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The Arab Inequality Puzzle: The Role of Income Sources in Egypt and Tunisia[1]

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Abstract

Egypt and Tunisia are perceived to have high levels of inequality, yet based on standard measures, inequality in these two countries is not unusually high. In this study we explore a new dimension of inequality in Egypt and Tunisia by using a more complete measure of income and decomposing inequality by income sources (factor components). We find that higher-income households have more income sources than lower-income ones. Informal wage work and earnings from household enterprises are more common in Egypt than Tunisia, while formal wage work, pensions, and social assistance are more common in Tunisia. Social assistance does little to offset income inequality in either country. Enterprise earnings (in Egypt) and agricultural earnings (in Tunisia) as well as rent and other capital income in both countries play a large role in inequality. High inequality in these non-wage income sources may help explain why inequality is perceived to be high.

Keywords: Income inequality; inequality decomposition; wages; Egypt; Tunisia

JEL codes: D31; O15; P46

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1 Introduction

Globally, rising income inequality has become an economic, political, and social issue (Milanovic 2016; Piketty 2014). In the Arab world, calls for greater social justice and redressing inequality were part of the Arab Spring uprisings (Arampatzi et al. 2018). In countries such as Egypt and Tunisia, people perceived high and rising levels of inequality (Krishnan et al. 2016; Verme et al. 2014). Yet standard measures of consumption, wage, and even earned income inequality show that levels of inequality were moderate in comparison to other countries and often declining (Assaad et al. 2018; Assaad, Krafft, et al. 2016; Belhaj Hassine 2015; Bibi and Nabli 2009; Krishnan et al. 2016). The contradiction between perception and measurement of inequality is often referred to as "the Arab inequality puzzle" (Devarajan and Ianchovichina 2018; Krishnan et al. 2016; World Bank 2015). This paper adds two new pieces to the inequality puzzle: (1) a more complete measure of income and (2) an examination of inequality in sources of income.

Past research has generally offered three potential explanations for the inequality puzzle: (1) income inequality is mis-measured, (2) inequality in other outcomes is what matters or (3) inequality of opportunity is high, but not overall income inequality. Mis-measurement is a concern with top incomes in particular, which may be difficult to accurately measure with survey data (Alvaredo and Piketty 2014; Hlasny and Verme 2014; van der Weide, Lakner, and Ianchovichina 2018). These studies suggest that top incomes may be mis-measured, leading to an underestimate of inequality. However, this literature does not convincingly demonstrate that this problem is worse in the Arab world than elsewhere. The (relative) position of the region in the global inequality distribution remains the same after correcting for measurement problems (Hlasny and Verme 2014).

Rather than incomes being mis-measured, the inequality puzzle may be due to the wrong outcome being measured. The "equality of what" question (Sen 2013) has led to researchers analyzing a variety of different outcomes (including different measures of income). Different outcome (income) measures do not lead to substantially different conclusions about global inequality (Suárez Álvarez and López Menéndez 2018). In the Arab world, authors have disagreed on whether inequality in wages or consumption is higher (Assaad et al. 2018; Belhaj Hassine 2011). Including all forms of earned income leads to higher estimates of income inequality compared to wage inequality in Egypt and Tunisia, for example (Assaad et al. 2018). Researchers have also compared inequality in wealth or assets (El Enbaby and Galal 2015; Hlasny and AlAzzawi 2018). In addition to inequality in different economic outcomes, some have posited that inequality in access to basic services or human development is particularly important and may underlie perceptions of high inequality (Assaad and Krafft 2016; Devarajan and Ianchovichina 2018; Krafft and El-Kogali 2014).

The inequality of opportunity (IOp) literature has emphasized the importance of the nature of inequality in injustice. This literature argues that the problematic component of inequality is when it is related to circumstances beyond individuals' control (such as sex, birth place, parents' characteristics, etc.) (Roemer 1998). While inequality derived from individual efforts is generally viewed as morally acceptable and potentially even desirable, inequality due to circumstances (IOp) is seen as a social justice problem. A number of authors have explored IOp in the Arab world (Assaad et al. 2018; Assaad, Krafft, et al. 2016; Belhaj Hassine 2011; Hashemi and Intini 2015; Krafft and Alawode 2018; Krishnan et al. 2016; Vladimir 2017). While IOp varies across outcomes, it does not appear to be unusually high compared to other countries (Assaad, Krafft, et al. 2016). Overall, these explanations – mismeasurement, different outcomes, and IOp – for the Arab inequality puzzle continue to be investigated and debated.

Our paper builds on two strands of the inequality puzzle literature, focusing on Egypt and Tunisia. First, in line with the mis-measurement and "inequality of what" explanations, we look at a more complete measure of income, including not only wages and earned income, but also transfers and non-labor or capital income. The household's total income better reflects available resources and thus may be a better outcome to consider for inequality than wages alone. Second, we explore a previously unaddressed component of inequality in the Arab world: the role that different sources of income, such as different types of wage employment, social assistance, and earnings from capital, play in income inequality. A better understanding of the role of different sources of income in inequality can shed light on the inequality puzzle as well as illustrate "where" income comes from in Egypt and Tunisia, including the role of social assistance and other policies in inequality.

2 Data

2.1 Surveys

We rely on two surveys in the Arab world that are publicly available[4] and have extremely detailed information on all forms of income: the Egypt Labor Market Panel Survey (ELMPS) 2012 and Tunisia Labor Market Panel Survey (TLMPS) 2014 (Assaad, Ghazouani, et al. 2016; Assaad and Krafft 2013; OAMDI 2013, 2016). These nationally representative household surveys collected detailed information on both individual-level wage earnings and any farm (agriculture or livestock) or non-farm household enterprises, as well as earnings from capital (through rent or interest) and income from transfers (including remittances, pensions, and social assistance). The rich detail on receipt and amount of all these different income sources allows us

[4] Publicly available from the Economic Research Forum's Open Access Microdata Initiative: www.erfdataportal.com. Code (STATA do files) for creating income variables will be made available on the corresponding author's website.

to see the role of different sources of income in inequality. Egypt and Tunisia were selected for the study because they are the only two countries in the region with such detailed data on income.

2.2 Measuring income

Even in developed countries, important components of income are often missing from national surveys (Smeeding and Weinberg 2001) and developing countries' income data are often inconsistent or incomplete (Ravallion 2003). The ELMPS 2012 and TLMPS 2014 gathered detailed information on the employment and productive activities of all household members, allowing for complete accounting of income sources and amounts for each household, including the net sales from both agricultural and non-agricultural household enterprises. A large number of questions capture different income sources. A brief overview of the income variables and assumptions is provided here, with additional details provided in the appendix.

Earnings information is collected on each household member who worked for wages in the past three months, including both monetary and in-kind earnings from employers. Total earnings are summed across jobs for each individual in the household, including basic wages, supplementary, overtime and bonus payments, and incentive and profit payments. Earnings are summed across individuals in the household into categories based on the type of employment: government or public enterprise ("public sector") wages; wages from a private employer with a formal employment relationship (either a contract, social insurance, or both) ("private formal wages"); and wage income from a private source without a formal employment contract or social insurance ("private informal wages").

Income from household enterprises was based on detailed questions about non-agricultural activities that produce goods or services for sale. Average net earnings accruing to the household from the enterprise for the past month were included in total household income.

Detailed income information was also collected with regards to agricultural activities and sales. For each crop, households reported the amount harvested and the net earnings from crops sold. Income therefore does not include crops grown and consumed by the household (subsistence agriculture), nor any other intra-household services, e.g. caregiving. Additional questions captured monthly sales related to other forms of agricultural income, such as milk and eggs. Households reported ownership of specific agricultural equipment such as tractors or pumps and reported the payments for renting out this equipment, which was included in agricultural income. Thus, household agricultural income included earnings from crops, livestock, other agricultural products, and equipment rental.

Other sources of income for households came from various transfers, rent received and other capital income. Specific questions asked about contributory pensions and social assistance from the government and religious or non-governmental institutions. The value of remittances from migrants, relatives, or friends, both cash and in-kind, was reported. Capital income included rent on land or buildings, interest on financial investments, and a small number of other responses, such as taxi income. For additional detail, refer to the Appendix.

The detailed questions about sources of income of households allow for in-depth analysis of inequality within and across income sources in the two countries. We define nine sources of income:

1. public wages
2. private formal wages
3. private informal wages
4. enterprise earnings
5. agricultural income
6. pensions
7. remittances
8. social assistance
9. rent and other capital income

Since receipt of many of these sources (all except wages) is captured on the household level, we calculate household receipt of these income sources, but in per capita terms. Thus, although our analyses are on an individual level, our income measures should be interpreted as based on living in a household that receives a certain type of income.

