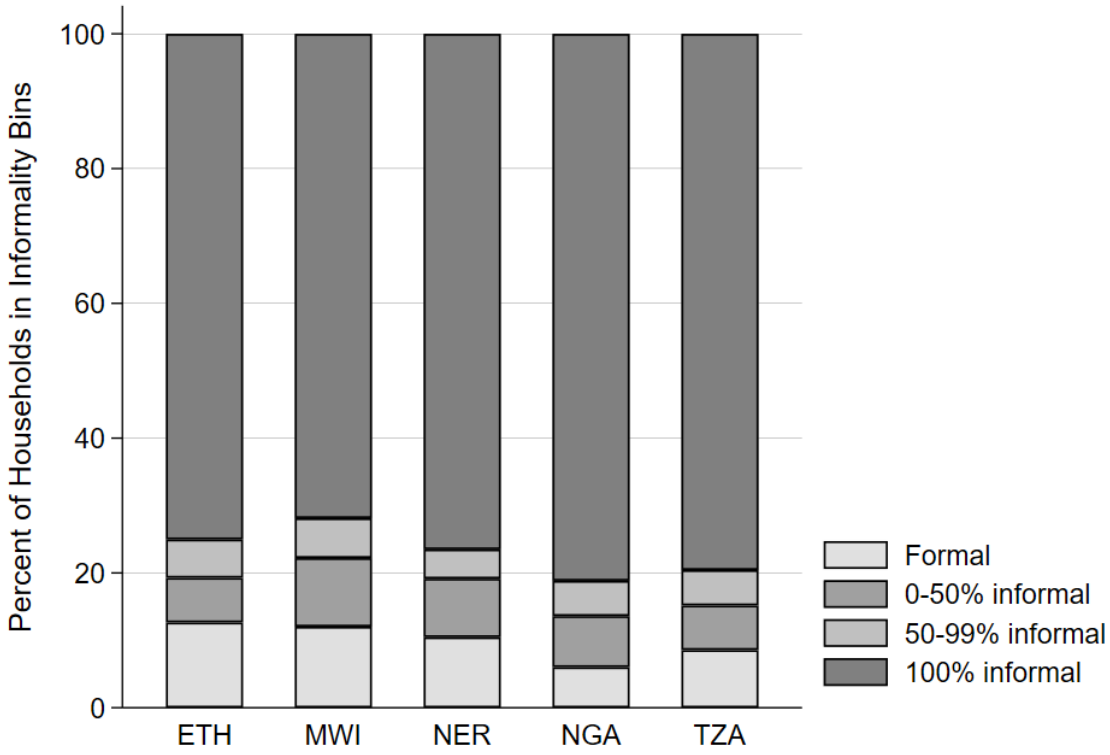
5.1 Estimation strategy

We run a simple regression of the welfare outcome Y_i on our informality measure Inf and other household and local characteristics X_i:

$$Y_i = \alpha + \beta_1 \text{Inf}_i^1 + \beta_2 \text{Inf}_i^2 + \beta_3 \text{Inf}_i^3 + \beta_4 X_i + \beta_5 Z_l + \epsilon_i \quad (1)$$

Y_i is either the log of per capita expenditure or a simple dummy of whether a household is poor based on the international poverty line of US$1.90 per day. The variables Inf_i^1 to Inf_i^5 are dummies for different bins in the distribution of our continuous informality measure. Inf_i^1 is the lowest bin of 0.1 to 50 per cent of informality, Inf_i^2 is 51 to 99 per cent of informality, and Inf_i^3 captures all observations with 100 per cent, meaning households whose income is earned fully from or all FTEs worked are in the informal sector. These dummies are all relative to the base category of 0 informal work or income shares. The logic behind this functional form is to avoid rigidly assuming that there is a linear dose-response function with respect to a household's informality mix. We use only four bins because of the limited sample size. X_i includes the sex and age of the household head, share of household members with secondary education, household size, dependency ratio, and a dummy whether the household owns any land. The vector Z_l includes dummies for the administrative areas of the highest level to capture structural differences between regions and a dummy for each tercile of travel distance to the nearest population centre.

Figure 2: Share of households within each informality bin, by country



Source: authors' compilation based on LSMS-ISA data.

The results of these regressions will be contrasted with those of a regression where a simple dummy for a household head working in the informal sector is used instead of our gradual measure of informality.

Figure 2 shows the distribution of the informal employment share by country. In Nigeria and Tanzania, 80 per cent or more of all households have fully informal income. In Ethiopia, Malawi, and Niger, this number is between 70 per cent and 80 per cent. The distribution of informal FTE shares looks almost identical across countries. The percentage of households with a fully formal income is around 10 per cent in all countries but lower in Nigeria, where relatively more households have a mixed income portfolio.

Not shown here, we separated the sample into administratively rural and urban defined areas to allow for structural differences in household income portfolios and access to formal jobs. In all countries, the share of households with 100 per cent of their income earned from informal activities is more than 80 per cent in rural areas, contrasting urban informality shares between 47 per cent in Malawi and up to 68 per cent in Niger. The cell sizes of observations in the informality bins are accordingly small in the rural sample. We therefore present our results only for urban areas.

5.2 Results

Regression results are plotted as coefficient graphs for ease of interpretation. The graphs include the coefficient of the simple household head dummy ('Dummy') and then plot the three coefficients of each informality bin compared to the 0 bin (= fully formal).

The full regression results with additional control variables can be found in the Appendix. Results are as expected: households with female heads are on average poorer, as are households with larger

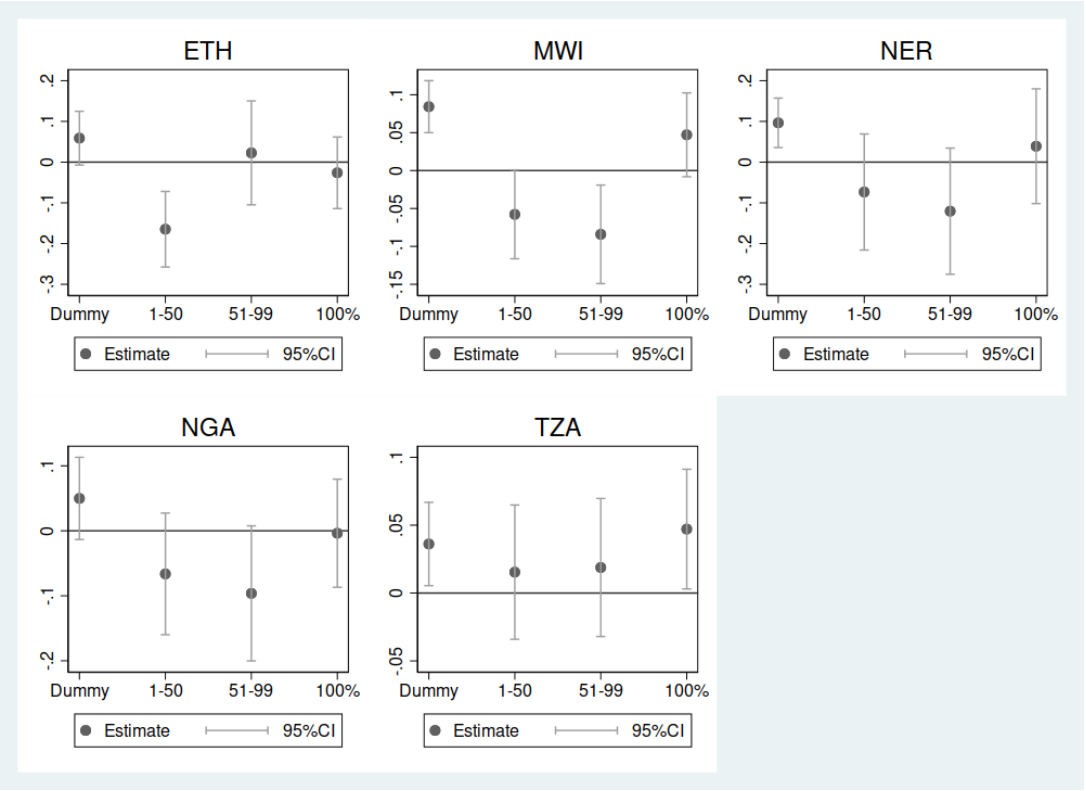
household size and those that own land. The latter is highly correlated with agriculture as the main income source, which in most cases is associated with smallholder farming in the countries of this study. More household members with secondary education relative to household size is associated with higher expenditure and lower probability to be poor.

