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2017

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ESTIMATING POVERTY AND INEQUALITY  
IN THE ABSENCE OF CONSUMPTION DATA:  
AN APPLICATION TO THE MIDDLE  
EAST AND NORTH AFRICA

Caroline Krafft, Ragui Assaad, Hanan Nazier,  
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Working Paper No. 1100

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**Working Paper 1100**

**May 2017**

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First published in 2017 by  
The Economic Research Forum (ERF)  
21 Al-Sad Al-Aaly Street  
Dokki, Giza  
Egypt  
[www.erf.org.eg](http://www.erf.org.eg)

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## Abstract

Measures of consumption and poverty are critical metrics of the wellbeing of individuals, their households, communities, and countries. Collecting data on consumption and poverty is challenging and costly, and therefore these measures are only infrequently available in survey data. In this paper, we demonstrate how information commonly available in household surveys can be used to impute consumption, even recovering the original variance, which is crucial for assessments of poverty and inequality. Our application adds consumption estimates to the publicly available Labor Market Panel Surveys for Egypt, Jordan, and Tunisia, which can act as a valuable resource for researchers interested in the intersection of inequality, poverty, and a host of labor market behaviors in the Middle East and North Africa.

**JEL Classifications:** D6, I3

**Keywords:** Inequality; consumption; poverty; Labor Market Panel Survey's

## ملخص

تعتبر مقاييس الاستهلاك والفقر مقاييس هامة لرفاهية الأفراد وأسرتهم ومجتمعاتهم المحلية وبلدانهم. ويعد جمع البيانات عن الاستهلاك والفقر أمرا صعبا ومكلفا، ومن ثم لا تتوفر هذه التدابير إلا في بيانات الاستقصاء. وفي هذه الورقة، نبين كيف يمكن استخدام المعلومات المتاحة عادة في مسوحات الأسر المعيشية في إهلاك الاستهلاك، بل وحتى استعادة التباين الأصلي، وهو أمر بالغ الأهمية لتقييم الفقر وعدم المساواة. يضيف طلبنا تقديرات الاستهلاك إلى استطلاعات الرأي العام لسوق العمل في مصر والأردن وتونس، والتي يمكن أن تكون مصدرا قيما للباحثين المهتمين بالتقاطع بين عدم المساواة والفقر ومجموعة من سلوكيات سوق العمل في الشرق الأوسط وشمال أفريقيا.

## 1. Introduction

How can policymakers and researchers quantify the wellbeing of individuals, households, communities, and countries? Two of the most common measures used in quantifying economic wellbeing are consumption levels, how much a household spends each year on goods and services, and poverty rates, the prevalence of acute shortfalls in consumption. In addition to concerns with average consumption and poverty rates, issues of inequality have been increasingly at the forefront of development, particularly in the Middle East and North Africa (MENA) region. Calls for greater social justice were an important part of the recent Arab Spring uprisings in the region, and reflected a strong sense of inequality (Diwan, 2013; Richards, Waterbury, Cammett, & Diwan, 2014; Verme, Milanovic, Al-Shawarby, et al., 2014). Improving average wellbeing, reducing poverty, and tackling inequality requires not only information on the distribution of consumption and poverty, but also information on how consumption, poverty, and inequality are related to a host of human and economic development phenomena.

In the developing world, Household Income, Expenditure, and Consumption Surveys (HIECSs) typically quantify the distribution of consumption and poverty at regular intervals. The goal of these surveys is to collect accurate and detailed consumption data, a challenging and expensive task. These surveys are not performed frequently. For instance, Tunisia fields its consumption survey every five years. The surveys are also limited in their geographic scope. While they can provide representative statistics on national and often regional income and poverty rates, only sampled areas have these estimates, precluding national efforts to provide localized targeting of services. Additionally, while HIECSs also collect supplemental data on individuals' and households characteristics, such as individuals' education, their place of residence, and their labor market status, these supplemental data are limited. For instance, while inequality in consumption can be calculated with HIECSs, intergenerational transmission of poverty and inequality cannot typically be examined, because data are not collected on the characteristics of individuals' parents. Thus, while the HIECSs have information crucial to assessing wellbeing, poverty, and inequality, it is difficult to link these critical sources to issues of economic and human development.

Recent econometric advances make it possible to overcome the limitations of the HIECSs by modeling consumption in HIECSs and using such models to predict consumption, including recovering the original variance of consumption. Such innovations allow for mapping consumption from survey-to-census data to provide highly localized estimates of poverty, consumption, and inequality for entire nations (Elbers, Lanjouw, & Lanjouw, 2003; Hentschel, Lanjouw, Lanjouw, & Poggi, 2000). More frequent estimates can also be provided, for instance with quarterly labor force surveys (Dang, Lanjouw, & Serajuddin, 2014). Particularly important for understanding the nature of poverty and inequality, these techniques also allow mapping consumption data on to richer data sources capturing more detail on human development and labor market phenomena—but not detailed consumption data (Ferreira, Gignoux, & Aran, 2011).

This paper illustrates the recent econometric advances by predicting per capita consumption and thence poverty and inequality from HIECSs onto a series of labor market panel surveys (LMPSs) in the MENA region. The LMPSs have been vital resources for researchers investigating a host of human and economic development issues, and have been especially critical as the workhorse of labor market analyses in the region. This paper imputes estimates of consumption, poverty, and inequality in the LMPSs for Egypt (1998, 2006, and 2012), Jordan (2010) and Tunisia (2014) based on proximate rounds of HIECSs. The data are compared to the HIECS along a number of dimensions, as well as to other data sources, such as wages and assets, to demonstrate their

consistency. The predicted consumption values will be made publicly available with the LMPSSs for researchers to use in further investigations of consumption, inequality, poverty, human development, and economic development.

The paper proceeds as follows. The second section reviews the methods of consumption prediction and discusses applications in the literature. The third section describes the HIECSs and LMPSSs data used in our estimation. The fourth section presents results on the levels and comparisons of consumption, poverty, and inequality across the HIECSs and LMPSSs. The fifth and final section concludes.

## **2. Methods and Applications for Imputing Consumption**

### ***2.1 Poverty mapping: from census to survey***

The methods for imputing consumption to generate poverty and inequality statistics were primarily pioneered by the World Bank with the goal of improving targeting of anti-poverty programs. While developing countries had sample-based surveys of consumption, expenditure, and income, such estimates were not collected by censuses. Thus, it was difficult to know where the poor lived, where poverty rates were high, and where to target anti-poverty programs and spending. Consumption imputation from surveys to censuses was thus a critical tool for identifying the poor and targeting high-poverty localities with interventions on a disaggregated level (Bedi, Coudouel, & Simler, 2007; Tarozzi & Deaton, 2009). These techniques yielded fine-grained “poverty maps” and hence the technique of imputing consumption to local levels was often referred to as poverty mapping. These techniques were implemented in Hentschel et al. (2000) and then the methodology further developed and detailed in Elbers, Lanjouw, and Lanjouw (2003) for the case of Ecuador, with precision comparable to survey data down to the level of 15,000 households.