Despite the careful and detailed enumeration of income sources for individuals and households, however, any study of this type must acknowledge the limitations of the data. Even random measurement error can bias measurements of inequality (Gottschalk and Huynh 2010). Systematic, non-classical measurement error may also bias results. Particularly concerning for our purposes is that households may underreport certain types of income (or over-report), and agricultural and enterprise income may be overstated because of insufficient information on costs of production. We restrict our analyses to individuals in households with non-missing data on all the sources of income. In Egypt, this results in a sample of 48,559 individuals in 11,880 households In Tunisia, this results in a sample of 4,950 individuals in 1,431 households.[5]

2.3 Individual and household characteristics

Earning or receiving different forms of income may be related to individuals' and households' characteristics, an issue we investigate empirically. The surveys provided detailed information on the characteristics of individuals and households. We grouped individuals into four age groups (under 15 years old, 15 to 24 years, 25 to 54 years, and 55 years or older). Marital status was categorized as single (i.e., never married), married, and widowed/divorced/separated. With regards to education, individuals were categorized as (1)

[5] Egypt's original sample was 49,186 individuals and 12,060 households, so is only slightly reduced. Tunisia's sample is more substantially reduced from an original dataset of 16,430 individuals in 4,521 households because of missings, however, research (Assaad, Ghazouani, et al. 2016) has demonstrated that these missings are generally random and primarily due to skip patterns in the questionnaire not being programmed.

under age 6, (2) under age 15 with no formal education, (3) over age 15 with no formal education, (4) basic education, (5) secondary education, (6) above secondary (post-secondary) education or (7) university and above. In Tunisia, the categories "above secondary" and "university and above" were combined due to small sample size into "secondary and above." Parents' education was available even when parents were no longer in the household. Parents' education categories were slightly different and included: (1) illiterate, (2) basic education, (3) secondary education, (4) above secondary education, including university and above, or (5) missing. In Egypt there was an additional category for "reads and writes" as separate from basic education, indicating that the individual is not illiterate but did not complete a basic education certificate. Father's employment status (when the respondent was 15, available even when he was not in the household) was grouped into (1) wage worker, (2) employer, (3) self-employed or working in a family business as an unpaid family worker, or (4) no job or missing. In Egypt we distinguished six regions: Greater Cairo, Alexandria and the Suez Canal Cities, urban Lower Egypt, rural Lower Egypt, rural Upper Egypt and urban Upper Egypt. In Tunisia, we examined differences in rural and urban areas since small samples precluded further disaggregation.

3 Methods

In order to understand the patterns and sources of income inequality in Egypt and Tunisia, we first compare the sources and amounts of income in the two countries. We report the percentage of individuals living in households receiving each income source, each source's share of total income ("factor share"), and the number of income sources per household analyzed by income quintile. For each income source we estimate a logit model for receipt (of that source) with covariates including sex, marital status, age group, education, region, urban/rural, and parent characteristics (education of mother and father, and father's employment status when respondent was age 15). These logits are estimated using individual-level data with household-

level income variables, and thus indicate the likelihood that an individual with given characteristics is in a household that receives a certain income type of income. Information about the receipt and amount of income sources, as well as the characteristics of those receiving certain types of income provides background to understand the decomposition of income inequality. In the next sections we describe the methods used to analyze total income inequality and then decompose the inequality measure by sources.

3.1 Measures of inequality

There are a wide variety of metrics for measuring inequality in continuous outcomes such as income. Measures vary in whether they have desirable theoretical or empirical properties, as well as what part of the distribution they emphasize in calculating inequality. In this paper we present a number of different measures of inequality in income, for comparison, and then focus on the coefficient of variation (CV) due to its desirable empirical and theoretical properties for decomposing income inequality by source.

We present a number of measures of inequality, starting with quantile (percentile) ratios. When considering the quantile function, $Q(p)$, the income below which p proportion of the population can be found, we can calculate quantile ratios as $Q(p1)/Q(p2)$ where $p1$ and $p2$ can be any two quantiles (Duclos and Araar 2006). We specifically present two common ratios, the quartile ratio (p75/p25) and the decile ratio (p90/p10). These measures show inequality by comparing specific points in the distribution. Other measures calculate inequality based on the entire distribution, placing varying weights on different parts of the distribution. One such common measure is the general entropy (GE) index (Duclos and Araar 2006):

$$GE(\theta) = \begin{cases} \frac{1}{\theta(\theta-1)} \int_0^1 \left(\frac{Q(p)}{\mu}\right)^{\theta} dp - 1 \;\; if\; \theta \neq 0,1 \\ \int_0^1 ln\left(\frac{\mu}{Q(p)}\right) dp \;\; if\; \theta = 0 \\ \int_0^1 \frac{Q(p)}{\mu} ln\left(\frac{Q(p)}{\mu}\right) dp \;\; if\; \theta = 1 \end{cases} \quad (1)$$

Where μ is the mean outcome of interest and θ varies to emphasize inequality in different points in the distribution. We use θ=0, 1, and 2. GE(0) is the mean logarithmic deviation, also known as the Theil-L. GE(1) is the Theil-T measure, while GE(2) is half the square of the coefficient of variation (Duclos and Araar 2006; World Bank 2005). With higher θ, inequality in the higher end of distribution is emphasized.

When we present results graphically, we rely on Lorenz curves, which measure the proportion of income belonging to population proportion *p* (Duclos and Araar 2006):

$$L(p) = \frac{\int_0^p Q(p)dp}{\int_0^1 Q(p)dp} = \frac{1}{\mu}\int_0^p Q(p)dp \quad (2)$$

The Lorenz curve also underlies the Gini coefficient, based on the distance between the Lorenz curve and perfect equality of outcomes, as in (Duclos and Araar 2006):

$$Gini = 2 * \int_0^1 \big(p - L(p)\big)dp \quad (3)$$

The Gini treats all inequality, no matter its location in the distribution, equally.

The last measure we use, and which we use for decomposing inequality due to different income sources, is the coefficient of variation (CV), which is simply the standard deviation (σ) relative to the mean, i.e. CV= σ / μ .

3.2 Analyzing income inequality

We use the method of factor decomposition of income inequality described by Shorrocks (1982). Household income is divided into a set of mutually exclusive sources or "factor

components" which sum to the total. We decompose income inequality to determine the share of inequality attributable to each of the nine sources of income identified above.[6] Because we are considering nine sources of income, and most households have only one or two of these sources, we need to use an inequality index that can account for zeros. Due to its intuitive and straightforward interpretation, we use the coefficient of variation for the inequality factor decomposition. As Shorrocks (1982) demonstrated, the share of different income components in inequality is independent of the inequality measure chosen.

Following the method and notation described in Jenkins (1995), the total inequality measure, I, is the sum of the contributions to inequality from each of the factors (sources of income), S_j. The proportionate share of factor f to total inequality, s_f, is defined by:

$$s_f = \rho_f * \frac{\mu_f}{\mu_{total}} * \frac{CV_f}{CV_{total}} \quad (4)$$

where ρ_f is the correlation between the factor and total income, μ_f is the mean of factor income and is divided by the mean of total income (i.e., factor share of income), and CV is the coefficient of variation (for the factor or for total income). Thus, the contribution of a source to total income inequality depends on the factor correlation with total income (ρ_f), the factor share of income, and within-factor inequality relative to the total inequality. An income source will have a greater contribution to income inequality if it has a higher correlation with total income, is a higher share of total income, or has greater within-factor inequality relative to the total. It is important to note that there has been much debate about the properties of different income inequality measures, and results may differ with alternative measures and decomposition techniques (Duclos and Araar 2006; Silber 1999). Results of factor decompositions depend on

[6] We use the ineqfac command in Stata to calculate the decomposition (Jenkins 1999).

the categorization of income and may be different with different categorizations (Shorrocks 1982).

4 Results

4.1 Total Income Inequality

Looking first at total income inequality, standard summary measures of inequality were similar for Egypt (2012) and Tunisia (2014). As show in Table 1, the percentile ratios, GE(0), GE(1) and Gini estimates were similar for the two countries, but high relative to similar measures in other countries as well as in comparison to wages and consumption (Amarante 2016; Assaad, Krafft, et al. 2016; Belhaj Hassine 2015; Bibi and Nabli 2009). The coefficient of variation of income and GE(2) showed some divergence between the two countries, however. The higher CV and GE(2) in Tunisia indicate that the level of inequality was higher than in Egypt in the upper tail of the income distribution, as these measures put more weight on the highest incomes (compared to other measures). This finding was confirmed by the plot of the Lorenz curves for both countries (Figure 1). The Lorenz curves were nearly identical throughout most of the income distribution, except at the uppermost tail. At the highest incomes, there was slightly more inequality in Tunisia than in Egypt. Perceptions of inequality in Tunisia may reflect this pattern at the upper tail of the distribution.

[Table 1 near here]

[Figure 1 near here]

4.2 Sources of Income

4.2.1 Percentage receiving any income from each source

We now turn to examining the different sources of income that comprise our more complete income measure. The importance of a source of income for the population as a whole depends on both how many households receive it as well as the size of the income flows. Figure 2 shows what percentage of individuals live in households that receive each of the nine sources of income. Public wages were the most or second most common income source in both countries, with about 30% receiving some public wages. Private formal wages were received by 26% in Tunisia, compared to only 13% in Egypt. In contrast, private informal wages (37%), enterprise earnings (21%), agricultural income (15%) and remittances (13%) were received by more households in Egypt than in Tunisia.[7] Pensions (18-21%) and social assistance (11-14%) were relatively important sources in both countries. In contrast rent and other capital income was received by only a 6% share in Egypt and only 1% in Tunisia.