Figures 3 and 4 plot the coefficients of the regressions of poverty status of households on their share of income earned from informal sources (Figure 3) or the share of FTEs worked in informal activities (Figure 4). The main finding is that poverty is not in all countries statistically significantly associated with informality, and it appears that households with both a formal income source and other informal sources achieve better welfare outcomes than fully informal households and sometimes even better than fully formal ones. These correlations might indicate that a greater diversification of income sources is associated with a lower likelihood of being poor. Overall, we observe that the precision of the bins between fully formal and fully informal is relatively low. This could partially be because of a lack of power. The first coefficient in each figure is from the dummy of the informal status of the household head. In Malawi, Niger, and Tanzania, households with an informally employed household head are significantly more likely to be poor than households with formally employed heads. In the other two countries, this relationship is insignificant. Only in Tanzania, households are also significantly more likely to be poor if their income origins are 100 per cent from informal sources. For FTE shares, this result is also significant for Malawi and Nigeria. In Figures 3 and 4, only Malawi shows a clear and significant relationship between poverty status and different steps of informality in terms of formal income shares. Households with some share of formal income are all significantly less likely to be poor than households with fully formal income or fully informal income. In Ethiopia, this applies to those households with informal income shares between 0 and 50 per cent and in Niger to households with more than half of their labor efforts in informal activities. Even though insignificant, similar patterns are observed in Nigeria for income shares.

Figures 5 and 6 present the same results for per capita expenditure instead of poverty status. While poverty status measures whether a household's expenditure lies below a specific threshold, these results capture the overall relationship between informality status and expenditure, and they appear more precise. The main results are that households with an informally working household head have significantly lower per capita expenditure: around 20 per cent less in Niger, 30 per cent less in Malawi and Nigeria, and 40 per cent less in Tanzania. Only in Ethiopia we do not find a significant disadvantage for informally employed household heads. This is also the case when we consider households with 100 per cent informal income shares or informal FTE shares. In Malawi, Niger, Nigeria, and Tanzania, the size of these expenditure gaps are the same as when comparing households with 100 per cent of household income earned from informal sources to those with fully formal income sources. Looking at the partially formal households, in all countries there are no significant differences between partially formal and fully formal households. Only in Ethiopia, when using income shares, households less than half of their income from informal sources are even richer than fully formal households.

The results presented provide interesting insights in three aspects. First, the informality status of a household head is strongly associated with our measure of fully informal households in terms of income shares or FTE shares. However, they do not yield always the same results, and most importantly, the simple household head measure obscures important nuances of household income generation and welfare. These are revealed in the second finding. That is, households with a mix of income sources or activities show better welfare outcomes than fully informal households and, in some countries, even better outcomes than fully formal households. It appears that households with a formally employed member fare even better if the household earns other income or spends time in other activities that are in the informal sector, controlling for household size and dependency ratio. In some countries, an income or activity share in formal activities of less than half can already make the household better off than fully informal income generation. The results are starker and more precise when we consider expenditure compared to poverty status. This is not surprising given the small cell sizes and that the expenditure re-

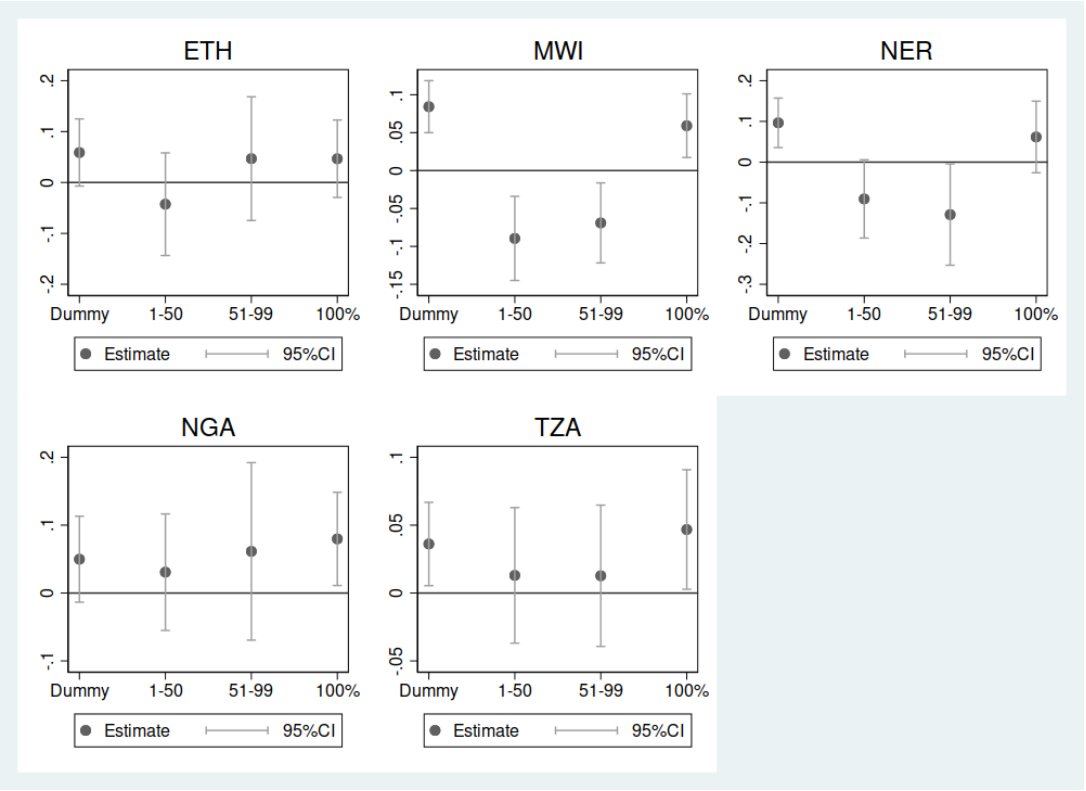
Figure 3: Coefficients of informality measures from regression of probability to be poor. Share of income earned from informal sources. Base category is fully formal income.



Note: the graphs plot coefficients and confidence intervals (CI) from two different regressions for each country. The first coefficient is that of the dummy indicating an informal household head from one regression. The other three coefficients are those of the informality bins from the regression as specified in 1. The base category is households with no informal income source.

Source: authors' compilation based on LSMS-ISA data.

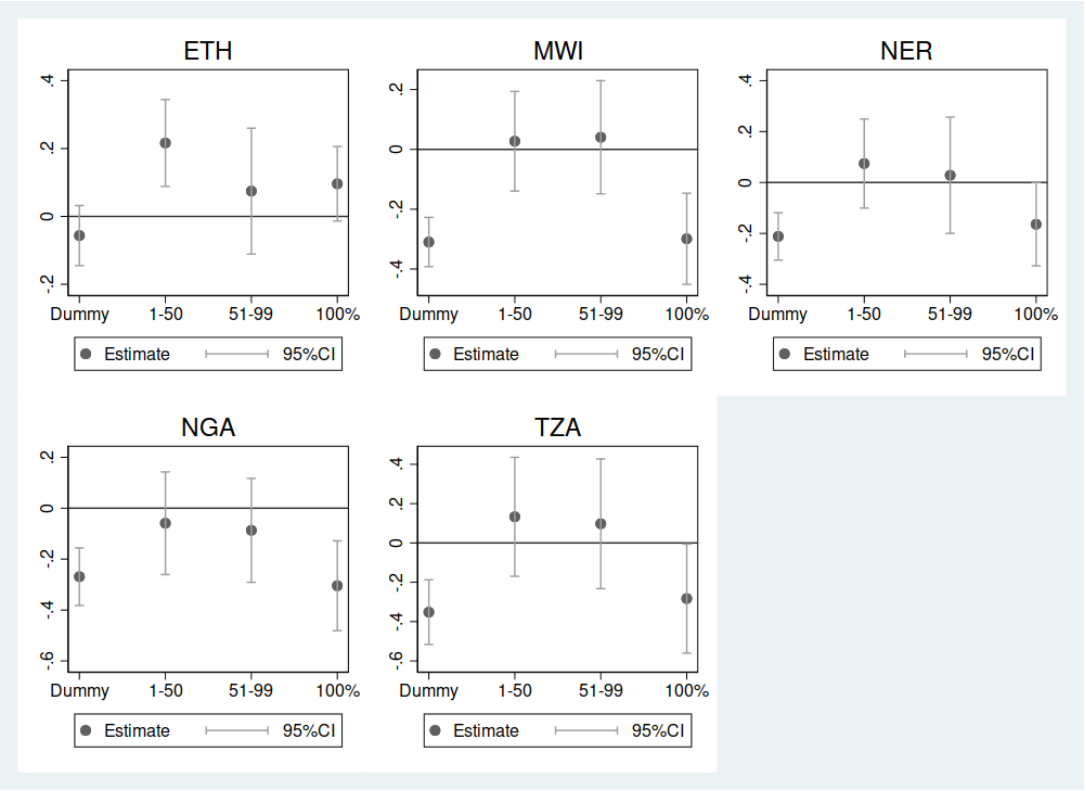
Figure 4: Coefficients of informality measures from regression of probability to be poor. Share of FTEs worked in informal activities. Base category is fully formal activities.



