Khan, Rumman; Morrissey, Oliver

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Abstract

We use six waves of national household surveys in Uganda, from 1992/3 to 2012/13, to study income diversification by households for a period of two decades during which the country saw sustained economic growth and poverty reduction. The income sources are agriculture (farming), agricultural wage, self-employment (informal), wage employment and remittances. We present estimates based on data from the individual surveys pooled and then, to capture dynamics and go some way towards addressing endogeneity, we provide estimates from a pseudo-panel. We find that households with more diversified income sources tend to lower consumption welfare, indicating diversification has mainly been due to push factors (the need for income pushing people into low earning activities). This is because much of the diversification has been into the agricultural wage sector, particularly amongst the poorest households who have also experienced reductions in remittances. Welfare (in terms of adult equivalent expenditure) is higher for households engaged in the non-agricultural wage sector, but growth in wage employment has been very low. This is one of the first studies to look at household welfare and income diversification at the national level (rural and urban) over such an extended period of time.

JEL Classification: I39, O12, O55

Keywords: Income diversification, Household welfare, Uganda

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Outline

The Authors

Dr Khan is a CREDIT Research Fellow (rumman.khan2@nottingham.ac.uk) and Professor Morrissey is Director of CREDIT (oliver.morrissey@nottingham.ac.uk), both in the School of Economics, University of Nottingham.

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Income Diversification and Household Welfare in Uganda 1992-2012

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1 Introduction

Over the two decades from 1990, Uganda sustained economic growth and reductions in poverty. The $1.90-a-day poverty measure reported by the World Bank (*PovcalNet*) indicates a halving of the headcount rate between 1992 and 2012, from 71% to 36%. Kakande (2010: 237-8) reports that headcount poverty according to the national poverty line fell from 56% in 1992 to 31% in 2006. Over the period 1992-2012, growth in GDP per capita averaged 3.6% per annum, resulting in a doubling of average real incomes. Growth and poverty reduction have not been uniform: the Central region (including Kampala) has fared much better than the country as a whole, while the Northern region (which experienced conflict for much of the period) has fared badly, with little if any reduction in poverty. The reduction in poverty and sustained growth in incomes were driven by the rural sector in the 1990s, mainly from coffee production in the first half of the decade and food crops in the latter half (Appleton, 2001), but has been more balanced since 2004. However, growth was low during 2000-03, poverty and inequality increased, and real consumption declined for all but the richest households. Adult equivalent household consumption only increased, at rates typically below 2% per annum over 2000-03, for the richest (in consumption terms) quintile of households; consumption declined by 1-2% per annum for households below the 80th percentile, and for most urban households except the very richest (Kappel, Lay & Steiner, 2005: 30-2).

Trends in poverty rates differ according to the sector in which the (head of) household is employed, with considerably higher poverty amongst agricultural (especially food crop) households compared to those in manufacturing or services. However, sector-level analysis is limited because 'it does not consider the composition of household income' (Kappel *et al*, 2005: 37), except perhaps for some consideration of the main sector of activity of the household head. The analysis here addresses this concern by considering five sources of household income - remittances and four types of labour income. A source is allocated to households if at least one member engages in the activity, and if remittances are received; income diversification is a count of the number of sources the household receives. Sensitivity analysis is conducted for an alternative measure allowing for individual members deriving income from more than one activity.

There are three novel elements to this paper. First, we examine trends in household welfare measured in terms of consumption (adult equivalent expenditure) across two decades with six surveys at the national level (all four regions with rural and urban households). Second, we examine the effect of diversification of income sources on household welfare, considering five sources of household income: remittances, and four relating to labour – agriculture (farming); agricultural (off-farm) wage; non-agricultural self-employment; and non-agricultural wage. Third, we complement estimates from pooled data from the six household surveys with estimates using specially constructed pseudo-panels to track representative households over the entire period.

A particular challenge in investigating household welfare or poverty over two decades is that there is no readily available deflator or poverty line in constant prices. The basket of goods used to calculate the national poverty line for each survey has changed over time (rendering

long-run comparisons difficult). Even if a constant price national line was available, it could not readily be applied to households in different regions as spatial prices (and consumption baskets) vary. Furthermore, many relevant prices or costs are not available. There is qualitative evidence that 'disposable household incomes were increasingly outstripped by needs' (Kakande, 2010: 239), such as spending on health and user fees for public services. Rather than using poverty, household welfare is measured here in terms of consumption. The descriptive analysis presents relative household welfare, in comparison with national mean consumption levels for the relevant survey year. The econometric analysis includes region, location (urban or rural), and year fixed effects as a means of accounting for spatial price variations (cohort fixed effects in the pseudo-panel).

The paper analyses the evolution of diversification of sources of household incomes and the association with household welfare using six Ugandan national household surveys over 1992 to 2013: 1992/93, 1999/00, 2002/03, 2005/06, 2009/10 and 2012/13. Section 2 provides a brief overview of related literature on diversification, and trends in incomes in Uganda. Section 3 discusses the data and how the measure of income diversification is constructed, with some descriptive statistics of the evolution of relative household welfare over of the period of study (more details in Appendix B). Section 4 presents the empirical model and estimates of the relationship between income diversification and household welfare, including details on constructing the pseudo-panel. Section 5 concludes with a summary and directions for further research.

2 Diversification of Sources of Income

Existing literature on income diversification tends to have a specific focus, such as increases in non-farm activities in rural areas (e.g., Reardon, Berdegué, Barrett & Stamoulis, 2007), or the emergence of household enterprises in urban areas (e.g., Fox & Sohnesen, 2012). There is a large literature on the effect of diversity of income sources for rural households, some focussing primarily on on-farm crop diversification (e.g., Kurosaki, 2003; McNamara & Weiss, 2005; Rahman, 2009) and others considering off-farm opportunities, typically in terms of two categories - farm and nonfarm activities (e.g., Reardon, Delgado & Matlon, 1992; Reardon, 1997; Ellis, 1998; Bryceson 2000; Block & Webb 2001; Davis *et al*, 2010). Davis, Di Guiseppe & Zezza (2017) do consider patterns of household engagement in agricultural wage, non-agricultural self-employment and wage, for a large number of countries, focusing on Sub-Saharan Africa (including Uganda). However: i) the analysis is restricted to rural households; ii) they only consider the activities that are the primary source of household income; iii) household welfare is not addressed; and iv) the Ugandan data are only for 2005/06 and 2009/10. Consequently, Davis *et al* (2017) do not address the effects of diversification of income sources on welfare over a long period.

Some literature, especially on increased opportunities in the non-farm sector, is primarily concerned with the potential to alleviate poverty (Reardon & Taylor, 1996; Ellis, 2000; Barrett, Reardon & Webb, 2001). There is little evidence that rural nonfarm employment reduces poverty, as the low-skilled (especially females) cannot access high paying jobs, although such opportunities may prevent incomes declining further for the poor (Lanjouw, 2007). Van de Walle & Cratty (2003) argue that a focus on sources of income (rather than patterns of expenditure) may better capture how a household is affected by changes in the economic environment by indicating the opportunities (a growing nonfarm sector in their case) that permit greater expenditure. This suggests the desirability of investigating how income diversification has changed for types of households over a reasonably long period.

Household-based business activities have become an important source of non-agricultural income diversification in urban areas. Fox & Sohnesen (2012) define household enterprises (HEs) as own-account enterprises in non-agricultural sectors that may employ family members (microenterprises are defined as employing at least one non-family member); in broad terms HE 'owners' correspond to individuals recorded as self-employed without employees in labour force surveys (although the two categories can differ). Analysis of eight SSA countries (including Uganda for 2005/06) finds that household enterprises generated most new jobs outside agriculture, even where there was relatively rapid growth in private non-farm wage jobs. On average, they account for a fifth of the national labour force: HE owners accounted for 19.8% of employed labour in Uganda and for over half of these the HE was the primary employment (Fox & Sohnesen, 2012: Table 8, p. 41). Earnings appear good: HE in Uganda had a greater marginal effect on household consumption than private wage employment, but a lower effect than public wage or microenterprises (Fox & Sohnesen, 2012: Table 3, p26). However, this a finding for a particular year and may not reflect trends over a longer period.

There has been little research on how labour market opportunities and participation have evolved in Uganda since the 1990s, given the lack of comparable quality employment data for a long period. Furthermore, labour force studies use the individual rather the household as the unit of analysis. Analysis of recent labour market conditions indicates that growth in wage employment has not matched rates of growth in the overall economy. Kavuma, Morrissey & Upward (2015) show that fewer than 20% of workers are in wage employment in the 2009/10 and 2010/11 rounds of the UNPS. The vast majority of workers are employed in either family labour (especially agriculture) or self-employed in the informal sector. For SSA as a whole, wage employment accounts for 25% of male workers and just 10% for female workers on average; meaning the task of expanding the wage sector is a major policy concern for the region (World Development Report, 2013). A particular concern is that SSA may be urbanising without industrialisation (Andersson Djurfeldt, 2015; Losch, Freguin-Gresh & White, 2012), hence a lack opportunities in manufacturing or high-wage services which provide opportunities for higher incomes in urban areas (Loison, 2015).

3 Data and Measuring Income Diversification

The Uganda Bureau of Statistics (UBoS) has conducted five Uganda National Household Surveys (UNHS): 1999/00 (10,696 households), 2002/03 (9,711 households), 2005/06 (7,426 households), 2009/10 (6,775 households) and 2012/13 (6,896 households). Adding the 1992/93 Integrated Household Survey (IHS), containing data on 9,925 households, allows coverage of the twenty years from 1992 to 2012. The IHS was the first comprehensive attempt in Uganda to monitor living standards using a national household survey. It contains detailed information on questions including household consumption, demographics, employment, education and health. The first wave of the UNHS was designed to be comparable to the IHS in terms of sampling design, coverage and scope. There is also a small panel element with the two surveys for 1,398 households. The subsequent waves of the UNHS have similar sampling designs and coverage to the first wave, but the questions and topics covered have sometimes differed. For example, some waves contain a specific labour force survey questionnaire while others just have an activities section in the main socio-economic survey. Some waves may have an agricultural module but other waves contain little information on household farming practices. Using the 2005/06 UNHS as a baseline survey, UBoS in conjunction with the World Bank has also collected the Ugandan National Panel Survey (UNPS) for 2009/10, 2010/2011 and 2011/2012. The original 2005/06 UNHS

constitutes a first wave as the UNPS aimed to re-interview 3123 households; given attrition, the subsequent waves contain 2607, 2564 and 2356 households respectively.

Given the changing nature of the survey questionnaires, especially regarding incomes and labour market activities, it is difficult to create measures of income sources that remain consistent throughout the six waves of data. A trade-off exists between the granularity of the different income sources and how consistently these can be traced across the surveys. One also needs to ensure the sources of incomes are comparable across both urban and rural households in order to facilitate the national level analysis. Household income sources are separated into five categories that can be consistently measured at the national level within each wave, and can be tracked accurately across waves given the changes in the underlying questionnaires. Labour activities are classified into four categories according to whether it is wage employment or self-employment, and agricultural or non-agricultural employment. The fifth source of income is remittances the household may receive, to capture income sources from members who have migrated away.

Agricultural self-employment, or agriculture (farm) income, includes all self-employed activities in agriculture and fisheries, be they for subsistence or market-orientated. As only a few of the waves (1992/93, 1999/00 and 2005/06) contain an agriculture module, it is not feasible to consider the type of farming (cash crops or food crops) or crop diversification. Non-agricultural self-employment includes all earnings activities for which the individual is not listed as an employee (such as being an own account worker, helping in the household, or being an employer) that is done outside of agriculture. Agricultural wage employment includes all private agricultural employment, while non-agricultural wage employment includes all private non-agricultural work and public employment. Research on income diversification in rural areas has shown the importance of migrant remittances (Reardon, 1997; Ellis, 1998; Wouterse & Taylor, 2008) for livelihoods. Hence, remittances are included as the final source of income; the 2002/03 wave does not contain data on remittances, so analysis with remittances excludes that wave. The 2009/10 wave only surveyed half of the sample of 6,775 household on their labour market activities. However, UBoS also conducted the second wave of the UNPS in the same year, which contains labour market information on 2,607 other households resurveyed from the 2005/06 wave of the UNHS using similar questionnaires. As both surveys are independent and nationally representative samples conducted over the same period, both are combined to keep sample sizes large and proportionate with the other waves. This is also important for constructing the pseudo-panel.

Income diversification can be measured in various ways. If only concerned with two sources, shares are appropriate. For example, a common approach for rural households is to use the nonfarm share in total income (Reardon *et al*, 1992; Davis *et al*, 2010). If it is necessary to allow for many sources of income, either because the household comprises a number of adults who may each engage in more than one activity or because activities can be sub-divided (different types of non-farm activity or diversifying crops grown) two approaches are common. One is to construct discrete indicator variables based on counts of number of sources or categories of types of income (Dercon & Krishnan, 1996; Abdulai & CroleRees, 2001). An alternative is to construct a Herfindahl index measure of shares of multiple sources (Anderson & Deshingkar, 2005). Earning shares are not possible to calculate as there is insufficient data on earnings from the different income sources. For remittances there are data on the income received (except for 2002/03 wave), but only for total remittances received (not by the source of the remittance).

Creating a measure of diversification at the individual level also proves difficult given differences in the questionnaires asking about earnings activities of individuals. Depending on the survey, individuals can list up to two, three or four different activities of varying recall periods meaning a measure of individual diversification would likely be dependent on the survey design. However, which types of employment (wage/self-employment or agricultural/non- agricultural) each worker has engaged in can more reliably be calculated. As such, it is possible to classify each worker in each type of employment as a different source of income. Although two workers in wage jobs can be seen as two distinct income sources, this separation is harder to justify for household activities - employment on household plots or in a household enterprise is treated as one (family labour) income source. Even for agricultural wage employment, incomes of different workers may be linked due to local conditions such as employment on the same neighbouring farms (thus the work may be temporary and short-term, one reason why earnings are low). We measure diversification as a simple count of how many of the five different income sources households received. The simplicity of the measure ensures consistency across waves given the different underlying questionnaires. This will be an underestimate to the extent that it misses multiple activities by individuals.

As an additional check, we construct a measure that also counts the number of activities of individuals: remittances and agriculture (farming) are treated as one source, whereas the number of wage and self-employment jobs of household members are each counted. (In principle, a household enterprise could also be treated as one source, but the surveys do not capture this consistently, see Appendix Table B4). While this broadens the definition of diversification to include multiple workers within an activity, it increases the likelihood of measurement error resulting from differing survey designs, particularly the different number of income generating activities workers are asked to list in each survey. Appendix C reports estimates of all the models considered in the analysis with this broader measure of income diversification, and the main results are largely unaltered. Throughout the analysis we only consider the employment of household members aged 14 or above.

The top section of Table 1 shows that the proportion of households receiving farm (agricultural self-employment) income has declined slightly. Households have also had to rely less on remittances, which saw a fall of 12 percentage points between 1992 and 2012. Non-agricultural self-employment almost doubled during 1992-2002, with more than half of all households nationwide receiving some income from this source, but has since stabilised at around 43%. The pattern for non-agricultural wage employment shows there has been little growth in this sector over the period, with initial falls during the 1990s and then a recovery since 2002 to slightly higher levels than in the early 1990s. Thus, not only are current rates of employment in this sector quite low as Kavuma *et al* (2015) find, but they have also remained largely unchanged during the period where the country saw sustained growth and poverty reduction.

Agricultural wage employment fell during the 1990s, reaching as low as 7% of households in 2002 (perhaps because of urban bias in that survey), but then rose sharply, reaching levels not too far from the rates of non-agricultural wage employment. Over the two decades there appear to be two distinct trends. In the 1990s there was a large expansion of the non-agricultural self-employment sector (mainly representing the informal sector) and falls in all the other four sources of incomes. In the 2000s, the non-agricultural self-employment sector became less important with a decline in the proportion of households receiving earnings from the peak in 2002, but still 10-15 percentage points higher than initial levels. Farm incomes also rose from the 2002 nadir but are still are below 1992 levels, while remittances continued to fall but have recovered somewhat in recent years. Wage employment in general

saw a recovery with the non-agricultural sector largely returning to 1992 levels whereas the agricultural sector has almost doubled from its initial level.

Table 1: Distribution of Household Income Sources 1992-2012

	1992	1999	2002	2005	2009	2012
Percentage of Households with each income source						
Farm income	82	81	74	81	76	77
Remittances	57	49	-	43	33	45
NA Self	28	34	51	43	39	43
NA Wage	25	22	19	27	30	27
Agri Wage	12	11	7	20	15	21
Average number of workers in households						
NA self	0.35	0.42	0.64	0.60	0.55	0.60
NA wage	0.29	0.26	0.23	0.32	0.35	0.30
Agri wage	0.14	0.13	0.08	0.26	0.21	0.31
Average Income Diversification Count Score						
ID	2.03	1.96	-	2.14	1.94	2.13
ID -R	1.47	1.47	1.51	1.71	1.61	1.68
ID NF jobs	0.65	0.66	0.77	0.90	0.85	0.91

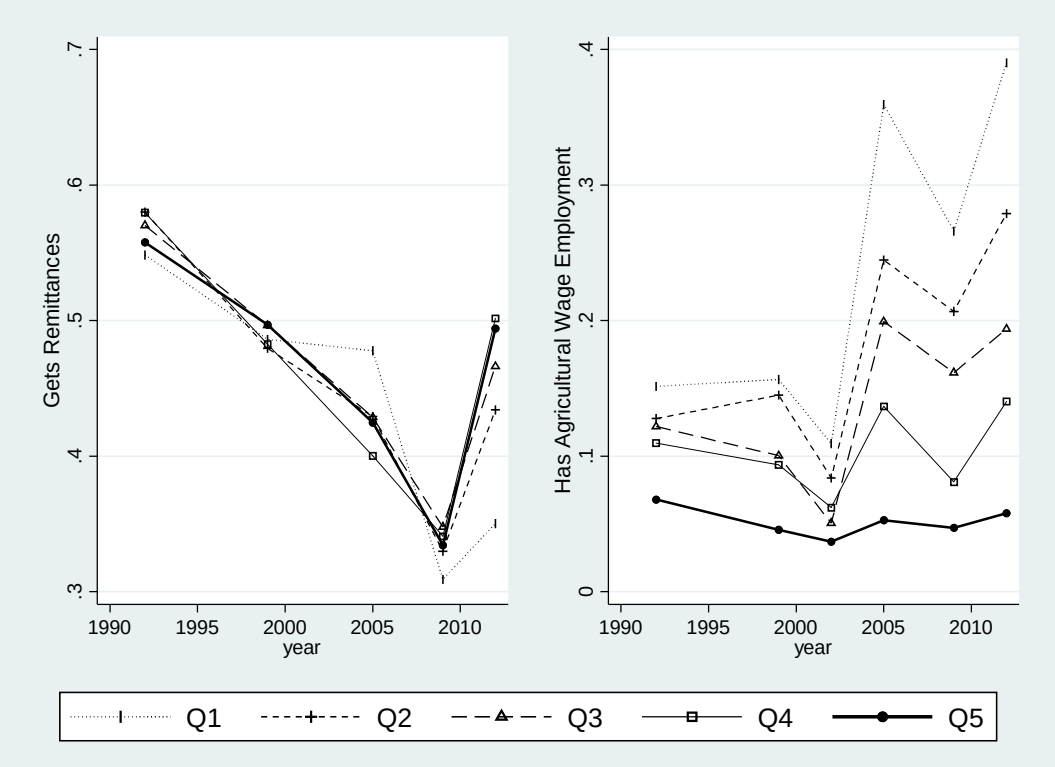
Notes: Population weighted using survey weights. The data for 2002/03 may be an outlier for the general trends as it samples more urban households (42% are urban households while the figures for 1990/00 and 2005/06 is 22% and 23% respectively) although once sampling weights are used the rates of urbanisation are consistent with other years. Agri is agricultural; NA is non-agricultural; ID is income diversification (-R excludes remittances); and NF is nonfarm (i.e., includes Agri wage).

The middle section of Table 1 shows the average number of workers per household in each type of employment. For non-agricultural wage employment there has been little change on average over the two decades. In contrast, for the other two types of non-farm employment the average number of workers per household have roughly doubled. By 2012, there were on average more workers earning agricultural wages than non-agricultural wages and double the average number of workers in non-agricultural self-employment to non-agricultural wage employment. In 1992, the latter two were fairly similar, with self-employment rates slightly higher and agricultural wage work being less than half of non-agricultural wage work. Non-agricultural wage employment may not have fallen in absolute terms but declined relative to the other types of non-farm employment. The final section of Table 1 shows what all these shifts in the sources of income mean for the count score measure of income diversification (ID): overall ID has largely stayed the same with a slight increase. However, this masks the compositional changes where the fall in remittances (and to a lesser extent farm incomes) have been countered by rises in non-farm employment, particularly in agricultural wage employment and non-agricultural self-employment.

Figure 1 illustrates how income sources differ by quintiles of adult equivalent consumption. The left panel shows the pattern for the proportion of households receiving remittances.

From 1992 to 2009 remittances rates and declines were similar across all quintiles, except perhaps for the poorest (Q1), who were less likely to have remittances (this may appear counter-intuitive, but suggests they were the poorest because they had no remittances). The recovery in remittances in 2012 was very different, with the lowest quintiles actually seeing a continued decline but stronger recoveries the higher the quintile. The right panel shows the pattern across quintiles for agricultural wage employment. Since 2002, there has been a divergence for the bottom four quintiles - all experience growth in employment but at different rates, with lower quintiles having higher growth rates. Looking at the second, third and fourth quintiles in particular, one sees they had very similar levels in 2002 but widely different levels by 2012. Thus, the poorest households have seen the biggest falls in remittances and the biggest rise in agricultural wage employment.

Figure 1: Agricultural Wage and Remittances by Quintile



In contrast, Figure 2 shows that the trends for non-agricultural wage and self-employment have been similar across quintiles so that differences have remained (except in self-employment for the two poorest quintiles). The richer households are more likely to have workers employed in either of these sectors (especially wage employment) and the poorest are less likely.