The poverty map technique imputing income onto censuses has since been applied to a large number of developing countries in order to provide geographically disaggregated estimates of poverty and inequality (Alderman, Babita, Demombynes, Makhatha, & Özler, 2003; Bedi, Coudouel, & Simler, 2007; Demombynes, Elbers, Lanjouw, et al., 2002; Elbers, Fujii, Lanjouw, Özler, & Yip, 2007). Studies have then used local poverty and inequality information to investigate their links with issues ranging from the effect of inequality on malnutrition (Larrea & Kawachi, 2005) to crime (Demombynes & Ozler, 2005). Dimensions other than geography have been used for imputation, for instance to assess poverty and inequality among ethnic groups (Agnosti, Brown, & Roman, 2010).

As well as survey-to-census imputation, there has been a recent trend of survey-to-survey imputation, mapping from surveys with consumption data to those with other outcomes of interest, unavailable in consumption surveys. This paper follows in the tradition of survey-to-survey imputation. The surveys onto which researchers impute consumption vary widely. For instance, survey-to-survey mapping has occurred from a consumption survey to one of Turkey’s Demographic and Health Surveys (Ferreira, Gignoux, & Aran, 2011), and across more detailed and less detailed rounds of national surveys in Brazil varying in not only the availability of consumption data but also sample size and potential disaggregation (Elbers, Lanjouw, Lanjouw, & Leite, 2004). Imputation can be particularly helpful in providing statistics on the trends in inequality and poverty locally and nationally during the years between surveys that collect detailed consumption data (Dabalen, Graham, Himelein, & Mungai, 2014; Mathiassen, 2009). Poverty estimates have even been calculated quarterly, using the quarterly labor force survey in Jordan (Dang, Lanjouw, & Serajuddin, 2014).

## 2.2 Methodology

Our goal is to use data from a country's HIECS survey to predict consumption onto a contemporaneous LMPS, modeling and recovering the original variance in order to ensure representative poverty and inequality estimates. Specifically, we rely on the methods of Elbers, Lanjouw and Lanjouw (2003) to impute per capita expenditure as our measure of wellbeing and calculate inequality and poverty based on this expenditure.<sup>1</sup> Here we describe their methods as the methods pertain to our case of HIECS to LMPS imputation. Denote per capita household expenditure in household  $h$  residing in cluster  $c$ , as measured in a HIECS, as  $y_{ch}$ . The first step of imputation is to estimate a model of expenditure in a HIECS sample based on covariates,  $X_{ch}$ ,<sup>2</sup> that are available in both the HIECS and corresponding LMPS:

$$\ln(y_{ch}) = \beta X_{ch} + u_{ch} \quad (1)$$

Where  $\beta$  are the  $k$  parameters to be estimated and  $u_{ch}$  is a vector of disturbances with distribution  $\mathcal{F}(0, \Sigma)$ . Because localities (clusters) are likely to have correlated disturbances, the  $u_{ch}$  disturbances can be decomposed into a cluster effect,  $\eta_c$ , and an idiosyncratic error,  $\varepsilon_{ch}$ , as (Elbers, Lanjouw, & Lanjouw, 2003):

$$u_{ch} = \eta_c + \varepsilon_{ch} \quad (2)$$

The two components of the error term,  $\eta_c$  and  $\varepsilon_{ch}$  are assumed to be, first, independent of each other, and second, uncorrelated with covariates  $X_{ch}$ .

After a preliminary estimate of  $\beta$  is obtained from equation (1) using OLS or feasible generalized least squares (FGLS), the estimated residuals,  $\hat{u}_{ch}$ , can be generated. Since there are typically only a small number of clusters sampled within a survey, the variance of the cluster effect cannot be modeled with heteroscedasticity, but the idiosyncratic element can be allowed heteroscedasticity of the form  $\sigma^2_{\varepsilon, ch}$  by decomposing the residuals as follows:

$$\hat{u}_{ch} = \hat{u}_c + (\hat{u}_{ch} - \hat{u}_c) = \hat{\eta}_c + e_{ch} \quad (3)$$

with  $\hat{u}_c$  denoting the average over cluster  $c$ . Here, the average values of  $\hat{u}_{ch}$  residuals within a cluster generate the cluster fixed effect and the idiosyncratic error is then the remainder of the  $\hat{u}_{ch}$  term.

This decomposition allows for a modeled estimate of the variance of  $\varepsilon_{ch}$  assuming a logistic functional form (Elbers, Lanjouw, & Lanjouw, 2003):

$$\sigma^2(z_{ch}, \alpha, A, B) = \left[ \frac{Ae^{z_{ch}\alpha} + B}{1 + e^{z_{ch}\alpha}} \right] \quad (4)$$

with  $A$  and  $B$  acting as upper and lower bounds that can be estimated along with parameters  $\alpha$  on  $z_{ch}$ , which are functions of the covariates  $X_{ch}$ .

Simulations are then required to generate the residuals  $\eta_c$  and  $\varepsilon_{ch}$ . Cluster residuals are the  $\hat{\eta}_c$  from (3) and the standardized household residuals,  $e_{ch}^*$ , can be generated as (Elbers, Lanjouw, & Lanjouw, 2003):

<sup>1</sup> This method could also be used to impute data for other outcomes, such as income, if they were not already available in the data.

<sup>2</sup> Since our goal is prediction, not interpreting coefficients, included  $X_{ch}$  variables may be endogenous without yielding estimation problems.

$$e_{ch}^* = \frac{e_{ch}}{\hat{\sigma}_{\varepsilon, ch}} - \left[ \frac{1}{H} \sum_{ch} \frac{e_{ch}}{\hat{\sigma}_{\varepsilon, ch}} \right] \quad (5)$$

Where  $H$  denotes the number of observations. These can be drawn from directly for simulations to avoid functional form assumptions or drawn from an assumed parametric distribution (Tarozi & Deaton, 2009).

With these elements, it is now possible to generate estimates of per capita expenditure for  $r$  simulations (Elbers, Lanjouw, & Lanjouw, 2003; Tarozi & Deaton, 2009). Parameters,  $\beta$ , are estimated for the consumption model using the HIECS as are the required parameters in the variance of the heteroscedastic error model in (4). Clusters in the LMPs are then assigned cluster errors based on draws from the observed distribution. Idiosyncratic errors then are generated in normalized terms from either the observed distribution or a parametric distribution. Heteroscedasticity is introduced into the errors using the model in (4). Lastly, simulated imputed values of  $\ln(y_{ch}^r)$  are generated for the LMPs as (Tarozi & Deaton, 2009):

$$\ln(y_{ch}^r) = \hat{\beta}^r X_{ch} + \hat{\eta}_c^r + e_{ch}^r \quad (6)$$

With the imputed values of consumption, it is possible to assess a variety of different poverty and inequality statistics, deriving the mean and standard error by bootstrapping the simulations.<sup>3</sup> We compare these statistics across the HIECS and the LMPs.

Based on the poverty lines (details of the construction of the poverty lines and sources are discussed below), we calculate both the poverty rate (also called the headcount ratio, capturing the proportion below the poverty line), and the average poverty gap, that is the average distance between the poverty line and consumption for the poor. Specifically, we calculate two of the three Foster, Greer, and Thorbecke (FGT) poverty indices, based on the poverty line,  $z$ . FGT(0) is the headcount ratio and FGT(1) the average poverty gap for the general class of FGT measures (Foster, Greer, & Thorbecke, 1984; Kakwani, 1999):

$$FGT(\alpha) = \int_0^z \left( \frac{z-y}{z} \right)^\alpha f(y) dy \quad (7)$$

We also assess inequality in imputed consumption using seven different measures. The first two are percentile ratios, specifically the ratio of consumption at the 90<sup>th</sup> percentile to that of consumption at the 10<sup>th</sup> percentile (p90/p10) and the ratio of consumption at the 75<sup>th</sup> percentile to that of consumption in the 25<sup>th</sup> percentile (p25/p75). These estimates assess inequality at specific points in the distribution.