Note: the graphs plot coefficients and confidence intervals (CI) from two different regressions for each country. The first coefficient is that of the dummy indicating an informal household head from one regression. The other three coefficients are those of the informality bins from the regression as specified in 1. The base category are households with no informal income source.

Source: authors' compilation based on LSMS-ISA data.

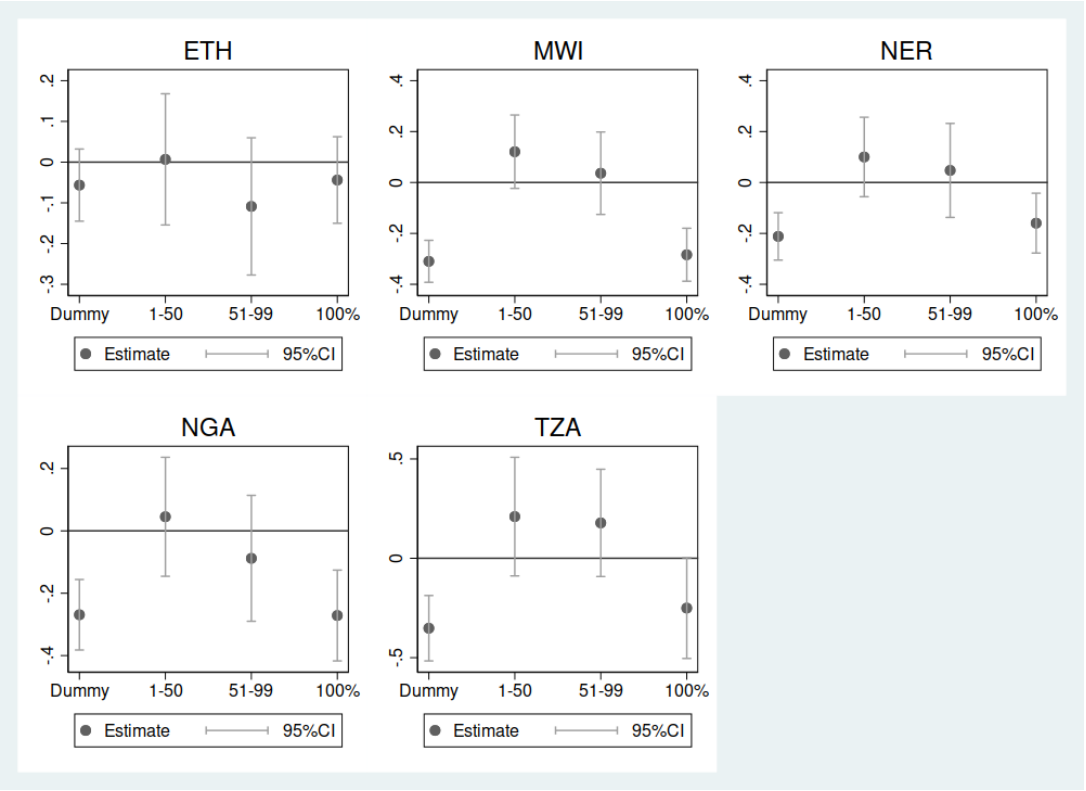
Figure 5: Coefficients of informality measures from regression of per capita expenditure. Share of income earned from informal sources. Base category is fully formal income.



Note: the graphs plot coefficients and confidence intervals (CI) from two different regressions for each country. The first coefficient is that of the dummy indicating an informal household head from one regression. The other three coefficients are those of the informality bins from the regression as specified in 1. The base category are households with no informal income source.

Source: authors' compilation based on LSMS-ISA data.

Figure 6: Coefficients of informality measures from regression of per capita expenditure. Share of FTEs worked in informal activities. Base category is fully formal activities.



Note: the graphs plot coefficients and confidence intervals (CI) from two different regressions for each country. The first coefficient is that of the dummy indicating an informal household head from one regression. The other three coefficients are those of the informality bins from the regression as specified in 1. The base category are households with no informal income source.

Source: authors' compilation based on LSMS-ISA data.

gression exploits more variation than the linear probability model of poverty. Lastly, comparing results using income shares with those using FTE shares, we find comparable patterns. This encourages the applicability of our measure in contexts when only income or only work hour data are available.

6 Depth of informality in a dynamic setting

So far, we have compared households at a specific point in time for each country and established some empirical patterns in the relationship between household welfare and depth of informality. The next question to ask about this relationship is whether changes in the depth of informality within a household are associated with improvements in welfare. In this section, we thus take a dynamic perspective that also accounts for several econometric concerns arising in the cross-sectional analysis.

The limits of estimating (1) in a cross-section lie in the presence of unobserved characteristics that, on one hand, may determine simultaneously a household's income portfolio and its welfare outcomes. On the other hand, such traits could predict a household's selection into formal or informal income-generating activities. These issues can be addressed with longitudinal data in which we observe households in several time periods. In general, there are examples in the literature that capture the information contained in panel data to investigate transitions between the informal and formal sector (Bosch and Maloney 2010; Danquah et al. 2019). However, to the best of our knowledge, none of this literature has considered informality transitions more widely as a household decision.

To that aim, we use three waves of the Nigerian LSMS-ISA panel data, namely waves 1–3 corresponding to 2010, 2012, and 2015–16,[4] as well as two waves of the Tanzanian panel, from 2010 and 2012. We use only FTE shares to measure the depth of informality again because of varying questionnaire designs that did not allow us to capture income shares consistently. However, based on the cross-sectional results, we are confident that the dynamic FTE results would be very similar if we used income shares instead.

6.1 Estimating transitions

We define three categories of depth of informality: fully informal (I), mixed portfolio (M), and fully formal (F). Then we assess transitions over time between these states. Our dynamic analysis proceeds in three steps. First, we document the differences in welfare by each type of transition that a household can make. Then we focus these transitions on the directions of interest that are in and out of full informality. Lastly, we apply the most robust definition of control groups and transition directions to control also for selection bias.

For the first part, households may switch status from one of three types into any permutation. This yields six possible transitions that a household may do over two periods and three instances of staying put. We compute statistics of the means before and after transition by type of switcher. Tables 4 and 5 present the results of a simple longitudinal analysis on these data. We compare transitions across a one-period 'hop', so we are only ever considering the short-run effects of moving from one status to another. In the data from Tanzania, this corresponds to two years and in Nigeria to two and three years. This approach is adopted to mitigate any potential issues in time-series estimation such as inconsistent standard errors caused by serial correlation, as raised by Bertrand et al. (2004). Both tables record the mean outcome for the relevant group's welfare indicator before and after their transition. Columns (3) in the tables present the raw gap between the relevant group and the never-changers group relative to staying in one's origin for both periods. For example, this would imply that for those going from having

[4] The latest wave of the Nigerian panel from 2018 was not consistent in the variable definitions, so we rely on the older waves.

a fully informal household portfolio to a mixed portfolio are compared with those households who across two periods would always remain informal. Columns (4) present the conditional gap where we control for land ownership, female headship, share of secondary school leavers, and year fixed effects. These estimates treat the data as a cross-section. Finally, columns (5) provide the two-way fixed effects results. While there is variation in the estimates in columns (5), we observe a general pattern. The two-way fixed effects estimates are generally smaller than the cross-sectional estimates. This suggests that, to the extent that anything is uncovered in the cross-section, these estimates may not ultimately hold up in longitudinal analysis as estimated effects rely on variation from groups that may not be appropriate control groups. For the majority of comparisons, the two-way fixed effects estimates are at least half the size of the cross-sectional estimate.[5]

The second pane of Tables 4 and 5 provide estimates of composite groups who transition in the same 'direction' as well as composite control groups who may serve as suitable counterfactuals for these groups. We estimate pre- and post-transition means, conditional and unconditional gaps, and a two-way fixed effects regression for those joining informality (i.e. those moving into a fully informal portfolio—MI & FI movers). These are compared to those households who remained always in the formal sector, either fully formal or mixed. Notably for this comparison, those transitioning between these statuses are no worse off after transitioning compared with the stayers when comparing both of our welfare measures. Similarly, we contrast those leaving informality, both from mixed portfolio households and fully informal households, with those who are always informal and always mixed. For this comparison, it is worth noting that whilst the cross-section results implied decreases in the conditional and unconditional probability of being poor, no such change is detected across time, whereas we do detect an increase in household expenditure as a consequence of the transition. As in the cross-sectional results, expenditure estimates provide more variation, as those remaining always below or above the poverty threshold might still experience changes in their expenditure levels.