Figure 2: Non-Agricultural Employment by Quintile

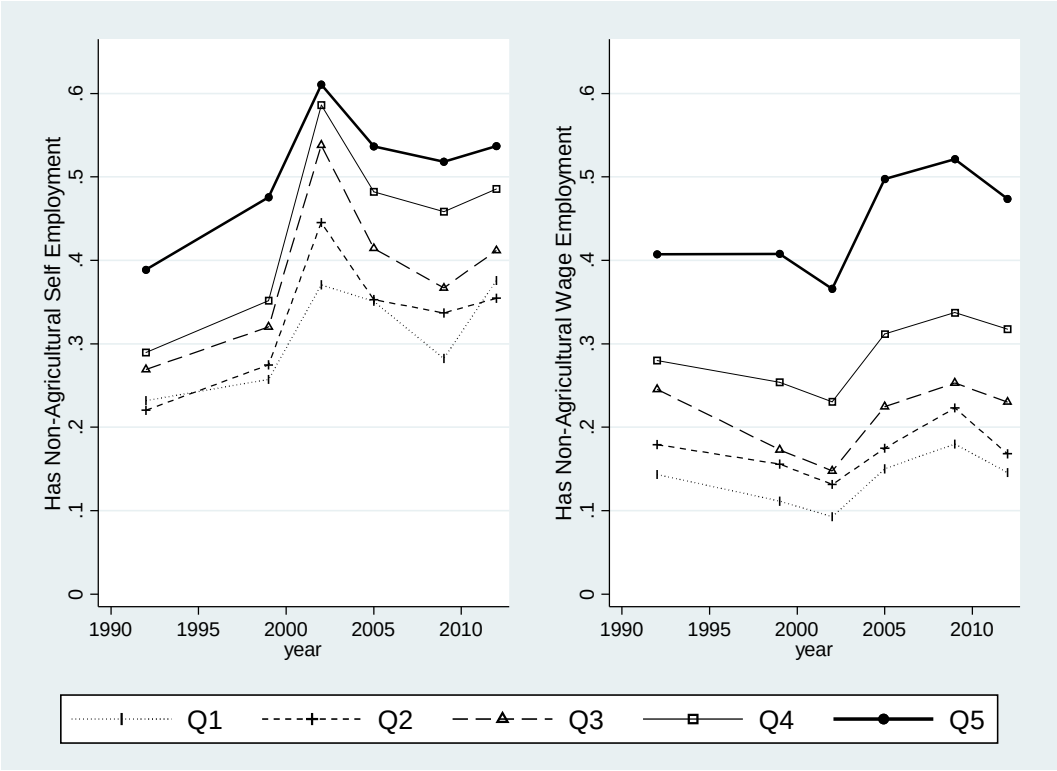
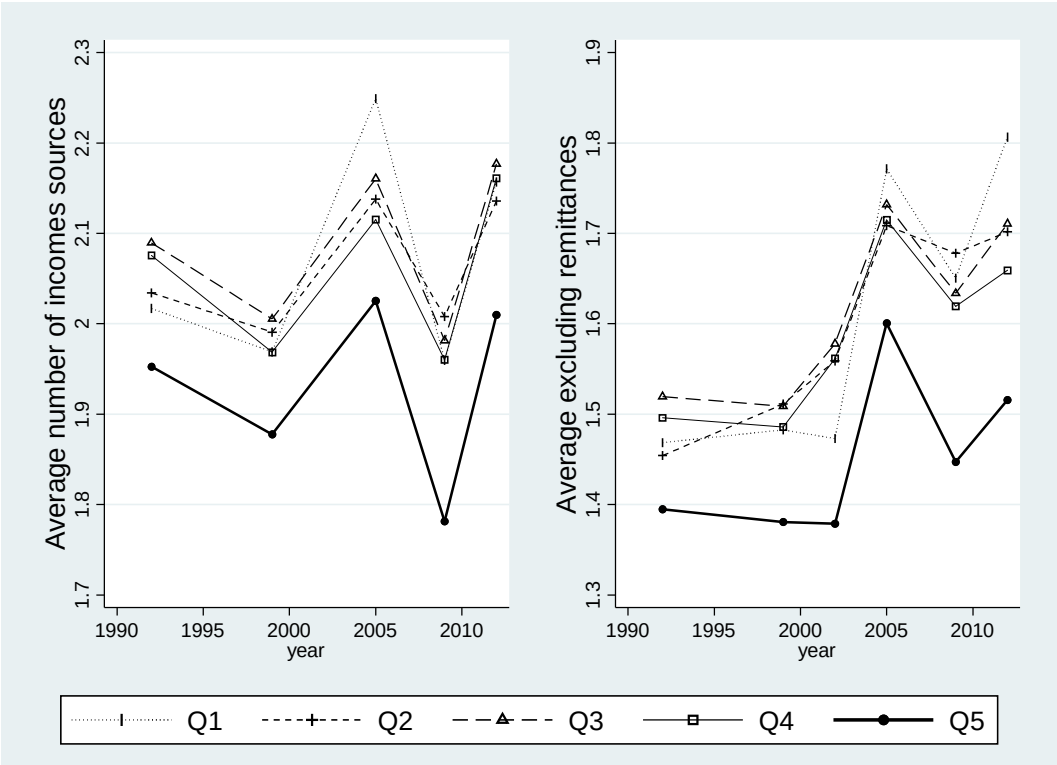


Figure 3: Income Diversification by Quintile



The implications for overall income diversification (ID) across the quintiles is shown in Figure 3. The bottom four quintiles have ID scores that have been converging over time and are very similar by 2012, shown in the left panel. The reason for this convergence is indicated in the right panel, with the ID measure excluding remittances being highest for the poorer quintiles thus offsetting the opposing trend in remittances across the quintiles. For both ID measures, the top consumption quintile always remains below the other four with the distance between them if anything increasing across time.

To summarise, the data shows that ID has been quite stable with only moderate increases over two decades. However, this masks the fact that the proportion of households receiving remittances has been falling and non-farm employment has risen to offset these falls, particularly agricultural wage and non-agricultural self-employment. Across consumption (income) quintiles, the bottom four quintiles have similar and converging ID scores but the composition of the sources of incomes differ, with agricultural wage employment playing an increasingly large role for the poorest households. The top quintile is the least diversified and although there are some signs it may be on an overall upward trend it is unlikely to reach the levels observed in the other quintiles anytime soon.

Appendix B provides a more detailed descriptive analysis of the data, distinguishing trends for the four major regions. A number of features of household welfare according to the sources of income are identified, and these are explored in the econometric analysis:

- Farming households have the second lowest level of relative welfare (fairly steady around 75% of mean over time). The share of farm households declined but accounts for the majority of households in all surveys.
- Households with agricultural (off-farm) wage [AW] as the primary income source exhibit the lowest welfare levels and their relative position deteriorated over time (from about 70% to about 50% of mean levels).
- Non-agricultural self-employment [NAS] is associated with above average consumption, although the gap has been decreasing (from about 25% above in 1992/93 to just above the mean from 2002/03).
- Non-agricultural wage [NAW] is associated with the highest average consumption, about 50% above mean consumption levels (fairly steady over time).
- Households receiving remittances are at the mean level of consumption and no different in average consumption to households not receiving remittances (suggesting that the remittances are important to bring consumption levels to the mean).

4 Empirical Analysis and Discussion

The relationship between income diversification and household welfare is explored using a standard reduced form model of household consumption (Glewwe, 1991; Appleton, 1996). Consumption (our measure of household welfare) is explained by a variety of household characteristics, to which are added measures of income diversification.

$$\log Cons_{it} = \alpha_i + \beta ID_{it} + \boldsymbol{\lambda}\mathbf{X}_{it} + \boldsymbol{\delta}\mathbf{Z}_{it} + \gamma_t + \pi_{rt} + \varepsilon_{it} \quad (1)$$

The dependent variable is the log of adult equivalent household consumption; *ID* is the count of income sources for the household; and **X** is a vector of dummy variables capturing the

main labour activity of the household head (agricultural [A] or non-agricultural [NA], wage [W] or self-employment [S], or not employed). The vector **Z** is a set of controls including: household size, log of household assets, the region the household is from and whether it is an urban or rural household; and characteristics of the head - age and age-squared, gender, years of education, and marital status. The γ_t captures time effects with a survey-year variable. As consumption is measured in current survey year prices we include π_{rt}, a dummy interaction term between region, urban or rural locations, and year. This allows inflation to differ across region and urban/rural locations. In (1), *i* indexes households and *t* indexes time (survey), and estimation pools observations across all six surveys.

Table 2: Income Diversification and Household Consumption

	(1) log Cons	(2) log Cons	(3) log Cons	(4) log Cons	(5) log Cons
ID	-0.017***	-0.029***			
	(0.003)	(0.003)			
ID = 2			-0.035***		
			(0.007)		
ID = 3			-0.068***		
			(0.008)		
ID = 4			-0.064***		
			(0.015)		
ID = 5			-0.089		
			(0.055)		
ID -R				-0.051***	
				(0.004)	
ID -R = 2					-0.067***
					(0.005)
ID -R = 3					-0.079***
					(0.010)
ID -R = 4					-0.114***
					(0.036)
Head NAS		0.185***	0.185***	0.208***	0.209***
		(0.008)	(0.008)	(0.007)	(0.007)
Head NAW		0.162***	0.162***	0.192***	0.192***
		(0.008)	(0.008)	(0.008)	(0.008)
Head AW		0.057***	0.057***	0.067***	0.066***
		(0.014)	(0.014)	(0.013)	(0.013)
Head not employed		-0.009	-0.010	-0.053***	-0.053***
		(0.014)	(0.014)	(0.014)	(0.014)
HH size	-0.090***	-0.088***	-0.088***	-0.088***	-0.088***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FE	Yes	Yes	Yes	Yes	Yes
N	37,344	37,289	37,289	45,946	45,946
R^2	0.763	0.768	0.768	0.745	0.745

Notes: Based on pooling observations for all surveys; Region*location*year fixed effects (FE). Columns (1)-(3) include remittances so the 2002 survey is excluded (hence the smaller sample); columns (4) and (5) omit remittances, so include 2002. ID (ID-R) is the count of household sources of income, and ID=2, etc are dummies for the given number of sources (ID = 1 the omitted category). NAS indicates household head whose main sector of employment is in non-agricultural self-employment; NAW is non-agricultural wage employment; AW is agricultural wage employment (agriculture is the omitted category). Coefficient estimates for other explanatory variables are in Appendix A, Table A2.

Results using Pooled OLS are in Table 2, with the ID measure both including and excluding (ID-R) remittances (full results are in the corresponding Appendix Table A2). There is a clear negative association between household consumption and household income diversification, the effect is stronger when we exclude remittances, and tends to increase going up to four sources (excluding remittances). At the national level, it appears that diversifying income sources across the five categories is a sign of distress and driven by push factors or what Loison (2015) classifies as 'survival-led' as opposed to 'opportunity-led' diversification. Survival-led diversification suggests that poorer households are forced to diversify into low return activities in order to ensure survival and reduce vulnerability to shocks. Table 2 shows that having a household head whose main sector of employment is in non-agricultural self-employment [NAS] offers the highest returns, closely followed by those in non-agricultural wage employment [NAW]. Surprisingly even having a household head engaged in agricultural wage [AW] employment increases household consumption compared to having a head whose main income is from agriculture (farming, the excluded category in the regression). There is only a negative effect of the head not in employment when the 2002 survey (no question on remittances) is included.

Note that the coefficient on household size is negative and significant; larger households have lower consumption and effects for income diversification control for household size. Coefficients for year dummies and other household characteristics are reported in Appendix Table A2, and all are significant with the expected sign. Consumption is higher for urban and richer households (in terms of assets), and if heads are female, older (but this benefit diminishes with age), and more education, but lower if the head is married. Consumption is significantly lower in the Eastern, Northern and (to a lesser extent) Western regions compared to Central. The survey year dummies capture the increase in nominal consumption over time.

Observing that urban households have higher consumption is unsurprising and uninformative regarding whether effects of diversification or other characteristics differ between rural and urban households. Table 3 splits the sample and shows that ID is negatively correlated with consumption in both rural and urban locations, highlighting that diversification is just as important for urban households (although most literature has focused on rural households). There are notable differences. In urban households, the negative coefficients tend to be larger but the effect is not significant beyond 3 sources, whereas for rural it remains significant for 4 sources (including remittances). Head not employed is always significant but negative for rural and positive for urban (explaining the mixed significance in Table 2). The consumption benefit of non-agricultural employment (NAS and NAW) is much greater for urban households, and even the benefit of an agricultural wage (compared to farming) is more beneficial for urban (note that a significant share of urban households are engaged in agriculture, see Figure B11 in Appendix B).

Table 4 presents estimates for each survey and shows that the relationship between ID and consumption has stayed negative and significant throughout the entire period. However, there have been changes in the effect of the main income source of the household head. The benefit of a non-agricultural wage or self-employment relative to farm employment has been decreasing, especially in the case of NAS. For agricultural wage employment, the relationship has reversed: until 2005 AW was strongly associated with higher consumption compared to Agriculture, whereas by 2012 it was significantly associated with lower consumption. Overall, this suggests increasing returns to agriculture (farming) relative to the three forms of employment, and a significant deterioration in earnings from agricultural wage employment.

Table 3: Diversification and Household Consumption: Rural vs Urban

	Rural log Cons	Urban log Cons	Rural log Cons	Urban log Cons	Rural log Cons	Urban log Cons
ID	-0.018***	-0.036***				
	(0.004)	(0.007)				
ID -R			-0.033***	-0.061***		
			(0.005)	(0.008)		
ID = 2					-0.019**	-0.042***
					(0.008)	(0.013)
ID = 3					-0.039***	-0.097***
					(0.009)	(0.016)
ID = 4					-0.044***	-0.050
					(0.017)	(0.030)
ID = 5					-0.083	-0.008
					(0.059)	(0.137)
Head NAS	0.155***	0.299***	0.174***	0.315***	0.155***	0.298***
	(0.010)	(0.017)	(0.009)	(0.014)	(0.010)	(0.017)
Head NAW	0.149***	0.253***	0.168***	0.282***	0.149***	0.254***
	(0.010)	(0.018)	(0.010)	(0.015)	(0.010)	(0.018)
Head AW	0.061***	0.073*	0.067***	0.083**	0.061***	0.072*
	(0.015)	(0.038)	(0.014)	(0.032)	(0.015)	(0.038)
Head not employed	-0.087***	0.185***	-0.117***	0.132***	-0.087***	0.183***
	(0.017)	(0.027)	(0.017)	(0.026)	(0.017)	(0.027)
FE	Yes	Yes	Yes	Yes	Yes	Yes
N	27,292	9,997	32,393	13,553	27,292	9,997
R^2	0.735	0.779	0.712	0.743	0.735	0.779

Notes: As for Table 2, except splitting sample and region*year FE. The middle two columns omit remittances, so include 2002 and have a larger sample. Coefficient estimates for other explanatory variables are shown in Appendix Table A3.

Table 4: Diversification and Household Consumption by Survey

	1992 log Cons	1999 log Cons	2005 log Cons	2009 log Cons	2012 log Cons
ID	-0.016**	-0.044***	-0.023***	-0.032***	-0.027***
	(0.007)	(0.007)	(0.007)	(0.009)	(0.008)
Head NAS	0.277***	0.198***	0.206***	0.150***	0.084***
	(0.019)	(0.016)	(0.017)	(0.020)	(0.017)
Head NAW	0.174***	0.215***	0.205***	0.103***	0.115***
	(0.018)	(0.017)	(0.019)	(0.021)	(0.020)
Head AW	0.218***	0.109***	0.126***	-0.039	-0.106***
	(0.033)	(0.031)	(0.028)	(0.045)	(0.026)
Head not employed	0.056**	-0.054*	0.054*	-0.075**	-0.055
	(0.028)	(0.029)	(0.029)	(0.036)	(0.042)
FE	Yes	Yes	Yes	Yes	Yes
N	9,224	9,633	6,812	5,453	6,167
R^2	0.509	0.541	0.609	0.578	0.638

Notes: As for Table 2, except by survey (omitting 2002) and region*location FE. Coefficient estimates for other explanatory variables are shown in Appendix Table A4.

Pseudo-Panel Construction and Estimation

We only interpret the relationship between ID and consumption as correlations, without any causal inferences, given the many potential sources of endogeneity and omitted variable bias. The latter arises due to the possibility that unobserved factors, such as household attitudes towards risk or innate ability of members, are correlated with diversification (or more generally with selection into type of employment). Reverse causality is a source of endogeneity as low consumption would drive households to diversify their income sources. As the surveys are not a panel, one way to address these concerns is by using pseudo-panel estimation (where households are grouped into cohorts based on time invariant characteristics and the cohort means are used as observations in a panel). It is then possible to control for unobserved fixed effects when the data are a series of repeated cross-sections rather than a panel (Deaton, 1985; Verbeek and Nijman, 1992).

The main difficulty with estimating pseudo-panel models is in constructing the representative households - how to group into cohorts - as there are two additional sources of bias arising from the grouping process. Firstly, estimates may be attenuated due to sampling error if the cohort sample means (affected by changes in composition) are not representative of the underlying cohort population means. Secondly, in a study such as this where the aim is to draw inferences at the household level, grouping into cohorts may lead to aggregation bias due to the loss of variation when using cohort level data, particularly if there exist non-linearities that are difficult to capture using simple group means. Thus grouping into cohorts needs to be done such that both potential sources of bias are reduced. Khan (2018) proposes two measures which can help assess the likelihood of sampling error and aggregation bias (see brief outline of the measures in Appendix A).

The first, CAWAR, assesses whether cell sizes (the number of households grouped into a cohort) are large enough given the amount of variation in the cohort level data for sampling error to be limited. The CAWAR statistic needs to be calculated individually for each explanatory variable and Khan (2018) provides a set of recommended values that the CAWAR statistic should exceed for small sample bias to be minimal (less than 10%). These recommended values differ across the number of time periods and the autocorrelation coefficient of the explanatory variables. Given our dataset has six waves and the estimated autocorrelation coefficients for most explanatory variables are less than 0.5, our explanatory variables need to have a CAWAR in excess of 11 for sampling error to be considered minimal. The second, AWAR, assesses whether there is sufficient variation in the cohort data for inferences to be comparable to those at the household level. Khan (2018) gives a general recommendation that the AWAR statistic for each explanatory variable exceeds 0.5 for cohort level inference to be comparable to those at the household level. As the analysis of the AWAR statistic is conducted using similar data and model (the four UNPS waves from 2005-2012), we can be confident of its applicability to our present study.

We consider five household characteristics that are suitable for grouping into cohorts (in that they are time invariant and observable in every wave) and have been used in previous pseudo-panel studies. The five characteristics are the same ones used by Khan (2018) when analysing the AWAR statistic and further discussion of other characteristics used in the literature can be found there. These five are: region of the household and whether it is urban or rural; the gender, age and education level of the household head (education is subdivided into three categories; none, primary, post-primary). The age of the head is based on birth cohorts, with alternative groupings based on 2, 5, 10 and 15 year age bands. Combining each of these with the other four characteristics, as well as the option of not using age (birth

cohorts), for constructing cohorts results in 79 grouping possibilities. Of these, 68 have sufficient cohort level observations for robust inference (with at least 8 observations in each wave and 48 in total).

Figure 4 plots the average CAWAR and AWAR values for the main regressors in our model (household size, household assets, and the four dummies for the main occupation of the head) except for ID and ID-R (see below) for the 68 alternative pseudo-panels. The majority pass the CAWAR test with values above 11 (and almost of all of those below are sufficiently close as the threshold of 11 is not precise), but relatively few pass the AWAR test of above 0.5. Three pseudo-panels highlighted are very close to meeting both tests. PP1 groups into cohorts based on two-year age bands of the household head combined with all the other four characteristics (region, urban/rural, gender and education of household head). PP2 uses five-year age bands, and PP3 ten-year age bands, combined with the other four characteristics.

Figure 4: Average CAWAR and AWAR of Regressors (except ID)

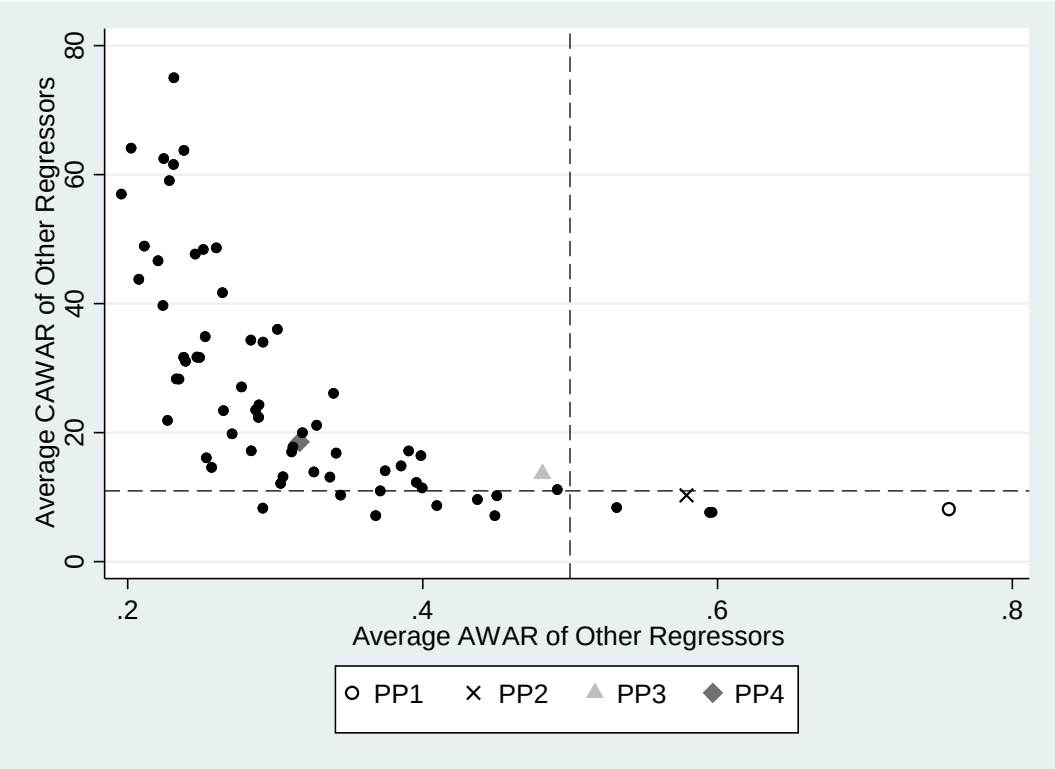
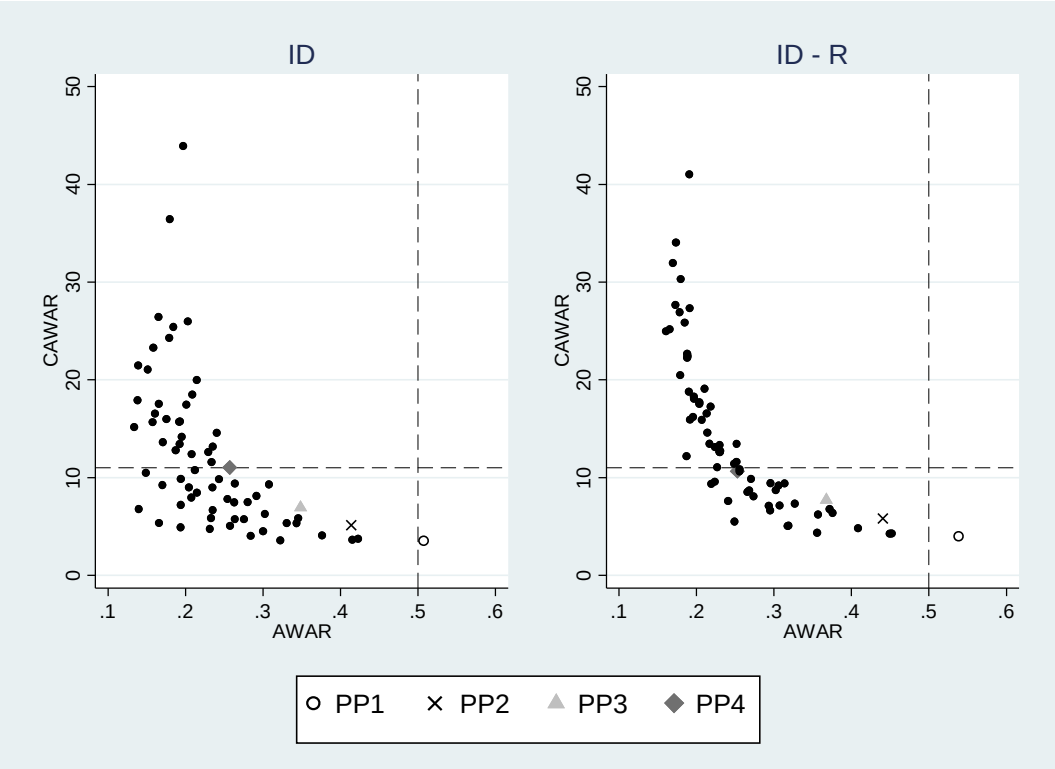


Figure 5 plots the CAWAR and AWAR values for ID (left panel) and ID-R (right panel) variables for the 68 alternative pseudo-panels. None of the 68 ways of constructing cohorts is able to meet both the AWAR and CAWAR thresholds. Only one exceeds the AWAR threshold of 0.5 while those that meet the CAWAR threshold all have AWAR values of less than 0.25. Thus we face a trade-off between sampling error (low CAWAR value) and aggregation bias (low AWAR value). This trade-off arises as for a given N (the number of households in each wave, $N = C \times n_c$, where C is the number of cohorts and n_c the cell size), AWAR is generally increasing in C (more cohorts tend to result in higher cohort level variation) and hence is decreasing in n_c, while the opposite holds for CAWAR.

Figure 5: CAWAR and AWAR of ID Measures



We prioritise the grouping options which provide AWAR values closest to the 0.5 threshold (rather than for CAWAR), hence prioritising aggregation over sampling error. To justify this choice, Figure 6 shows that for all 68 grouping options the pseudo-panel estimates of the coefficient on ID from the above model converge to -0.03 as AWAR increases towards its threshold. In contrast, estimates above the CAWAR threshold are dispersed more than those below the threshold. Although there is convergence with AWAR we cannot be sure that estimates are converging to the true coefficient. Figure 7 shows similar charts for estimates of household size, one of the other explanatory variables. Again we see convergence with AWAR but not for CAWAR, and if anything convergence occurs at low CAWAR values. Convergence with AWAR occurs at a value of -0.085 for the coefficient on household size. Khan (2018) estimates a similar household consumption model using similar Ugandan household data but with four panel surveys waves from 2005-2012. Their panel and pseudo-panel estimates indicate similar coefficients on household size (-0.092), indicating that convergence with AWAR is occurring towards plausible coefficient estimates.

Consequently, for our pseudo-panel analysis we first pick the grouping option that produces the largest AWAR value for our ID and ID-R measures, indicated by PP1 in Figures 5 and 6 (PP1, PP2, PP3 and PP4). Although other options may give slightly larger AWAR values, PP2 and PP3 produce the largest CAWAR values given AWAR. Although there are fewer cohorts (as it is based on 15-year birth cohort bands), PP4 is included because it gives the largest AWAR value while meeting the CAWAR threshold. Figure 4 shows that these four pseudo-panels produce larger AWAR and CAWAR values on average for the other main regressors in our model. Although a trade-off between meeting CAWAR and AWAR thresholds exists, the other regressors are closer to the respective thresholds than the ID and ID-R variables.