Our remaining estimates calculate inequality over the entire distribution, the Gini coefficient and the four (-1, 0, 1, 2) general entropy measures. If we order the sample in order of their outcome (consumption) from lowest to highest, where the outcome at ordered proportion  $p$  is  $Q(p)$  and the sample mean is  $\mu$ , we can calculate the Lorenz curve, measuring the proportion of income belonging to  $p$  as follows (Duclos & Araar, 2006):

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<sup>3</sup> Specifically, we bootstrap not only over 100 repetitions of the imputed consumption, but also we redraw the LMP sample five times for each  $r$  (and different redraws as we move through the different imputed consumptions) in order to incorporate the variability from using a second survey rather than the census. This yields 500 repetitions of the bootstrap, which are redrawn accounting for the sampling structure (PSUs) of the various surveys.



$$L(p) = \frac{\int_0^p Q(p)dp}{\int_0^1 Q(p)dp} = \frac{1}{\mu} \int_0^p Q(p)dp \quad (8)$$

The Lorenz curve is the basis of the Gini index, measuring the distance between the observed Lorenz curve and the case of perfect equality of outcomes, calculated as (Duclos & Araar, 2006):

$$Gini = 2 * \int_0^1 (p - L(p))dp \quad (9)$$

The Gini index cannot be readily decomposed, but the class of general entropy indices (GE) can. The GE measures are calculated as (Duclos & Araar, 2006):

$$GE(\theta) = \begin{cases} \frac{1}{\theta(\theta - 1)} \int_0^1 \left( \frac{Q(p)}{\mu} \right)^\theta dp - 1 & \text{if } \theta \neq 0, 1 \\ \int_0^1 \ln \left( \frac{\mu}{Q(p)} \right) dp & \text{if } \theta = 0 \\ \int_0^1 \frac{Q(p)}{\mu} \ln \left( \frac{Q(p)}{\mu} \right) dp & \text{if } \theta = 1 \end{cases} \quad (10)$$

As  $\theta$  increases in value, the GE index shifts from emphasizing inequality on the lower end of the distribution to the higher end. These estimates can be decomposed into the contributions of between group and within group differences by simulating inequality between groups if every individual had their group mean.

All our estimates rely on poverty mapping implemented in PovMap2, a World Bank software package, and calculations of inequality and poverty are further implemented using STATA. Additionally, all our 100 imputed values for each survey will be publicly available through the Economic Research Forum (ERF)'s Open Access Microdata Initiative (OAMDI) as a supplement to the publicly available LMPSSs, along with the poverty lines used in our estimates.

### 3. Data

Recall that we are implementing five different consumption imputations over pairs of relatively similar HIECS and LMPSSs. Here we first describe the general features of the HIECS and the LMPSSs, and then discuss specifically each pair of surveys used in imputation. All of the HIECS surveys collect detailed information on consumption and expenditure, allowing us to calculate our dependent variable for the imputations, annual expenditure per capita. Additionally, all have detailed demographic information on household members, their assets, and housing, which act as the key X variables for mapping across surveys. The LMPSSs are designed, first and foremost, to capture much more detailed information on labor market statuses and histories than is typically available in countries' annual or quarterly labor force surveys. Additionally, they collect detailed information on a host of behaviors related to labor markets and human development, including housing, assets, parental background, education experiences and outcomes, mobility and migration, income and transfers, time use, marriage and fertility, women's empowerment, savings and borrowing, household enterprises, and agriculture.

Both sets of surveys include information on household size, the age, gender, education, and labor market status of household members, their place of residence (urban/rural, governorate), their housing conditions (sanitation, water), and their durable assets (for instance, owning a car or air

conditioner). In order to create models with the greatest possible predictive power, although we necessarily limited our models to  $X$  variables available in two of a pair of surveys, we did not limit the set of variables to be identical across all five pairs of surveys. Particularly in regard to assets, the different surveys collected different information on ownership across countries and over time. Across the surveys, we identify as many characteristics as possible that can serve as predictors of consumption ( $X$  variables). Because the original data are sometimes collected with slightly different questions, definitions, and categories, some harmonization work was necessary. The degree to which the surveys find similar characteristics, given the harmonization, can be assessed with the summary tables in Appendix 1. It should also be kept in mind, when making comparisons, the time that may have passed (and the natural evolution of characteristics that occurs) between surveys. For instance, the ELMPS 1998 shows relatively fewer durable assets (such as individuals in households with refrigerators, 66%) than the ELMS 1999 the following year (71% of individuals in households with refrigerators). Likewise, the ELMPS 2006 shows more durable assets (83% of individuals in households with refrigerators) than the 2004/2005 HIECS the year before (81% of individuals in households with refrigerators). In general, the differences are small. Geographic and demographic differences in particular tend to be small. The head's labor market status is generally similar, although nuances of sector and economic activity show more variation. Education differences are a bit larger, particularly none versus basic, likely due to difficulties determining and defining completion for less educated adults.

The HIECSs and LMPSs sample individuals and households in a similar fashion. Clusters (enumeration areas, or primary sampling units (PSUs) are selected within each country (and often within strata, such as urban/rural or by governorate)), and then a number of households selected within each cluster. All individuals within the selected households are then surveyed. Sample weights are used with the surveys to generate representative statistics.

Recall that five pairs of surveys are used. We now describe each pair of surveys in turn. The earliest survey we have is from 1998 in Egypt, the Egypt Labor Market Survey (ELMS), the first (base) round of the ELMPS. It sampled 4,816 households and 23,997 individuals (Assaad & Barsoum, 2000; OAMDI, 2013a). The corresponding HIECS survey is the 1999/2000. The original survey covered approximately 48,000 households, and we use here the 50% sample made available publicly through ERF, covering 23,975 households and 113,267 individuals (OAMDI, 2014a).<sup>4</sup>

The second pair of surveys covering Egypt consists of the 2006 round of the ELMPS and the 2004/2005 HIECS. The 2006 ELMPS followed 1998 round households and split households, as well as adding a refresher sample, for a total of 8,351 households and 37,140 individuals (Assaad & Roushdy, 2009; Barsoum, 2009; OAMDI, 2013b). The 2004/2005 HIECS covered approximately 48,000 households, and we use here the 50% sample made available publicly through ERF, covering 23,548 households and 103,609 individuals (OAMDI, 2014b).

The third pair of surveys for Egypt consists of the 2012 round of the ELMPS and the 2012/13 HIECS. The 2012 ELMPS followed previous round households, split households, and added a refresher sample for a total of 12,060 households and 49,186 individuals (Assaad & Krafft, 2013; OAMDI, 2013c). The HIECS 2012/13 publicly available sample from ERF covers 50% of the original survey data, specifically 7,528 households and 32,732 individuals (OAMDI, 2014c).