[Figure 2 near here]

4.2.2 Shares of sources in income by income quintile

The importance of the different sources varies across the income distribution because of differences in how many households receive a source and the size of the income flows. Figure 3 shows the shares of each income source by income quintile for the two countries.[8] Wages of all kinds were less important to the poorest households than to those with more income. Wages were 48% of income on average for the poorest households in Egypt and 18% in Tunisia. The share of

[7] In total, 68% of Egyptians and 72% of Tunisians lived in a household that received at least one kind of wage income.

[8] The income share of each source by quintile is calculated by summing all income from that source received by households within the quintile and dividing it by total income in the quintile; not as the average share of the income source across households within the quintile.

wages in income peaked at 63% in Egypt in the third ("middle") quintile and 76% in Tunisia in the fourth ("richer") quintile, but fell, especially in the top ("richest") quintile where other sources of income played a larger role. The type of wages varied dramatically across quintiles, with poorest households more reliant on private informal wages and the richer quintiles obtaining a larger share (of their higher income) from public wages. Agricultural income was a small and similar share (4-7%) across income quintiles in Egypt. In Tunisia agriculture was a low share of most quintiles (2-5%) but a high share (20%) of income for the richest quintile. Non-farm enterprise earnings were a small and similar share (4-7%) in Tunisia but rose from a 10% share among the poorest to a 21% share among the richest in Egypt. Transfers (the sum of remittances, pensions, and social assistance), were much more important for the poorest, representing a 33% share of income in Egypt and 71% in Tunisia. The highest quintile was the only one in which rent and other capital income was important, with a 16% share in Tunisia and a 20% share in Egypt. Other quintiles had almost no such capital income.

[Figure 3 near here]

4.2.3 Multiple sources of income at the household level

Receiving multiple sources of income, or diversification of sources, may be a livelihood strategy (Barrett, Reardon, and Webb 2001; Ellis 1998). In Egypt and Tunisia there was not a high level of income source diversification (based on the division into nine sources). Most households had only one or two types of income (Table 2). On average, households had 1.7 sources of income in Egypt, and 1.3 in Tunisia (out of a maximum of nine). The mean number of sources increased with income, with the poorest households averaging 1.3 sources in Egypt (1.1 in Tunisia) and the

richest having 2.1 (1.8 in Tunisia). Thus, in these two countries, multiple sources of income were not a common survival strategy for poor households, or not an option.

4.2.4 Sources of income based on household characteristics

We next examine how the characteristics of individuals and households relate to receiving different sources of income. For each income source we estimate a logit model for receipt with covariates including sex, marital status, age group, education, region, urban/rural, and parent characteristics (education of mother and father, and father's employment status when respondent was age 15). These logits were run on individual-level data with household level income variables, and thus indicate the likelihood that an individual with given characteristics is in a household that receives a certain type of income.

The marginal effect estimates are shown in Table 3 for Egypt and Table 4 for Tunisia. As expected, in Egypt, those who were more educated, had more educated parents, and lived outside Greater Cairo were more likely to live in households that received public wages. For example, compared to those with basic education in Egypt, those with secondary education, above secondary, or university education were 10, 15 and 20 percentage points (p.p.) more likely to live in households that received public wages, respectively. Egyptians in households that received private formal wages were more likely to be in Greater Cairo, young or middle-age adults, and university educated. Having a father who engaged in wage work (relative to being an employer, self-employed or missing job information) increased the likelihood of both public and private formal wages. Having a father who was an employer increased the likelihood of enterprise earnings and agricultural earnings by about 17 p.p. each, and a self-employed father was associated with a 30 p.p. increase in having enterprise earnings. Pension receipt followed similar patterns to public and private formal wage work, since these jobs had social insurance, as well as

being associated with being age 55 or older. Social assistance was more likely to be received by the household for those who were less educated and had less educated families. Rent and other capital income, in contrast, was positively associated with own education and parents' education.

[Table 3 and Table 4 near here]

In Tunisia, the patterns relating individual characteristics to sources of income were similar to Egypt, although the smaller sample resulted in fewer estimates that were statistically significant. Women in Tunisia were more likely to be living in households that received pensions (3.9 p.p.) or social assistance (2.3 p.p.) compared to men. Those living in rural areas were less likely to receive public wages (-8.6 p.p.), private formal wages (-5.3 p.p.), enterprise earnings (-5.6 p.p.), and pensions (-8.6 p.p.) compared to urban residents. Rural residents were more likely to have agricultural income (18.2 p.p.) and social assistance (2.3 p.p.), all else equal. Not surprisingly, those age 55 years or older were over 60 p.p. more likely to live in households with pension income, as well as 16.7 p.p. more likely to receive social assistance. Those with above secondary education were more likely to live in households receiving public wages (by 15.4 p.p.) and less likely (by 13.9 p.p.) to receive informal wages than those with only basic education. As in Egypt, having a father who engaged in self-employment or was an employer was associated with living in a household that had enterprise earnings (13.9 p.p. increase) and agricultural income (16.3 p.p. increase).

Having described the types and amounts of different income flows, we next turn to the factor decomposition of income inequality in order to assess the relationship between income sources and the distribution of income.

4.3 Factor Decomposition of Income Inequality

Different sources of income can exacerbate inequality because of differential opportunities to obtain a source and because of the level of variability in income from a source. As noted earlier, the contribution to income inequality of each income source depends on three components: the factor share of income, the within-factor inequality relative to the total inequality, and the correlation between the factor and total income. Any given type of income may either increase or decrease total income inequality depending on who receives more income from the source (e.g., poorer or richer households), the level of within-factor inequality, and its correlation with total income.

Table 5 provides the factor share decomposition of inequality for each country, showing the three key components of the decomposition (factor shares, within-factor inequality (CV), and correlation between factors and total income). To provide context for the discussion of inequality within each factor, Table 5 also repeats the information on the percentage receiving any of a source and shows the CV for each factor for recipients only (in the first two rows). We first discuss each of the three key components of the decomposition followed by the summary measure of proportionate contribution of each factor to total income inequality.

[Table 5 near here]

4.3.1 Factor shares of total income

The factor share of an income source is the mean income from that source divided by mean total income, in other words, the percentage of income coming from that source (the same as the total column in Figure 3). Generally, the factor share will be higher for income sources that are received by more households and provide larger amounts of income. In Egypt, public wages, private informal wages and enterprise income each provided 18-20% of household income in 2012. Rent and other capital income was 11% of income. Private formal wages and

pensions were each 10% of income. Agriculture provided 6% of income and social assistance 1%. In contrast, while public wages were 22% of income in Tunisia (as in Egypt), private formal wages were more important (19% vs 10% in Egypt). Pensions (18%), agricultural income (13%), and private informal wages (10%) were the next three largest factor shares in Tunisia. Remittances (1%) and social assistance (4%) both had smaller shares of income in both countries than did the rent and other capital income category (10% in Tunisia and 11% in Egypt). Although few households received rent and other sources of capital income, this category had an important role in income inequality in the two countries.

4.3.2 Inequality within a source

Variation in income within a source depends both on the proportion receiving any of that source and the variation in amounts received. Table 5 shows the CV both for all recipients and for all individuals. Among those who received each type of income, the Lorenz curves are shown in Figure 4 for a visualization of the amount of inequality in each income source. High inequality within a source occurred in agricultural income in both countries (CV=2.87 Egypt; CV=3.79 Tunisia). Among those receiving wages, public, private formal and private informal wages each had smaller coefficients of variation than total income (total income CV=2.37 in Egypt, CV=3.33 in Tunisia per Table 1). In Tunisia, the variation in private informal wages was particularly low among those who earned them. In Egypt, remittances (CV=3.70), rent and other capital income (CV=3.62) and enterprise income (CV=3.27) were also highly unequal. Overall, fewer sources of income were highly unequal among recipients in Tunisia than in Egypt, suggesting that inequality in Tunisia was due more to receipt of particular income sources than variation in income from a source. In Egypt, in contrast, inequality within certain income sources contributed more to overall income inequality.

[Figure 4 near here]

4.3.3 Correlation with total income

The influence of a factor on total income inequality also depends on the correlation between the factor and total income (see equation (4)). The estimated correlations are shown in Table 5. Most of the factors were not very highly correlated with total income and were similar across countries. Important exceptions include enterprise earnings in Egypt (0.58) and agricultural income in Tunisia (0.84). In both countries, rent and other capital income was highly correlated (0.68 to 0.72) with total income. As we see in the next section, these factors were important contributors to income inequality in these countries.

4.3.4 Proportionate share of inequality by factor

The key result for the decomposition is the proportionate contribution of each income source to total income inequality, shown in Table 5 (last two rows). The proportionate contributions are expressed as the share of total income inequality, and so they sum to 100% across the nine income sources. In Egypt, household income inequality was largely driven by two sources: enterprise earnings (30%) and rent and other capital income (51%). While 21% of households received enterprise earnings, only 6% received rent and other capital income. The contribution to inequality derives partly from the relatively small number of households that received large amounts from these sources. In Egypt, the 90th percentile amount of rent and other capital income received by households was 50 times the 10th percentile, and this ratio was 12.5 for enterprise earnings. While agricultural income in Egypt was also highly unequal, it was a smaller share of household income on average, and less highly correlated with total income; thus, its contribution to inequality was smaller. Other income sources barely contributed to income inequality in Egypt.