Figure 6: ID Coefficient Estimates from all Pseudo-panel Models

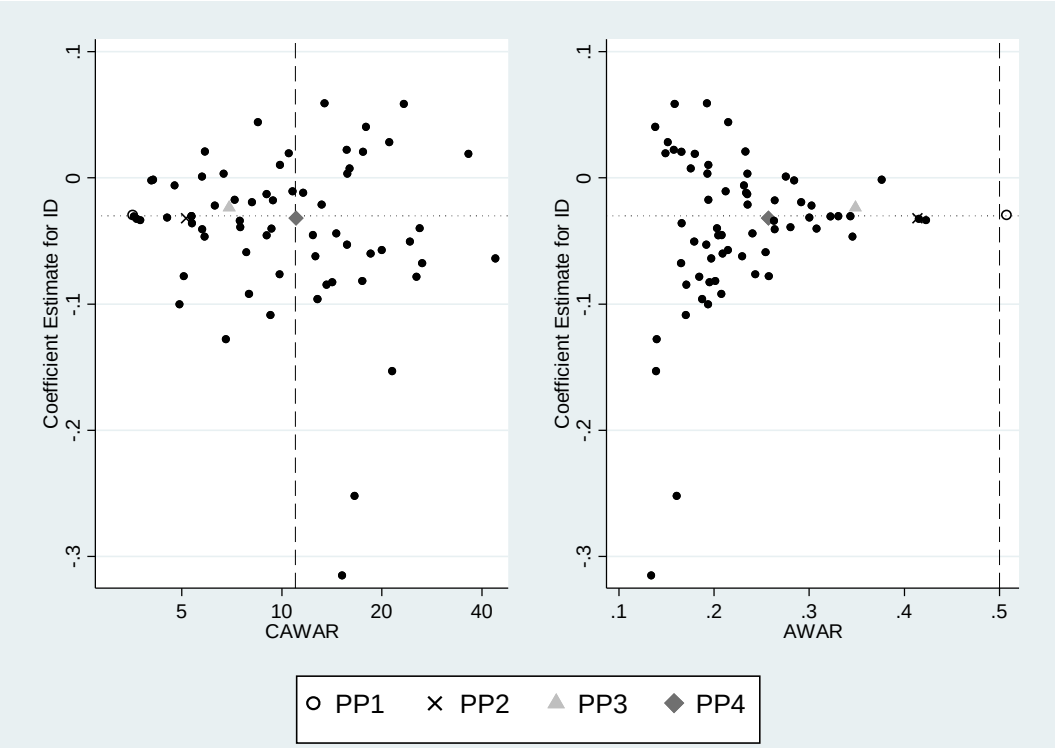


Figure 7: Household Size Coefficient Estimates from all Pseudo-panel Models

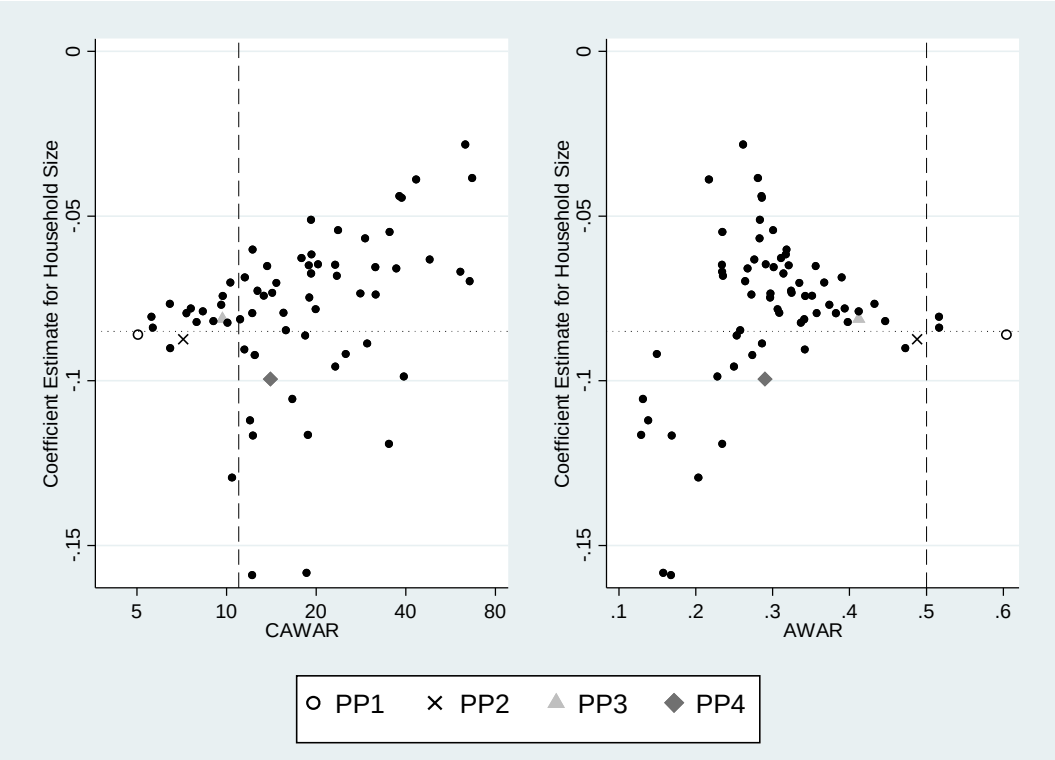


Table 5: Diversification and Consumption: Pseudo Panel Estimates

	PP1 log Cons	PP1 log Cons	PP2 log Cons	PP2 log Cons
ID	-0.029**		-0.032*	
	(0.013)		(0.017)	
ID -R		-0.068***		-0.075***
		(0.014)		(0.020)
Head NAS	0.194***	0.195***	0.247***	0.260***
	(0.035)	(0.028)	(0.047)	(0.038)
Head NAW	0.219***	0.219***	0.172***	0.181***
	(0.034)	(0.030)	(0.046)	(0.041)
Head AW	-0.032	-0.038	0.039	0.051
	(0.057)	(0.051)	(0.088)	(0.079)
Head not employed	0.108**	0.060	0.123**	0.051
	(0.049)	(0.041)	(0.062)	(0.054)
FE	Yes	Yes	Yes	Yes
N	3,861	4,774	2,070	2,537
R^2	0.960	0.951	0.971	0.966

Notes: Estimates of pseudo panels with cohort FE: PP1 uses cohorts based on gender, education, and two-year age bands for household head; region, urban or rural. PP2 uses similar groupings but with five-year age bands. Results for PP3 and PP4 are in Table A5.

Table 6: Pseudo Panel Estimates with Lagged Diversification

	PP1 log Cons	PP1 log Cons	PP2 log Cons	PP2 log Cons
ID	-0.068		-0.150*	
	(0.049)		(0.085)	
ID -R		-0.168**		-0.035
		(0.080)		(0.114)
Head NAS	0.165***	0.173***	0.249***	0.244***
	(0.034)	(0.031)	(0.048)	(0.042)
Head NAW	0.251***	0.259***	0.264***	0.213***
	(0.041)	(0.044)	(0.057)	(0.059)
Head AW	-0.032	-0.045	0.016	-0.018
	(0.066)	(0.064)	(0.093)	(0.092)
Head not employed	-0.009	-0.070	0.139*	0.077
	(0.059)	(0.063)	(0.074)	(0.084)
FE	Yes	Yes	Yes	Yes
N	2,358	3,217	1,383	1,850
R^2	0.895	0.885	0.919	0.915

Notes: As for Table 5 except diversification variables are lagged one period and cohort FE. Results for PP3 and PP4 are in Table A6.

Table 5 presents pseudo-panel fixed effects estimates for the four selected options, which reduce bias arising from omitted variables. The negative effect of diversification persists, although it is weaker when remittances are included – this is consistent with observing that households with remittances are at mean national consumption levels in all years (Appendix Figure B9) and for regions consumption levels are very similar for households with and

without remittances in all years (Figure B10). This suggests that remittances maintain consumption (prevent it from falling below mean levels). The consumption 'premium' from non-agricultural employment persists, but there is no significant difference between consumption of agriculture and agricultural wage households.

Table 6 again uses fixed effects in a pseudo-panel framework but with lagged values of ID as instruments for the contemporaneous values in order to address some of the concerns regarding reverse causality. Significance levels for the ID variables are much lower (the effect remains negative), but the 'premium' from non-agricultural employment persists. Both exercises indicate that endogeneity is attenuating the effect of ID on consumption, if anything, as they give larger coefficients in absolute size than the pooled OLS estimates. Lower significance in the pseudo-panel estimates is expected given the loss of variation and sample size as one moves from the household to the cohort level. Estimates for PP4 in particular are rather erratic, likely due to it having low variation given its low AWAR and exacerbated by lagged instrumentation. Nonetheless, the results are indicative.

Analysis for Each Source of Income

To assess how different components of ID affect household consumption, we replace ID with a set of dummies for whether the household receives farm income, remittances and the three types of nonfarm income (NAS, NAW, AW). In doing so we also exclude the variable on the household head's main sector of occupation as for many households the head is the sole income earner causing collinearity issues with the earnings activities dummies. Table 7 presents estimates disaggregating the ID measure (using pooled OLS). The first column shows that having any source of nonfarm employment is positively correlated with consumption, while the second column shows this is only true for earnings from male nonfarm employment. The third column highlights that agricultural wage employment is negatively associated with consumption but the other two types of employment have a strong positive correlation, with the effect being larger for non-agricultural self-employment.

The fourth column shows that agricultural wage employment of both males and females is negatively associated with consumption and the effect for females is around three times larger. Only NA self-employment of males is associated with higher consumption with the effect being insignificant for females. However, female NA wage employment has a larger positive effect than NAW for male. The final two columns show the effect of employment by non-head members of the household. The fifth column shows that nonfarm earning by non-head members is negatively associated with consumption and the final column shows this is driven by the effect of employment in the agricultural wage sector by non-heads. To summarise, the table indicates that diversification into agricultural wage employment, particularly when it is done by female or non-head members of the household, is mainly a form of survival-led diversification. This is consistent with the general perspective that such forms of employment have low entry barriers but also low returns. In contrast, female non-agricultural wage employment and male non-agricultural self-employment are more likely to be due to opportunity-led diversification, i.e. being mainly due to pull factors.

Table 8 shows how the different components of the ID measure has evolved across surveys. The effect of farm income remains negative throughout but the size of the effect has been on a downwards trend in recent years, potentially indicating increases returns to household agriculture alluded to earlier. The effect of remittances is usually insignificant or weakly significant at best, consistent with our earlier observation that remittances serve to maintain, rather than increase, consumption. Agricultural wage employment remains negative

throughout and the size of the effect has been increasing in recent years, in line with the expansion in such types of employment. The (absolute) size of the negative effect is greater in urban areas, suggesting that diversification of urban households into AW is a strong sign of distress (Figure B15 shows that the share of urban households with an AW worker increased from about 5% in 1992 to about 15% in 2012). Non-agricultural self-employment is positive and significant in all samples and has a larger effect for urban households than rural (the reverse is true for non-agricultural wage employment, which is also positive).

Table 7: Disaggregated Diversification and Consumption

	(1) log Cons	(2) log Cons	(3) log Cons	(4) log Cons	(5) log Cons	(6) log Cons
NF work	0.037***					
	(0.006)					
Male NF		0.022***				
		(0.006)				
Female NF		0.006				
		(0.006)				
NAS work			0.051***			
			(0.006)			
NAW work			0.038***			
			(0.007)			
AW work			-0.075***			
			(0.008)			
Male NAS				0.070***		
				(0.007)		
Male NAW				0.029***		
				(0.007)		
Male AW				-0.039***		
				(0.009)		
Female NAS				0.009		
				(0.007)		
Female NAW				0.080***		
				(0.010)		
Female AW				-0.101***		
				(0.011)		
Nh NF work					-0.036***	
					(0.006)	
Nh NAS						0.002
						(0.007)
Nh NAW						0.006
						(0.009)
Nh AW						-0.132***
						(0.011)
Farms	-0.216***	-0.219***	-0.211***	-0.208***	-0.228***	-0.224***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
R	0.002	0.001	0.002	0.002	-0.001	-0.000
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Head sector	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
FE	Yes	Yes	Yes	Yes	Yes	Yes
N	37,413	37,413	37,413	37,413	37,413	37,413
R^2	0.769	0.768	0.770	0.770	0.769	0.769

Notes: Pooled OLS as for Table 2, surveys including remittances.

Table 8: Disaggregated Diversification and Consumption by Survey

	1992 log Cons	1999 log Cons	2005 log Cons	2009 log Cons	2012 log Cons	Rural log Cons	Urban log Cons
NAS	0.078***	0.027**	0.057***	0.033**	0.043***	0.041***	0.084***
	(0.012)	(0.011)	(0.012)	(0.015)	(0.014)	(0.007)	(0.012)
NAW	0.022	0.050***	0.050***	0.018	0.058***	0.057***	0.021*
	(0.014)	(0.013)	(0.014)	(0.016)	(0.016)	(0.008)	(0.012)
AW	-0.061***	-0.071***	-0.049***	-0.070***	-0.120***	-0.062***	-0.191***
	(0.018)	(0.017)	(0.015)	(0.020)	(0.017)	(0.008)	(0.024)
Farm	-0.211***	-0.303***	-0.272***	-0.167***	-0.109***	-0.191***	-0.208***
	(0.017)	(0.017)	(0.018)	(0.022)	(0.019)	(0.011)	(0.013)
R	0.021*	-0.016	0.023*	-0.000	-0.017	0.004	0.002
	(0.011)	(0.011)	(0.012)	(0.015)	(0.013)	(0.006)	(0.011)
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	9,236	9,640	6,832	5,519	6,186	27,364	10,049
R^2	0.508	0.547	0.615	0.580	0.642	0.736	0.781

Notes: Pooled OLS as for Table 2. Main activity of household head omitted; coefficients for NAS, NAW and AW workers, household farm and receiving remittances (*R*). All regressions include Region*location*year fixed effects (FE).

Table 9: Disaggregated Diversification, Pseudo Panel Estimates

	PP1 log Cons	PP1 log Cons	PP2 log Cons	PP2 log Cons
NAS	0.024	0.025	0.075**	0.066**
	(0.024)	(0.020)	(0.034)	(0.029)
NAW	0.082***	0.064***	0.030	0.009
	(0.025)	(0.022)	(0.035)	(0.031)
AW	-0.172***	-0.143***	-0.203***	-0.141***
	(0.032)	(0.028)	(0.045)	(0.039)
Farm	-0.216***	-0.235***	-0.209***	-0.245***
	(0.029)	(0.024)	(0.039)	(0.032)
R	0.036*		0.029	
	(0.021)		(0.028)	
FE	Yes	Yes	Yes	Yes
N	3,861	4,774	2,070	2,537
R^2	0.961	0.952	0.972	0.966

Notes: As for Table 8 except pseudo-panel so cohort FE (as for Table 5). Results for PP3 and PP4 are in Table A9.

Finally, Table 9 includes pseudo-panel fixed effects estimates of these regressions in order to address some of the potential endogeneity issues mentioned previously. The results strongly suggest that accounting for unobserved heterogeneity makes the negative effect of agricultural wage employment larger, showing the OLS estimates may be underplaying the

role of diversifying into this sector. In contrast, the results imply that remittances play a beneficial role to household consumption whereas before the effect was uncertain. The effects of non-agricultural self and wage employment are less consistent but generally indicate a positive relationship with consumption.

5 Conclusion

The paper investigated the role of income diversification on household welfare using six Ugandan national household surveys over 1992 to 2013: 1992/93, 1999/00, 2002/03, 2005/06, 2009/10 and 2012/13. Econometric analysis of pooled survey data was complemented by constructing a pseudo-panel of representative households classified according to region; rural or urban; gender, age, and education of the household head. Household welfare is measured in terms of consumption (adult equivalent expenditure); the descriptive analysis (Appendix B) presents trends in relative welfare for household types in comparison with national mean consumption levels for the relevant survey year. Income diversification is captured by the number and types of sources of income for household workers. The analysis considers five sources of household income: remittances, and four relating to labour (types of economic activity) – agriculture (farming); agricultural (off-farm) wage; non-agricultural self-employment; and non-agricultural wage.

The number of income-earning activities (sources) that households engage in has increased, on average from 1.5 in 1992 to 1.7 in 2013 (excluding remittances), although the number of adults in households has not increased on average. While this is a small change, it hides the fact that the number of nonfarm workers in households (other than the head) increased by about a third on average, the share of households with agricultural wage and with non-agricultural self employment almost doubled, and there was an increase in the number of labour activities that individuals engaged in (multiple jobs). There is compelling evidence that households have increased the number of types of labour activities they engage in as the Ugandan economy grew. Although we cannot draw causal inferences, there is an association between labour diversification and household welfare. The general finding is that engaging in more labour activities is primarily due to push factors: lower income households need to engage in more activities to meet their consumption needs; this appears to be associated with lower per capita consumption (i.e., the additional employment is not increasing, or even maintaining, welfare). The reason is that for these households the expansion of activities has been in agricultural wage employment: this has become increasingly the low paid activity of need (rather than choice), especially for females.

This is consistent with evidence from the literature on the increase in nonfarm (off-farm) employment for rural households, but goes further (for Uganda) in highlighting the importance, in terms of welfare, of the type of employment, and showing that a significant proportion of households classed as urban have members engaged in agricultural wage employment. Non-agricultural self and wage employment are associated with higher welfare, but growth of non-agricultural wage employment has been too slow to raise welfare for significant numbers of households, consistent with the absence of structural change, or the lack of industrialisation (Andersson Djurfeldt, 2015; Losch, Freguin-Gresh & White, 2012). Those with non-agricultural wage employment benefit from higher consumption (especially females), perhaps because earnings are higher, but the share of households has barely changed. The share of households with non-agricultural self employment, in contrast, has risen and these households have benefitted from increasing welfare (if it is males). Furthermore, engaging in non-agricultural self and wage employment seem to have similar positive association with household consumption.

Long-run trends in relative welfare by household income sources support these conclusions. Farming households have the second lowest level of relative welfare (around 75% of mean) and households with agricultural wage as the primary income have the lowest welfare levels (which deteriorated from about 70% to about 50% of mean levels). Non-agricultural self-employment is associated with above average consumption, although the gap has been decreasing (from about 25% above in 1992/93 to just above the mean from 2002/03). Non-agricultural wage is associated with the highest average consumption, about 50% above mean consumption levels (fairly steady over time). Households receiving remittances are at the mean level of consumption and no different in average consumption to households not receiving remittances (suggesting that the remittances are important to bring consumption levels to the mean). Other household characteristics have the expected association with welfare: households with more educated or younger heads tend to have higher consumption on average; there is no consistent difference in relative consumption by gender of household head (although female heads have about two years less education); smaller (size) and richer (more assets) households have higher welfare.

A relevant topic for further research is to identify which types of employment are most likely to bring households out of poverty. It is not possible to address this directly given the absence of cohort-level deflators or poverty lines. One approach would be to investigate the association between diversification and welfare for consumption quintiles, incorporating the lag of welfare in the pseudo-panel application. Another approach would be to construct dependent variables capturing relative welfare or the consumption gap to capture how these are associated with diversification. The role of remittances is worthy of further investigation. The analysis sugggests they play an important smoothing role, maintaining receiving households at mean consumption levels. To the extent that they are internal, the income effect of diversification for remitting households is underestimated (as transfers are not included as expenditure).

Descriptive analysis suggests other issues that could be investigated further. Regional variations in trends in relative welfare are significant. The Central region has average consumption 50% higher than the national mean (the only region above the mean), whereas the Northern region is getting relatively poorer, declining from about two-thirds in 1992/93 to around half of mean consumption since 1999/00. While the Eastern and Western regions were similar (70-80% mean consumption) until 2009/10, since then Western has reached mean national consumption whereas Eastern deteriorated to 60% of the mean. Regional disparities are increasing, but the rural-urban gap is decreasing, although urban households relative consumption is double that of rural. Future analysis could look deeper into regional and rural-urban differences in employment types and growth.

References

Abdulai, A. & A. CroleRees (2001), Determinants of income diversification amongst rural households in Southern Mali, *Food Policy*, **26**, 437-452.

Anderson E. & P. Deshingkar (2005), Livelihood diversification in rural Andhra Pradesh, India., In F. Ellis and A. Freeman (Eds), *Rural Livelihoods and Poverty Reduction Policies*, Routledge: London and New York; pp.62–81.

Andersson Djurfeldt, A. (2015), Urbanization and linkages to smallholderfarming in sub-Saharan Africa: implications for foodsecurity, *Global Food Security*, **4**, 1-7.

Appleton, S. (1996), Women-headed households and household welfare: An empirical deconstruction for Uganda. World Development, **24**(12), pp.1811-1827.

Appleton S. (2001), Education, Incomes and Poverty in Uganda in the 1990s, University of Nottingham, School of Economics, *CREDIT Research Paper 01/22*.

Barrett, C.B., T. Reardon & P. Webb (2001), Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics and policy implications, *Food Policy*, **26**, 315-331.

Block, S. & P. Webb (2001), The Dynamics of Livelihood Diversification in post-famine Ethiopia, *Food Policy*, **26**, 333-350.

Bryceson, D. (2000), African Rural Labour, Income Diversification and Livelihood Approaches: A Long-term Development Perspective, *Review of African Political Economy*, **80**, 171-189.

Davis, B., P. Winters, G. Carletto, K. Coarrubias, W. Quinones, A. Zezza, K.Stamoulis, C. Azzarri & S. Di Guiseppe (2010), A Cross-country Comparison of Rural Income Generating Activities, *World Development*, **38**(1), 48-63.

Deaton, A. (1985), Panel data from time series of cross-sections, *Journal of Econometrics*, **30**, 109–126.

Dercon, S. & P. Krishnan (1996), Income Portfolios in Rural Ethiopia and Tanzania: Choices and Constraints, *Journal of Development Studies*, **55**, 1-42.

Ellis, F. (1998), Household strategies and rural livelihood diversification, *Journal of Development Studies*, **35**(1), 1-38.

Ellis, F. (2000), *Mixing it: Rural Livelihoods and Diversity in Developing Countries*, Oxford: OUP.

Fox, L. & T. P. Sohnesen (2012), Household Enterprises in Sub-Saharan Africa - Why they matter for growth, jobs, and livelihoods, The World Bank, *Policy Research Working Paper WPS6184*.

Glewwe, P. (1991), Investigating the Determinants of Household Welfare in the Côte d'Ivoire, *Journal of Development Economics*, **35**, 307-37.

Kakande, M. (2010), Poverty Monitoring, Chapter 10 in F. Kuteesa, E. Tumusiime-Mutebile, A. Whitworth and T. Williamson (Editors), *Uganda's Economic Reforms: Insider Accounts*, Oxford: Oxford University Press, pp 226-245.

Kappel, R., J. Lay & S. Steiner (2005), Uganda: No More Pro-poor Growth?, *Development Policy Review*, **23**(1), 27-54.

Kavuma, S., O. Morrissey & R. Upward (2015), Worker Flows and the Impact of Labour Transitions on Earnings in Uganda, University of Nottingham, School of Economics, *CREDIT Research Paper 15/01*.

Khan, R. (2018), Assessing cohort aggregation to minimise bias in pseudo-panels, University of Nottingham, School of Economics, *CREDIT Research Paper 18/01*.

Kurosaki, T. (2003), Specialization and Diversification in Agricultural Transformation: The Case of West Punjab, 1903-92, *American Journal of Agricultural Economics*, **85**(2), 372–386

Lanjouw, P. (2007), Does the Rural Nonfarm Economy Contribute to Poverty Reduction?, Chapter 3 (pp 55-81) in P. Hazel, S. Haggblade & T. Reardon (Eds), *Transforming the Rural Nonfarm Economy*, Baltimore: Johns Hopkins University Press.

Loison, S. A. (2015), Rural Livelihood Diversification in Sub-Saharan Africa: A Literature Review, *The Journal of Development Studies*, **51**(9), 1125-1138

Losch, B., S. Freguin-Gresh & E. White (2012), *Structural transformation and rural change revisited: Challenges for late developing countries in a globalizing world*. Agence Française de Developpement and the World Bank: Washington, DC: World Bank Publications.

McNamara, K., & C. Weiss (2005), Farm Household Income and On- and Off-Farm Diversification, *Journnal of Agricultural and Applied Economics*, **37**, 37–48.

Rahman, S. (2009), Whether crop diversification is a desired strategy for agricultural growth in Bangladesh? *Food Policy*, **34**(4), 340–349.

Reardon, T. (1997), Using evidence of household income diversification to inform study of the rural non-farm labour market in Africa, *World Development*, **25**(5), 735-748.