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<sup>4</sup> In all of the analyses of Egypt, because the ELMPSs exclude the Frontier governorates, we likewise exclude these areas from the samples of the HIECS in implementing the poverty mapping.

The two surveys for Jordan are the 2010 Jordan Labor Market Panel Survey (JLMPS) and the 2010 Household Expenditure and Income Survey (HEIS). The JLMPS 2010 survey is the base round of a planned panel survey of Jordan, which sampled 5,102 households and 25,969 individuals (Assaad, 2014; OAMDI, 2014d). The 2010 HEIS covered 2,845 households and 15,472 individuals (OAMDI, 2014e).

In Tunisia, the two surveys used are the 2014 Tunisian Labor Market Panel Survey (TLMPS) and the 2010 National Survey on Household Budget, Consumption, and Standard of Living (EBCNV). The 2014 TLMPS sampled 4,521 households and 16,430 individuals, but because of missing data problems we include only 2,525 households in our consumption mapping (Assaad, Ghazouani, Krafft, & Rolando, 2016; OAMDI, 2016). The 2010 EBCNV sampled 11,281 households and 50,371 individuals (OAMDI, 2014f).

## **4. Results**

The results of the poverty mapping are first presented in terms of the models for predicting consumption, followed by comparisons of distributions of consumption, poverty rates and inequality across the different pairs of surveys.

### ***4.1 Models of consumption***

Recall that the first step of creating the consumption model is estimating the relationship between the covariates,  $X$ , and annual per capita consumption ( $\ln y$ ) as per equation (1) using the HIECS for each country. The models for all five of our HIECS surveys are presented in Appendix II. The most critical aspect of the models is how well they predict consumption, as that will determine how accurate the poverty predictions are for the LMPSSs. The adjusted R-squares for all the models of log consumption per capita are all quite good, between 65% to 70%. In Egypt for 1999 the adjusted R-squared is 69.6%, for Egypt 2004/5 68.6%, for Egypt 2012/13 65.3%, Jordan 66.2%, and Tunisia 67.8%. While the models can explain two-thirds of the variation in log consumption per capita, one-third is not explained and therefore the relationship between unobserved characteristics and per capita consumption in the LMPSSs is not represented.

The characteristics that predict per capita consumption vary across countries and rounds, but the patterns overall are quite consistent with expectations. Larger households tend to have lower per capita consumption, likely due to economies of scale. For instance, in Egypt in 1999, an additional individual decreases per capita consumption 7.3%. Having various assets is associated with higher consumption, with meaningful relationships apparent between asset quality/cost and consumption. For example, in Egypt in 2004/5 having an iron, a relatively low cost asset not necessarily associated with high socio-economic status, predicts 2.8% higher consumption. In contrast, having an air conditioner, a quite expensive and high-end asset, predicts a 30.3% higher consumption. In Egypt, where we have data over time, we can even see predictable shifts in the relationship between consumption and assets; for instance, in 1999 an air conditioner predicted a higher, 45.2%, increase in consumption, consistent with this asset being a marker of privilege—but to a decreasing extent. Households where the home is owned tend to have higher consumption, with rental status predicting 15.3% lower consumption per capita in Egypt in 2012/13.

More educated heads predict higher consumption. In Jordan, compared to an illiterate head, a basic educated head predicts 11.1% higher consumption, compared to 17.5% for a secondary educated head, 23.5% for a post-secondary educated head, and 27.5% for a university educated head, a logical pattern. While the relationships between head labor market status and consumption vary substantially across contexts and time, generally better statuses (such as being an employer in

Jordan and Egypt) are associated with higher consumption. In Tunisia, it is particularly households whose heads are private sector wage workers who are worse off compared to government wage workers, with consumption 8.9% lower for those in the non-agricultural sector and 6.6% lower for those in the agricultural sector. Geographic differences are consistent with the health of regional economies. For instance, compared to Cairo, consumption is much lower in areas such as Assuit (43.2% lower in 1999), consistent with high poverty and limited economic development in Upper Egypt. In terms of demographics, as the share of adults in the household increases, and especially working adults, consumption increases. In Egypt in 2004/5, increasing the share of adult females by 10 percentage points would increase consumption by 0.6% and increasing the share of adult males by 10 percentage points would increase consumption by 1.0%. The household effect models, attempting to model the variance, do not show clear or consistent patterns of predictors. They have low adjusted R-squared, 3.8% in Egypt 1999, 3.6% in Egypt 2004/5, 2.7% in Egypt 2012/13, and 1.6% in Jordan and Tunisia.

#### ***4.2 Comparing distributions of consumption***

The models of consumption generate fairly similar distributions of consumption across the paired surveys. Figure 1 shows, for pairs of surveys, the observed distribution of annual per capita consumption (kernel densities) for individuals in each HIECS and the mapped distribution for the corresponding LMPS. In Egypt, the HIECS shows a more peaked distribution across surveys than the LMPS. This difference in distributions, as shown below, leads to some differences in poverty estimates and inequality. The Jordan observed values in the HIECS likewise show a more peaked observed value while the predictions are slightly more dispersed for the JLMPS. However, the distributions are very similar for low values of the consumption with the differences being largely in terms of the JLMPS having more individuals with higher consumption. The Tunisia distributions are very similar in shape, but the 2014 TLMPS predicted values appear essentially shifted to higher values than the observed 2010 values. Given that four years passed between the surveys, this shift likely represents real changes in consumption.

Table 1 (for Egypt), Table 2 (for Jordan), and Table 3 (for Tunisia) present mean annual expenditure per capita both overall and by characteristics across pairs of surveys. Although the overall distribution is a bit different in Egypt, mean values are similar for all three rounds. Total values are also close in Jordan and in both Egypt and Jordan the values for each survey fall within the other's 95% confidence interval. In Tunisia, the mean is substantially higher (3838 international PPP dollars (I\$)) in 2014 compared to 2010 (I\$3581), as expected. There are only modest differences by the sex of the household head, but more variation when looking at differences by region; some are predicted more accurately than others. The expected head education and consumption per capita gradient is apparent. Lower levels of education show more consistency than the (rarer and more elite) higher levels. Age groups show the expected gradient, with younger children living in household with less expenditure per capita. Predictions by age group are quite similar to observed values. Differences by employment status are generally small, although self-employment in Tunisia and Jordan is not well matched.

Although wages are only one source of income or funds for consumption, it is informative to examine the relationship between log annual wages and log annual expenditure per capita in Figure 2. As both variables are logs, the relationship presented is an elasticity. Note that these data are only for wage workers, a select share of individuals. The relationship between log wage work and log consumption appears strongest in 1998 for Egypt, a correlation of 0.323, which falls to 0.250 in 2006 and 0.186 in 2012. In Jordan, the correlation is 0.208 and in Tunisia 0.291. These

relationships are not so much reflective of the explanatory power of the models (although that does fall slightly in Egypt over time) as the share of wages in income and consumption.