We further consider the effects of diversifying a household's portfolio compared to leaving mixed portfolios. Yet, it should not be surprising that for both of these we do not observe any differences in the two-way fixed effects approach.

[5] It is worth noting that as we report the unconditional means for all transition groups, it should be straightforward for the reader to estimate a naive differences-in-differences for any comparison group, if preferred over the ones we have selected.

Table 4: Poverty, log total expenditure, by status and transition, Nigeria 2010–15

	P(Poor=1)					ln(TotExp)				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Portfolio *v* control	Before	After	Raw Δ	Cond Δ	DiD	Before	After	Raw Δ	Cond Δ	DiD
II *v* FF	0.179***	0.177***	0.140***	0.136***	0.017	4.771***	5.322***	-0.512***	-0.501***	-0.021
	(0.009)	(0.008)	(0.018)	(0.019)	(0.035)	(0.025)	(0.026)	(0.137)	(0.072)	(0.079)
N	2,018	2,018	4,168	4,168	4,168	2,018	2,018	4,168	4,168	4,168
FI *v* FF	0.098**	0.073*	0.047	0.035	0.005	5.292***	5.826***	0.000	0.056	-0.043
	(0.047)	(0.041)	(0.045)	(0.042)	(0.050)	(0.209)	(0.246)	(0.257)	(0.148)	(0.131)
N	41	41	214	214	214	41	41	214	214	214
IF *v* II	0.104***	0.125***	0.077**	0.078**	0.039	4.757***	5.605***	-0.378**	-0.203**	0.212**
	(0.031)	(0.034)	(0.032)	(0.030)	(0.045)	(0.132)	(0.147)	(0.187)	(0.097)	(0.105)
N	96	96	324	324	324	96	96	324	324	324
FF *v* II	0.045*	0.030	-0.140***	-0.136***	-0.017	5.279***	5.839***	0.512***	0.501***	0.021
	(0.026)	(0.021)	(0.018)	(0.019)	(0.035)	(0.139)	(0.150)	(0.137)	(0.072)	(0.079)
N	66	66	4,168	4,168	4,168	66	66	4,168	4,168	4,168
MI *v* MM	0.141***	0.156***	0.058	0.067*	0.026	4.918***	5.768***	0.258	0.104	0.106
	(0.044)	(0.046)	(0.045)	(0.040)	(0.064)	(0.132)	(0.148)	(0.159)	(0.104)	(0.121)
N	64	64	282	282	282	64	64	282	282	282
IM *v* II	0.121***	0.100***	-0.067***	-0.091***	-0.028	4.701***	5.181***	-0.105	0.269***	0.051
	(0.028)	(0.025)	(0.023)	(0.021)	(0.033)	(0.099)	(0.092)	(0.089)	(0.058)	(0.075)
N	140	140	4,316	4,316	4,316	140	140	4,316	4,316	4,316
MM *v* II	0.091***	0.091***	-0.087***	-0.107***	-0.001	4.822***	5.348***	0.038	0.212***	-0.030
	(0.033)	(0.033)	(0.029)	(0.028)	(0.034)	(0.105)	(0.111)	(0.102)	(0.065)	(0.076)
N	77	77	4,190	4,190	4,190	77	77	4,190	4,190	4,190
MF *v* MM	0.040	0.000***	-0.071**	-0.070*	-0.044	4.945***	5.720***	0.248	0.176*	-0.027
	(0.040)		(0.035)	(0.037)	(0.053)	(0.230)	(0.183)	(0.212)	(0.104)	(0.177)
N	25	25	204	204	204	25	25	204	204	204
FM *v* FF	0.095	0.095	0.057	0.049	0.028	5.345***	5.471***	-0.151	-0.141	-0.292
	(0.066)	(0.066)	(0.067)	(0.064)	(0.054)	(0.201)	(0.175)	(0.214)	(0.132)	(0.206)
N	21	21	174	174	174	21	21	174	174	174

Note: table continued on next page.

Table 4—continued from previous page

	P(Poor=1)					ln(TotExp)				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Portfolio *v* control	Before	After	Raw Δ	Cond Δ	DiD	Before	After	Raw Δ	Cond Δ	DiD
Joiners M (FM&IM *v* FF&MM)	0.118***	0.099***	0.042	0.034	-0.022	4.785***	5.219***	-0.302***	-0.089	0.007
	(0.026)	(0.024)	(0.027)	(0.026)	(0.036)	(0.091)	(0.083)	(0.115)	(0.070)	(0.090)
N	161	161	608	608	608	161	161	608	608	608
Leavers M (MF&MI *v* FF&MM)	0.112***	0.112***	0.046	0.040	0.014	4.925***	5.755***	0.036	-0.005	0.021
	(0.034)	(0.034)	(0.031)	(0.029)	(0.048)	(0.114)	(0.118)	(0.134)	(0.080)	(0.100)
N	89	89	464	464	464	89	89	464	464	464

Note: this table gives means and estimates of the effect of transitioning as household to/from informality. Groups are defined by their state across the transition gap, so for someone who is always formal (FF), always informal (II), always mixed (MM), and permutations thereof. Columns (1)&(2) provide the raw means for each portfolio group, in the respective time. Columns (3)&(4) provide the gap relative to their respective 'control groups' estimated as a simple intercept shift using ordinary least squares (OLS). For columns (4)&(5) the estimates are conditional on household size, share of secondary school leavers, and 'real-time' fixed effects. Columns (5) are estimated using a household fixed effects model. The data are stacked on a dimensionless 'transition time' that is the gap in time between period 0 & 1, but naturally this duplicates observations in 'real time' in wave 2 in 2012. Errors are clustered at the household level.

Source: authors' compilation based on LSMS-ISA data.

Table 5: Poverty, log total expenditure, by status and transition, Tanzania 2012–14

			P(Poor=1)							
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
LHS	Before	After	Raw Δ	Cond Δ	DiD	Before	After	Raw Δ	Cond Δ	DiD
II *v* FF	0.118***	0.074**	-0.029	-0.075	0.143	1.193***	1.471***	0.041	0.271**	-0.189
	(0.039)	(0.032)	(0.113)	(0.107)	(0.225)	(0.073)	(0.079)	(0.200)	(0.123)	(0.386)
N	68	68	144	144	144	68	68	144	144	144
FI *v* FF	0.125	0.000***	-0.063	-0.065	0.014	1.476***	1.695***	0.294	0.321	-0.004
	(0.085)		(0.120)	(0.128)	(0.217)	(0.145)	(0.122)	(0.224)	(0.195)	(0.369)
N	16	16	40	40	40	16	16	40	40	40
IF *v* II	0.286**	0.000***	0.018	-0.016	-0.026	1.232***	2.019***	0.334	0.489***	-0.031
	(0.101)		(0.123)	(0.117)	(0.228)	(0.199)	(0.106)	(0.233)	(0.173)	(0.457)
N	21	21	50	50	50	21	21	50	50	50
FF *v* II	0.250	0.000***	0.029	0.075	-0.143	0.860*	1.723**	-0.041	-0.271**	0.189
	(0.250)		(0.113)	(0.107)	(0.225)	(0.379)	(0.382)	(0.200)	(0.123)	(0.386)
N	4	4	144	144	144	4	4	144	144	144
MI *v* MM	0.080	0.000***	0.040	0.041	-0.077	1.499***	1.546***	-0.275**	-0.285**	-0.335*
	(0.055)		(0.028)	(0.029)	(0.055)	(0.131)	(0.117)	(0.137)	(0.130)	(0.194)
N	25	25	84	84	84	25	25	84	84	84
IM *v* II	0.273**	0.000***	0.041	0.033	-0.294***	1.249***	1.698***	0.142	0.178*	0.442***
	(0.097)		(0.055)	(0.050)	(0.109)	(0.163)	(0.089)	(0.113)	(0.093)	(0.156)
N	22	22	180	180	180	22	22	180	180	180
MM *v* II	0.000***	0.000***	-0.096***	-0.094***	0.055	1.625***	1.969***	0.465***	0.485***	0.009
			(0.026)	(0.031)	(0.053)	(0.145)	(0.095)	(0.112)	(0.116)	(0.180)
N	17	17	170	170	170	17	17	170	170	170
MF *v* MM	0.000***	0.000***	0.000***	0.000***	0.000***	1.639***	2.078***	0.061	0.005	-0.161
						(0.171)	(0.233)	(0.162)	(0.124)	(0.204)
N	7	7	48	48	48	7	7	48	48	48
FM *v* FF	0.077	0.000***	-0.087	-0.127	0.028	1.741***	1.959***	0.559**	0.806***	0.056
	(0.077)		(0.120)	(0.133)	(0.220)	(0.183)	(0.153)	(0.229)	(0.186)	(0.368)
N	13	13	34	34	34	13	13	34	34	34

Note: table continued on next page.