In Tunisia, the largest proportionate contributions to total inequality were from agricultural income (46%) and rent and other capital income (39%). Again, the income households received from these two sources were highly skewed, with a 90/10 ratio of over 200 for rent, and 53 for agriculture. As in Egypt, the contributions of other types of income to overall inequality were small. Interestingly, pensions contributed 9% of total income inequality in Tunisia. Social assistance neither increased nor decreased overall income inequality in either country due to its small share in total income (1-4%), low inequality, and weak correlation with total income.

5 Discussion and Conclusion

What explains "the Arab inequality puzzle," where high levels of perceived inequality were not reflected in measured inequality? Previous research focused on three main explanations for the puzzle: (1) inequality is mis-measured, (2) inequality in other outcomes is what matters or (3) inequality of opportunity is high, but not necessarily overall inequality. Yet previous research failed to show inequality was particularly high, relative to other regions, even after undertaking corrections (Hlasny and Verme 2014), focusing on other outcomes (Assaad et al. 2018; Belhaj Hassine 2015; El Enbaby and Galal 2015), or measuring IOp (Assaad, Krafft, et al. 2016; Belhaj Hassine 2011).

Our paper demonstrates that a more complete measure of income was substantially more unequal than past estimates for consumption or wages for Egypt and Tunisia (Assaad, Krafft, et al. 2016; Belhaj Hassine 2015; Bibi and Nabli 2009). Furthermore, these levels of inequality in Egypt and Tunisia were higher than any of the 2011 measures for five Latin American countries using a comparable income measure (Amarante 2016). The inequality measures we calculated for Egypt and Tunisia were also comparable to the levels of inequality observed in these same countries in 2002, when inequality was even higher in Latin America, a region known for high

inequality (Ravallion 2014). Inequality based on the full income measure in Egypt and Tunisia was higher than income inequality in the US, UK, Canada, Germany, Norway, or Sweden over 1969-2005 (García-Peñalosa and Orgiazzi 2013). Thus, our more complete measure of income suggests that the Arab world is unusually income-unequal, contrary to results with more standard measures based on earned income or consumption.

Both individual and household characteristics, especially parental background, were highly predictive of receiving different sources, consistent with research on the intergenerational transmission of socio-economic status in Egypt and Tunisia (Assaad and Krafft 2014; Assaad, Krafft, and Salemi 2019), and suggesting a role for IOp here as well. Transfers, especially social assistance could potentially reduce income inequality, depending on the accuracy of targeting. While the characteristics of those receiving social assistance were consistent with expectations, the factor decomposition revealed that social assistance did not reduce income inequality. The amount of income received from social assistance was, however, low. Similarly, Amarante (2016) found non-contributive transfers had small relative contributions to inequality ranging from -1.6 to 7.0% in five Latin American countries in 2011.[9] In contrast to studies in a number of other countries (Amarante 2016; Rani and Furrer 2016), formal wages did not contribute to inequality in Egypt and Tunisia.

A few specific sources of income, namely rent and other capital income in both Egypt and Tunisia, agricultural income in Tunisia, and enterprise income in Egypt, contributed by far the most to inequality. These are, notably, sources of income that are not included or well-measured in most surveys. Amarante (2016) noted the challenges of measuring capital income in surveys, which may explain the relatively small contributions to inequality from capital income

[9] Amarante's decomposition is of the Gini coefficient and her income categories differ slightly from ours: non-contributive transfers include both public transfers like social assistance programs and private transfers such as alimony (Amarante 2016). Note that when examining changes in the Gini coefficient over time, she found that non-contributive transfers had an equalizing effect in these countries.

she found in Latin America in 2011. The contributions of rent and other capital income in Egypt and Tunisia were driven by their correlation with total income as well as high inequality within the source itself, more so than their share in total income. Higher-income households had more sources of income than lower-income households, suggesting inequality is driven by adding, more so than substituting, income sources. Rent and other capital income in particular was almost exclusively earned by the highest-income households in both countries. While direct measures of wealth inequality are difficult to obtain (Wittenberg and Leibbrandt 2017), income inequality was connected to income from assets such as land, businesses, and buildings more so than earned income. Thus, very unequal access to certain income sources, sources also tied to wealth and capital, may help explain the Arab inequality puzzle.

References

Alvaredo, Facundo, and Thomas Piketty. 2014. "Measuring Top Incomes and Inequality in the Middle East: Data Limitations and Illustration With the Case of Egypt." *Economic Research Forum Working Paper Series No. 832*. Cairo, Egypt.

Amarante, Verónica. 2016. "Income Inequality in Latin America: A Factor Component Analysis." *Review of Income and Wealth* 62 (S1): S4–S21.

Arampatzi, Efstratia, Martijn Burger, Elena Ianchovichina, Tina Röhricht, and Ruut Veenhoven. 2018. "Unhappy Development: Dissatisfaction With Life on the Eve of the Arab Spring." *Review of Income and Wealth* 64 (S1): S80–S113.

Assaad, Ragui, Samir Ghazouani, Caroline Krafft, and Dominique J. Rolando. 2016. "Introducing the Tunisia Labor Market Panel Survey 2014." *IZA Journal of Labor & Development* 5 (15): 1–21.

Assaad, Ragui, and Caroline Krafft. 2013. "The Egypt Labor Market Panel Survey: Introducing the 2012 Round." *IZA Journal of Labor & Development* 2 (8): 1–30.

———. 2014. "Youth Transitions in Egypt: School, Work, and Family Formation in an Era of Changing Opportunities." *Silatech Working Paper No. 14–1*. Doha, Qatar: Silatech.

———. 2016. "Inequality of Opportunity in Human Development." In *The Middle East Economies in Times of Transition*, edited by Ishac Diwan and Ahmed Galal. New York, NY: Palgrave Macmillan.

Assaad, Ragui, Caroline Krafft, John Roemer, and Djavad Salehi-Isfahani. 2016. "Inequality of Opportunity in Income and Consumption: The Middle East and North Africa Region in Comparative Perspective." *Economic Research Forum Working Paper Series No. 1003*. Cairo, Egypt.

———. 2018. "Inequality of Opportunity in Wages and Consumption in Egypt." *Review of Income and Wealth* 64 (S1): S26–S54.

Assaad, Ragui, Caroline Krafft, and Colette Salemi. 2019. "Socioeconomic Status and the Changing Nature of the School-to-Work Transition in Egypt, Jordan, and Tunisia." *Economic Research Forum Working Paper Series No. 1287*. Cairo, Egypt.

Barrett, C.B., T. Reardon, and P. Webb. 2001. "Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics, and Policy Implications." *Food Policy* 26: 315–331.

Belhaj Hassine, Nadia. 2011. "Inequality of Opportunity in Egypt." *The World Bank Economic Review* 26 (2): 265–295.

———. 2015. "Economic Inequality in the Arab Region." *World Development* 66: 532–556.

Bibi, Sami, and Mustapha K. Nabli. 2009. "Income Inequality in the Arab Region: Data and Measurement, Patterns and Trends." *Middle East Development Journal* 1 (2): 275–314.

Devarajan, Shantayanan, and Elena Ianchovichina. 2018. "A Broken Social Contract, Not High Inequality, Led to the Arab Spring." *Review of Income and Wealth* 64 (S1): S5–S25.

Duclos, Jean-Yves, and Abdelkrim Araar. 2006. *Poverty and Equity: Measurement, Policy and Estimation with DAD*. New York, NY: Springer International Development Research Centre.

El Enbaby, Hoda, and Rami Galal. 2015. "Inequality of Opportunity in Individuals' Wages and Households' Assets in Egypt." *Economic Research Forum Working Paper Series No. 942*. Cairo, Egypt.

Ellis, Frank. 1998. "Household Strategies and Rural Livelihood Diversification." *Journal of Development Studies* 35 (1): 1–38.

García-Peñalosa, Cecilia, and Elsa Orgiazzi. 2013. "Factor Components of Inequality: A Cross-