Another measure that ought to be related to consumption is wealth; in the LMPSs there are wealth quintiles based on a factor analysis of assets. Many of these same assets are inputs in the consumption regression. The two distributions are clearly related, although unsurprisingly not identical, as shown in Figure 3. There is substantial overlap particularly at the bottom and top of the distribution; In Egypt in 1998 45% of those in the poorest wealth quintile are in the poorest consumption quintile. Likewise, in Egypt in 2012, 52% of the richest wealth quintile is identified as in the richest consumption quintile. Very few of the richest, in terms of assets, are identified as poor in terms of consumption, and likewise very few of those poor in terms of assets are identified as having high consumption. Distinctions in the middle asset quintiles are less closely related; in Egypt in 1998 24% of those in the middle wealth quintile are in the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> consumption quintiles each (72% in total), with 13% in the richest consumption quintile and 15% in the poorest. Overall, assets and consumption per capita are clearly related, albeit somewhat different measures of wellbeing.

### ***4.3 Comparing distributions of inequality***

One of the key uses of this new database is examining inequality and its relationship with other characteristics that are not typically captured in consumption surveys, such as parental background (Assaad, Krafft, Roemer, & Salehi-Isfahani, 2016a, 2016b). Table 4 shows key inequality measures (and poverty measures, which are discussed below) across the different surveys. For the general entropy measure, the GE(1) and GE(2) measures place increasing emphasis on inequality at the higher end of the distribution compared to GE(-1) and GE(0). Therefore, comparing across these measures, and also the P90/P10 versus P75/P25 measures suggests how similar the distributions are when emphasizing on different segments of the distribution. The GE(0) and GE(-1) measures do tend to be quite similar. The mapped statistics typically fall within the 95% confidence intervals of the observed statistics (and vice versa), indicating that observed differences are statistically insignificant and may simply be due to sampling variability across the different surveys.

The GE(0) are 0.011 apart (0.178 ELMPS vs. 0.189 HIECS) in 1998/1999, with a similar difference in 2006 for Egypt and 2010 for Jordan. The difference is even smaller in 2012 for Egypt (0.002 apart, 0.144 LMPS and 0.146 HIECS). All these statistics are within 95% confidence intervals of each other. The data in Egypt shows a clear decline in inequality in 2012 compared to previous years, and lower inequality than in Jordan or Tunisia. The TLMPS GE(0) of 0.191 is lower than that of the EBCNV, 0.251, and falls outside the confidence interval, likely due to changes over the intervening four years. The GE(1) and GE(2) measures show higher inequality in the HIECS than LMPS in all three countries, although this gap diminishes over time in Egypt and usually statistics are within 95% confidence intervals. Higher GE(1) and GE(2) differences are likely driven by outliers at the very high end of the distribution, as the LMPS actually have slightly higher P90/P10 and P75/P25 ratios than the HIECS everywhere except Tunisia. These statistics are relatively close across surveys, for instance a P75/P25 ratio of 2.285 in Jordan 2010 with the LMPS and 2.150 with the HIECS, and results are usually statistically indistinguishable. The Gini measures of inequality are akin to the GE(0) measures in being very similar (at most 0.012 apart and not significantly different) in all pairs except Tunisia, where the LMPS measures a Gini of 0.337 and the EBCNV 0.385. As with the GE(0) measures, using the Gini there is a clear

decline in inequality in Egypt and lower inequality in 2012 than for Jordan in 2010 or Tunisia in 2014.

An important use of these data is analyses of disparities within and across groups. Table 5 (for Egypt), Table 6 (for Jordan), and Table 7 (for Tunisia) show GE(0) measures by characteristics. These can be thought of as within-group inequality where the group has in common a particular characteristic. After considering the small differences in the overall inequality, Egypt shows some differences in the overall inequality in each region when comparing survey pairs, although the relative ranking (for instance, rural areas being more homogeneous and urban heterogeneous) persists. Likewise the mapped consumption shows the same declining gradient in inequality within groups by education in both survey pairs. Inequality within different labor market segments is generally similar in Egypt and Tunisia, but less so in Jordan.

#### ***4.4 Comparing distributions of poverty***

As well as examining inequality, the predicted consumption data can be used to study poverty. Table 8 presents the poverty lines used in the analyses of poverty rates. The rates are region and urban/rural specific in Egypt. However, in Jordan the rate is national and in Tunisia it is stratum specific (large cities, other cities, and non-cities (rural)). The poverty rates from the year of the HIECS are then used for the LMPSs. The head count ratio, in Table 4, is the proportion of individuals who fall below the poverty line. The average poverty gap is the average normalized distance between the poverty line and consumption for the poor. In Egypt in 1998 the LMPS estimated poverty rate is higher (24.1%) in 1998 than in the 1999 HIECS (18.2%). Likewise the 2006 LMPS poverty rate of 22.9% is higher than the rate of 19.8% for the 2004/5 HIECS. The opposite case pertains in 2012, when the poverty rate from the LMPS of 26.8% is slightly lower than from the HIECS (28.2%). In Jordan, the poverty rates are identical for 2010, 15.0% from both sources. In Tunisia, the EBCNV poverty rate of 2010 was 14.2% and the LMPS rate in 2014 was substantially lower, 8.6%, likely due (at least in part) to the passage of time. Aside from Egypt in 1998/1999 and Tunisia, the poverty rates fall within each other's 95% confidence intervals.

Understanding how poverty relates to measures of human and economic development is a critical application for these data. Table 9 (for Egypt), Table 10 (for Jordan) and Table 11 (for Tunisia) show how the poverty rate (FGT (0)) varies by characteristic. The overall rates are, of course, in line with Table 4 and thus much of the variation across survey pairs follows this as well. In Egypt, the poverty rates are slightly higher for women than men. Since consumption is calculated on the household level, it is notable that there are even the small differences observed. The rise in the poverty rate in Egypt over time is not consistent across regions, and both sets of surveys detect an increase in poverty that is particularly acute in Upper Egypt. Although increases in the poverty rate have affected all education groups, the higher rates for those with moderate education in 2012 are visible across both surveys. A bimodal age distribution of poverty, with rates particularly high and increasing among the young and elderly, is observed. Both sources also detect higher rates of poverty among those engaged in agriculture. In Jordan, as in Egypt, there are slightly higher poverty rates for females. Rates are higher in the South in both surveys. There is a very similar gradient by education in both surveys, with only 2%-4% of university graduates impoverished compared to 21% of those with no education. Poverty rates are distinctly higher among children (as high as 22-23% for those 6-14) than among working-age adults. There is not as clear an increase in poverty among the elderly in Jordan as for Egypt. In Tunisia, again women are more likely to be in poverty across both surveys. It is consistently the interior (west) of the country that has above average poverty rates with the highest rates in the Center West. Poverty clearly decreases with

education, and is below 2% among university graduates. Poverty is demographically bimodal as in Egypt, with rates high among children and the elderly. Rates of poverty are lowest for public sector and government wage workers (4%-5%).

In terms of the poverty gap (FGT (1)), the average normalized distance below the poverty line of the poor (Table 4), this measure is 0.059 in the ELMPS 1998 compared to 0.033 in the 1999 HIECS, following a similar pattern to the differences in poverty rates. Likewise the 2006 ELMPS has a poverty gap of 0.058, compared to 0.037 for the 2004/5 HIECS. The average poverty gap measure is much closer in 2012, 0.064 with the ELMPS and 0.058 with the HIECS. The gap is fairly close in Jordan as well, 0.036 with the JLMPS and 0.029 with the HIECS. As with the poverty rates and likely due to the gap of four years, Tunisia has a larger difference in the average poverty gap, 0.036 in 2010 with the EBCNV and 0.017 in 2014 with the HIECS. The poverty gaps are significantly different in most cases, based on the 95% confidence intervals.