Reardon, T., J. Berdegué, C. Barrett & K. Stamoulis (2007), Household Income Diversification into Rural Nonfarm Activities, Chapter 6 (pp 115-140) in P. Hazel, S. Haggblade & T. Reardon (Eds), *Transforming the Rural Nonfarm Economy*, Baltimore: Johns Hopkins University Press.

Reardon, T., C. Delgado & P. Matlon (1992), Determinants and Effects of Income Diversification amongst Farm Households in Burkina Faso, *Journal of Development Studies*, **32**, 899-912.

Reardon, T. & K. Taylor (1996), Agroclimatic shock, income inequality and poverty: Evidence from Burkina Faso, *World Development*, **24** (4), 901-914.

Van de Walle, D. & D. Cratty (2003), Is the Emerging Non-Farm Market Economy the Route Out of Poverty in Vietnam?, *Policy Research Working Paper no. 2950*, World Bank, Washington, D.C.

Verbeek, M. & T. Nijman (1992), Can cohort data be treated as genuine panel data? *Empirical Economics*, **17**, 9–23.

World Bank (2012), *World Development Report 2013: Jobs*. Washington, DC: World Bank. DOI: 10.1596/978-0-8213-9575-2

Wouterse, F. & J. E. Taylor (2008), Migration and income diversification: Evidence from Burkina Faso, *World Development*, **36**(4), 625–640.

APPENDIX A: Additional Material

Cohort Construction Test Criteria

Verbeek & Nijman (1992, 1993) demonstrate that the sample bias depends on two key factors: the true level of variance at the cohort population level (w_1), capturing the variation *across* cohorts (must be >0 for model to be identified), and the sampling error variance of the observed cohort means ($w_2 = \sigma_v^2 / n_c$), capturing the variation *within* cohorts. As w_1 increases relative to w_2, the bias from sampling error decreases and so does the cell size required for minimising bias.

Khan (2018) proposes CAWAR (named as it captures cell size and the across-to-within variation adjusted for autocorrelation) combining w_1, σ_v^2, and time variation in order to assess whether cell sizes are sufficient for addressing sampling error. Time variation is introduced by assuming the explanatory variables follow an AR[1] specification ($x_{ct}^* = \rho x_{c(t-1)}^* + e_{ct}$) so that we have $w_1 = \frac{\sigma_e^2}{1-\rho^2}$ where σ_e^2 represents the genuine level of variation across cohort observations. Thus the ratio of interest for assessing cell size should be σ_e^2/w_2 rather than w_1/w_2.

CAWAR $= \frac{\sigma_e^2}{w_2} = \frac{w_1(1-\rho^2)}{w_2} = \frac{w_1(1-\rho^2)n_c}{\sigma_v^2}$ calculated for each variable.

Khan (2018) suggests sample proxies:

- w_1 uses the variance across the cohort sample means
- w_2 uses the average of the variances for individuals in each cohort
- ρ uses the autocorrelation coefficient obtained by regressing the cohort means on their first lag and a constant term
- If cell sizes vary across cohorts we also recommend all three be calculated using the square-root of the cell size as weights.

The AWAR metric is used to measure aggregation bias, which arises when moving from the individual to the cohort level. Although CAWAR could be used, cell size unlikely to affect aggregation. Thus, with AWAR $= \frac{\sigma_e}{\sigma_v} = \frac{w_1^{0.5}(1-\rho^2)^{0.5}}{\sigma_v}$ we have $\mathrm{CAWAR} = \mathrm{AWAR}^2 \times n_c$ and the same proxies are used as above.

Threshold values for a variable can be estimated for each metric for the given data from which cohorts are constructed: an AWAR threshold of around 0.5 is recommended to limit aggregation; while a threshold of CAWAR of about 11 seems appropriate the precise recommendation depends on parameter values (especially T and ρ). These provides tests for whether the psuedo-panel, as constructed, is likely to provide relaible coefficient estimates.

Appendix Tables: Full and Additional Results

Tables are numbered corresponding to the table in the text.

Table A2: Household Consumption and Characteristics

	(1) log Cons	(2) log Cons	(3) log Cons	(4) log Cons	(5) log Cons
HH size	-0.090***	-0.088***	-0.088***	-0.088***	-0.088***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log HH assets	0.166***	0.165***	0.165***	0.173***	0.173***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Head age	0.008***	0.006***	0.006***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Head agesq	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head female	0.004	0.018***	0.019***	0.012*	0.011*
	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)
Head married	-0.115***	-0.108***	-0.108***	-0.116***	-0.115***
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Head education	0.038***	0.034***	0.034***	0.036***	0.036***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Eastern region	-0.260***	-0.251***	-0.251***	-0.251***	-0.251***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Northern region	-0.294***	-0.281***	-0.280***	-0.274***	-0.275***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Western region	-0.144***	-0.147***	-0.147***	-0.143***	-0.144***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Urban	0.400***	0.313***	0.313***	0.280***	0.278***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
1999	0.681***	0.686***	0.686***	0.674***	0.674***
	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
2002				0.630***	0.630***
				(0.019)	(0.019)
2005	0.912***	0.900***	0.899***	0.887***	0.886***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
2009	1.344***	1.319***	1.318***	1.300***	1.299***
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
2012	1.851***	1.835***	1.835***	1.812***	1.812***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Region*location*year effects	Yes	Yes	Yes	Yes	Yes
Observations	37,344	37,289	37,289	45,946	45,946
R-squared	0.763	0.768	0.768	0.745	0.745

Notes: As for Table 2.

Table A3: Household Consumption and Characteristics: Rural vs Urban

	Rural log Cons	Urban log Cons	Rural log Cons	Urban log Cons	Rural log Cons	Urban log Cons
HH size	-0.082***	-0.104***	-0.081***	-0.105***	-0.082***	-0.104***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Log HH assets	0.160***	0.173***	0.164***	0.187***	0.160***	0.173***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Head age	0.005***	0.009***	0.004***	0.011***	0.005***	0.009***
	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.003)
Head agesq	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head female	0.010	0.032**	0.008	0.020*	0.010	0.034**
	(0.008)	(0.014)	(0.008)	(0.012)	(0.008)	(0.014)
Head married	-0.098***	-0.127***	-0.103***	-0.134***	-0.098***	-0.126***
	(0.009)	(0.014)	(0.008)	(0.012)	(0.009)	(0.014)
Head education	0.031***	0.039***	0.032***	0.041***	0.031***	0.039***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Eastern region	-0.329***	-0.301***	-0.324***	-0.275***	-0.329***	-0.301***
	(0.023)	(0.038)	(0.023)	(0.038)	(0.023)	(0.038)
Northern region	-0.557***	-0.386***	-0.541***	-0.331***	-0.557***	-0.384***
	(0.021)	(0.037)	(0.021)	(0.037)	(0.021)	(0.037)
Western region	-0.143***	-0.206***	-0.140***	-0.184***	-0.143***	-0.208***
	(0.023)	(0.036)	(0.023)	(0.037)	(0.023)	(0.036)
1999	0.679***	0.700***	0.676***	0.681***	0.679***	0.700***
	(0.017)	(0.032)	(0.016)	(0.032)	(0.017)	(0.032)
2002			0.592***	0.518***		
			(0.019)	(0.026)		
2005	0.898***	0.837***	0.897***	0.815***	0.898***	0.835***
	(0.019)	(0.033)	(0.019)	(0.034)	(0.019)	(0.033)
2009	1.315***	1.106***	1.311***	1.075***	1.314***	1.107***
	(0.020)	(0.048)	(0.020)	(0.049)	(0.020)	(0.048)
2012	1.858***	1.662***	1.848***	1.633***	1.858***	1.661***
	(0.021)	(0.038)	(0.021)	(0.038)	(0.021)	(0.038)
Region*year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,292	9,997	32,393	13,553	27,292	9,997
R-squared	0.735	0.779	0.712	0.743	0.735	0.779

Notes: As for Table 3.

Table A4: Household Consumption and Characteristics by Survey

	1992 lcons	1999 lcons	2005 lcons	2009 lcons	2012 lcons
HH size	-0.090***	-0.080***	-0.091***	-0.090***	-0.099***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Log HH assets	0.148***	0.174***	0.205***	0.160***	0.145***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Head age	0.008***	0.001	0.010***	0.003	0.010***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Head agesq	-0.000***	-0.000	-0.000***	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Head female	0.044***	0.002	0.029*	0.006	0.014
	(0.015)	(0.014)	(0.016)	(0.019)	(0.016)
Head married	-0.115***	-0.117***	-0.107***	-0.111***	-0.070***
	(0.015)	(0.015)	(0.017)	(0.020)	(0.018)
Head education	0.031***	0.030***	0.035***	0.037***	0.039***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Eastern region	-0.236***	-0.170***	-0.219***	-0.140***	-0.329***
	(0.019)	(0.016)	(0.018)	(0.023)	(0.024)
Northern region	-0.281***	-0.422***	-0.379***	-0.333***	-0.563***
	(0.020)	(0.019)	(0.020)	(0.023)	(0.022)
Western region	-0.139***	-0.168***	-0.147***	-0.165***	-0.139***
	(0.019)	(0.015)	(0.019)	(0.023)	(0.023)
Urban	0.318***	0.283***	0.308***	0.365***	0.281***
	(0.023)	(0.022)	(0.027)	(0.027)	(0.026)
Region*location effects	Yes	Yes	Yes	Yes	Yes
Observations	9,224	9,633	6,812	5,453	6,167
R-squared	0.509	0.541	0.609	0.578	0.638

Notes: As for Table 4.

Table A5 reports estimates for PP3 and PP4 corresponding to Table 5. Although ID is insignificant, ID-R remains significant and Head NAS or NAW remain positive and generally significant. Table A6 reports estimates for PP3 and PP4 corresponding to Table 6. Neither ID nor ID-R are significant but Head NAS or NAW remain positive and generally significant. Estimates for PP4 are generally weaker, likely due to it low variation given low AWAR exacerbated by lagged instrumentation. Table A9 reports estimates for PP3 and PP4 corresponding to Table 9. The main differences are that neither NAS nor NAW are significant, the significance of AW is (much) lower but the coefficient remains negative, while farming (negative) and remittances (positive) are significant.

Table A5: Diversification and Consumption: Pseudo Panel Estimates

	PP3 log Cons	PP3 log Cons	PP4 log Cons	PP4 log Cons
ID	-0.024		-0.032	
	(0.024)		(0.041)	
ID -R		-0.098***		-0.135***
		(0.028)		(0.048)
Head NAS	0.230***	0.266***	0.257***	0.284***
	(0.060)	(0.049)	(0.099)	(0.088)
Head NAW	0.166***	0.194***	-0.199	0.219**
	(0.061)	(0.054)	(0.232)	(0.087)
Head AW	0.016	0.058	-0.048	-0.053
	(0.121)	(0.100)	(0.168)	(0.201)
Head not employed	0.214**	0.110	-0.032	-0.067
	(0.094)	(0.081)	(0.041)	(0.157)
Cohort fixed effects	Yes	Yes	Yes	Yes
Observations	1,166	1,433	360	432
R-squared	0.978	0.975	0.989	0.988

Notes: As for Table 5; PP3 uses similar groupings to PP2 with ten-year age bands respectively, and PP4 uses 15-year age bands alongside region, urban/rural and education of the head.

Table A6: Pseudo Panel Estimates with Lagged Diversification

	PP3 log Cons	PP3 log Cons	PP4 log Cons	PP4 log Cons
ID	-0.183		-0.311	
	(0.147)		(0.375)	
ID -R		-0.135		-0.741
		(0.173)		(0.966)
Head NAS	0.272***	0.272***	0.290***	0.396***
	(0.060)	(0.050)	(0.104)	(0.127)
Head NAW	0.276***	0.244***	0.520***	0.518
	(0.071)	(0.074)	(0.173)	(0.329)
Head AW	0.048	0.071	-0.101	0.280
	(0.126)	(0.111)	(0.267)	(0.614)
Head not employed	0.185*	0.048	-0.160	-0.473
	(0.106)	(0.115)	(0.257)	(0.755)
Cohort fixed effects	Yes	Yes	Yes	Yes
Observations	850	1,115	288	360
R-squared	0.938	0.941	0.967	0.960

Notes: As for Table A5 except diversification variables are lagged one period.

Table A9: Disaggregated Diversification, Pseudo Panel Estimates

	PP3 log Cons	PP3 log Cons	PP4 log Cons	PP4 log Cons
NAS workers	0.024	0.025	-0.028	-0.001
	(0.047)	(0.039)	(0.086)	(0.077)
NAW workers	0.002	-0.027	-0.003	-0.071
	(0.048)	(0.042)	(0.093)	(0.083)
AW workers	-0.172***	-0.091*	-0.247**	-0.084
	(0.065)	(0.055)	(0.113)	(0.097)
HH farms	-0.223***	-0.273***	-0.255***	-0.311***
	(0.050)	(0.042)	(0.080)	(0.070)
Remittances	0.095***		0.109*	
	(0.036)		(0.060)	
Cohort fixed effects	Yes	Yes	Yes	Yes
Observations	1,166	1,433	360	432
R-squared	0.979	0.975	0.990	0.988

Notes: As for Table A5. Main activity of household head omitted.

APPENDIX B: Patterns in Ugandan Household Welfare 1992-2012

The Appendix Figures illustrate: i) changes in welfare of types of household over surveys to identify which have performed better or worse relative to the average; and ii) analysis of the role of income diversification in changes in household welfare, with a focus on sources of income for household workers. The Figures compare average household welfare (consumption measured by adult equivalent expenditure) by household types grouped according to various household characteristics (e.g. region, rural or urban, gender or age of head, main income source) to mean (national) household consumption (welfare) in the surveys over 1992/93 to 2012/13.

- Welfare (consumption) relative to mean by types, according to region, rural-urban; household head education, age and gender
- Welfare relative to mean by regions, according to rural-urban; household head education, age and gender
- Welfare relative to mean according to income diversification

Figure B1 shows that only the Central region has average consumption higher (by about 50%) than the mean whereas the Northern region averages around half of mean consumption. Although trends are not smooth over time, Central and Western (since about 2010) regions have become richer while Eastern and Northern have been getting poorer relative to the (national) average. Northern saw consumption fall relatively the most during the 1990s, with a slight relative improvement since the mid-2000s. Urban households had consumption more than double that of rural, relative to the average, consistent with the majority of urban households being in the Central region. The consumption for urban areas has been falling relative to the average since the mid-2000s (possibly reflecting the inclusion of more households classified as urban in regions other than Central).

Relative consumption is rising in education levels of household heads (Figure B2); heads with post-primary education have consumption 50% above the mean. Since the mid-2000s the gap has narrowed slightly as with relative consumption levels increasing for households with no or only primary education. It is interesting to note that the relative positions in 2012/13 are almost identical to those of 1991/92. There is no consistent difference in relative consumption by age or gender of household head (Figure B2 & B3) and the gaps are negligible, especially for gender. There is a tendency, especially in the most recent surveys, for households with younger heads to have slightly higher relative consumption.

Figure B4 shows that the pattern of regional differences is similar for rural and urban households, with urban considerably better off than rural in all regions (relative to the national average). However, in all regions relative urban consumption has fallen over time, although relative rural welfare has also fallen except for Central in the 2000s and Western most recently. By 2012/13, rural levels in Eastern and Northern regions were about 50% the national average whereas urban levels were almost at the average; urban levels in Central were about twice the average and in Western about 50% above average (whereas in both regions rural levels were about the average). Put another way, by 2012/13 urban households in Eastern and Northern regions had similar incomes to rural households in Central and Western regions, whereas in 1991/92 urban households in Eastern and Northern regions had higher incomes (by 25-50%) than rural households in Central and Western regions.