Country Study." *Review of Income and Wealth* 59 (4): 689–727.
Gottschalk, Peter, and Minh Huynh. 2010. "Are Earnings Inequality and Mobility Overstated? The Impact of Nonclassical Measurement Error." *The Review of Economics and Statistics* 92 (2): 302–315.
Hashemi, Ali, and Vito Intini. 2015. "Inequality of Opportunity in Education in the Arab Region." New York, NY: United Nations Economic and Social Commission for Western Asia (ESCWA).
Hlasny, Vladimir, and Shireen AlAzzawi. 2018. "Asset Inequality in the MENA: The Missing Dimension?" *Quarterly Review of Economics and Finance*.
Hlasny, Vladimir, and Paolo Verme. 2014. "Top Incomes and the Measurement of Inequality in Egypt." *Economic Research Forum Working Paper Series No. 874*. Cairo, Egypt.
Jenkins, Stephen P. 1999. "INEQFAC: Stata Module to Calculate Inequality Decomposition by Factor Components." Statistical Software Components S366003, Boston College Department of Economics, revised 31 Mar 2009.
Jenkins, Stephen P . 1995. "Accounting for Inequality Trends: Decomposition Analyses for the UK, 1971- 86." *Economia* 62 (245): 29–63.
Krafft, Caroline, and Halimat Alawode. 2018. "Inequality of Opportunity in Higher Education in the Middle East and North Africa." *International Journal of Educational Development* 62: 234–244.
Krafft, Caroline, and Safaa El-Kogali. 2014. "Inequalities in Early Childhood Development in the Middle East and North Africa." *Economic Research Forum Working Paper Series No. 856*. Cairo, Egypt.
Krishnan, Nandini, Gabriel Lara Ibarra, Ambar Narayan, Saliesh Tiwari, and Tara Vishwanath. 2016. *Uneven Odds, Unequal Outcomes: Inequality of Opportunity in the Middle East and North Africa*. Washington, DC: World Bank.
Milanovic, Branko. 2016. *Global Inequality: A New Approach for the Age of Globalization*. Cambridge, MA: Harvard University Press.
OAMDI. 2013. "Labor Market Panel Surveys (LMPS), Version 2.1 of Licensed Data Files; ELMPS 2012. Egypt: Economic Research Forum (ERF)." Retrieved July 30, 2015. http://www.erf.org.eg/cms.php?id=erfdataportal.
———. 2016. "Labor Market Panel Surveys (LMPS). Version 2.0 of Licensed Data Files; TLMPS 2014. Egypt: Economic Research Forum (ERF)." Retrieved August 22, 2016. www.erfdataportal.com.
Piketty, Thomas. 2014. *Capital in the Twenty-First Century*. Cambridge, MA: Harvard University Press.
Rani, Uma, and Marianne Furrer. 2016. "Decomposing Income Inequality into Factor Income Components: Evidence from Selected G20 Countries." *ILO Research Paper No. 15*.
Ravallion, Martin. 2003. "Measuring Aggregate Welfare in Developing Countries: How Well Do National Accounts and Surveys Agree?" *Review of Economics and Statistics* 85 (3): 645–652.
———. 2014. "Income Inequality in the Developing World." *Science* 344 (6186): 851–855.
Roemer, John E. 1998. *Equality of Opportunity*. Cambridge, MA: Harvard University Press.
Sen, Amartya. 2013. "Equality of What?" In *Globalization and International Development: The Ethical Issues*, edited by H.E. Baber and Denise Dimon, 61–76. Buffalo, New York: Broadview Press.
Shorrocks, A. F. 1982. "Inequality Decomposition by Factor Components." *Econometrica* 50 (1): 193–211.
Silber, Jacques, ed. 1999. *Handbook on Income Inequality Measurement*. New York: Springer

Science & Business Media.
Smeeding, Timothy M., and Daniel H. Weinberg. 2001. “Toward a Uniform Definition of Household Income.” *Review of Income and Wealth* 47 (1): 1–24.
Suárez Álvarez, Ana, and Ana J. López Menéndez. 2018. “Inequality of Opportunity in Developing Countries: Does the Income Aggregate Matter?” *LIS Working Paper Series No. 739*.
van der Weide, Roy, Christoph Lakner, and Elena Ianchovichina. 2018. “Is Inequality Underestimated in Egypt? Evidence from House Prices.” *Review of Income and Wealth* 64 (s1): S55–S79.
Verme, Paolo, Branko Milanovic, Sherine Al-Shawarby, Sahar El Tawila, May Gadallah, and Enas Ali A. El-Majeed. 2014. “Inside Inequality in the Arab Republic of Egypt: Facts and Perceptions across People, Time, and Space.” *World Bank Studies*. Washington, DC: World Bank.
Vladimir, Hlasny. 2017. “Evolution of Opportunities for Early Childhood Development in Arab Countries.” *International Journal of Human Rights in Healthcare* 10 (4): 256–276.
Wittenberg, Martin, and Murray Leibbrandt. 2017. “Measuring Inequality by Asset Indices: A General Approach with Application to South Africa.” *Review of Income and Wealth* 63 (4): 706–730.
World Bank. 2005. “World Development Report 2006: Equity and Development.” Washington, DC: World Bank.
———. 2015. “Inequality, Uprisings, and Conflict in the Arab World.” *MENA Economic Monitor*. Washington, DC: World Bank.

Tables

Table 1. Income inequality by country and measure

Inequality measures	Egypt	Tunisia
p90/p10	8.87	8.25
p75/p25	2.87	2.67
GE(0)	0.50	0.63
GE(1)	0.66	0.99
GE(2)	2.81	5.55
Gini	0.53	0.58
CV	2.37	3.33

Source: Authors' calculations based on ELMPS 2012 and TLMPS 2014

Table 2. Mean number of income sources by income quintile and country

	Egypt	Tunisia
Poorest	1.3	1.1
Poorer	1.4	1.2
Middle	1.6	1.2
Richer	1.9	1.4
Richest	2.1	1.8
Total	1.7	1.3

Source: Authors' calculations based on ELMPS 2012 and TLMPS 2014

Table 3. Marginal effects from logits of receipt of various income sources, Egypt

	Public wages	Private formal wages	Private informal wages	Enterprise earnings	Agric. Income	Remittances	Pensions	Social asst.	Rent, other
Sex (male omit.)									
Female	0.007	-0.006	-0.048***	-0.010*	0.001	0.019***	0.020***	0.005	0.005
	(0.005)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Region (Gr. Cairo omit.)									
Alx, Suez C.	0.056***	-0.044***	0.023*	-0.008	0.006***	-0.030***	0.003	-0.011	-0.043***
	(0.011)	(0.010)	(0.012)	(0.010)	(0.002)	(0.006)	(0.009)	(0.007)	(0.006)
Urb. Lwr.	0.040***	-0.112***	0.010	0.049***	0.034***	0.046***	-0.052***	0.035***	-0.034***
	(0.010)	(0.009)	(0.010)	(0.009)	(0.003)	(0.007)	(0.008)	(0.006)	(0.006)
Urb. Upp.	0.098***	-0.141***	0.018	0.014	0.104***	0.009	-0.048***	0.040***	-0.048***
	(0.009)	(0.008)	(0.010)	(0.009)	(0.004)	(0.006)	(0.008)	(0.006)	(0.005)
Rur. Lwr.	0.069***	-0.121***	0.022*	-0.040***	0.211***	0.087***	-0.078***	0.051***	-0.018**
	(0.008)	(0.008)	(0.009)	(0.008)	(0.004)	(0.006)	(0.007)	(0.005)	(0.006)
Rur. Upp.	0.026**	-0.166***	0.053***	-0.055***	0.244***	0.036***	-0.113***	0.081***	-0.034***
	(0.009)	(0.008)	(0.009)	(0.008)	(0.004)	(0.006)	(0.007)	(0.006)	(0.006)
Age (under 15 omit.)									
Age 15-24	-0.069***	0.044***	0.128***	-0.008	0.006	0.001	0.043***	0.016*	-0.006
	(0.012)	(0.012)	(0.014)	(0.011)	(0.008)	(0.012)	(0.007)	(0.007)	(0.006)
Age 25-54	0.005	0.050***	0.059***	0.010	0.009	-0.045***	0.147***	0.039***	0.007
	(0.015)	(0.013)	(0.016)	(0.013)	(0.010)	(0.012)	(0.011)	(0.009)	(0.007)
Age 55 or older	0.019	0.024	-0.087***	-0.054***	0.033**	-0.036**	0.536***	0.094***	0.076***
	(0.018)	(0.014)	(0.016)	(0.014)	(0.012)	(0.014)	(0.014)	(0.013)	(0.013)
Marital status (single omit.)									
Married	-0.017	0.011	-0.067***	-0.012	-0.090***	0.037***	-0.208***	-0.104***	-0.031***
	(0.009)	(0.007)	(0.009)	(0.008)	(0.006)	(0.008)	(0.007)	(0.006)	(0.005)
Widow/div./sep.	-0.055***	-0.012	-0.103***	-0.053***	-0.131***	0.088***	-0.082***	-0.016	-0.027***
	(0.015)	(0.012)	(0.015)	(0.013)	(0.008)	(0.015)	(0.012)	(0.011)	(0.007)
Education (basic omit.)									