## **5. Discussion and Conclusions**

Consumption levels, poverty, and inequality are central measures of economic development. These outcomes are also critically related to opportunities for human development and individuals' wellbeing and happiness. Although important, these outcomes are also quite difficult to measure, and in MENA, as in most developing countries, surveys with detailed information on consumption are not fielded regularly. Those surveys that are fielded also focus primarily on consumption, limiting the ability of researchers to study the links between consumption and other issues such as intergenerational inequality or the relationship between poverty and fertility. Advances in econometrics, specifically in predicting consumption and recovering its original variance by mapping from survey-to-census or survey-to-survey, now allow researchers to overcome these data challenges.

This paper has presented the methods, data, and validation of consumption and poverty mapping from five MENA HIECS onto contemporaneous LMPSs. The results are promising; as well as high explanatory power in the consumption models (in the 65%-70% range), resulting measures of consumption, poverty, and inequality are similar across survey pairs. Particularly for the data in Jordan and Egypt, and especially the more recent data for Egypt, key measures are only insignificantly different, with the small differences observed likely due to sampling variability across the surveys. Thus the consumption estimates are a high-quality tool for analyses of critical trends in MENA economies.

A few limitations must be kept in mind for applications. First, the data are based on household consumption; thus, intra-household disparities (for instance, between men and women or youth and adults) are assuredly under-estimated. Inasmuch as observable characteristics are related to unobservables, measurement of inequality along other dimensions will vary from its true value. For instance, the HIECS lack migration histories, and thus the quality of any analyses relating poverty to migration histories using the LMPS depends on the relationship between the predictors of consumption and migration. Although some caution is required in using the data, empirical applications in this paper demonstrate its potential. Both the original and predicted consumption estimates show falling inequality and rising poverty in Egypt. Key disparities on both socio-economic and demographic lines are visible in the data, including high rates of child and elderly poverty in the region as well as specific regional disparities within countries, such as the under-development of Tunisia's interior.

These results are just scratching the surface of what can be done with this data. Such information is a public good, and therefore the consumption estimates will be publicly released by ERF through OAMDI to facilitate further research on these issues. Already the data has been used to examine the evolution of inequality of opportunity over time in Egypt (Assaad, Krafft, Roemer, & Salehi-Isfahani, 2016b) and in comparative work (Assaad, Krafft, Roemer, & Salehi-Isfahani, 2016a). We hope to see future work utilizing the LMPSs and predicted consumption data that takes advantage of the rich information in the surveys. The panel nature of the Egypt data in particular can allow for examinations of the relationship between different human development and labor market dynamics and patterns of consumption, inequality and poverty. Topics such as health, education, job characteristics, marriage, fertility, women's status, and savings and borrowing can be linked to consumption, poverty, and inequality using this data and the LMPSs. Just as the creation and application of poverty mapping allowed for localized targeting of poverty programs, the rich data of the LMPSs combined with the predicted consumption data can allow for a more detailed understanding of critical human and economic development challenges.



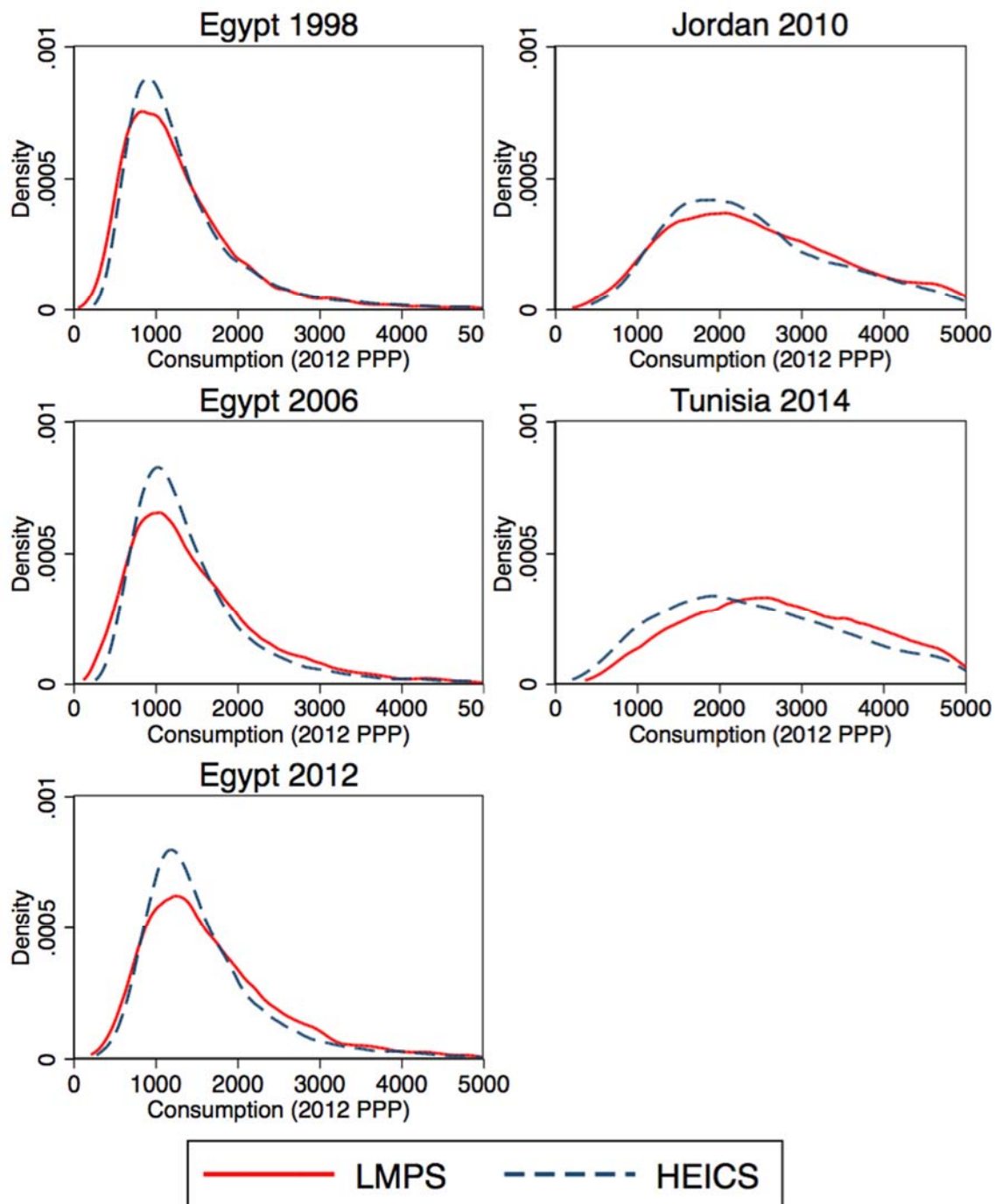
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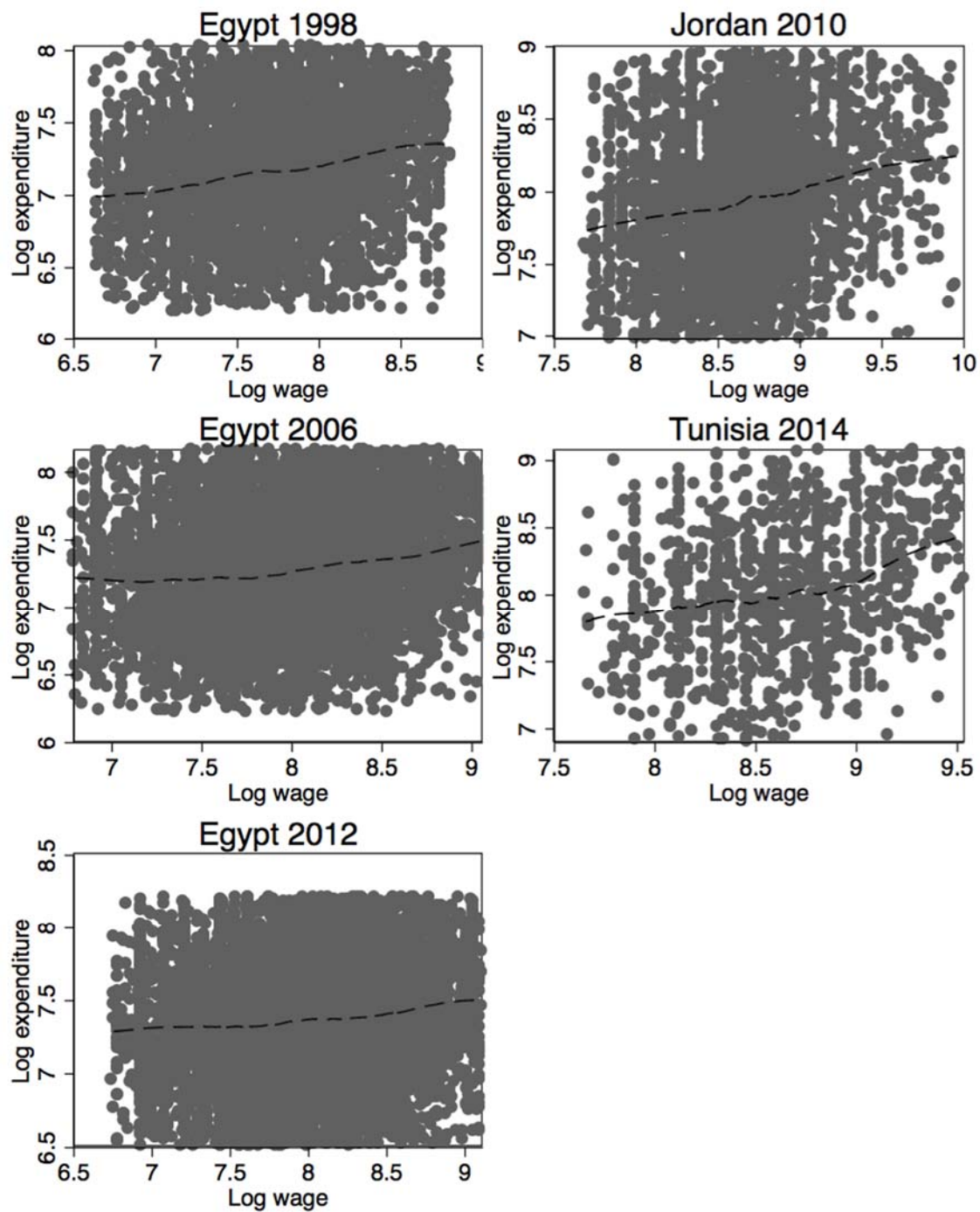
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**Figure 1: Observed and Mapped Distributions of Annual per Capita Consumption over Survey Pairs**