Fig B1 Consumption (Welfare) relative to mean by Regions and Rural-Urban

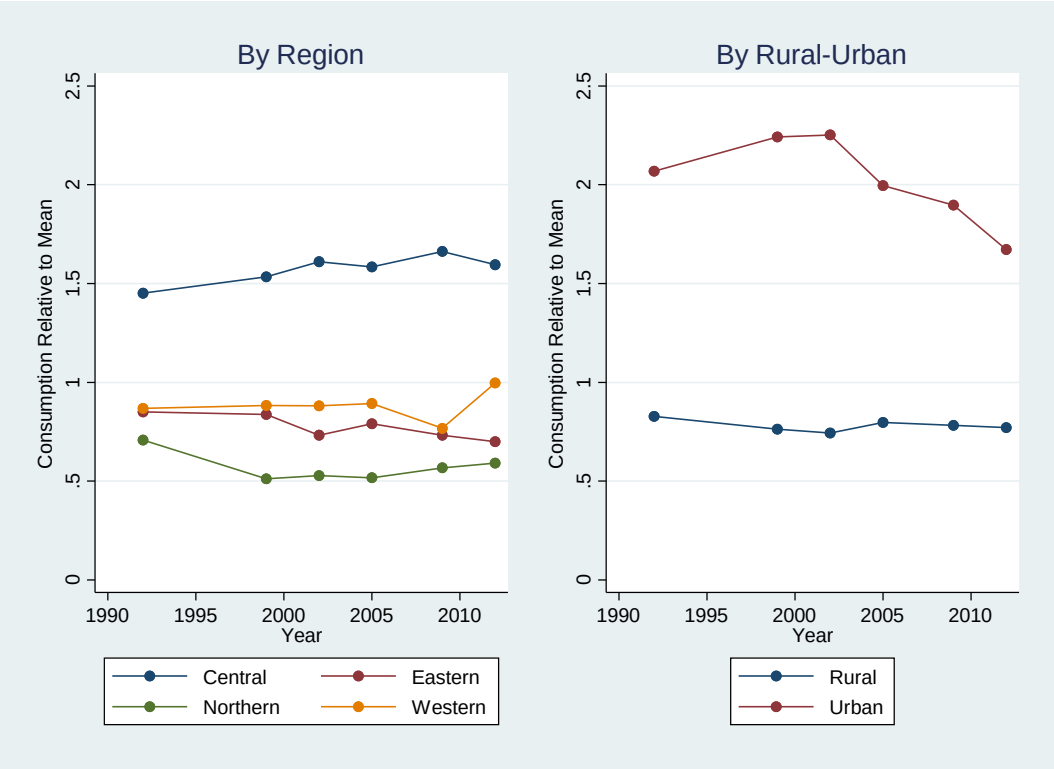


Fig B2 Consumption relative to mean by Education and Gender of Head

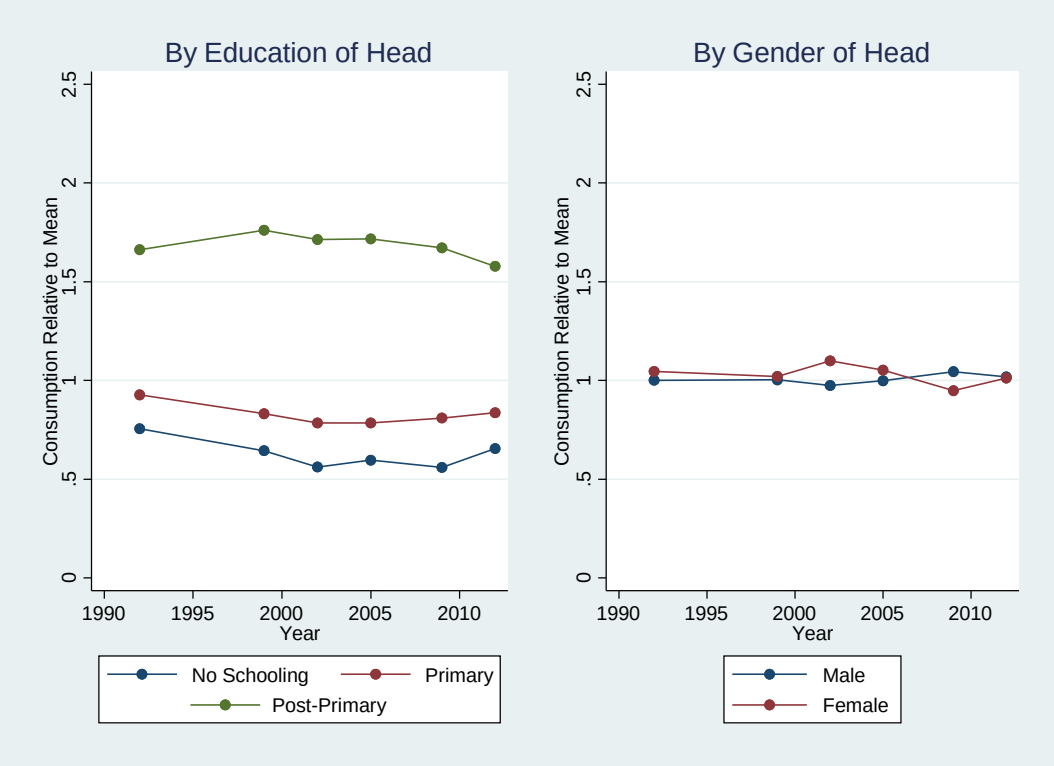


Fig B3 Consumption (Welfare) relative to mean by Age of Head and by year

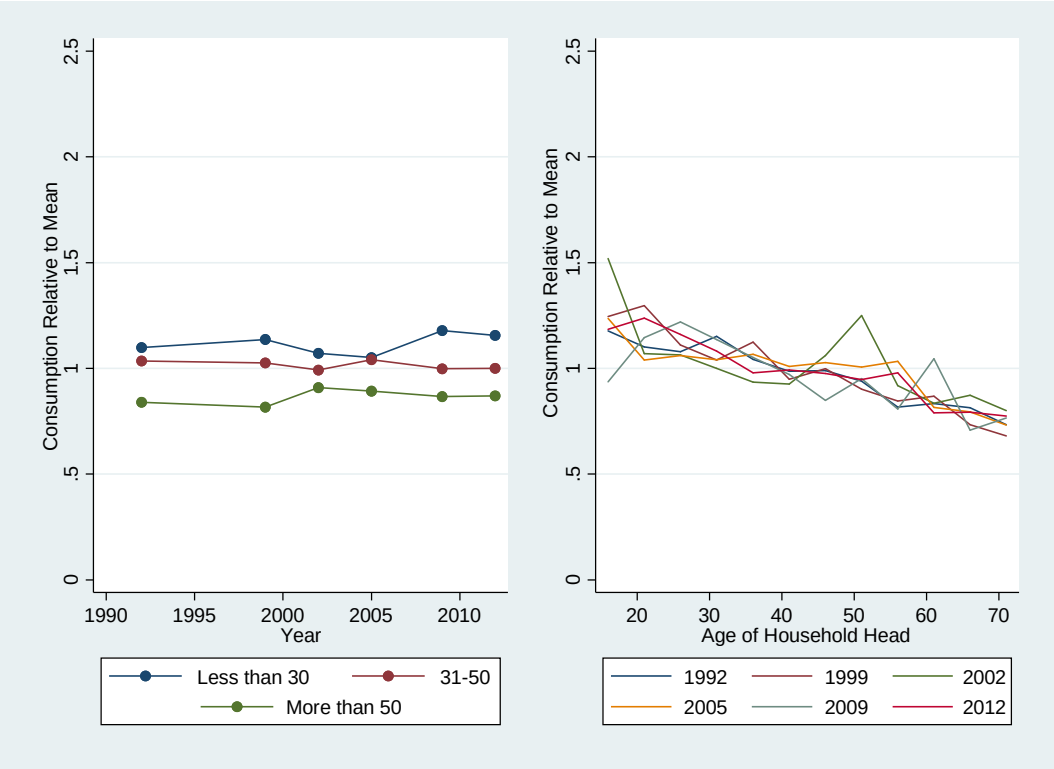


Fig B4: Rural-Urban Differences by Region and Year

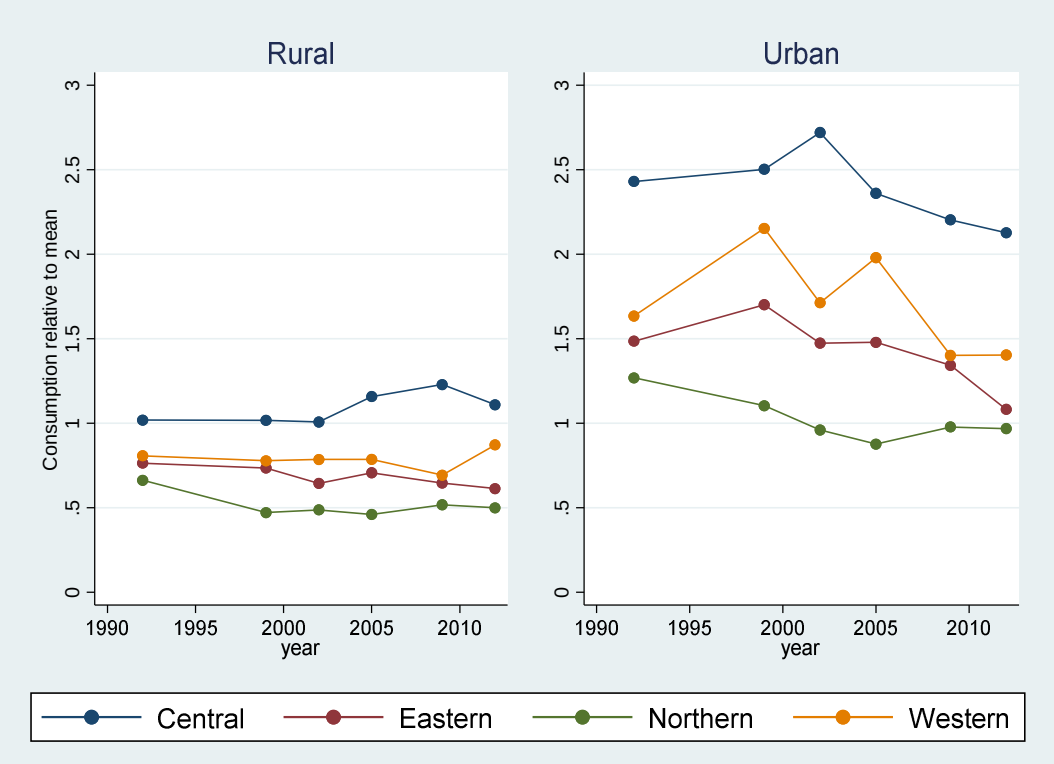
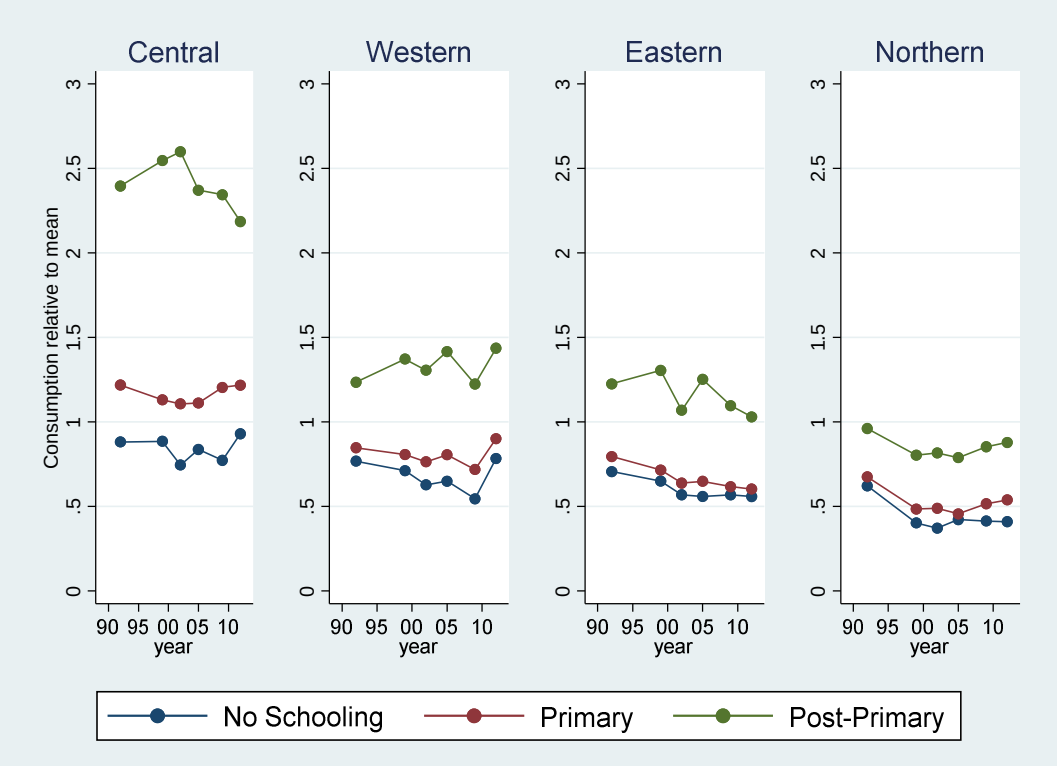


Figure B5 reports rural-urban and regional differences by education of the head. The benefits of post-primary education are most pronounced in Central (but declined over time) and non-existent in Northern. With the exception of Central, there is little difference in relative levels for heads with no schooling or primary education, whereas relative consumption for households with heads with post-primary education is about twice or more that of other households in the region. Households with primary education in Central region have higher mean consumption levels than those in Eastern or Northern with post-primary education.

The urban/rural breakdown by education levels shows that rural households with heads with post-primary education have consumption levels almost twice those less educated, and similar to the least educated in urban areas. In Eastern, Northern and (to a lesser extent) Western regions even the most educated households in rural areas have consumption levels below or about the national average (Figure B6), and well below the least educated urban households in Central. The most educated urban Northern households have similar welfare levels to the least educated rural Central households.

There is evidence that average years of education of household heads has increased over time (Figure B7). Urban areas have almost double the average years of education of rural (roughly 8 compared to 4 years). Household heads in Central region have over a year more of education on average than in the other three regions (about 6.5 compared to 5 or less by 2012/13). Male household heads have two or more extra years of education on average compared to female heads, whereas younger household heads also have on average two more years of education than older heads (Figure B8).

Fig B5: Education of Head by Region, Urban-Rural and Year



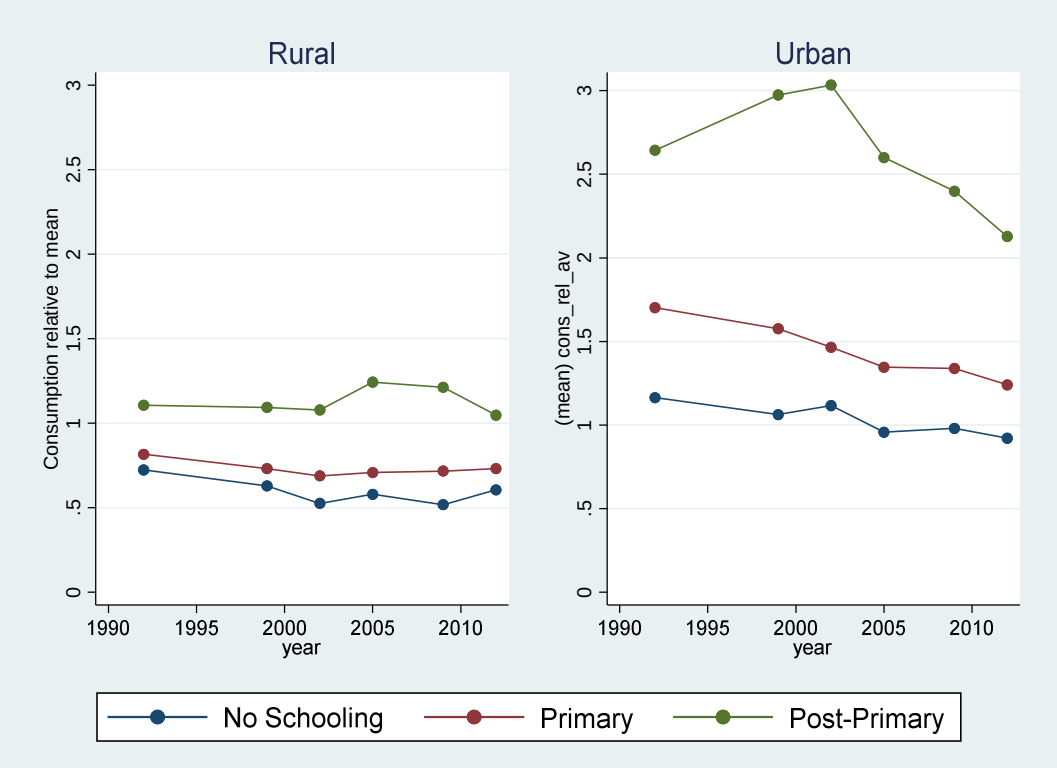
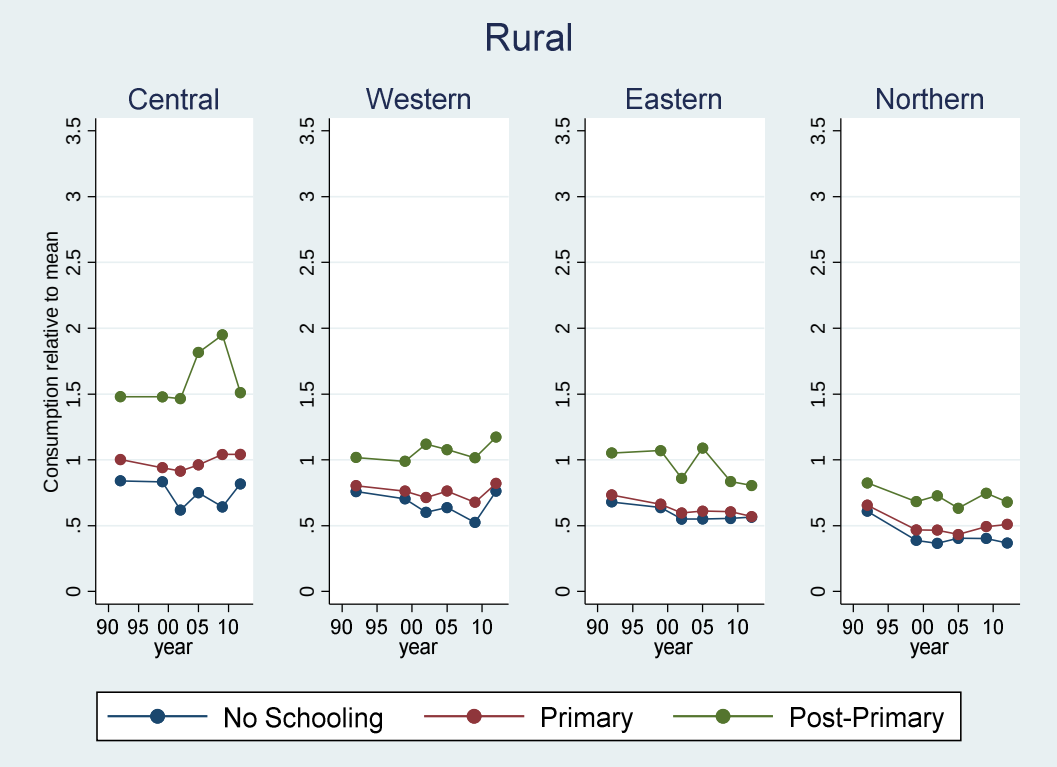


Fig B6: Education of Head Differences by Region and Rural-Urban



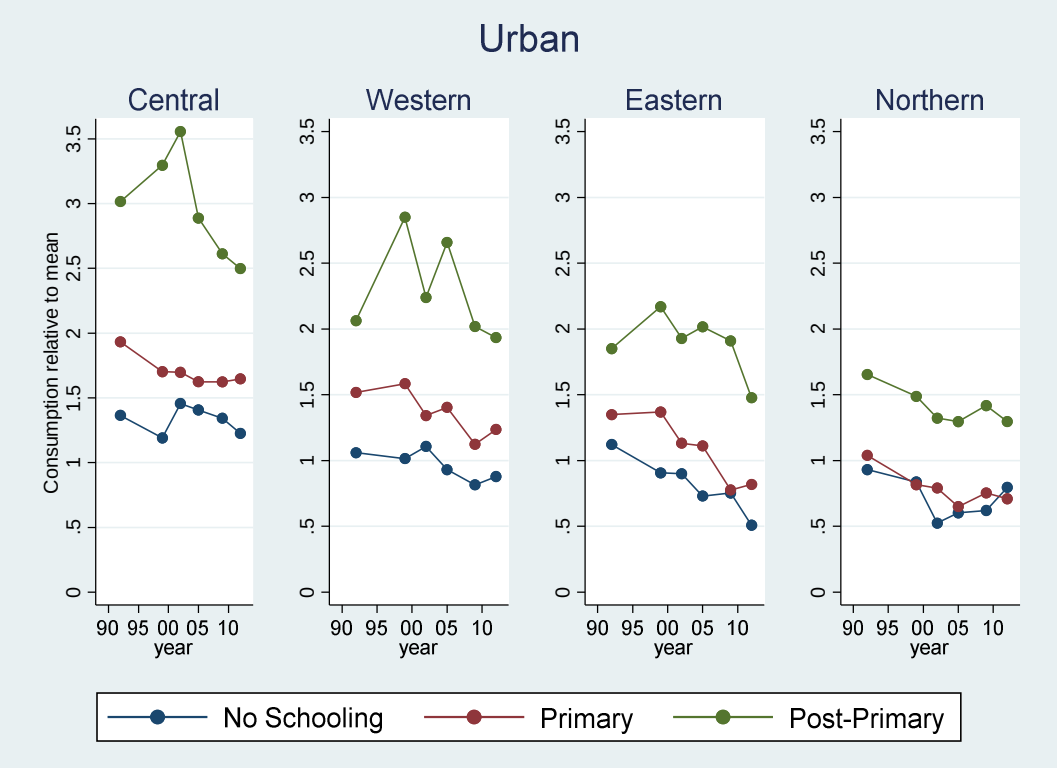


Fig B7 Average years education of heads by Region and Rural-Urban

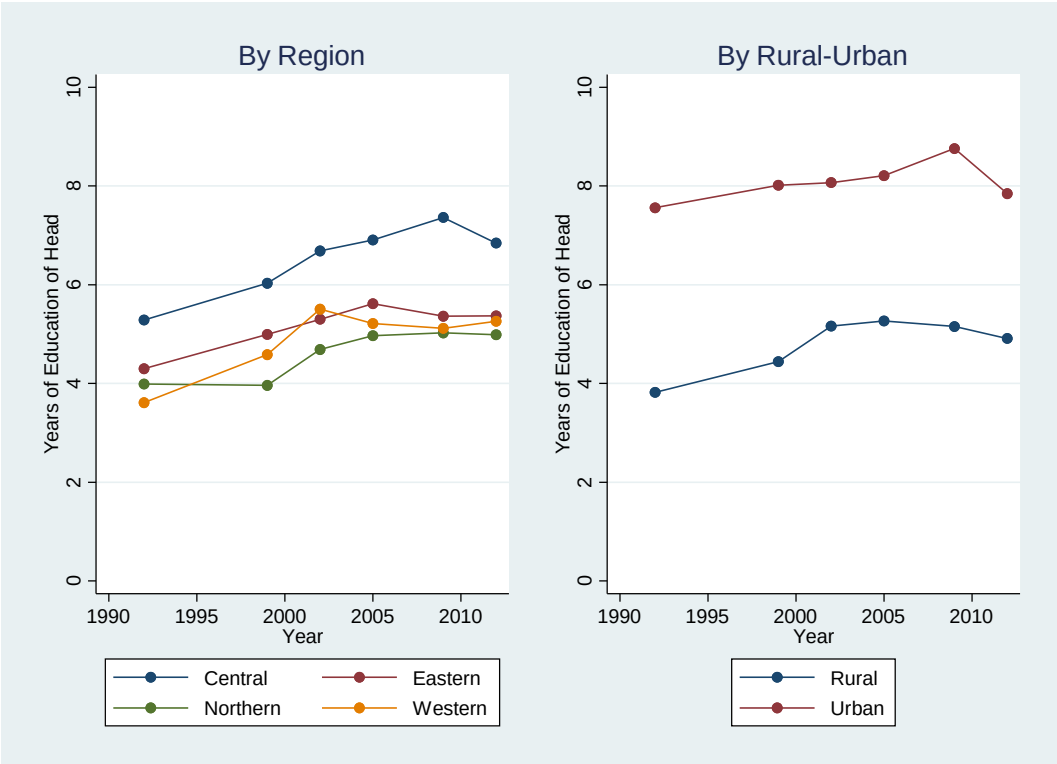
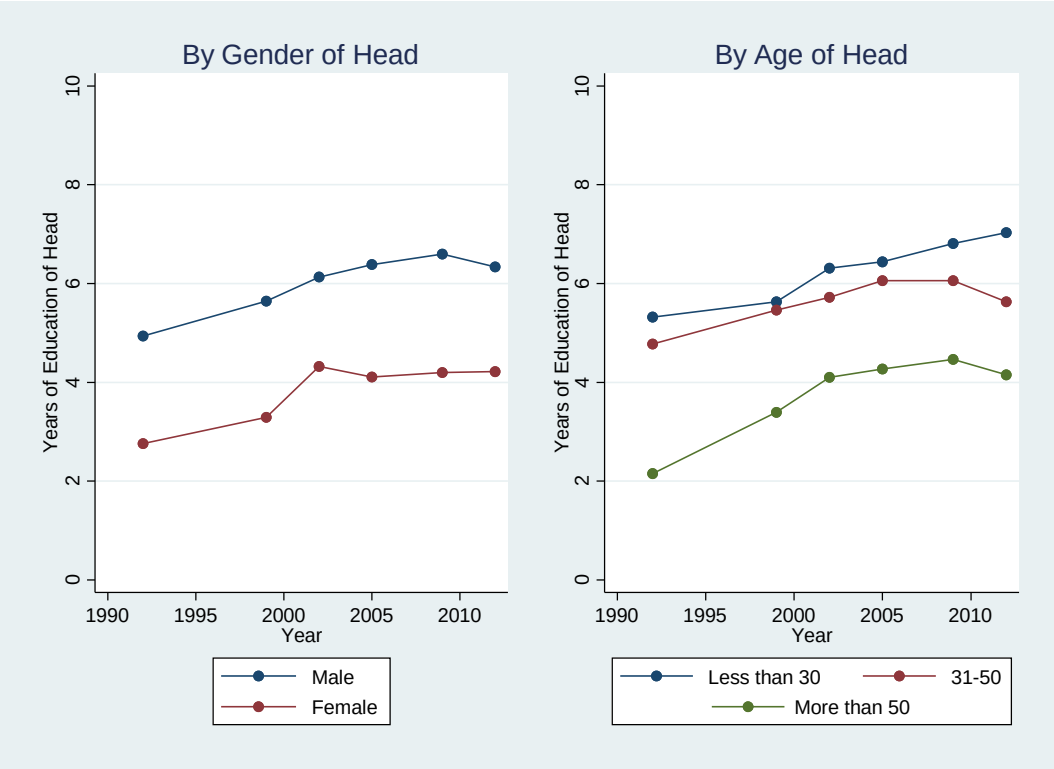


Fig B8 Average years education of household heads by Gender and Age



Five sources of household income are considered for the analysis of income diversification: remittances, farm, agricultural wage (off-farm), non-agricultural self-employment, and non-agricultural wage. The analysis allows for how many sources of income a household has, but the Figures here focus on whether a household has a particular source. Households that rely primarily on farm income (any member engaging in agricultural self-employment) or have members engaging in agricultural wage labour have the lowest welfare levels, up to 50% less than mean consumption (Figure B9). Furthermore, the relative consumption levels of households with agricultural wage labour have been falling over time.

Households with at least one member in non-agricultural wage employment (likely to comprise mostly urban and Central households) have the highest average consumption, about 50% above mean consumption levels, and this difference has been steady since the late 1990s. Households with at least one member in non-agricultural self-employment have above average consumption, although the gap has been decreasing and by 2012/13 these households had consumption levels at about the mean. Households receiving remittances are at the mean level of consumption (Figure B9) there is no consistent difference in average consumption of households receiving remittances and those not (Figure B10).

Households with farm income have lower average welfare compared to non-farm households in all regions; the gap is largest in Central and smallest in Northern (Figure B10). This pattern across regions is also evident comparing households with versus without non-agricultural self-employment and non-agricultural wage employment. However, households with agricultural wage employment have lower welfare than those without.