	Public wages	Private formal wages	Private informal wages	Enterprise earnings	Agric. Income	Remittances	Pensions	Social asst.	Rent, other
Under age 6	0.005	0.068***	-0.131***	0.076***	-0.047***	0.038***	-0.081***	-0.070***	-0.002
	(0.013)	(0.015)	(0.012)	(0.013)	(0.008)	(0.011)	(0.010)	(0.006)	(0.008)
None (under age 15)	-0.070***	0.034**	0.039**	-0.009	-0.009	0.021*	-0.064***	-0.005	-0.019***
	(0.010)	(0.012)	(0.014)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.005)
None (over age 15)	-0.067***	-0.021**	0.071***	-0.004	0.047***	0.003	-0.032***	0.051***	-0.001
	(0.009)	(0.007)	(0.010)	(0.008)	(0.007)	(0.007)	(0.007)	(0.008)	(0.006)
Secondary	0.095***	0.009	-0.044***	-0.027***	-0.019**	0.000	0.014	-0.013*	0.004
	(0.009)	(0.007)	(0.009)	(0.007)	(0.006)	(0.006)	(0.007)	(0.006)	(0.005)
Above secondary	0.149***	0.013	-0.105***	0.004	-0.048**	-0.001	-0.016	-0.036*	0.023
	(0.022)	(0.013)	(0.019)	(0.018)	(0.015)	(0.014)	(0.015)	(0.015)	(0.013)
University & above	0.203***	0.036***	-0.138***	-0.038***	-0.031***	0.005	0.007	-0.062***	0.037***
	(0.013)	(0.009)	(0.011)	(0.009)	(0.009)	(0.008)	(0.009)	(0.008)	(0.008)
Mother's education (illit. omit.)									
Read and write	0.048***	-0.015	-0.046***	0.032**	-0.038***	0.020	-0.000	-0.023**	0.016*
	(0.013)	(0.008)	(0.013)	(0.012)	(0.009)	(0.010)	(0.009)	(0.009)	(0.007)
Basic Education	-0.025*	0.027**	-0.016	0.012	-0.047***	0.000	0.000	-0.020**	0.003
	(0.010)	(0.009)	(0.012)	(0.009)	(0.007)	(0.008)	(0.008)	(0.007)	(0.005)
Secondary	0.105***	-0.009	-0.095***	0.042***	-0.073***	0.010	-0.037***	-0.028***	0.008
	(0.012)	(0.008)	(0.011)	(0.010)	(0.006)	(0.008)	(0.007)	(0.007)	(0.006)
Above secondary	0.214***	0.004	-0.152***	0.038**	-0.083***	0.042**	-0.041***	-0.073***	0.049***
	(0.020)	(0.012)	(0.017)	(0.014)	(0.010)	(0.014)	(0.010)	(0.007)	(0.010)
Father's education (illit. omit.)									
Read and write	0.072***	0.015*	-0.094***	0.040***	-0.028***	0.026***	0.044***	-0.042***	0.013**
	(0.009)	(0.007)	(0.009)	(0.008)	(0.006)	(0.007)	(0.006)	(0.005)	(0.004)
Basic Education	0.054***	0.028***	-0.101***	0.045***	-0.019**	-0.002	0.046***	-0.052***	0.020***
	(0.009)	(0.008)	(0.009)	(0.008)	(0.006)	(0.007)	(0.007)	(0.005)	(0.006)
Secondary	0.136***	0.013	-0.189***	-0.001	0.019*	0.008	0.049***	-0.051***	0.023***
	(0.011)	(0.008)	(0.010)	(0.009)	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)
Above secondary	0.198***	0.019	-0.257***	0.016	0.036**	-0.018*	0.060***	-0.067***	0.062***
	(0.015)	(0.010)	(0.011)	(0.012)	(0.011)	(0.009)	(0.010)	(0.007)	(0.009)

	Public wages	Private formal wages	Private informal wages	Enterprise earnings	Agric. Income	Remittances	Pensions	Social asst.	Rent, other
Father's employment (wage worker omit.)									
Employer	-0.100***	-0.048***	-0.158***	0.172***	0.179***	0.002	-0.020***	-0.007	0.050***
	(0.006)	(0.005)	(0.006)	(0.007)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
Self-employed/Family	-0.130***	-0.052***	-0.140***	0.305***	0.092***	-0.025***	-0.022***	0.011*	0.011*
	(0.008)	(0.006)	(0.008)	(0.009)	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)
No job	-0.114***	-0.034**	-0.046**	-0.054***	-0.051***	0.043***	0.232***	0.070***	0.038***
	(0.014)	(0.011)	(0.015)	(0.009)	(0.007)	(0.013)	(0.014)	(0.012)	(0.010)
N	48499	48499	48499	48499	48499	48499	48499	48499	48499

Source: Authors' calculations based on ELMPS 2012

Notes: *p<0.05; **p<0.01; ***p<0.001. Standard errors in parentheses

Table 4. Marginal effects from logits of receipt of various income sources, Tunisia

	Public wages	Private formal wages	Private informal wages	Enterprise earnings	Agric. Income	Remittances	Pensions	Social asst.
Sex (male omit.)								
Female	-0.016	0.003	-0.017	-0.002	-0.004	0.002	0.039**	0.023*
	(0.017)	(0.016)	(0.015)	(0.010)	(0.007)	(0.006)	(0.013)	(0.011)
Location (urban omit.)								
Rural	-0.086***	-0.053***	0.027*	-0.056***	0.182***	0.010	-0.086***	0.023*
	(0.015)	(0.015)	(0.014)	(0.009)	(0.010)	(0.006)	(0.012)	(0.011)
Age (Under 15 omit.)								
Age 15-24	-0.044	-0.022	0.098**	0.017	-0.027	-0.013	0.065***	0.003
	(0.043)	(0.041)	(0.038)	(0.029)	(0.017)	(0.014)	(0.018)	(0.022)
Age 25-54	0.043	0.001	0.011	-0.021	-0.038*	-0.013	0.127***	0.035
	(0.047)	(0.046)	(0.040)	(0.031)	(0.019)	(0.014)	(0.023)	(0.027)
Age 55 or older	-0.132**	-0.154***	-0.117**	-0.062*	-0.028	0.008	0.621***	0.167***
	(0.047)	(0.046)	(0.040)	(0.031)	(0.022)	(0.019)	(0.032)	(0.043)
Marital status (single omit.)								
Married	0.032	0.083**	-0.041	0.034	-0.005	-0.006	-0.191***	-0.200***
	(0.028)	(0.030)	(0.025)	(0.019)	(0.013)	(0.011)	(0.020)	(0.021)
Widow/div./sep.	0.006	0.033	-0.113***	0.027	-0.046**	-0.014	-0.276***	-0.022
	(0.048)	(0.055)	(0.034)	(0.035)	(0.014)	(0.012)	(0.023)	(0.035)
Education (basic omit.)								
Under age 6	-0.047	0.145	0.173	0.050	0.059	0.008	-0.053	-0.096***
	(0.064)	(0.097)	(0.090)	(0.072)	(0.051)	(0.044)	(0.060)	(0.020)
None (under age 15)	0.081	-0.055	-0.002	-0.002	-0.015	-0.011	-0.047	0.020
	(0.045)	(0.037)	(0.035)	(0.024)	(0.010)	(0.010)	(0.050)	(0.036)
None (over age 15)	-0.020	-0.068**	0.027	-0.017	0.007	0.007	-0.007	0.088***
	(0.025)	(0.023)	(0.021)	(0.016)	(0.010)	(0.010)	(0.020)	(0.023)
Secondary	0.121***	-0.071*	-0.089***	-0.017	0.065*	-0.010	0.029	-0.031
	(0.037)	(0.029)	(0.024)	(0.018)	(0.031)	(0.012)	(0.026)	(0.022)

	Public wages	Private formal wages	Private informal wages	Enterprise earnings	Agric. Income	Remittances	Pensions	Social asst.
Above Secondary	0.154***	0.031	-0.139***	-0.049**	-0.020	-0.022**	0.079*	-0.050*
	(0.040)	(0.040)	(0.023)	(0.016)	(0.013)	(0.007)	(0.031)	(0.022)
Mother's education (illit. omit.)								
Basic Education	-0.054*	0.054*	0.038	0.020	-0.005	0.010	-0.035	-0.030
	(0.024)	(0.027)	(0.027)	(0.017)	(0.012)	(0.012)	(0.023)	(0.022)
Secondary and above	0.067	0.150**	-0.133***	-0.028	0.007	-0.026***	-0.006	-0.021
	(0.046)	(0.048)	(0.033)	(0.018)	(0.023)	(0.005)	(0.039)	(0.033)
Missing	0.070	-0.028	-0.073	0.008	0.008	-0.001	-0.050	0.116*
	(0.067)	(0.066)	(0.050)	(0.037)	(0.020)	(0.016)	(0.045)	(0.045)
Father's education (illit. omit.)								
Basic Education	0.001	0.043	-0.011	0.035*	-0.017	-0.005	0.030	-0.076***
	(0.022)	(0.024)	(0.022)	(0.017)	(0.013)	(0.007)	(0.018)	(0.017)
Secondary and above	0.040	-0.006	-0.113***	0.074**	0.033	0.042	0.062	-0.096***
	(0.034)	(0.033)	(0.029)	(0.028)	(0.023)	(0.025)	(0.034)	(0.022)
Missing	0.133*	-0.028	-0.096*	-0.012	-0.062**	-0.015	-0.005	-0.078**
	(0.062)	(0.054)	(0.047)	(0.028)	(0.020)	(0.014)	(0.042)	(0.027)
Father's employment (wage worker omit.)								
Employer	-0.116**	-0.020	-0.093**	0.139***	0.163***	-0.012	0.049	-0.056**
	(0.036)	(0.043)	(0.035)	(0.035)	(0.043)	(0.011)	(0.029)	(0.020)
Self-employed/Family	-0.080***	-0.060*	-0.066***	0.156***	0.080***	-0.023***	0.015	0.009
	(0.022)	(0.024)	(0.019)	(0.020)	(0.009)	(0.006)	(0.017)	(0.013)
No job	-0.091**	-0.031	-0.113***	0.006	0.010	-0.014	0.182***	0.065*
	(0.034)	(0.034)	(0.028)	(0.018)	(0.012)	(0.011)	(0.030)	(0.026)
Missing	-0.048	-0.072*	-0.073**	0.031	0.012	-0.005	0.015	0.029
	(0.034)	(0.032)	(0.027)	(0.021)	(0.010)	(0.012)	(0.022)	(0.019)
N	4586	4586	4586	4586	4586	4586	4586	4586

Source: Authors' calculations based on TLMPS 2014

Notes: *p<0.05; **p<0.01; ***p<0.001. Standard errors in parentheses. Rent & other not estimated due to few recipients.