Table 5—continued from previous page

	P(Poor=1)									
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
LHS	Before	After	Raw Δ	Cond Δ	DiD	Before	After	Raw Δ	Cond Δ	DiD
Joiners I (MI&FI *v* FF&MM)	0.098**	0.000***	0.025	0.031	-0.067	1.490***	1.604***	-0.154	-0.179	-0.228
	(0.047)		(0.033)	(0.037)	(0.069)	(0.097)	(0.085)	(0.120)	(0.119)	(0.185)
N	41	41	124	124	124	41	41	124	124	124
Leavers I (MF&IF *v* II&MM)	0.214**	0.000***	0.031	0.046	-0.152*	1.334***	2.034***	0.259**	0.161	0.203
	(0.079)		(0.044)	(0.045)	(0.089)	(0.157)	(0.096)	(0.113)	(0.102)	(0.176)
N	28	28	226	226	226	28	28	226	226	226
Joiners M (FM&IM *v* FF&MM)	0.200***	0.000***	0.076*	0.081*	-0.237**	1.432***	1.795***	-0.087	-0.055	0.126
	(0.069)		(0.042)	(0.045)	(0.092)	(0.128)	(0.081)	(0.126)	(0.132)	(0.194)
N	35	35	112	112	112	35	35	112	112	112
Leavers M (MF&MI *v* FF&MM)	0.062	0.000***	0.007	0.008	-0.014	1.529***	1.663***	-0.105	-0.095	-0.344*
	(0.043)		(0.032)	(0.034)	(0.063)	(0.108)	(0.110)	(0.128)	(0.122)	(0.189)
N	32	32	106	106	106	32	32	106	106	106

Note: this table gives means and estimates of the effect of transitioning as a household to/from informality. Groups are defined by their respective state across the transition gap, for someone who is always formal (FF), always informal (II), always mixed (MM), and permutations thereof. Columns (1)&(2) provide the raw means for each portfolio group, in the respective time. Columns (3)&(4) provide the gap relative to their respective 'control groups' estimated as a simple intercept shift using OLS. For Columns (4)&(5), the estimates are conditional on household size and share of secondary school leavers. Columns (5) apply a household fixed effects model. Errors are clustered at the household level. ***, **, and * indicate significance at the 1, 5, and 10 per cent critical level, respectively.

Source: authors' compilation based on LSMS-ISA data.

In a final step, we aim to more directly relate the dynamic switches to the findings in the cross-country cross-sectional analysis where we gained two insights. First, household head informality is as bad as a fully informal household income portfolio with regards to household welfare and vice versa for formality. Secondly, households with a mixed income portfolio are not worse off than fully formal households, and they are better off than fully informal households. To test whether our findings from the cross-sectional analysis also hold in the longitudinal context, we derive six hypotheses:

H1 Becoming a household with an informal head is as bad as becoming a fully informal household.

H2 Becoming a household with a formal head is as good as becoming a fully formal household.

H3 Households that diversify their income portfolio to a mixed one from previously being fully formal are not worse off than before.

H4 Households that diversify their income portfolio to a mixed one from previously being fully informal are better off than before.

H5 Diversified households who collapse their portfolio to formality will only do so if they are as well off as before.

H6 Diversified households who collapse their portfolio to informality will only do so if they are as well off as before.

Following advances in the difference-in-difference literature, we estimate these dynamics in difference in a 2x2 two-way fixed effects estimation setup as proposed by Goodman-Bacon (2018). We deal with the differential treatment timings by focusing solely on one-period 'hops' and 'stacking' the data on a timeless 'transition time'. We then estimate 2 as follows:

$$\mathrm{Y}_{i,t} = \alpha_i + \beta \mathrm{Post}_t + \delta \mathrm{Switcher} \times \mathrm{Post}_{i,t} + X'\gamma_{i,t} \tag{2}$$

where $Y_{i,t}$, the welfare outcome of household i in time t, is predicted by a time invariant indicator whether a household changes its income portfolio, *Switcher*, between t and t-1 and the dummy, *Post*, indicating the second time period in which a household is observed and the interaction of both indicators. δ is the coefficient of interest showing the effect of the household's change in status on its welfare. We also control for a vector of household time-varying characteristics, X (*viz.* household size and share with secondary schooling). Further controls used in the cross-sectional case, such as land ownership and female headship, were considered but ultimately deemed to be potential sources of collider bias in the dynamic setup, as the parameters would be identified only for those switching status. Those 'switchers' amongst the land and household head composition would therefore likely correlate with the switch in informal household status, expected to bias the estimates of the effect of interest.

With this setup, we automatically eliminate any time-invariant unobserved household characteristics that determine a household's welfare outcomes. However, the issue of selection remains. Imagine we compare households that are fully informal in $t-1$, and now we define those as switchers who change their income portfolio to mixed in t and continue to compare them to those who remain fully informal. It is likely that those who remain fully informal are fundamentally different from those switchers, for example because of higher risk aversion. We would thus not compare like with like. Therefore, we design our control group more carefully by exploiting different treatment timings. With three time periods, we can identify up to two switches for each household, and we can identify those households who never switch. These do not serve as good control for our switchers. Instead, we use those households who switch between the first two periods ('*early switchers*'). They serve as comparison to those households who move in the same direction but only between the last two periods ('*late switchers*'). We believe this is the most robust choice for exploring employment transition dynamics in an endogenous decision-making process.

More specifically, we look at the following switchers to test the hypotheses above:

H1 Fully formal household switched to fully informal

H2 Fully informal household switched to fully formal

H3 Fully formal household switched to mixed portfolio

H4 Fully informal household switched to mixed portfolio

H5 Mixed portfolio household switched to fully formal

H6 Mixed portfolio household switched to fully informal

The control groups are defined accordingly as those who switched early, while the treated are those who switched later (groups switching from period T1 to T2 are used as comparison for those moving from T2 to T3). While all our data sets are one round of a panel survey, because of inconsistencies in data collection over time for variables most relevant to our study, we can only use three waves of the Nigeria survey. Using a two-wave panel as available in Tanzania would not overcome the issue of selection, while it can be resolved with the above described strategy for Nigeria.

To illustrate how comparable early and late switcher households are in our sample, we present pre-switching balance statistics in Table 6. Each broad column shows the balance tests of one sample related to one specific hypothesis test. The table demonstrates that we compare statistically similar households based on their observable characteristics that we use as controls. We note, however, that especially when investigating switchers from formal to informal or mixed income portfolios, the sample is very small, especially for the control groups of early switchers. To confirm whether estimated effects are true or a result of low power, we will conduct randomization inference of the point estimates we obtain from the two-way fixed effects as a robustness check.

Table 7 reports the results of estimation (2); each cell represents the estimate for the δ parameter. The purpose of this estimation strategy is to ensure that any unobserved heterogeneity that may bias the estimates is cancelled out, as we focus our estimates on those who transition compared to those who transition in the same direction, in the following wave. This gives the average treatment effect on the treated, conditioning out the potential endogenous unobservables that influence the decision for a household to change its formality status. It is worthwhile remarking that when this is done, no comparison is found to be significant. That is, no transition is found to differently affect a household's welfare. The only transition subgroup for which we can detect any difference is those who move from full formality into a mixed portfolio. There we observe no change on the probability of being poor, but there is a decline in total expenditure of 32.6 per cent. This is consistent with the view that households may be subject to covariate shocks that may make their welfare decrease but by hedging household trade-off consumption levels to adjust to this change. However, households are not pushed into poverty by this move.

It is a stark finding that regardless of the other direction of transitions, there are no effects detected on household welfare measures. It is, however, worth bearing in mind that some of the cells of switchers are very small, which would put inference drawn from these estimates under suspicion, calling for a thorough inspection in this sense in the next section.