Fig B9 Income diversification and relative consumption

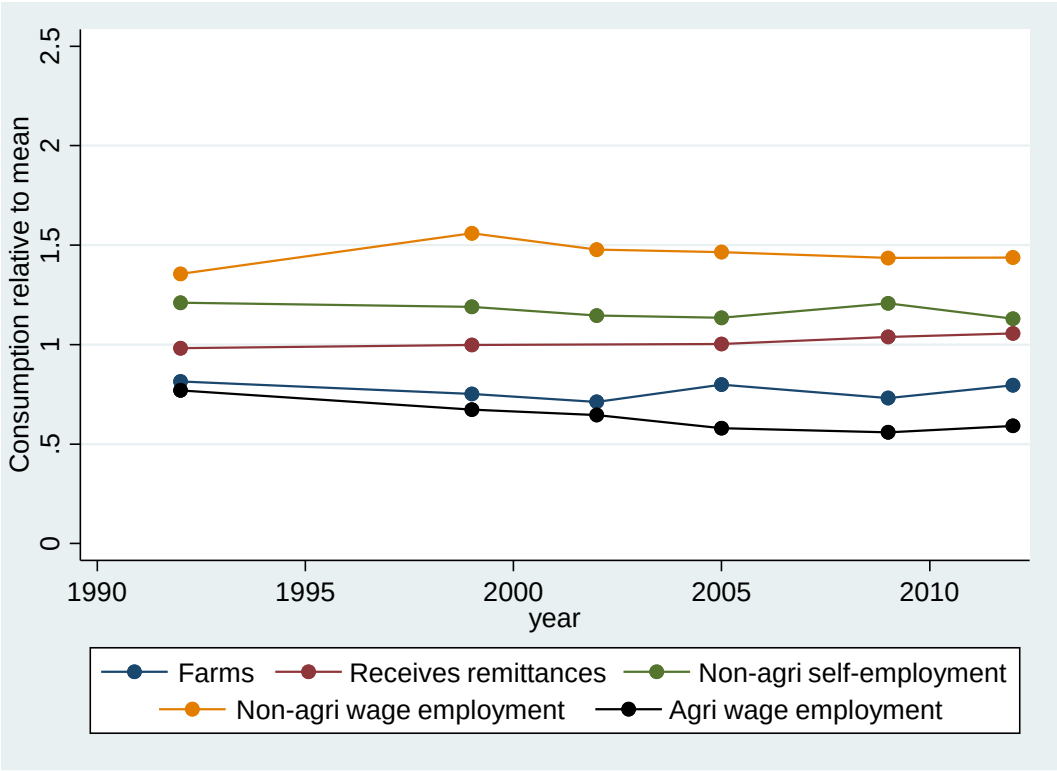
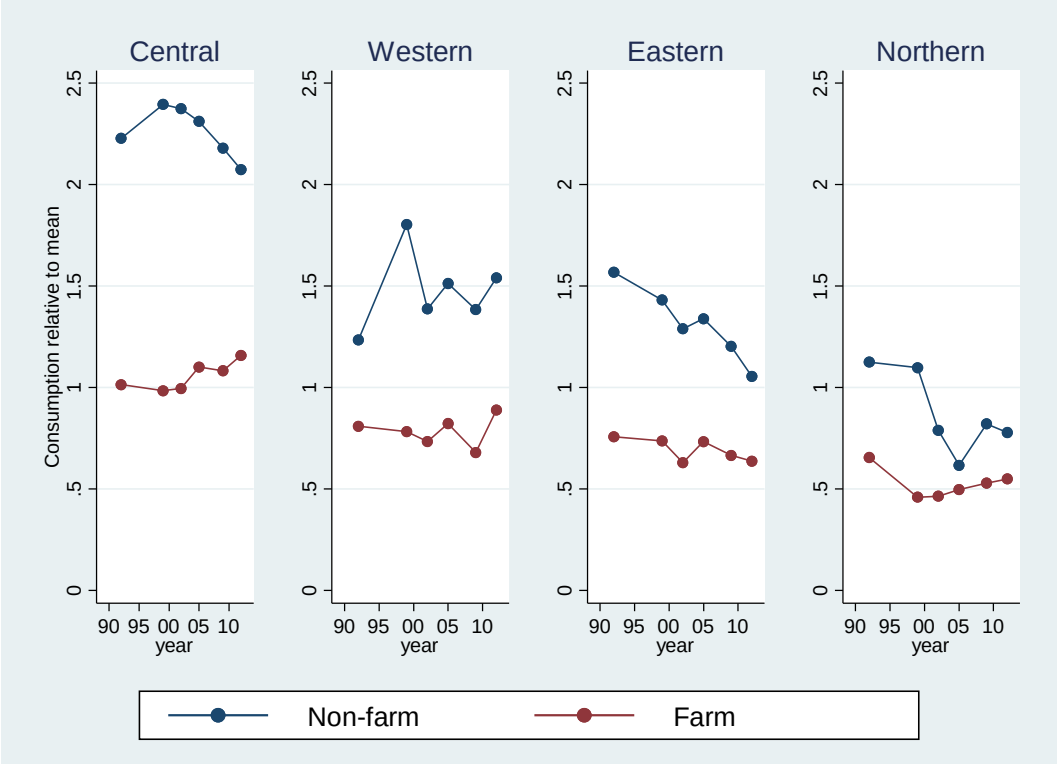
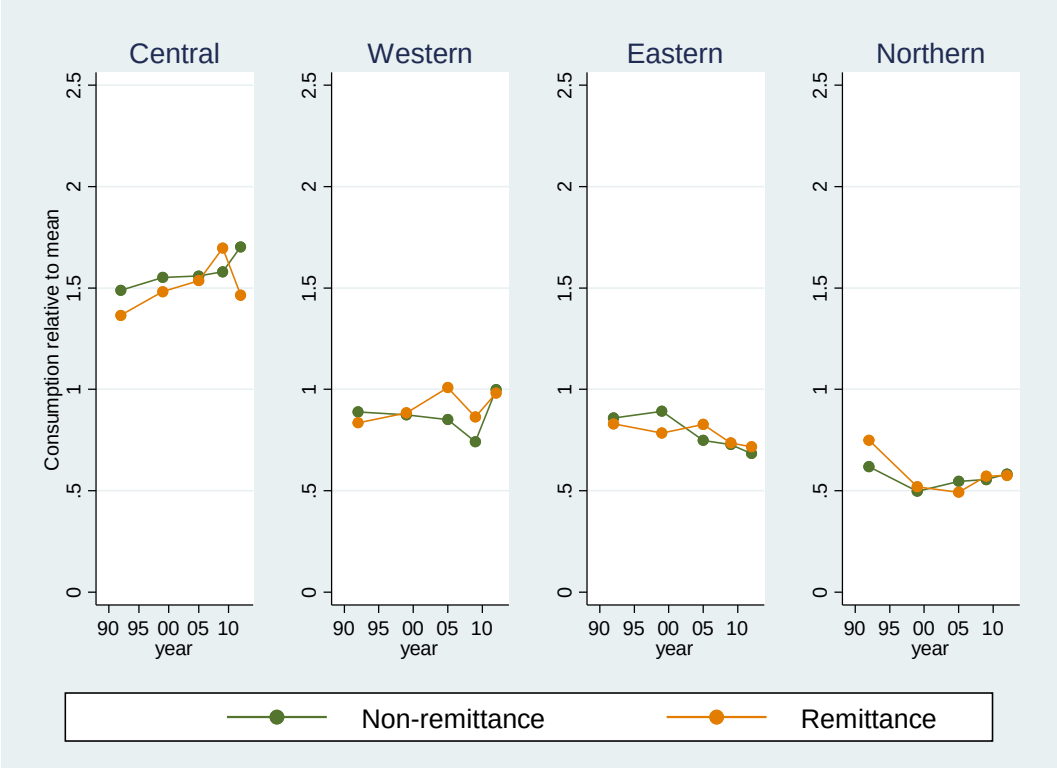
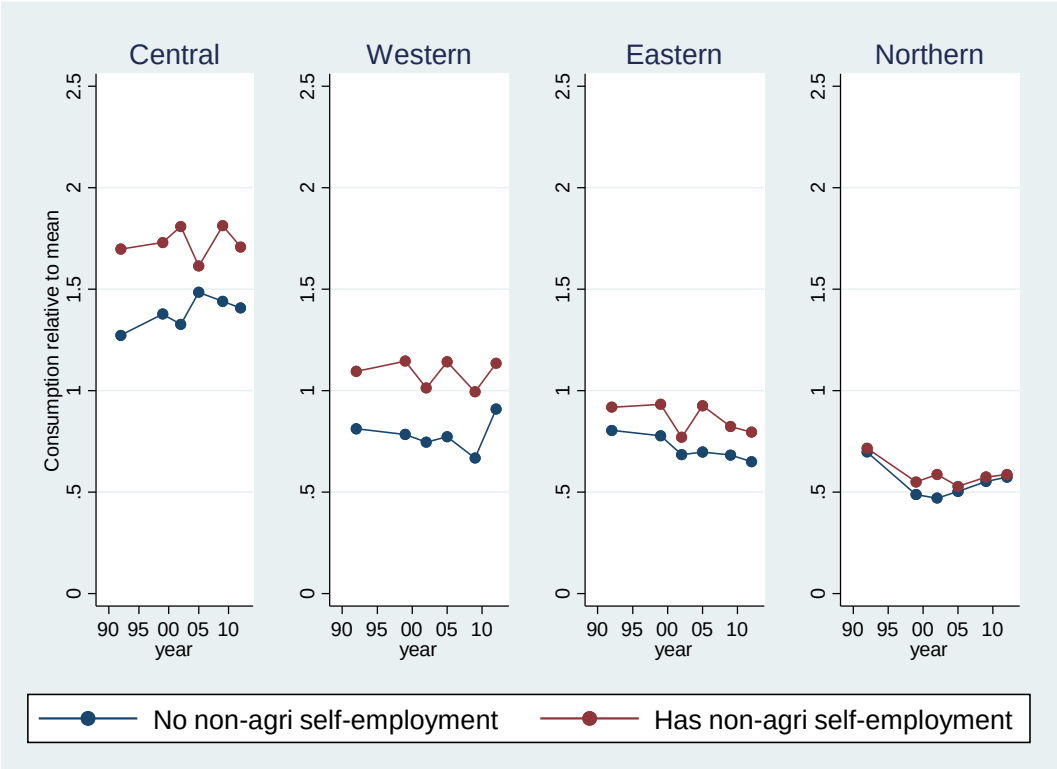
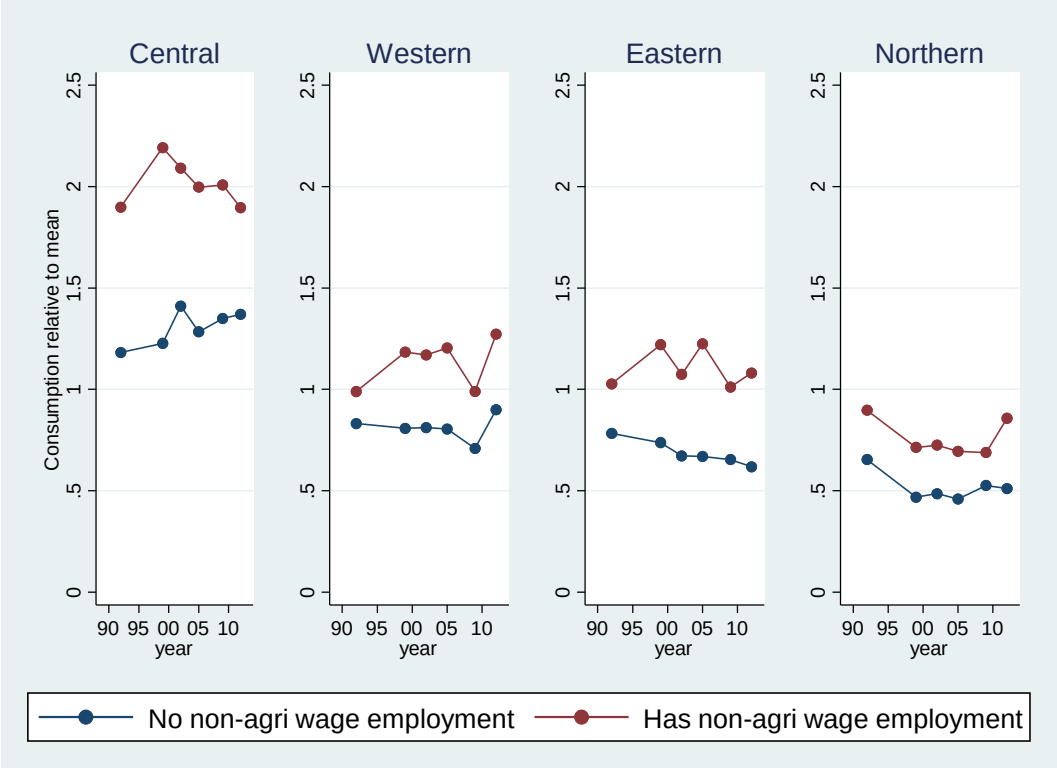


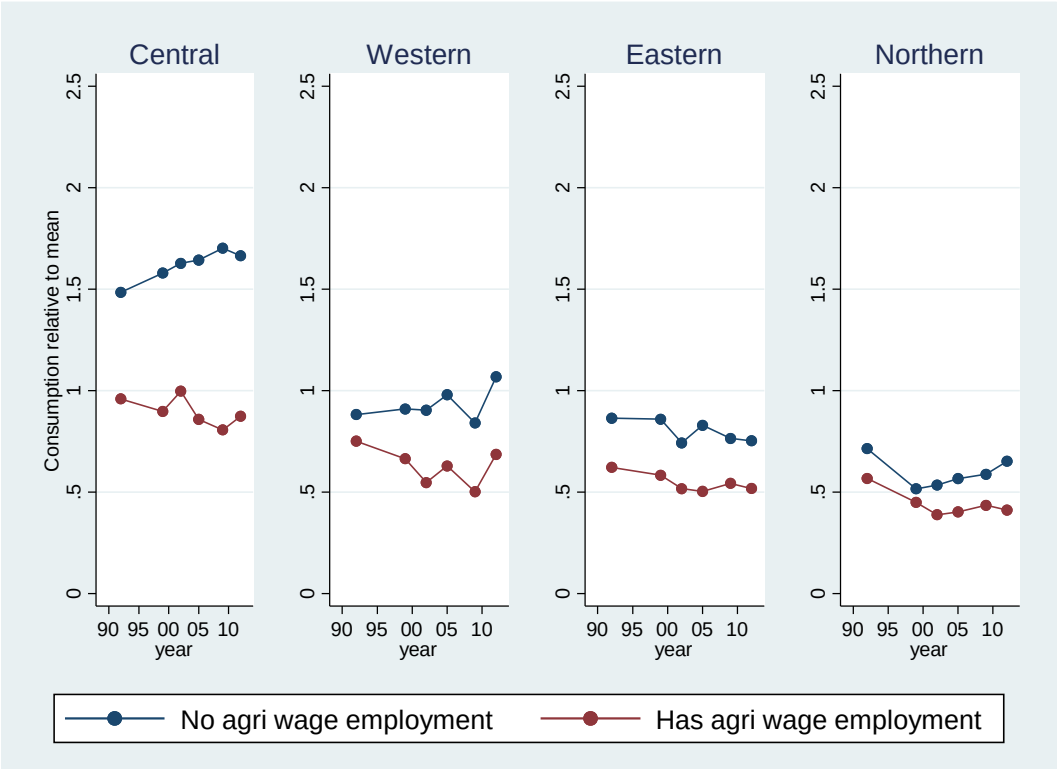
Fig B10 Income diversification and relative consumption by Region




Central
Western
Eastern
Northern
Consumption relative to mean
0
.5
1
1.5
2
2.5
90 95 00 05 10
year
Non-remittance
Remittance


Central
Western
Eastern
Northern
Consumption relative to mean
0
.5
1
1.5
2
2.5
90 95 00 05 10
year
No non-agri self-employment
Has non-agri self-employment

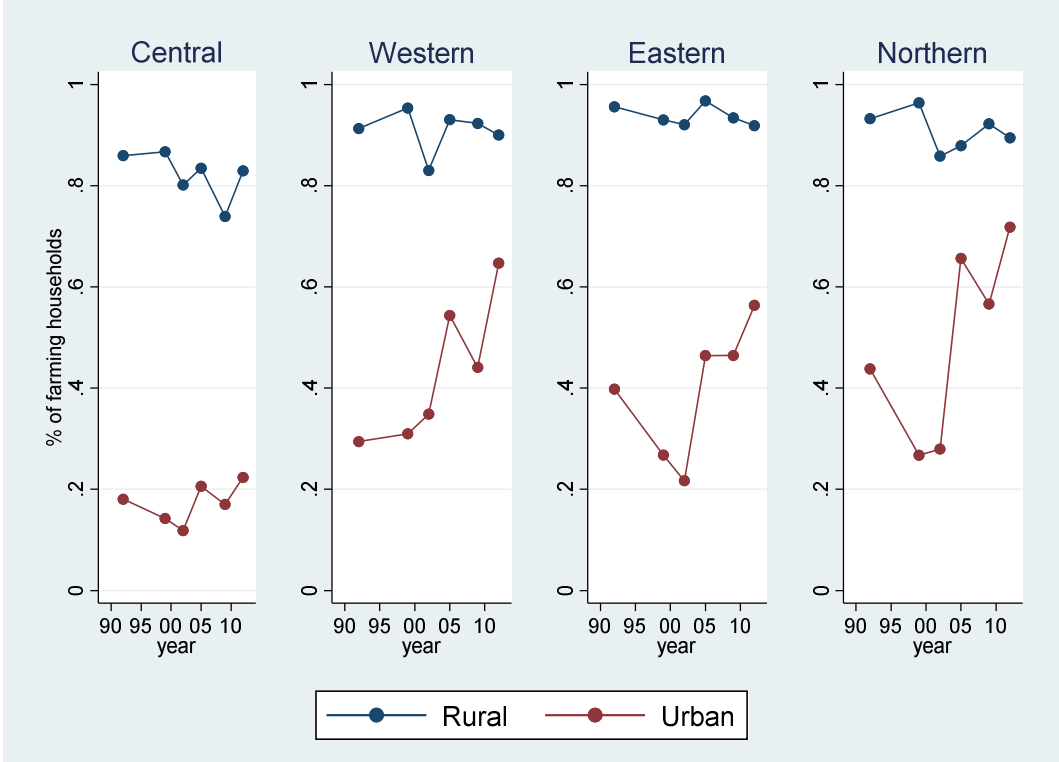

Central
Western
Eastern
Northern
Consumption relative to mean
0
.5
1
1.5
2
2.5
90 95 00 05 10
year
No non-agri wage employment
Has non-agri wage employment


Central
Western
Eastern
Northern
Consumption relative to mean
0
.5
1
1.5
2
2.5
90 95 00 05 10
year
No agri wage employment
Has agri wage employment

Although there was a general increase in diversification, Table 1 in the text shows that the share of farm households and households receiving remittances fell. Figure B11 shows that, nevertheless, in all regions the majority of rural households are engaged in Agriculture, with only a small decline since 1992. Many households defined as urban are also in Agriculture: about 20% in Central; in Western the share increased from about 30% in 1990s to over 60% by 2012; in Eastern and Northern the share declined from about 40% in the 1990s but then rose considerable, to almost 60% in Eastern and over 70% in Northern by 2012. This increase is in part due to the expansion over time of areas defined as urban. Households with older heads or heads without post-primary education are more likely to be in Agriculture.

Figure B12 shows how the share of households receiving remittances declined in all regions, from about 60% in 1992 (except for Western, the region with the lowest share, where it was below 50%) to 40% or less by 2010. There was an increase in all regions by 2012, except for Northen. There were no consistent difference for rural or urban households, but the share was somewhat lower for households with younger, male or more educated heads.

Figure B11: Share of Households engaged in Agriculture



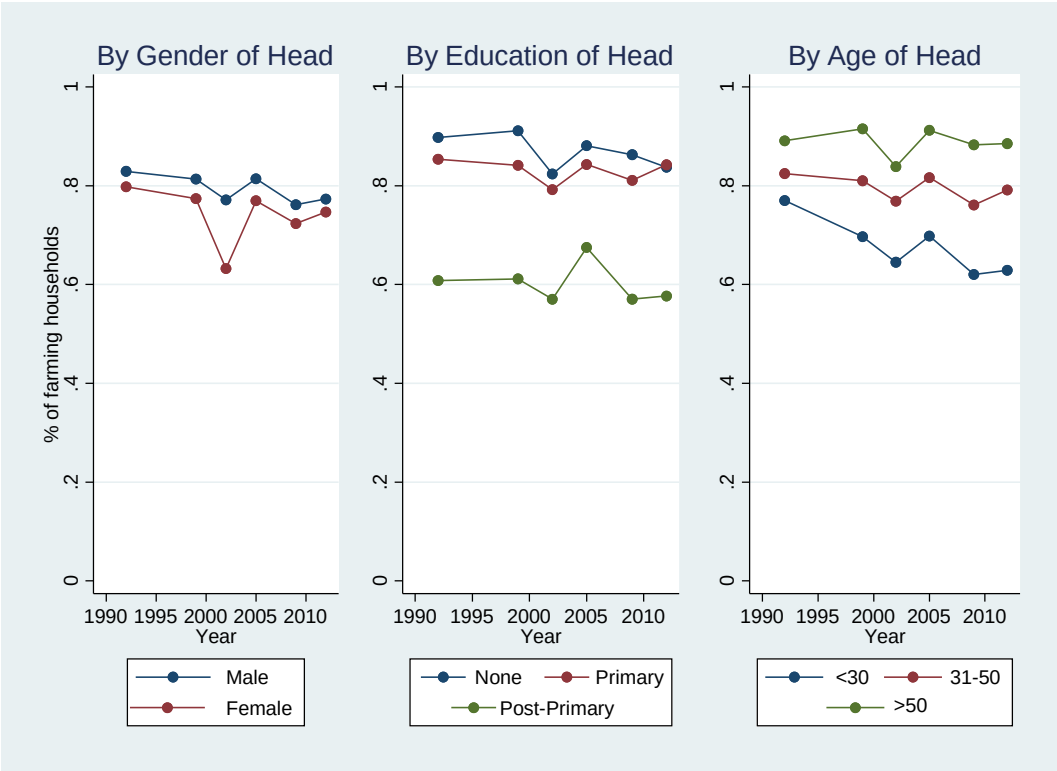
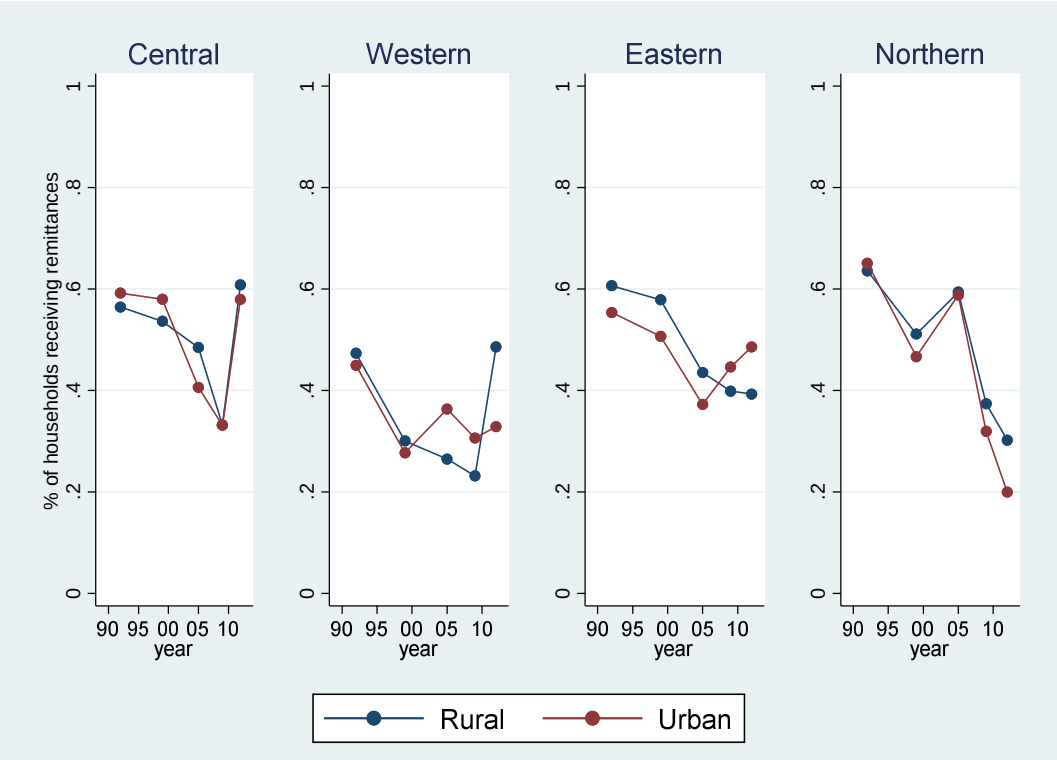
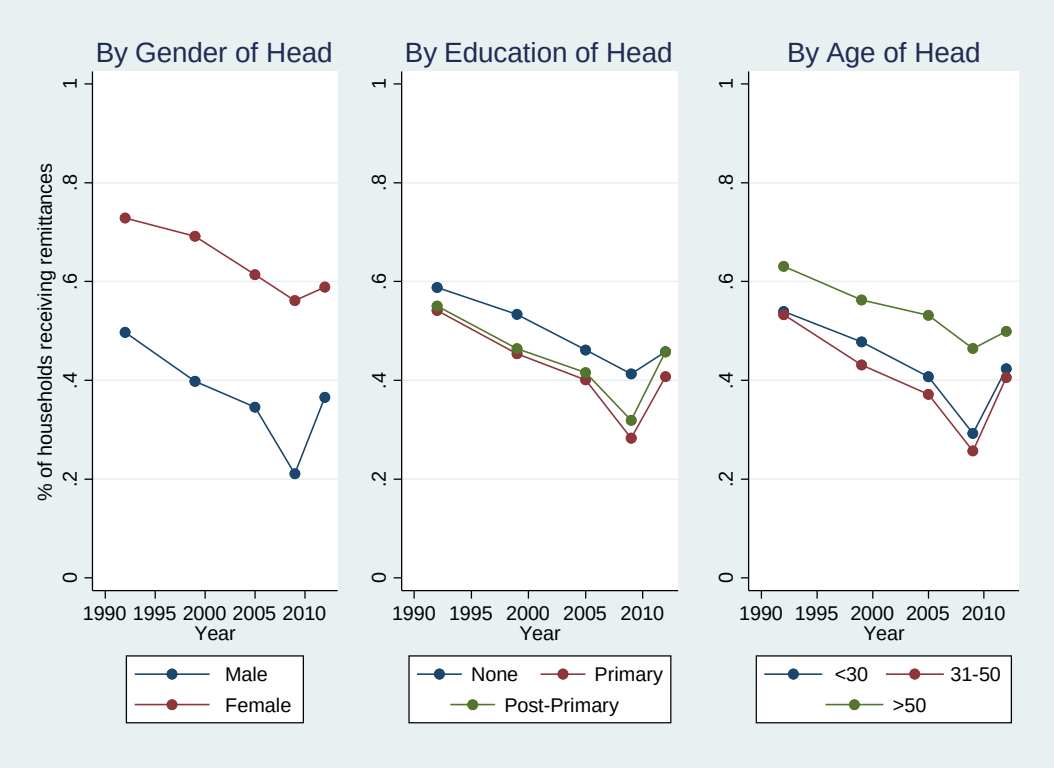


Figure B12: Share of Households Receiving Remittances





The share of households engaged in agriculture or receiving remittances does not reflect what members of the household are doing. While remittances are no doubt important for households that receive them, they do not account for increasing sources of income (Tables B1 and B2). Excluding remittances, the number of household income sources increased on average from 1.5 to almost 1.7. In the 1990s, around 60% of households had only one income source, and around 5% had 3 or more; by 2012 only about 40% had just one source and over 10% had 3 or more.

Table B1: Number Income Sources Excluding Remittances (%)

Number	1992	1999	2002	2005	2009	2012
1	57	55	51	42	48	42
2	37	41	44	44	42	47
3 or more	6	4	4	14	11	11
Average	1.47	1.47	1.51	1.71	1.61	1.68

Notes: Based on all households (including farming), population weighted from surveys.

Table B2: Income Sources Including Remittances (number)

	1992	1999	2005	2009	2012
1	24	27	25	32	21
2	52	52	44	45	49
3	21	20	24	19	25
4 or more	3	2	7	4	4
Average	2.03	1.96	2.14	1.94	2.13

Notes: Based on all households (including farming), population weighted from surveys.

Of more relevance, there has been a clear increase in the number of non-farm workers in households. Much of the increase in non-farm employment is by household members other than the head, the household average increasing from 0.24 in 1992 to 0.52 in 2012 (Table B3). In the 1990s, about 80% of households had no non-head non-farm workers, and less than 5% had 2 or more; by 2012 about 60% had none and almost 10% had 2 or more. This increase is more pronounced for females (Table B3b) than for males (Table B3a).

Table B3: Households: non-head Members with non-farm Employment (%)

Number	1992	1999	2002	2005	2009	2012
0	81.1	79.3	74.7	65.4	64.6	61.7
1	15.2	17.5	21.5	26.9	26.0	29.7
2	2.6	2.1	2.9	5.5	5.8	5.6
3 or more	1.1	1.1	1.0	2.2	3.6	3.0
Average	0.24	0.26	0.30	0.45	0.50	0.52

Notes: Reports percentage of households, based on all households (including farming), population weighted from surveys.