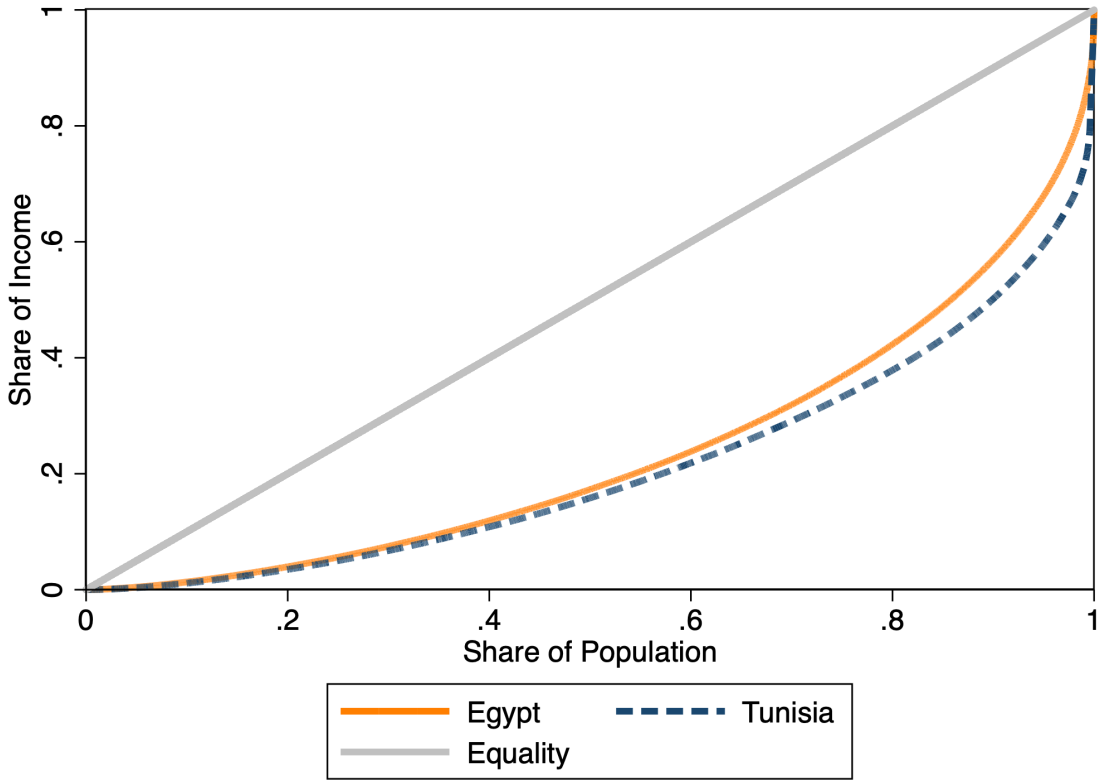
Table 5. Factor share decomposition by country

	Public wages	Private formal wages	Private informal wages	Enterprise income	Agric. income	Remittances	Pensions	Social assistance	Rent, other
Share with any (%)									
Egypt	31	13	37	21	15	13	18	11	6
Tunisia	28	26	24	9	7	3	21	14	1
Factor inequality for recipients (CV)									
Egypt	1.12	1.43	1.05	3.27	2.87	3.70	1.34	1.36	3.62
Tunisia	1.34	1.26	0.70	0.93	3.79	1.53	2.13	1.54	1.58
Factor inequality (CV)									
Egypt	2.51	4.66	2.18	7.44	7.73	10.55	3.79	5.09	14.88
Tunisia	3.02	3.01	2.31	4.46	14.89	11.17	5.08	4.90	17.06
Factor share (%)									
Egypt	22	10	18	18	6	4	10	1	11
Tunisia	22	19	10	5	13	1	18	4	10
Correlation with total income									
Egypt	0.226	0.181	0.072	0.578	0.196	0.192	0.149	0.003	0.678
Tunisia	0.197	0.168	-0.003	0.052	0.843	0.008	0.296	0.092	0.717
Proportionate contribution (%)									
Egypt	5	3	1	30	4	3	3	0	51
Tunisia	3	2	0	0	46	0	9	1	39