Note: Bandwidth 100 for Egypt, 200 for Jordan and Tunisia. One iteration of consumption is shown, selected by a random number generator.  
Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

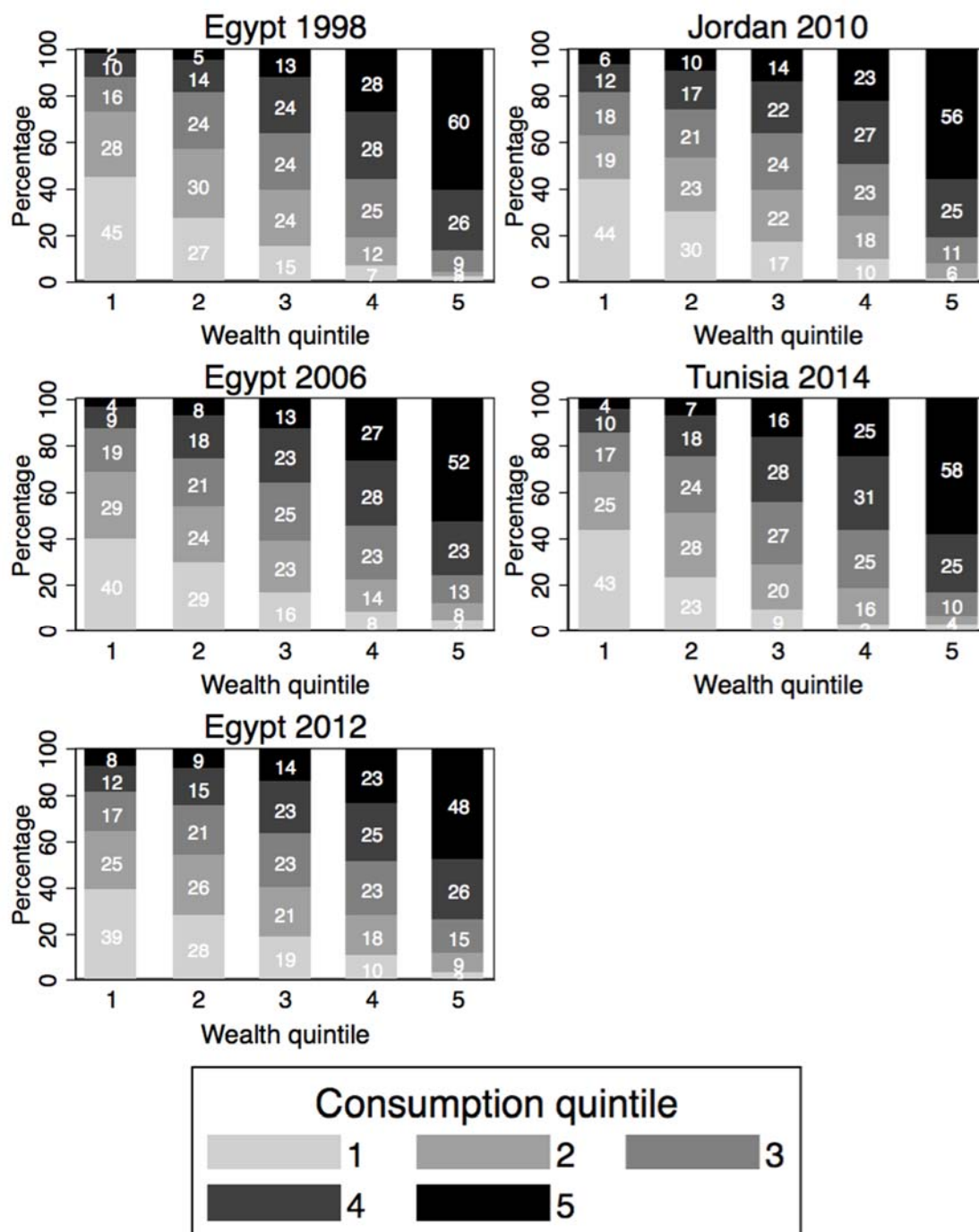
**Figure 2: Mapped Distributions of Log Annual Per capita Consumption versus Log Annual Wages, LMPs**



Notes: restricted to 5<sup>th</sup>-95<sup>th</sup> percentiles of the distribution for visibility. Lowess with bandwidth of 0.3. One iteration of consumption is shown, selected by a random number generator.