Table 6: Balance statistics of observable characteristics for six samples, Nigeria

	Early switchers		Late switchers		T-test
Variable	N	Mean	N	Mean	Difference
(a) Fully formal switched to fully informal					
Household size	20	5.550	140	6.336	-0.786
		(0.613)		(0.405)	
Share in household with secondary school	20	0.125	140	0.154	-0.029
		(0.061)		(0.025)	
(b) Fully informal switched to fully formal					
Household size	256	6.047	128	4.719	1.328***
		(0.254)		(0.255)	
Share in household with secondary school	256	0.143	128	0.157	-0.014
		(0.017)		(0.028)	
(c) Fully formal switched to mix					
Household size	12	5.333	72	5.681	-0.347
		(0.225)		(0.350)	
Share in household with secondary school	12	0.111	72	0.134	-0.023
		(0.060)		(0.031)	
(d) Fully informal switched to mix					
Household size	388	5.912	168	6.113	-0.201
		(0.132)		(0.299)	
Share in household with secondary school	388	0.133	168	0.134	-0.001
		(0.013)		(0.019)	
(e) Mix to fully formal					
Household size	16	7.125	84	6.238	0.887
		(1.056)		(0.278)	
Share in household with secondary school	16	0.158	84	0.159	-0.001
		(0.070)		(0.031)	
(f) Mix to fully informal					
Household size	52	5.962	204	5.936	0.025
		(0.537)		(0.199)	
Share in household with secondary school	52	0.158	204	0.130	0.029
		(0.044)		(0.017)	

Note: the value displayed for t-tests are the differences in the means across the groups. Standard errors are below in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 per cent critical level, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table 7: Difference-in-difference estimates for switchers, Nigeria

LHS	P(Poor=1)	ln(TotExp)
Fully formal switched to fully informal (H1)	-0.048	0.145
	(0.034)	(0.212)
N	160	160
Fully informal switched to fully formal (H2)	0.004	-0.074
	(0.050)	(0.111)
N	384	384
Fully formal switched to mix (H3)	0.059	-0.395**
	(0.044)	(0.176)
N	84	84
Fully informal switched to mix (H4)	-0.027	-0.090
	(0.044)	(0.108)
N	556	556
Mix to fully formal (H5)	-0.055	-0.180
	(0.054)	(0.249)
N	100	100
Mix to fully informal (H6)	-0.051	0.107
	(0.069)	(0.146)
N	256	256

Note: each cell in this table represents the estimate of the δ parameter from (2). The functional form presented controls for year fixed effects, household size, and the share of household members with secondary schooling. Standard errors are clustered at the household level. *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

6.2 Robustness: randomization inference

A concern that may be raised with respect to our strictest estimation sample groups is that we are attempting to draw inference from small sample sizes. Inherently, the lack of statistical significance in the estimated effects may simply be because of the lack of statistical power available in the data.

In order to mitigate this concern, we adopt randomization inference to obtain the null set bounds from the Fisher exact test (Fisher 1935) as recently popularized by Young (2018). We implement it using `ritest` by Heß (2017) in Stata. In short, the underlying intuition behind the approach is simple. We do not know the sampling distribution to our point estimate. But perhaps we can estimate the exact bounds of the null hypothesis that the estimated point estimate is exactly zero. We randomize a notional treatment constrained to the same proportion as one of our switches, and we then estimate a regression with the same functional form as in specification (2). As the switch is randomly allocated, there is no information, and any point estimate obtained will be spurious. This procedure is repeated 1,000 times. We then take the 1,000 estimates of the point estimates for our spurious treatments and can construct an exact p-value for our estimate being in the null set. This is given as the ratio of estimates whose values are as extreme as the one we estimated with the real transition in Table 7 over the number of randomized permutation regressions estimated. Note that these bounds may be made as arbitrarily narrow as desired by increasing the number of spurious regressions permuted. One can obtain the 95 per cent exact internal null bounds of the treatment by estimating the 5th and 95th percentiles of the permuted null estimates. Table 8 reports the results of this exercise. Note that the point estimate remains unchanged as before, but we now report the exact test p-value from the exercise, as well as the intervals from our 1,000 permutations. It is notable that our results stand; that is, there are no significant differences in welfare across any group as a result of their transition. This stark finding suggests that households are able to effectively hedge their positions by transitioning.

Table 8: Difference-in-difference estimates for switchers, Nigeria 2010–15 with randomized inference

LHS	P(Poor=1)	ln(TotExp)
Fully formal switched to fully informal (H1)	-0.048	0.145
(RI p-val)	(0.604)	(0.455)
95% null CI	-0.173–0.176	-0.315–0.303
Fully informal switched to fully formal (H2)	0.004	-0.074
(RI p-val)	(0.928)	(0.395)
95% null CI	-0.074–0.082	-0.131–0.143
Fully formal switched to mix (H3)	0.059	-0.395
(RI p-val)	(0.600)	(0.120)
95% null CI	-0.220–0.230	-0.459–0.400
Fully informal switched to mix (H4)	-0.027	-0.090
(RI p-val)	(0.513)	(0.224)
95% null CI	-0.064–0.061	-0.119–0.123
Mix to fully formal (H5)	-0.055	-0.180
(RI p-val)	(0.590)	(0.408)
95% null CI	-0.197–0.204	-0.385–0.349
Mix to fully informal (H6)	-0.051	0.107
(RI p-val)	(0.432)	(0.399)
95% null CI	-0.106–0.113	-0.216–0.197

Note: each cell in this table represents the estimate of the δ parameter from (2); these point estimates are identical to those presented in Table 7. However, in contrast to the small sample statistics, the p-value and confidence interval (CI) presented here are the results of randomization inference with 1,000 replications. We randomize the switcher status across the whole population constrained to the proportion obtained in the data. As the switch is allocated at random, any estimates obtained should be considered to be spurious, and so the intuition behind the Fisher exact test is that we have effectively estimated the null set bounds. The functional form presented controls for year fixed effects, household size, and the share of household members with secondary schooling. The p-value obtained gives the probability to accept the Fisher exact test. It represents the ratio of realized random treatments for which the observed value is at least as extreme as that which was estimated/number of replications. The confidence intervals represent the 5th and 95th percentile estimates of the sharp null set, as estimated from 1,000 replications of the randomized inference. *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

7 Conclusions

In this article, we proposed a new measure of informality at the household level, which allows for income pooling, and we assessed how the depth of informality relates to household welfare in five sub-Saharan African countries.

First, using the cross-sectional urban data in five countries, we exploit variation in the level of informal wage employment composition in the household to describe how the depth of informality correlates with poverty or consumption levels, explicitly comparing it to a simplified measure of the household head's formality status. The cross-sectional results point at important welfare effects of social protection access not just for the workers themselves but for their households as a whole. A small share of formal income can already make a household as well off as a fully formally earning household. Using only the formality status of the household head obscures this mechanism.

Second, we explored how changes in the depth of informality over time influence household welfare by exploiting three waves of urban-level panel data for one country, Nigeria. This approach allowed control of unobserved characteristics and selection. The evidence from the longitudinal analysis is stark. The headline estimates are found to be approximately half of those found from cross-sectional regressions. When breaking down these estimates and applying a two-way fixed effects estimation strategy, we find that there are few significant effects on household welfare from changes in formality profiles. The only estimates found to be significant came from non-moving households (i.e. comparing always informal versus always formal portfolios), suggesting that unobserved characteristics play a large role in the

estimates found in the cross-sectional analysis. Furthermore, comparing transition groups who moved with those who had moved in the previous wave, we find that there is no evidence of any household welfare effects. The transition cell sizes are small in the sample, and these may cast aspersions on inference drawn from these estimates. In order to mitigate this concern, we employ randomization inference on our point estimates and find that all of the estimates presented fall within the null bounds, suggesting that we have precisely defined zero effects.

Our results thus go in line with the literature that inspects the role of institutionalization of protective measures for the informal economy and to those that argue for both vertical and horizontal extensions of social protection systems. The fact that household welfare is the same for households with even a small share of their income generated from work, which is covered by health insurance and/or pension as households that earn all income from such a protected job, is suggestive of the potential for social protection to reach beyond the direct beneficiary. In terms of policy, this suggests that the extension of social insurance coverage through changes in its design better adapted to people that are uncovered should not be ignored as a policy tool—at least in urban areas. For extending coverage options, we see a strong role for national as well as local authorities to provide the right regime setups at the sectoral and/or local level to make this instrument more accessible in SSA.

Lastly, we highlight a few avenues for future research. First, urban areas in SSA have a particular labour market setting, and we can only portrait a single point in time for our comparative analysis. Future research should inspect longitudinal data for more countries in the region as well as in other geographies to better appreciate differential trends in the depth of informality and the power of social protection coverage to alter welfare at the household level. Second, we believe our research could be extended in future contributions to labor force surveys—having greater information on employment and status sectors—or ad-hoc informality surveys. Future research should question whether the results are different within the full spectrum of the informal economy not visible with the data at hand. For example, an interesting question is whether an individual employment type (i.e. dependent on sectoral collective agreements or not) changes the relative effect of the depth of informality at the household level. Moreover, whether a person is a wage worker or self-employed for the majority of the year could give further nuances of the availability of schemes for protecting the self-employed in a country under analysis. Third, in the longitudinal analysis, we account for transitioning in some form of household employment status, not directly modelling intra-household dynamics and assuming a neoclassical model of common preferences (Thomas 1990). We could expect that heterogeneity in outcomes may be partly explained by bargaining decisions, so future research could bring further nuances in the understanding of household dynamics. We believe that a longer longitudinal study would be better suited to model intra-household dynamics and test hypotheses at the household level. Lastly, we show that a real change to well-being only occurs when a member can substantially benefit according to her trajectory, and we could also expect that this might be different between young or more senior workers (in terms of income-generating capacity, ability, or experience acquired, which thus influence the overall household material well-being and consumption). It would be interesting to model the trade-offs in these decisions through longitudinal data that can be disaggregated further by worker types within the same household.