Table B3a: Households: Male Members with non-farm Employment (%)

Number	1992	1999	2002	2005	2009	2012
0	55.3	53.4	48.5	45.7	49.1	44.9
1	40.4	43.5	48.0	48.2	44.4	48.5
2	3.4	2.5	2.9	4.6	4.5	5.0
3 or more	0.9	0.7	0.6	1.5	2.0	1.5
Average	0.50	0.51	0.56	0.62	0.60	0.64

Table B3b: Households: Female Members with non-farm Employment (%)

Number	1992	1999	2002	2005	2009	2012
0	79.4	76.6	68.1	61.1	61.7	56.3
1	18.3	21.0	28.5	33.7	31.6	37.4
2	1.9	2.0	2.8	4.3	5.4	4.9
3 or more	0.5	0.5	0.6	0.9	1.2	1.4
Average	0.23	0.27	0.36	0.45	0.46	0.52

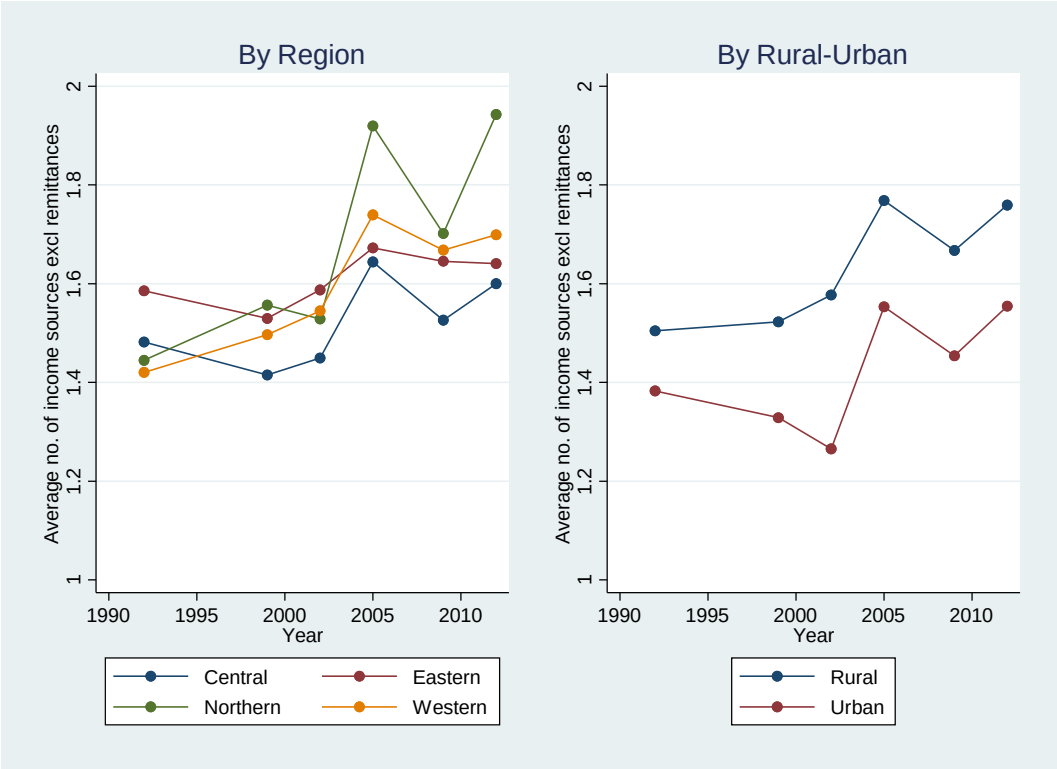
Notes: As for Table B3.

Figure B13 shows the gentle increase in the number of income sources (excluding remittances) in all regions (most pronounced in Northern). The numbers are similar for rural and urban households, and somewhat lower for households with female, more educated or younger heads. Figure B14 shows that the number of nonfarm workers in households rose in all regions and for all types of households, tending to be higher in urban households and in households with male or more educated heads.

The share of non-farm workers in households is highest in Northern and Central regions, but with a different composition (Figure B15). In the Northern region, nonfarm workers are most likely to be either non-agricultural self-employed (the largest share in all regions) or agricultural wage workers (for which the share is highest in Northern). In the Central region, non-agricultural self-employed is again the largest share of nonfarm workers, the next

highest share is non-agricultural wage workers (for which the share is highest in Central). The fact that non-agricultural wage incomes tend to be significantly higher than agricultural wage incomes (see Figure B9) is one reason why household welfare levels are lowest in Nothern but highest in Central.

Figure B13: Number of Income sources (excluding remittances)



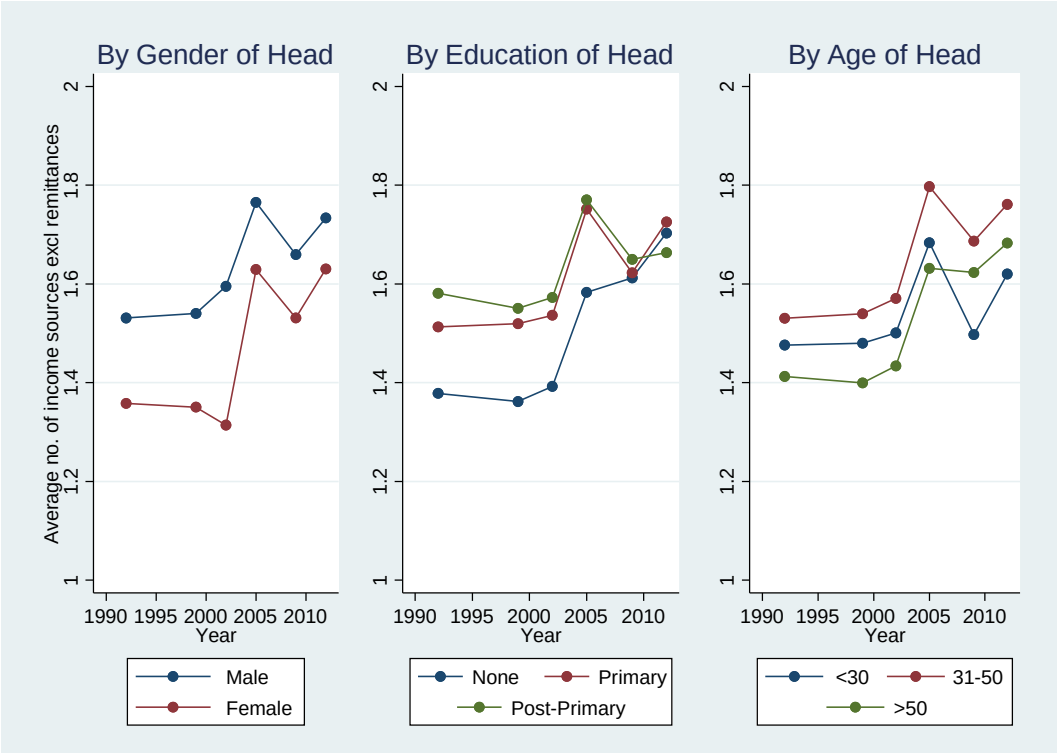
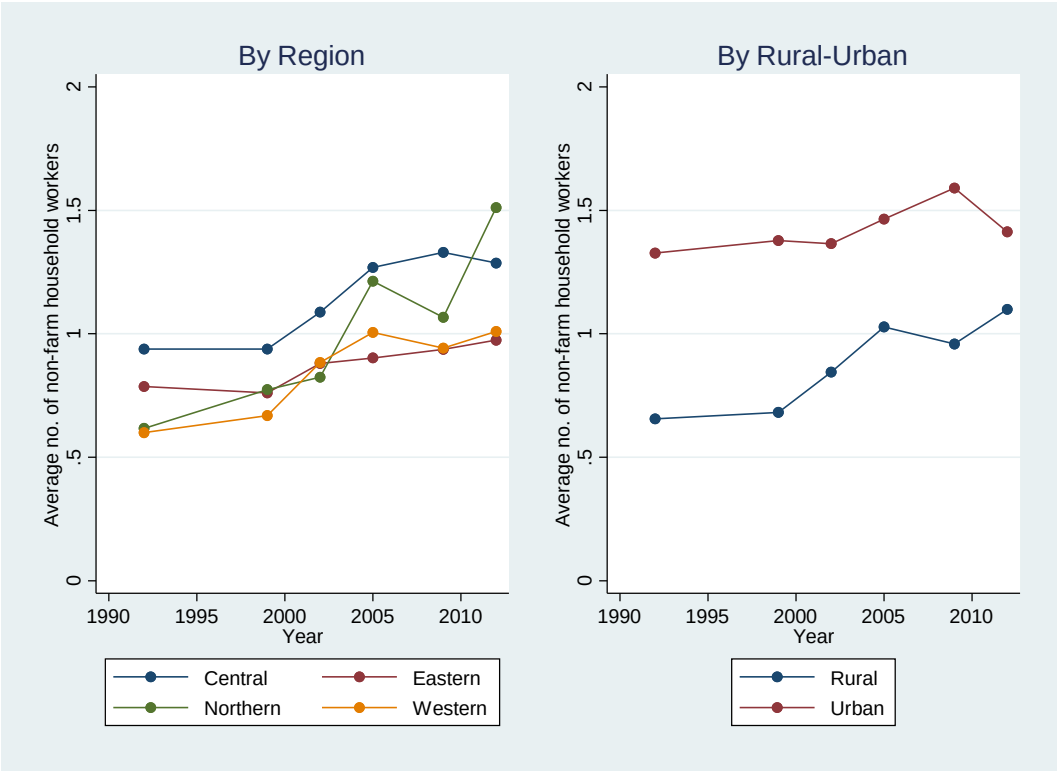


Figure B14: Number of non-farm household workers



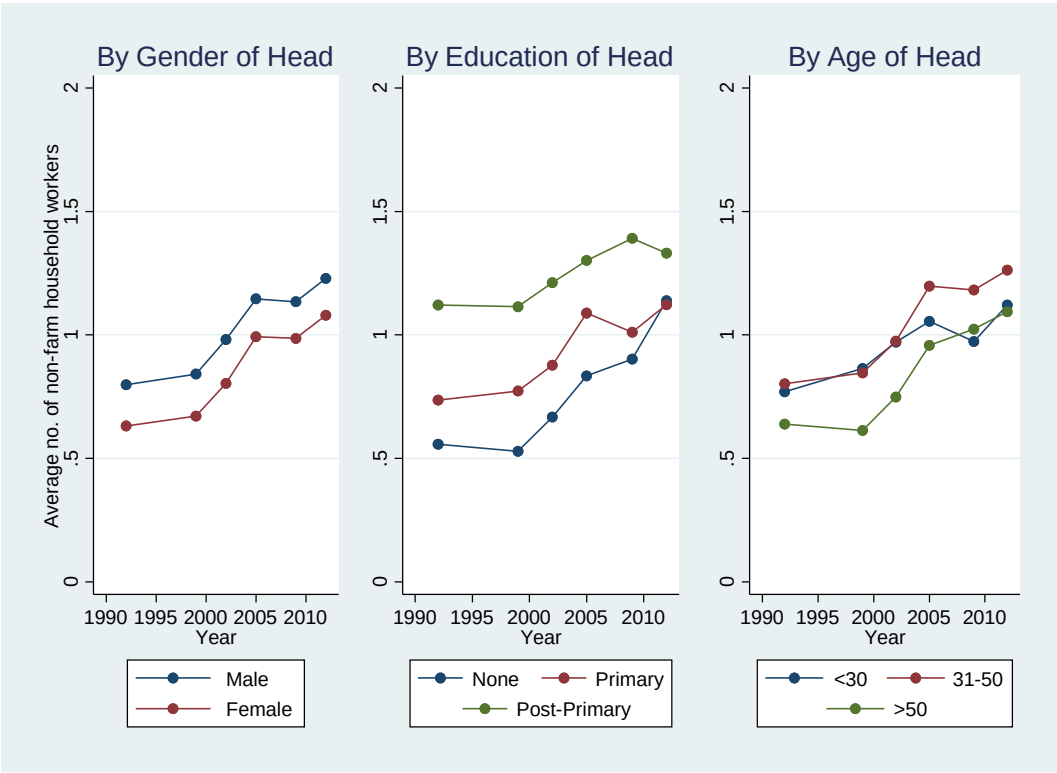
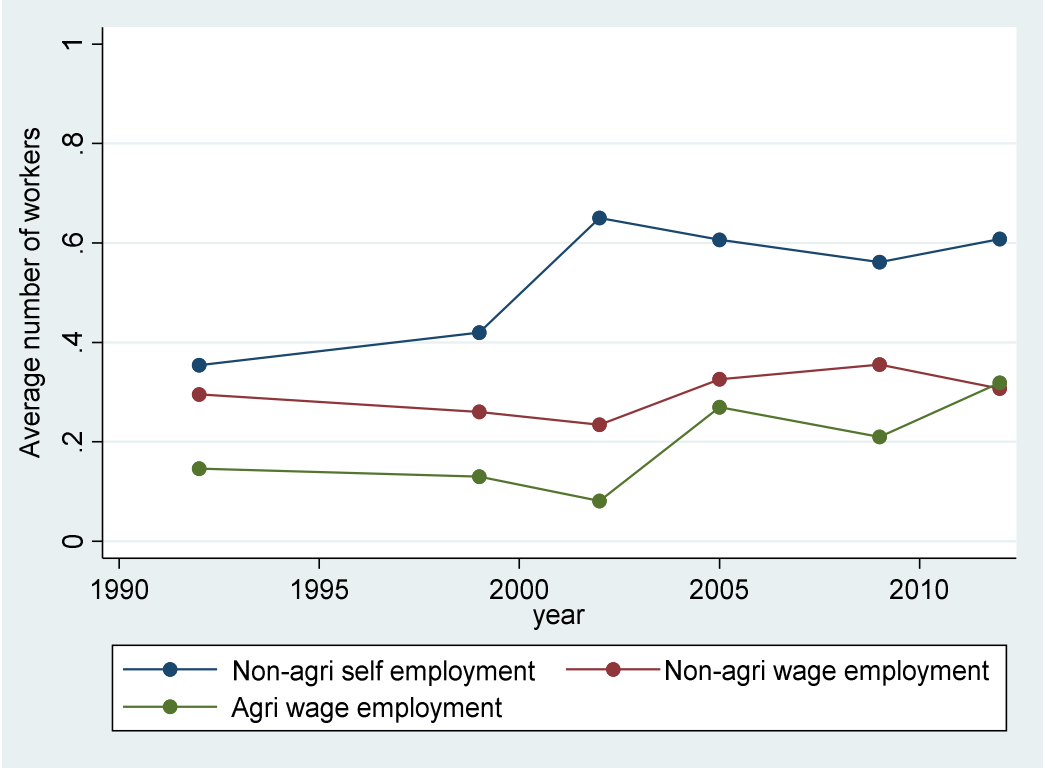
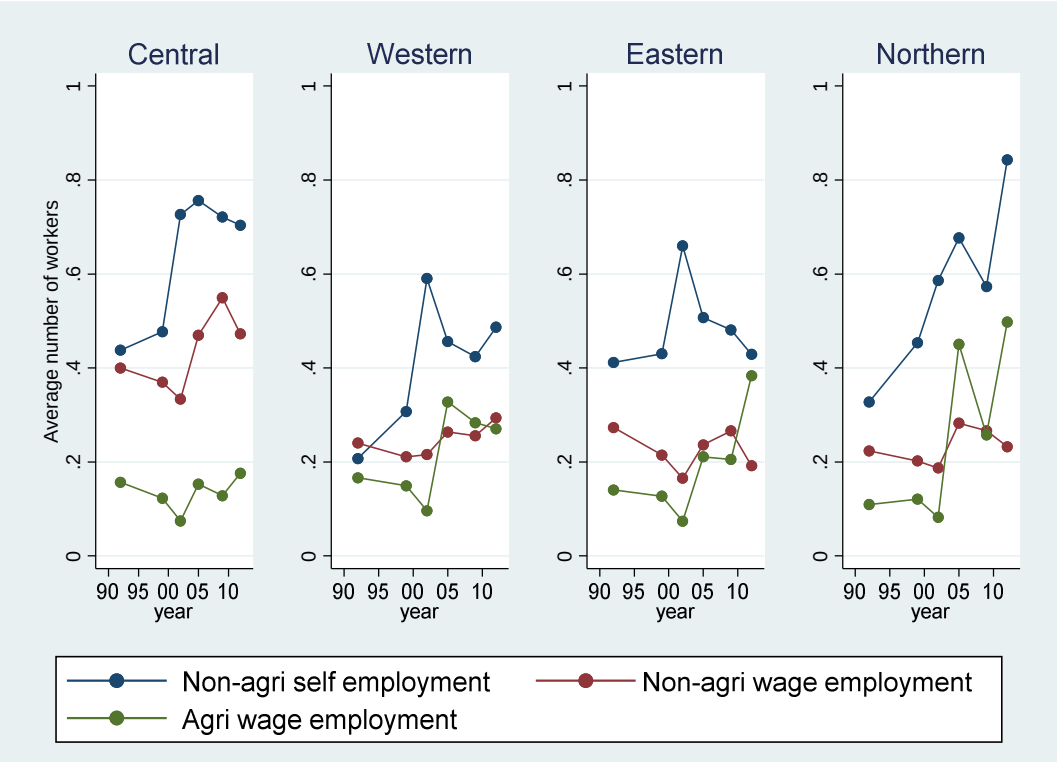
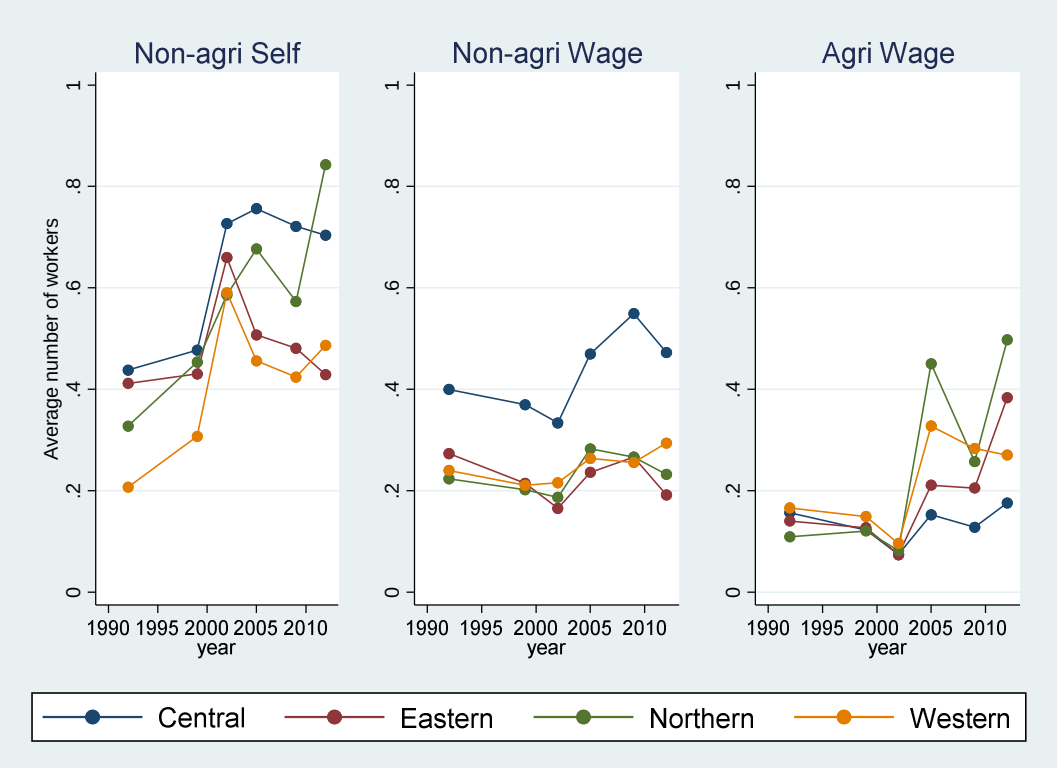
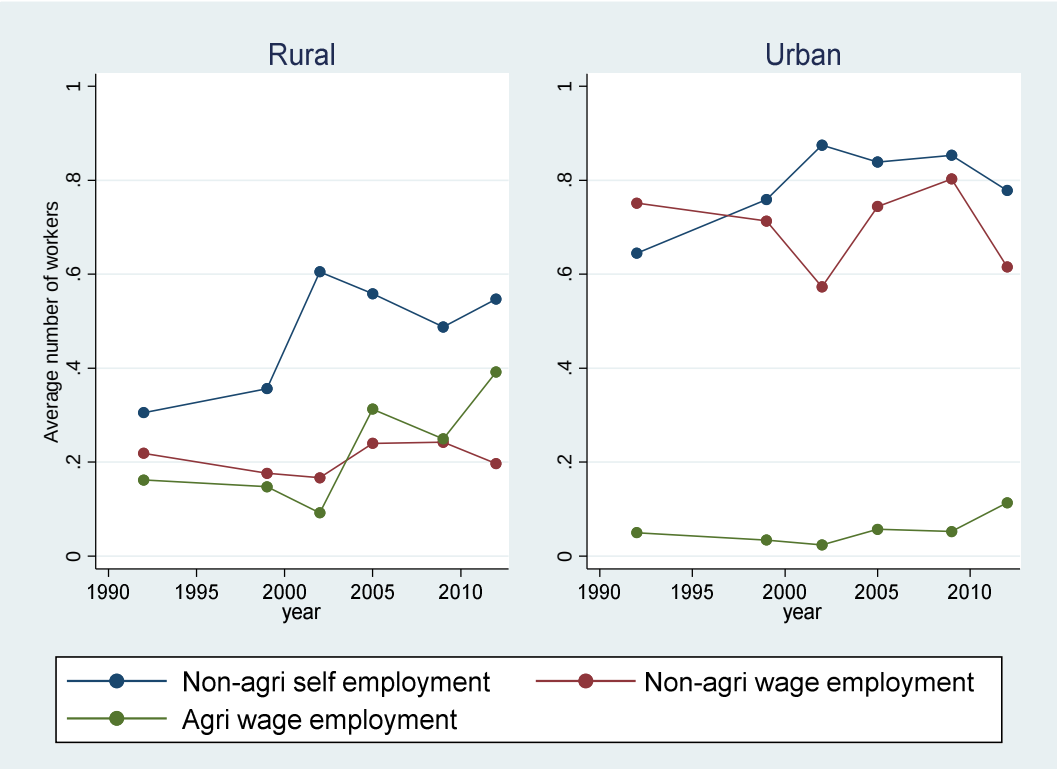


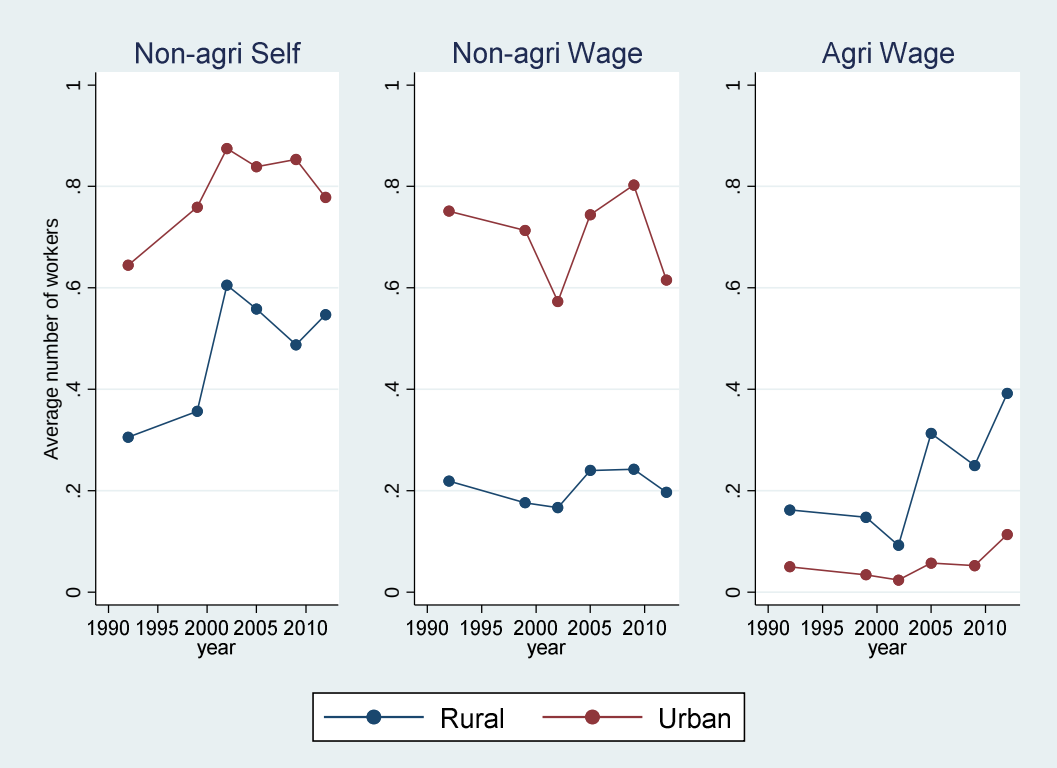
Figure B15: Composition of non-farm workers