Source: Authors' calculations based on ELMPS 2012 and TLMPS 2014

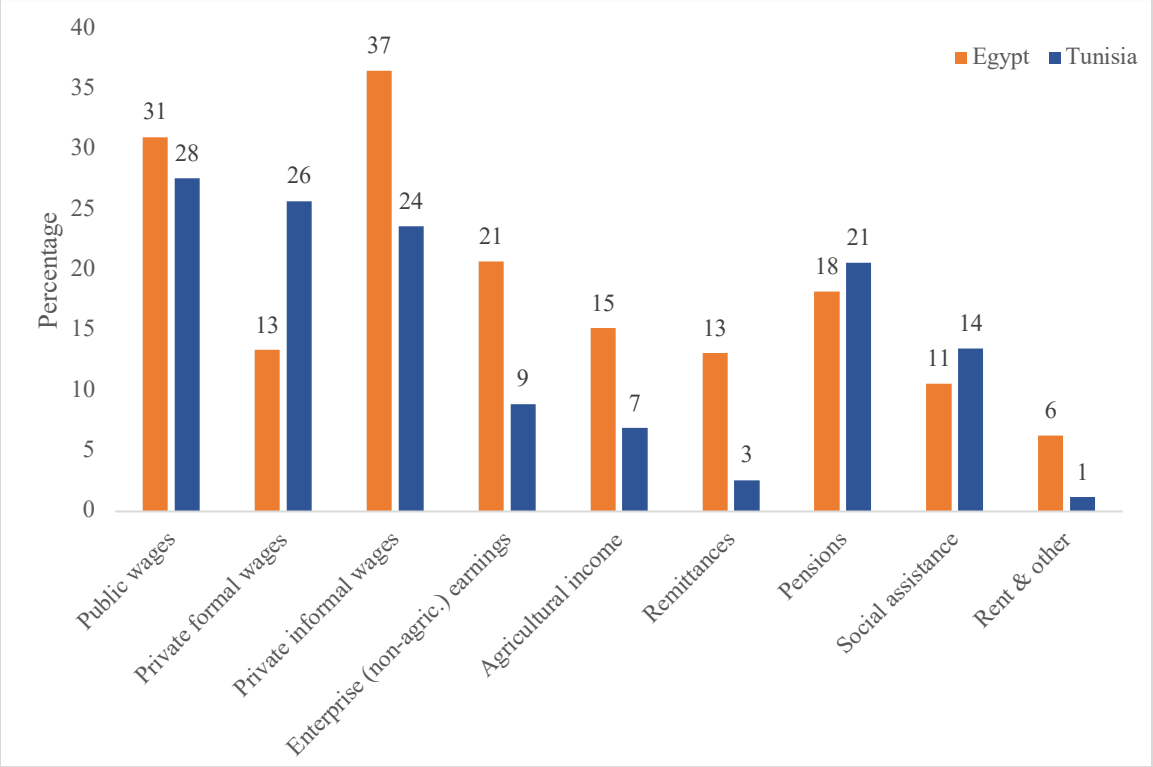
Figures

Figure 1. Lorenz curves of income inequality by country



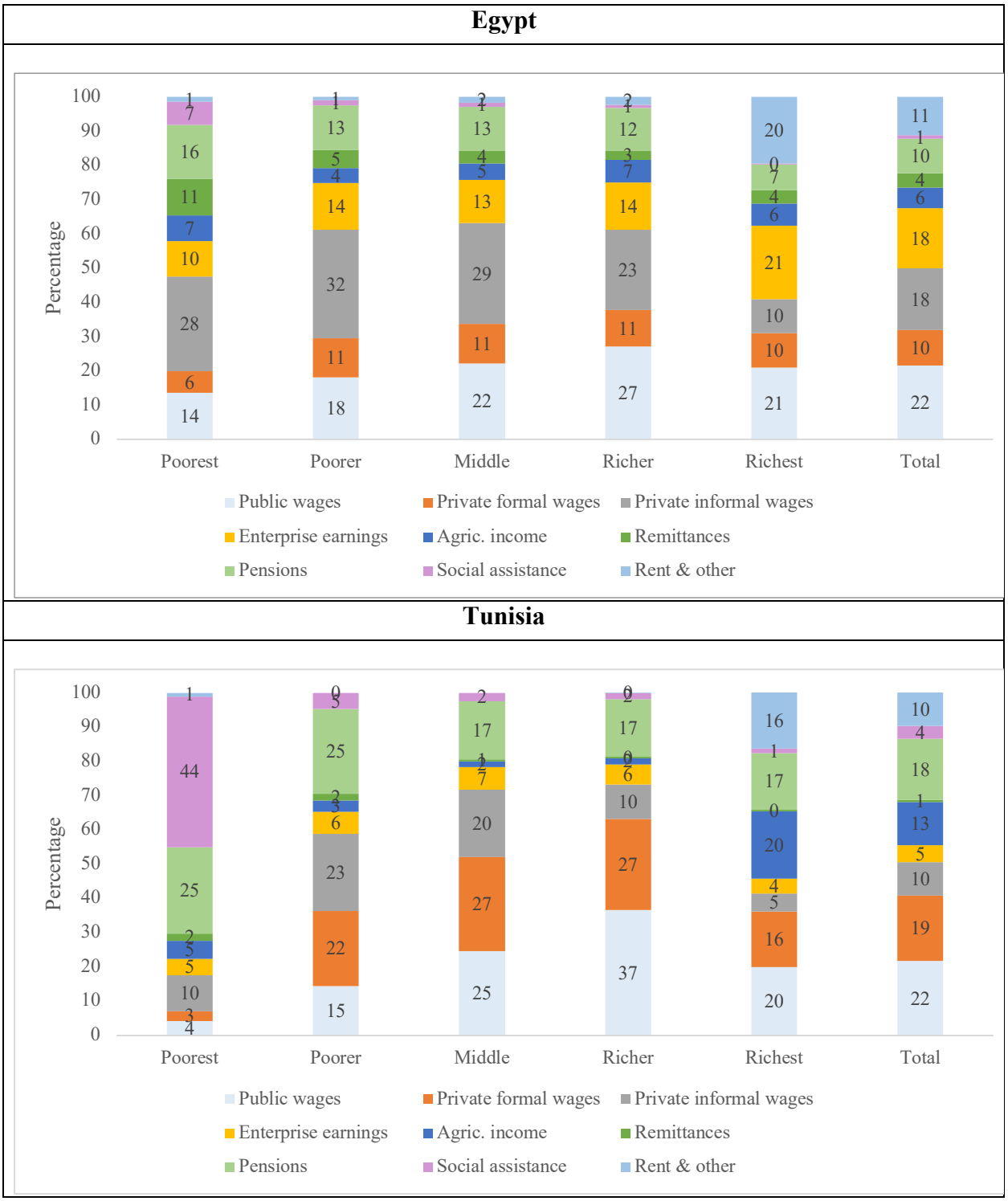
Source: Authors' calculations based on ELMPS 2012 and TLMPS 2014

Figure 2. Percentage of individuals in households receiving income source by country



Source: Authors' calculations based on ELMPS 2012 and TLMPS 2014

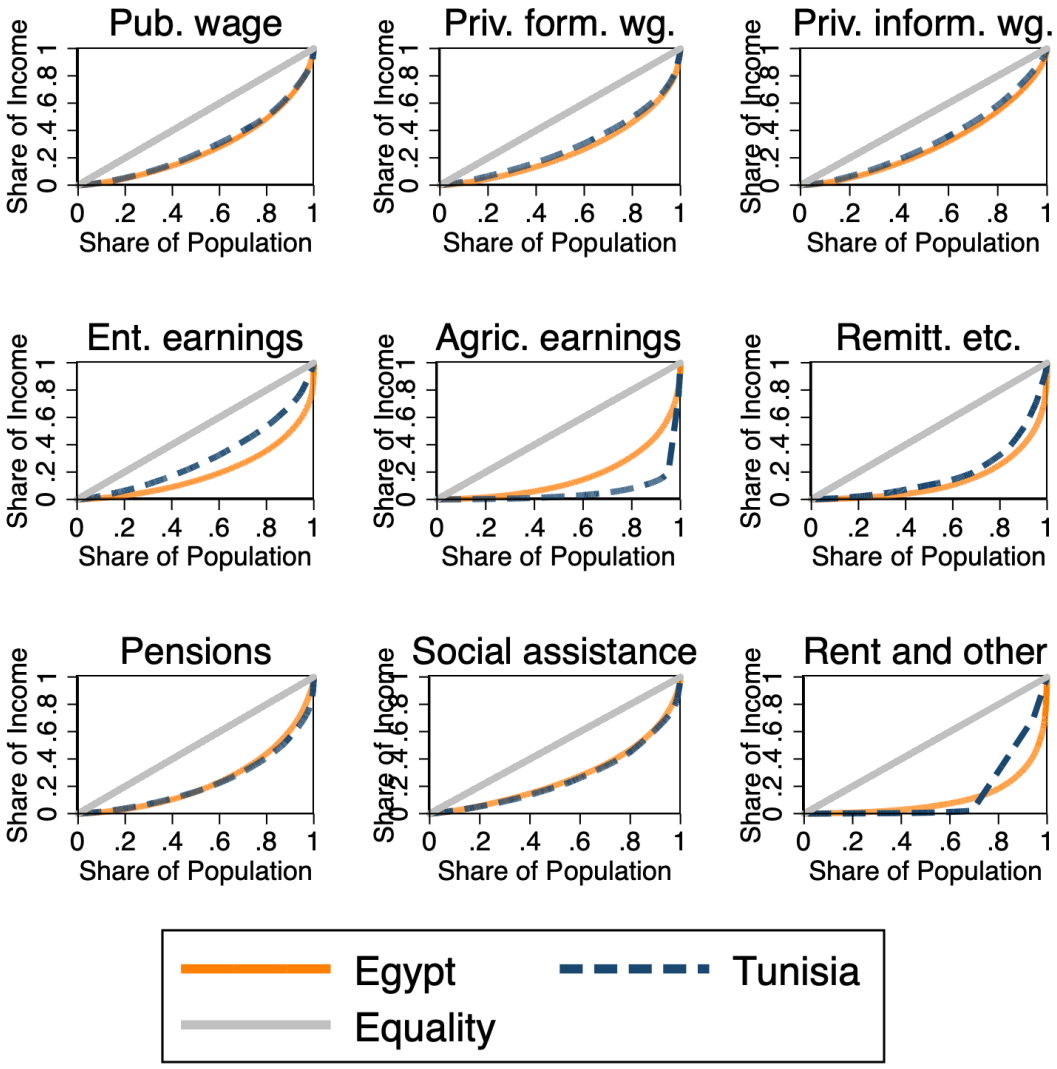
Figure 3. Percentage of income from different sources by income quintile and country



Source: Authors' calculations based on ELMPS 2012 and TLMPS 2014

Notes: The income share of each source by quintile is calculated by summing all income from that source received by households within the quintile and dividing it by total income in the quintile; not as the average share of the income source across households within the quintile.

Figure 4. Lorenz curves of source-specific income inequality for those receiving source, by country



Source: Authors' calculations based on ELMPS 2012 and TLMPS 2014

Appendix: Details of Measuring Income

The ELMPS 2012 and TLMPS 2014 (Assaad, Ghazouani, et al. 2016; Assaad and Krafft 2013; OAMDI 2013, 2016) [10] gathered detailed information on the employment and productive activities of all household members, allowing for complete accounting of income and income sources for each household, including the net sales from both agricultural and non-agricultural household enterprises. A large number of questions captured different dimensions of income across sources. This appendix describes the definitions and assumptions used to calculate income-related variables from across multiple questions.

Wage earnings information was collected on each household member who worked for wages in the past three months, including both monetary and in-kind earnings from employers. Information on wages included basic wages, supplementary, overtime and bonus payments, and incentive and profit payments. Values were converted to monthly amounts based on the reported time units. Questions on wages were asked for both primary employment and secondary employment. Wage work was categorized as formal or informal based on whether a contract or social security was associated with the primary job. Formal work was a contract and/or social security and informal work neither. These questions were not asked for secondary jobs, so all secondary job income is counted in private informal wages.

The most knowledgeable person in the household was asked detailed questions about non-agricultural enterprises in any household where individuals were self-employed, employers, or unpaid family workers who were producing goods or services for sale. Net earnings taken home by the household from the enterprise were converted to monthly amounts based on the

[10] Data are publicly available from the Economic Research Forum's Open Access Microdata Initiative: www.erfdataportal.com. Code (STATA do files) for creating income variables will be made available on the corresponding author's website.

reported time units. Average net earnings of the enterprise, on a monthly basis, were included in the income variable. Profits that were reinvested in the enterprise were excluded from income.

Detailed information was also collected with regards to agricultural activities and sales. Households reported the amount harvested for each crop and the net earnings from crops sold within the past 12 months. The value of crops consumed was not included in household income. For each type of livestock, the number of animals and number sold within the past 12 months were reported, with 75% of the value of livestock sales counted as income. To capture other sources of agricultural income, households were asked about sales of milk, cheese, eggs, poultry, honey, olive oil and other items within the past month. The monthly value of these sales was included in household agricultural income. Lastly, households reported ownership of specific agricultural equipment, such as tractors or pumps, and reported any payments for renting out this equipment within the past 12 months. Total agricultural enterprise income included earnings from sales of crops, livestock, or other agricultural products, and equipment rental. The value of land or land sales was not included. Value of land rental was included with other rental income in capital income, described below.

Households were asked a series of questions about various transfers, rent and interest payments received in the past year and their average value per month. The “rent and other capital income” category included rent on land or buildings, interest on financial investments, and a small number of other responses, such as taxi medallion income. A variety of questions captured social assistance from the government and religious or non-governmental institutions. Non-contributory pensions were included in social assistance, while pensions captured the amount of contributory pensions received. The value of remittances from migrants, relatives, or friends, both cash and in-kind, was reported for the past 12 months.