References

Alaniz, E., Gindling, T. H., Mata, C., and Rojas, D. (2020). 'Transforming Informal Work and Livelihoods in Costa Rica and Nicaragua'. WIDER Working Paper 2020/100. Helsinki: UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2020/857-3

Attanasio, O., and Lechene, V. (2002). 'Tests of Income Pooling in Household Decisions'. *Review of Economic Dynamics*, 5(4): 720–48. https://doi.org/10.1006/redy.2002.0191

Bertrand, M., Duflo, E., and Mullainathan, S. (2004). 'How Much Should We Trust Differences-In-Differences Estimates?' *The Quarterly Journal of Economics*, 119(1): 249–75. https://doi.org/10.1162/003355304772839588

Bhorat, H., Kanbur, R., and Stanwix, B. (2014). 'Estimating the Impact of Minimum Wages on Employment, Wages, and Non-Wage Benefits: The Case of Agriculture in South Africa'. *American Journal of Agricultural Economics*, 96(5): 1402–19. https://doi.org/10.1093/ajae/aau049

Bosch, M., and Maloney, W. (2010). 'Comparative Analysis of Labor Market Dynamics Using Markov Processes: An Application to Informality'. *Labour Economics*, 17(4): 621–31. https://doi.org/10.1016/j.labeco.2010.01.005

Brown, C., and van de Walle, D. (2020, April). 'Headship and Poverty in Africa'. Working Paper 531. Washington, DC: Center for Global Development. Available at: https://ideas.repec.org/p/cgd/wpaper/531.html

Danquah, M., Schotte, S., and Sen, K. (2019). 'Informal Work in Sub-Saharan Africa. Dead End or Stepping Stone?'. WIDER Working Paper 2019/107. Helsinki: United Nations University World Institute for Development Economics Research. https://doi.org/10.35188/UNU-WIDER/2019/743-9

Degroote, S., Ridde, V., and De Allegri, M. (2019). 'Health Insurance in Sub-Saharan Africa: A Scoping Review of the Methods Used to Evaluate its Impact'. *Applied Health Economics and Health Policy*, 18(-): 825–40. https://doi.org/10.1007/s40258-019-00499-y

Dercon, S. (2002). 'Income Risk, Coping Strategies, and Safety Nets'. *World Bank Research Observer*, 17(2): 141–66. https://doi.org/10.1093/wbro/17.2.141

De Weerdt, J., and Dercon, S. (2006, December). 'Risk-Sharing Networks and Insurance Against Illness'. *Journal of Development Economics*, 81(2): 337–56. https://doi.org/10.1016/j.jdeveco.2005.06.009

Elgin, C., and Birinci, S. (2016). 'Growth and Informality: A Comprehensive Panel Data Analysis'. *Journal of Applied Economics*, 19(2): 271–92. https://doi.org/10.1016/S1514-0326(16)30011-3

Ferreira, F. H. G., Chen, S., Dabalen, A., Dikhanov, Y., Hamadeh, N., Jolliffe, D., Narayan, A., Prydz, E. B., Revenga, A., Sangraula, P., Serajuddin, U., and Yoshida, N. (2016). 'A Global Count of the Extreme Poor in 2012: Data Issues, Methodology and Initial Results'. *The Journal of Economic Inequality*, 14(2): 141–72. https://doi.org/10.1007/s10888-016-9326-6

Fisher, R. (1935). *The Design of Experiments. 1935*. Edinburgh: Oliver and Boyd.

Gong, X., van Soest, A., and Villagomez, E. (2004). 'Mobility in the Urban Labor Market: A Panel Data Analysis for Mexico'. *Economic Development and Cultural Change*, 53(1): 1–36. https://doi.org/10.1086/423251

Goodman-Bacon, A. (2018). 'Difference-in-Differences with Variation in Treatment Timing'. NBER Working Paper Series 25018. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w25018

Government of Malawi (2018). *Malawi National Social Support Programme II (MNSSP II).* Available at: https://socialprotection.org/discover/publications/malawi-national-social-support-programme-mnssp-ii

Hamer, S., and Seekings, J. (2017). 'Social Protection, Electoral Competition, and Political Branding in Malawi'. WIDER Working Paper 2017/99. Helsinki: UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2017/323-3

Heß, S. (2017). 'Randomization Inference with Stata: A Guide and Software'. *The Stata Journal*, 17(3): 630–51. https://doi.org/10.1177/1536867X1701700306

ICLS15 (1993). *Statistics of Employment in the Informal Sector, ICLS/15/III.* Geneva: Fifteenth International Conference of Labour Statistics. Available at: www.ilo.org/public/libdoc/ilo/1992/92B09_385_engl.pdf

ICLS17 (2003). *General Report, Report I, ICLS/17/2003/I.* Geneva: Seventeenth International Conference of Labour Statistics. Available at: www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/meetingdocument/wcms_087585.pdf

ISSA (2019). *Ten Global Challenges for Social Security: Developments and Innovation.* Geneva: International Social Security Association. Available at: https://ww1.issa.int/sites/default/files/documents/publications/2-10-challenges-Global-2019-WEB-263629.pdf

Maloney, W. F. (1999). 'Does Informality Imply Segmentation in Urban Labor Markets? Evidence from Sectoral Transitions in Mexico'. *The World Bank Economic Review*, 13(2): 275–302.

https://doi.org/10.1093/wber/13.2.275
Niño-Zarazua, M., Barrientos, A., Hickey, S., and Hulme, D. (2012). 'Social Protection in Sub-Saharan Africa: Getting the Politics Right'. *World Development*, 40(1): 163–76. https://doi.org/10.1016/j.worlddev.2011.04.004
OECD and ILO (2019). *Tackling Vulnerability in the Informal Economy*. Paris: OECD and International Labour Organization Publishing. https://doi.org/10.1787/939b7bcd-en
OECD et al. (2002). *Measuring the Non-Observed Economy: A Handbook*. Paris: OECD Publishing. https://doi.org/10.1787/9789264175358-en
Riedel, E. (2007). *Social Security as a Human Right*. Berlin: Veroffentlichungen des Instituts fur Deutsches, Europaisches und Internationales Medizinrecht, Gesundheitsrecht und Bioethik der Universitaten Heidelberg und Mannheim, Springer. https://doi.org/10.1007/978-3-540-31469-1
Thomas, D. (1990). 'Intra-Household Resource Allocation: An Inferential Approach'. *The Journal of Human Resources*, 25(4): 635–64. https://doi.org/10.2307/145670
Ulriksen, M. S. (2016). 'Ideational and Institutional Drivers of Social Protection in Tanzania'. WIDER Working Paper 142/2016. Helsinki, Finland: UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2016/186-4
Young, A. (2018). 'Channeling Fisher: Randomization Tests and the Statistical Insignificance of Seemingly Significant Experimental Results'. *The Quarterly Journal of Economics*, 134(2): 557–98. https://doi.org/10.1093/qje/qjy029