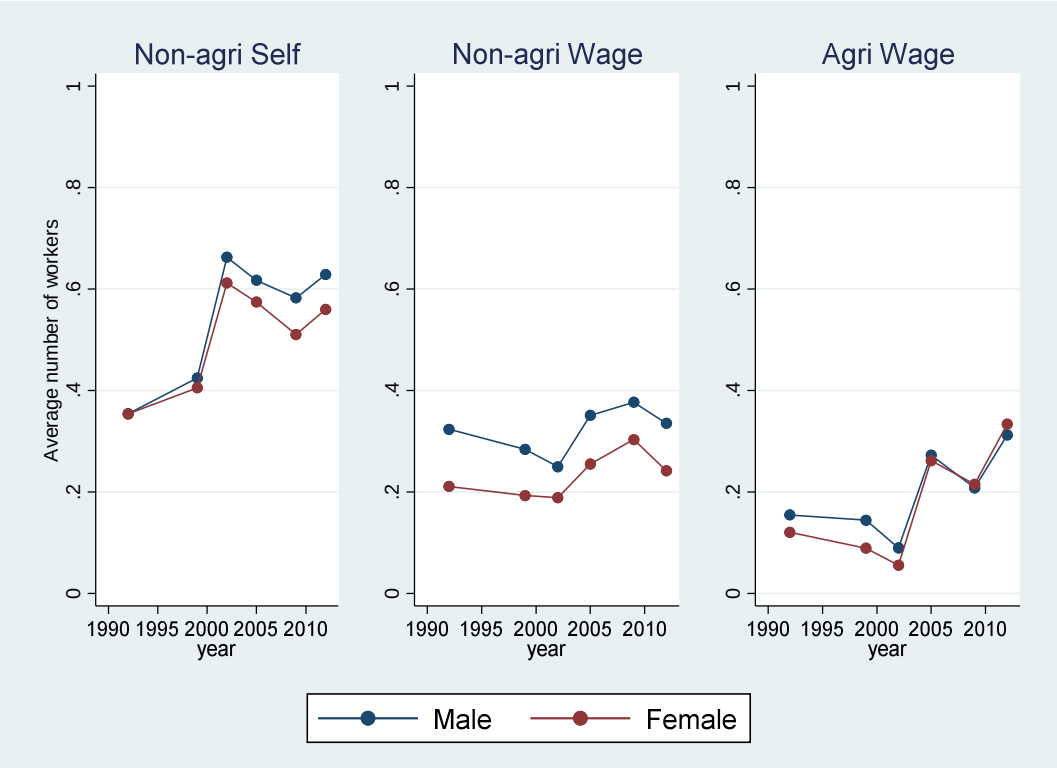


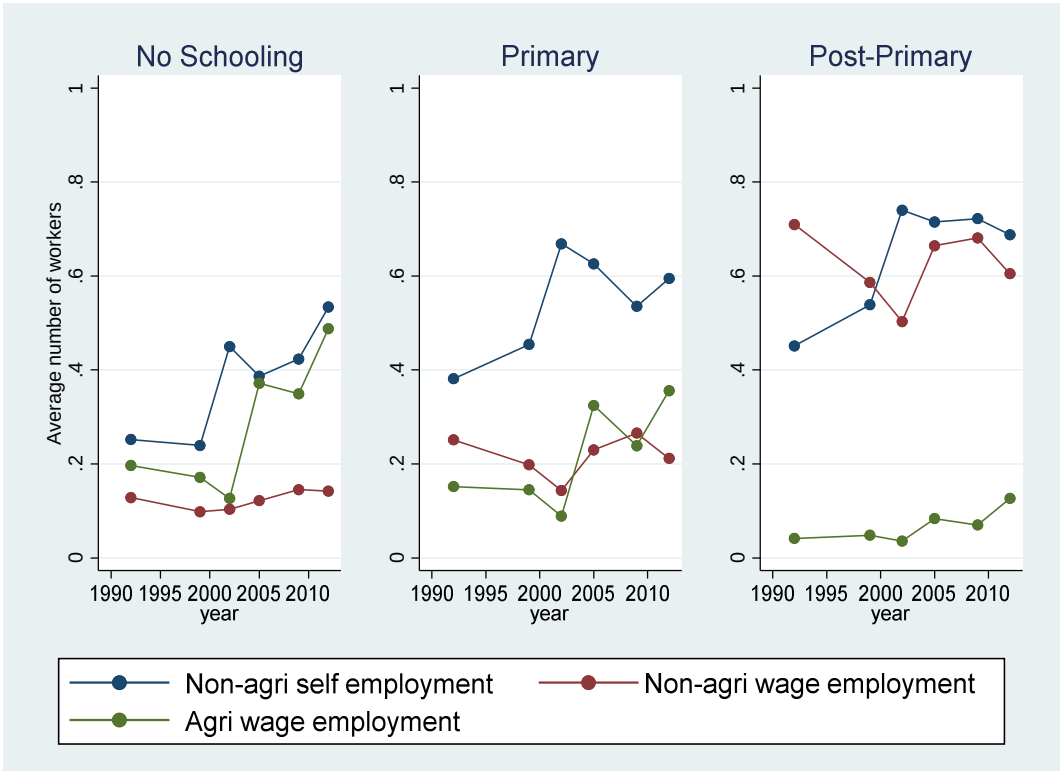


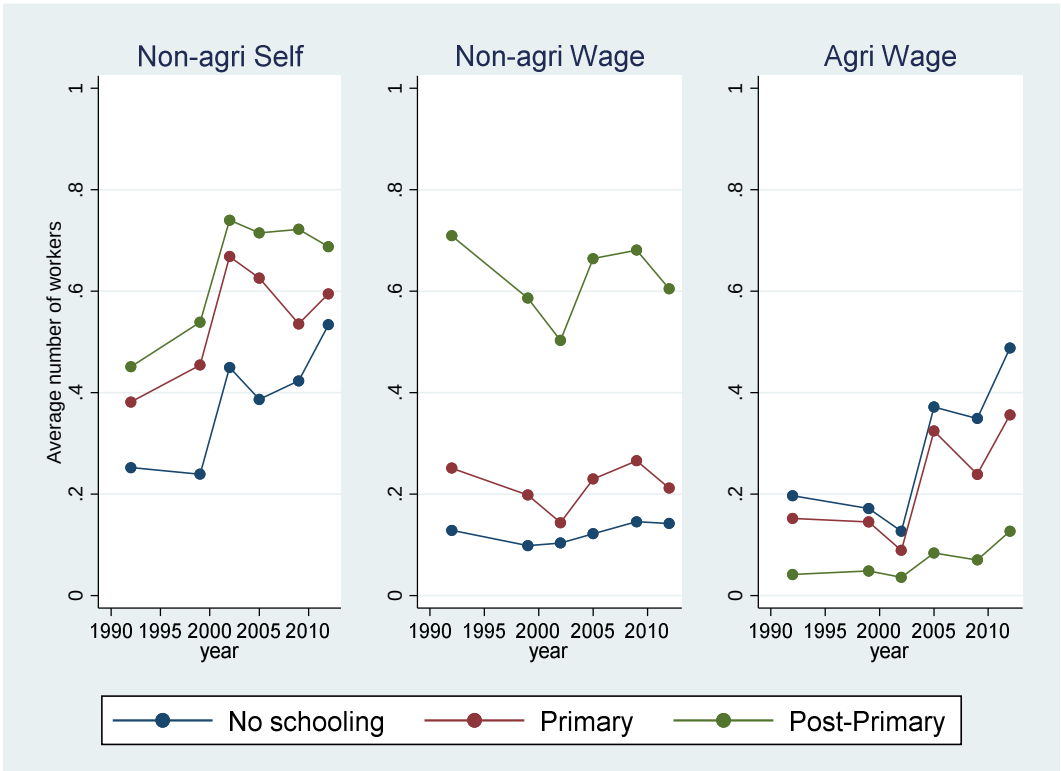

Non-agri Self
Non-agri Wage
Agri Wage
Average number of workers
0
.2
.4
.6
.8
1
1990 1995 2000 2005 2010
year
Central
Eastern
Northern
Western

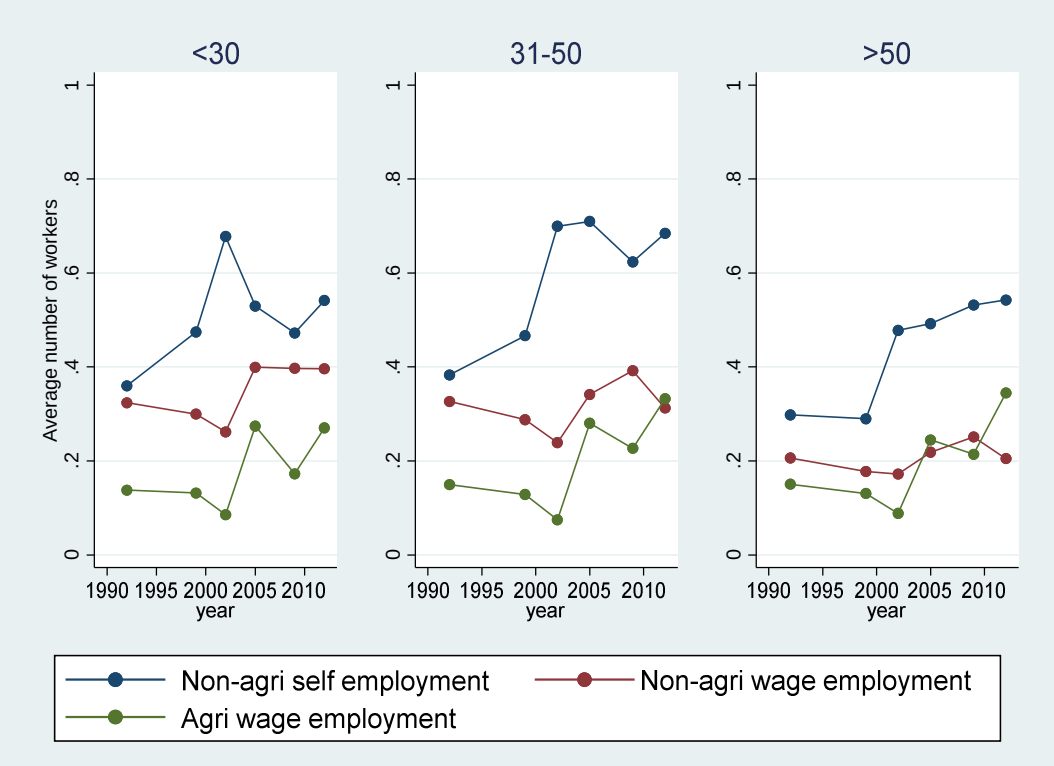

Rural
Urban
Average number of workers
0
.2
.4
.6
.8
1
1990 1995 2000 2005 2010
year
Non-agri self employment
Non-agri wage employment
Agri wage employment


Non-agri Self
Non-agri Wage
Agri Wage
Average number of workers
0
.2
.4
.6
.8
1
1990 1995 2000 2005 2010
year
Rural
Urban


Non-agri Self
Non-agri Wage
Agri Wage
Average number of workers
0
.2
.4
.6
.8
1
1990 1995 2000 2005 2010
year
Male
Female


No Schooling
Primary
Post-Primary
Average number of workers
0
.2
.4
.6
.8
1
1990 1995 2000 2005 2010
year
Non-agri self employment
Non-agri wage employment
Agri wage employment


Non-agri Self
Non-agri Wage
Agri Wage
Average number of workers
0
.2
.4
.6
.8
1
1990 1995 2000 2005 2010
year
No schooling
Primary
Post-Primary



The surveys do not provide consistent data on household enterprises (which could be treated as a source like farming) or separate out from the self-employed those who work in a household enterprise. Only in the 2005/06 wave was there is a specific household enterprise module, including the names of those in charge of the enterprise and any other household member who has worked for the enterprise. The other waves just have a question asking if an individual "helped without pay on a family business". Table B4 provides estimates of household enterprises for each wave. It is plausible that the share of households with an enterprise, and the average number of household enterprise workers, has risen since the 1990s, but given the measurement difficulties we are not confident that the numbers have fallen since 2005/06. It seems reasonable to siuggest that since the mid-2000s about 10% or households have an enterprise.

Table B4: Household Enterprise Workers

	1992	1999	2002	2005	2009	2012
% of HHs with	3	3	6	11	10	9
Av. per household	0.04	0.03	0.07	0.15	0.15	0.13

Notes: Based on all households (including farming), population weighted from surveys.

APPENDIX C: Estimates using broader measure of income diversification

Table C2: Income Diversification and Household Consumption

	(1) log Cons	(2) log Cons	(3) log Cons	(4) log Cons	(5) log Cons
ID2	-0.010***	-0.022***			
	(0.003)	(0.003)			
ID2 = 2			-0.034***		
			(0.007)		
ID2 = 3			-0.071***		
			(0.008)		
ID2 = 4			-0.081***		
			(0.012)		
ID2 ≥ 5			-0.008		
			(0.018)		
ID2 -R				-0.035***	
				(0.003)	
ID2 -R = 2					-0.075***
					(0.005)
ID2 -R = 3					-0.087***
					(0.008)
ID2 -R ≥ 4					-0.033**
					(0.013)
Head NAS		0.187***	0.188***	0.210***	0.216***
		(0.008)	(0.008)	(0.007)	(0.007)
Head NAW		0.159***	0.161***	0.185***	0.192***
		(0.008)	(0.008)	(0.008)	(0.008)
Head AW		0.056***	0.057***	0.063***	0.068***
		(0.014)	(0.014)	(0.013)	(0.013)
Head not employed		-0.008	-0.009	-0.052***	-0.051***
		(0.014)	(0.014)	(0.014)	(0.014)
HH size	-0.090***	-0.088***	-0.088***	-0.088***	-0.089***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region*location*year effects	Yes	Yes	Yes	Yes	Yes
Observations	37,336	37,281	37,281	45,922	45,922
R-squared	0.763	0.768	0.768	0.744	0.745

Notes: As for Table 2 but using broader measures of income diversification (ID2 and ID2-R), which counts whether the household has farm income, remittances, and the number of household members engaged in off-farm employment, including the number of activities.

Table C3: Diversification and Household Consumption: Rural vs Urban

	Rural log Cons	Urban log Cons	Rural log Cons	Urban log Cons	Rural log Cons	Urban log Cons
ID2	-0.016***	-0.019***				
	(0.003)	(0.006)				
ID2 -R			-0.026***	-0.032***		
			(0.004)	(0.006)		
ID2 = 2					-0.018**	-0.044***
					(0.008)	(0.138)
ID2 = 3					-0.042***	-0.100***
					(0.009)	(0.016)
ID2 = 4					-0.059***	-0.082***
					(0.013)	(0.024)
ID2 ≥ 5					-0.019	0.075**
					(0.021)	(0.034)
Head NAS	0.157***	0.307***	0.176***	0.327***	0.158***	0.302***
	(0.010)	(0.017)	(0.009)	(0.014)	(0.010)	(0.017)
Head NAW	0.146***	0.255***	0.162***	0.284***	0.147***	0.253***
	(0.010)	(0.018)	(0.010)	(0.015)	(0.010)	(0.018)
Head AW	0.062***	0.072*	0.066***	0.077**	0.062***	0.067*
	(0.015)	(0.038)	(0.014)	(0.032)	(0.015)	(0.038)
Head not employed	-0.087***	0.195***	-0.116***	0.141***	-0.087***	0.185***
	(0.017)	(0.027)	(0.017)	(0.026)	(0.017)	(0.027)
Region*year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,289	9,992	32,386	13,536	27,289	9,992
R-squared	0.735	0.779	0.712	0.743	0.735	0.780

Notes: As for Table 3 but with the broader measure used in Table C2.

Table C4: Diversification and Household Consumption by Survey

	1992 log Cons	1999 log Cons	2005 log Cons	2009 log Cons	2012 log Cons
ID2	-0.018***	-0.029***	-0.013**	-0.023***	-0.021***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)
Head NAS	0.280***	0.201***	0.204***	0.152***	0.087***
	(0.019)	(0.016)	(0.017)	(0.020)	(0.017)
Head NAW	0.175***	0.210***	0.202***	0.096***	0.110***
	(0.018)	(0.017)	(0.019)	(0.021)	(0.020)
Head AW	0.220***	0.109***	0.119***	-0.040	-0.106***
	(0.033)	(0.031)	(0.028)	(0.045)	(0.026)
Head not employed	0.055**	-0.051*	0.057*	-0.077**	-0.056
	(0.027)	(0.029)	(0.029)	(0.036)	(0.042)
Region*location effects	Yes	Yes	Yes	Yes	Yes
Observations	9,224	9,633	6,808	5,452	6,164
R-squared	0.509	0.540	0.609	0.578	0.638

Notes: As for Table 4 but with the broader measure used in Table C2.

Table C5: Diversification and Consumption: Pseudo Panel Estimates

	PP1 log Cons	PP1 log Cons	PP2 log Cons	PP2 log Cons	PP3 log Cons	PP3 log Cons	PP4 log Cons	PP4 log Cons
ID2	-0.029***		-0.027*		-0.015		-0.039	
	(0.011)		(0.015)		(0.021)		(0.035)	
ID2 -R		-0.042***		-0.045***		-0.054**		-0.089**
		(0.011)		(0.016)		(0.022)		(0.036)
Head NAS	0.202***	0.204***	0.256***	0.271***	0.234***	0.277***	0.244**	0.330***
	(0.035)	(0.029)	(0.047)	(0.039)	(0.060)	(0.049)	(0.106)	(0.087)
Head NAW	0.218***	0.208***	0.170***	0.171***	0.165***	0.185***	0.260***	0.204**
	(0.034)	(0.029)	(0.046)	(0.040)	(0.061)	(0.054)	(0.098)	(0.087)
Head AW	-0.027	-0.039	0.040	0.040	0.019	0.054	-0.171	-0.030
	(0.057)	(0.051)	(0.088)	(0.078)	(0.121)	(0.101)	(0.234)	(0.201)
Head not employed	0.108**	0.073*	0.123**	0.066	0.214**	0.132	-0.057	-0.048
	(0.049)	(0.041)	(0.062)	(0.054)	(0.095)	(0.080)	(0.168)	(0.157)
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,861	4,774	2,070	2,537	1,166	1,433	360	432
R-squared	0.960	0.951	0.971	0.966	0.978	0.975	0.989	0.988

Notes: As for Table 5 but with the broader measure used in Table C2.

Table C6: Pseudo Panel Estimates with Lagged Diversification

	PP1 log Cons	PP1 log Cons	PP2 log Cons	PP2 log Cons	PP3 log Cons	PP3 log Cons	PP4 log Cons	PP4 log Cons
ID2	-0.087*		-0.096		-0.113		0.508	
	(0.051)		(0.098)		(0.127)		(1.771)	
ID2 -R		-0.189**		-0.117		-0.223		-0.076
		(0.076)		(0.133)		(0.233)		(0.385)
Head NAS	0.194***	0.229***	0.283***	0.288***	0.297***	0.330***	-0.146	0.383
	(0.041)	(0.044)	(0.061)	(0.068)	(0.075)	(0.087)	(1.415)	(0.257)
Head NAW	0.253***	0.256***	0.257***	0.242***	0.272***	0.286***	0.165	0.303*
	(0.040)	(0.040)	(0.059)	(0.065)	(0.078)	(0.104)	(0.827)	(0.166)
Head AW	-0.013	-0.013	0.016	0.027	0.067	0.167	-0.766	-0.095
	(0.068)	(0.069)	(0.095)	(0.102)	(0.135)	(0.176)	(1.846)	(0.469)
Head not employed	-0.015	-0.092	0.141*	0.034	0.168	-0.022	0.440	0.027
	(0.059)	(0.066)	(0.073)	(0.092)	(0.106)	(0.163)	(1.443)	(0.406)
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,358	3,217	1,383	1,850	850	1,115	288	360
R-squared	0.895	0.881	0.920	0.914	0.940	0.936	0.951	0.975

Notes: As for Table 6 but with the broader measure used in Table C2.

Table C7: Disaggregated Diversification and Consumption

	(1) log Cons	(2) log Cons	(3) log Cons	(4) log Cons	(5) log Cons	(6) log Cons
NF work2	0.011***					
	(0.003)					
Male NF2		0.022***				
		(0.004)				
Female NF2		-0.001				
		(0.005)				
NAS work2			0.033***			
			(0.004)			
NAW work2			0.029***			
			(0.005)			
AW work2			-0.054***			
			(0.005)			
Male NAS2				0.065***		
				(0.006)		
Male NAW2				0.022***		
				(0.006)		
Male AW2				-0.032***		
				(0.007)		
Female NAS2				0.004		
				(0.005)		
Female NAW2				0.061***		
				(0.009)		
Female AW2				-0.083***		
				(0.009)		
Non-head NF work2					-0.005	
					(0.004)	
Non-head NAS2						0.016***
						(0.005)
Non-head NAW2						0.011
						(0.007)
Non-head AW2						-0.076***
						(0.008)
HH farms	-0.219***	-0.220***	-0.211***	-0.210***	-0.225***	-0.222***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Remittances	0.001	0.001	0.001	0.002	-0.000	-0.000
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Main industry of head	Excluded	Excluded	Excluded	Excluded	Excluded	Excluded
Region*location*year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,413	37,413	37,413	37,413	37,413	37,413
R-squared	0.768	0.768	0.770	0.770	0.768	0.769

Notes: As for Table 7 but with broader measures which counts the total number of each type of worker in a household rather than use a dummy for whether household has such a worker.

Table C8: Disaggregated Diversification and Consumption by Survey

	1992 log Cons	1999 log Cons	2005 log Cons	2009 log Cons	2012 log Cons	Rural log Cons	Urban log Cons
NAS workers2	0.052***	0.026***	0.043***	0.019**	0.024***	0.023***	0.066***
	(0.008)	(0.008)	(0.007)	(0.009)	(0.008)	(0.004)	(0.007)
NAW workers2	0.010	0.051***	0.044***	0.013	0.039***	0.052***	0.019**
	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)	(0.007)	(0.008)
AW workers2	-0.064***	-0.060***	-0.041***	-0.048***	-0.056***	-0.045***	-0.143***
	(0.013)	(0.013)	(0.010)	(0.013)	(0.009)	(0.005)	(0.017)
HH farms	-0.214***	-0.298***	-0.270***	-0.168***	-0.114***	-0.191***	-0.202***
	(0.016)	(0.017)	(0.018)	(0.022)	(0.019)	(0.011)	(0.012)
Remittances	0.020*	-0.017	0.021*	-0.000	-0.018	0.003	0.003
	(0.011)	(0.011)	(0.012)	(0.015)	(0.013)	(0.006)	(0.011)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,236	9,640	6,832	5,519	6,186	27,364	10,049
R-squared	0.508	0.548	0.616	0.581	0.640	0.736	0.782

Notes: As for Table 8 but with the broader measure used in Table C7.

Table C9: Disaggregated Diversification, Pseudo Panel Estimates

	PP1 log Cons	PP1 log Cons	PP2 log Cons	PP2 log Cons	PP3 log Cons	PP3 log Cons	PP4 log Cons	PP4 log Cons
NAS workers2	0.012	0.017	0.035*	0.036**	0.024	0.023	0.006	0.007
	(0.014)	(0.012)	(0.018)	(0.016)	(0.024)	(0.021)	(0.039)	(0.037)
NAW workers2	0.055***	0.044***	0.021	0.006	0.018	-0.008	0.004	-0.065
	(0.019)	(0.016)	(0.025)	(0.023)	(0.035)	(0.031)	(0.069)	(0.062)
AW workers2	-0.118***	-0.098***	-0.167***	-0.129***	-0.115***	-0.069*	-0.153**	-0.081
	(0.021)	(0.019)	(0.030)	(0.027)	(0.042)	(0.036)	(0.071)	(0.061)
HH farms	-0.222***	-0.237***	-0.220***	-0.249***	-0.220***	-0.269***	-0.242***	-0.313***
	(0.029)	(0.024)	(0.038)	(0.032)	(0.050)	(0.041)	(0.078)	(0.068)
Remittances	0.033		0.025		0.097***		0.105*	
	(0.021)		(0.028)		(0.036)		(0.060)	
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,861	4,774	2,070	2,537	1,166	1,433	360	432
R-squared	0.961	0.952	0.972	0.967	0.979	0.975	0.990	0.989

Notes: As for Table 9 but with the broader measure used in Table C7.