Appendix

Table A1: Informal household head regressions, Ethiopia

	ln(ExpPC)	P(Poor=1)
Informal HH head	-0.056	0.059*
	(0.045)	(0.034)
Household size	-0.073***	0.037***
	(0.011)	(0.008)
Female head	-0.216***	0.091***
	(0.040)	(0.028)
Age of household head	-0.001	0.000
	(0.001)	(0.001)
Owns land	-0.156***	0.047
	(0.058)	(0.043)
Share of HH members with secondary schooling	0.493***	-0.261***
	(0.068)	(0.043)
R^2	0.38	0.24
N	1,579	1,635
Geog FEs	yes	yes
Distance FEs	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A2: Informal depth regressions, Ethiopia

	ln(ExpPC) Sh Inf Inc (SocProt Based)	ln(ExpPC) Sh FTE Inf (SocProt Based)	P(Poor=1) Sh Inf Inc (SocProt Based)	P(Poor=1) Sh FTE Inf (SocProt Based)
0–50% informal	0.176***	-0.041	-0.113**	-0.007
	(0.064)	(0.071)	(0.047)	(0.047)
51–99% informal	0.103*	-0.042	-0.036	0.045
	(0.056)	(0.054)	(0.045)	(0.039)
Household size	-0.075***	-0.074***	0.040***	0.039***
	(0.011)	(0.011)	(0.008)	(0.008)
Female head	-0.223***	-0.218***	0.091***	0.093***
	(0.041)	(0.040)	(0.029)	(0.028)
Age of household head	-0.001	-0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Owns land	-0.164***	-0.154***	0.048	0.045
	(0.059)	(0.058)	(0.044)	(0.043)
Share of HH members with secondary schooling	0.519***	0.505***	-0.281***	-0.262***
	(0.069)	(0.069)	(0.044)	(0.043)
R^2	0.37	0.38	0.24	0.24
N	1,496	1,579	1,548	1,635
Geog FEs	yes	yes	yes	yes
Distance FEs	yes	yes	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A3: Informal household head regressions, Malawi

	ln(ExpPC)	P(Poor=1)
Informal HH head	-0.310***	0.084***
	(0.042)	(0.017)
Household size	-0.130***	0.044***
	(0.010)	(0.006)
Female head	-0.008	0.035
	(0.041)	(0.023)
Age of household head	-0.001	0.001
	(0.001)	(0.001)
Owns land	-0.174***	0.079***
	(0.046)	(0.029)
Share of HH members with secondary schooling	0.905***	-0.128***
	(0.061)	(0.026)
R^2	0.48	0.26
N	2,230	2,230
Geog FEs	yes	yes
Distance FEs	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A4: Informal depth regressions, Malawi

	ln(ExpPC) Sh Inf Inc (SocProt Based)	ln(ExpPC) Sh FTE Inf (SocProt Based)	P(Poor=1) Sh Inf Inc (SocProt Based)	P(Poor=1) Sh FTE Inf (SocProt Based)
0–50% informal	0.030	0.092	-0.065**	-0.083***
	(0.082)	(0.066)	(0.029)	(0.025)
51–99% informal	-0.300***	-0.284***	0.048*	0.059***
	(0.078)	(0.053)	(0.028)	(0.021)
Household size	-0.135***	-0.134***	0.046***	0.045***
	(0.010)	(0.010)	(0.006)	(0.006)
Female head	-0.013	-0.004	0.031	0.034
	(0.039)	(0.041)	(0.023)	(0.023)
Age of household head	0.000	-0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Owns land	-0.159***	-0.164***	0.073**	0.075***
	(0.045)	(0.046)	(0.029)	(0.029)
Share of HH members with secondary schooling	0.876***	0.867***	-0.103***	-0.115***
	(0.061)	(0.061)	(0.027)	(0.026)
R^2	0.49	0.48	0.27	0.26
N	2,153	2,230	2,153	2,230
Geog FEs	yes	yes	yes	yes
Distance FEs	yes	yes	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A5: Informal household head regressions, Niger

	ln(ExpPC)	P(Poor=1)
Informal HH head	-0.212***	0.096***
	(0.047)	(0.031)
Household size	-0.042***	0.020***
	(0.006)	(0.006)
Female head	0.023	0.029
	(0.049)	(0.046)
Age of household head	0.000	0.000
	(0.001)	(0.001)
Owns land	0.015	0.013
	(0.055)	(0.051)
Share of HH members with secondary schooling	0.799***	-0.297***
	(0.085)	(0.064)
R^2	0.39	0.21
N	1,286	1,286
Geog FEs	yes	yes
Distance FEs	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A6: Informal depth regressions, Niger

	ln(ExpPC) Sh Inf Inc (SocProt Based)	ln(ExpPC) Sh FTE Inf (SocProt Based)	P(Poor=1) Sh Inf Inc (SocProt Based)	P(Poor=1) Sh FTE Inf (SocProt Based)
0–50% informal	0.056	0.083	-0.092	-0.103**
	(0.090)	(0.071)	(0.072)	(0.049)
51–99% informal	-0.163*	-0.159***	0.040	0.062
	(0.083)	(0.060)	(0.072)	(0.045)
Household size	-0.042***	-0.043***	0.020***	0.020***
	(0.006)	(0.006)	(0.007)	(0.006)
Female head	0.017	0.017	0.030	0.031
	(0.049)	(0.049)	(0.046)	(0.046)
Age of household head	-0.001	-0.000	0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)
Owns land	0.022	0.023	0.006	0.006
	(0.055)	(0.055)	(0.051)	(0.051)
Share of HH members with secondary schooling	0.746***	0.760***	-0.271***	-0.269***
	(0.089)	(0.087)	(0.066)	(0.065)
R^2	0.40	0.40	0.21	0.22
N	1,263	1,286	1,263	1,286
Geog FEs	yes	yes	yes	yes
Distance FEs	yes	yes	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A7: Informal household head regressions, Nigeria

	ln(ExpPC)	P(Poor=1)
Informal HH head	-0.269***	0.060**
	(0.057)	(0.028)
Household size	-0.107***	0.032***
	(0.010)	(0.007)
Female head	-0.044	0.031
	(0.050)	(0.027)
Age of household head	-0.000	0.000
	(0.001)	(0.001)
Owns land	-0.020	-0.014
	(0.059)	(0.037)
Share of HH members with secondary schooling	0.466***	-0.055
	(0.079)	(0.034)
R^2	0.41	0.21
N	1,210	1,210
Geog FEs	yes	yes
Distance FEs	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A8: Informal depth regressions, Nigeria

	ln(ExpPC) Sh Inf Inc (SocProt Based)	ln(ExpPC) Sh FTE Inf (SocProt Based)	P(Poor=1) Sh Inf Inc (SocProt Based)	P(Poor=1) Sh FTE Inf (SocProt Based)
0–50% informal	-0.070	-0.006	-0.022	0.025
	(0.094)	(0.087)	(0.030)	(0.039)
51–99% informal	-0.304***	-0.270***	0.049*	0.076**
	(0.090)	(0.074)	(0.029)	(0.032)
Household size	-0.108***	-0.108***	0.033***	0.032***
	(0.011)	(0.010)	(0.007)	(0.007)
Female head	-0.026	-0.042	0.030	0.030
	(0.051)	(0.050)	(0.028)	(0.027)
Age of household head	-0.001	-0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Owns land	-0.005	-0.014	-0.025	-0.016
	(0.058)	(0.059)	(0.036)	(0.037)
Share of HH members with secondary schooling	0.436***	0.450***	-0.037	-0.051
	(0.084)	(0.080)	(0.036)	(0.034)
R^2	0.42	0.41	0.22	0.21
N	1,156	1,210	1,156	1,210
Geog FEs	yes	yes	yes	yes
Distance FEs	yes	yes	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A9: Informal household head regressions, Tanzania

	ln(ExpPC)	P(Poor=1)
Informal HH head	-0.352***	0.036**
	(0.084)	(0.016)
Household size	-0.062***	0.014**
	(0.019)	(0.007)
Female head	-0.072	0.036**
	(0.059)	(0.018)
Age of household head	-0.000	0.002**
	(0.002)	(0.001)
Owns land	0.151*	0.000
	(0.085)	(0.024)
Share of HH members with secondary schooling	0.306**	0.051
	(0.129)	(0.043)
R^2	0.39	0.17
N	537	537
Geog FEs	yes	yes
Distance FEs	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.

Table A10: Informal depth regressions, Tanzania

	ln(ExpPC) Sh Inf Inc (SocProt Based)	ln(ExpPC) Sh FTE Inf (SocProt Based)	P(Poor=1) Sh Inf Inc (SocProt Based)	P(Poor=1) Sh FTE Inf (SocProt Based)
0–50% informal	0.123	0.199	0.016	0.013
	(0.146)	(0.136)	(0.023)	(0.024)
51–99% informal	-0.283**	-0.252*	0.047**	0.047**
	(0.141)	(0.129)	(0.022)	(0.022)
Household size	-0.062***	-0.060***	0.013**	0.014**
	(0.019)	(0.019)	(0.007)	(0.006)
Female head	-0.080	-0.063	0.038**	0.036**
	(0.058)	(0.058)	(0.018)	(0.018)
Age of household head	-0.000	-0.000	0.002**	0.002**
	(0.002)	(0.002)	(0.001)	(0.001)
Owns land	0.129	0.113	0.000	0.001
	(0.081)	(0.081)	(0.025)	(0.025)
Share of HH members with secondary schooling	0.270**	0.283**	0.056	0.057
	(0.131)	(0.132)	(0.044)	(0.045)
R^2	0.40	0.41	0.17	0.17
N	526	537	526	537
Geog FEs	yes	yes	yes	yes
Distance FEs	yes	yes	yes	yes

Note: *, **, and *** indicate statistical significance at 1, 5, and 10 per cent, respectively.

Source: authors' compilation based on LSMS-ISA data.