Source: Authors' calculations based on LMPs (mapped)

**Figure 3. Mapped Distributions of Annual per Capita Consumption Quintile versus Wealth Quintile, LMPSS**



Notes: One iteration of consumption is shown, selected by a random number generator.  
Source: Authors' calculations based on LMPs (mapped).

**Table 1: Observed and Mapped Mean Annual per Capita Consumption (in 2012 International PPP Dollars) by Characteristics over Survey Pairs, Egypt**

	Egypt					
	1998		2006		2012	
	LMPS	HIECS	LMPS	HIECS	LMPS	HIECS
Total	1381 (53)	1473 (154)	1564 (44)	1567 (144)	1749 (37)	1720 (105)
<b>Sex</b>						
Male	1382 (53)	1474 (153)	1561 (44)	1565 (144)	1734 (37)	1714 (101)
Female	1381 (54)	1473 (155)	1567 (44)	1570 (143)	1763 (39)	1727 (108)
<b>Region</b>						
Cairo	2133 (124)	2589 (259)	2493 (133)	2466 (160)	2358 (135)	2504 (93)
Suez	2203 (132)	1582 (203)	2217 (124)	1749 (260)	2471 (127)	1708 (200)
Urban-Lower	1534 (58)	1563 (77)	1747 (60)	1701 (131)	2017 (61)	2035 (95)
Urban-Upper	1259 (84)	1245 (93)	1534 (96)	1304 (54)	1587 (65)	1540 (58)
Rural-Lower	1148 (52)	1170 (42)	1287 (36)	1310 (74)	1670 (35)	1651 (49)
Rural-Upper	889 (45)	918 (43)	1032 (38)	1034 (55)	1155 (28)	1174 (58)
<b>Education Level</b>						
None	1166 (39)	1221 (68)	1326 (34)	1349 (76)	1528 (28)	1535 (66)
Primary	1431 (51)	1462 (135)	1515 (42)	1518 (125)	1680 (34)	1653 (85)
Secondary	1639 (64)	1729 (170)	1701 (43)	1735 (139)	1881 (40)	1894 (109)
Post-Secondary	1887 (96)	1880 (153)	2087 (80)	2017 (165)	2224 (104)	2135 (125)
University	2615 (138)	3129 (475)	2807 (135)	3072 (421)	2794 (127)	2895 (282)
<b>Age Group</b>						
0-5	1135 (41)	1218 (95)	1300 (36)	1300 (92)	1482 (31)	1395 (55)
6-11	1194 (48)	1248 (110)	1290 (38)	1327 (110)	1453 (34)	1463 (79)
12-14	1246 (52)	1306 (119)	1373 (48)	1380 (128)	1497 (41)	1553 (101)
15-19	1329 (55)	1426 (142)	1472 (42)	1484 (129)	1713 (43)	1658 (101)
20-29	1442 (55)	1526 (141)	1642 (48)	1639 (135)	1845 (43)	1791 (97)
30-39	1412 (55)	1511 (151)	1557 (45)	1556 (138)	1722 (44)	1617 (93)
40-49	1515 (62)	1675 (211)	1670 (52)	1688 (174)	1787 (44)	1804 (112)
50-59	1728 (91)	1836 (224)	1901 (67)	1971 (213)	2196 (71)	2123 (120)
60-64	1767 (98)	1948 (268)	2050 (95)	2042 (197)	2352 (110)	2319 (182)
Over 65	1624 (100)	1763 (206)	2008 (105)	2090 (210)	2269 (72)	2391 (221)
<b>Labor Market Status</b>						
Wage worker gov.	1737 (72)	1818 (192)	1984 (70)	1957 (209)	2211 (61)	2182 (133)
Wage worker pub.	1896 (117)	1977 (196)	2183 (105)	2124 (224)	2497 (169)	2330 (170)
Wage worker priv. non-ag.	1455 (62)	1622 (182)	1677 (59)	1727 (171)	1834 (53)	1755 (115)
Wage worker priv. ag.	911 (46)	915 (35)	1054 (42)	1031 (45)	1267 (46)	1245 (59)
Employer ag.	1087 (62)	1146 (33)	1256 (40)	1325 (38)	1564 (52)	1548 (59)

	Egypt					
	1998		2006		2012	
	LMPS	HIECS	LMPS	HIECS	LMPS	HIECS
Employer non-ag.	2069 (128)	2671 (486)	2144 (101)	2323 (279)	2352 (117)	2368 (238)
Self-emp. Ag.	1052 (73)	1096 (38)	1165 (57)	1235 (40)	1366 (62)	1434 (55)
Self-emp. Non-ag.	1510 (103)	1478 (106)	1638 (64)	1592 (127)	1807 (64)	1769 (93)
OLF, Unemp.	1368 (53)	1444 (150)	1550 (44)	1538 (142)	1742 (38)	1674 (106)
N	23849	111176	37131	102146	49167	32131

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses.  
Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)



**Table 2: Observed and Mapped Mean Annual Per capita Consumption (in 2012 International PPP Dollars) by Characteristics over Survey Pairs, Jordan**

	<b>Jordan 2010</b>	
	<b>LMPS</b>	<b>HIECS</b>
Total	3341 (134)	3236 (375)
<b>Sex</b>		
Male	3321 (133)	3163 (330)
Female	3362 (138)	3307 (419)
<b>Region</b>		
Middle	3676 (183)	3619 (484)
North	2823 (123)	2623 (108)
South	2731 (140)	2484 (186)
<b>Education Level</b>		
None	2785 (115)	2851 (293)
Primary	3080 (101)	2882 (233)
Secondary	4040 (180)	4072 (522)
Post-Secondary	4146 (182)	3975 (381)
University	5771 (380)	5458 (961)
<b>Age Group</b>		
0-5	2827 (122)	2626 (200)
6-11	2538 (106)	2499 (204)
12-14	2585 (114)	2443 (238)
15-19	3081 (126)	2925 (287)
20-29	3920 (166)	3597 (350)
30-39	3277 (141)	3314 (408)
40-49	3334 (151)	3128 (366)
50-59	4645 (258)	4516 (685)
60-64	5520 (404)	4958 (735)
Over 65	5144 (399)	5128 (897)
<b>Labor Market Status</b>		
Wage worker gov.	3470 (161)	3033 (161)
Wage worker priv. non-ag.	3483 (371)	3925 (569)
Wage worker priv. ag.	3980 (193)	2547 (373)
Employer ag.	2282 (266)	2682 (621)
Employer non-ag.	3339 (676)	6545 (1464)
Self-emp. Ag.	5505 (479)	3973 (703)
Self-emp. Non-ag.	2751 (469)	3125 (263)
OLF, Unemp.	3601 (188)	3101 (339)
N	25967	15472

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses.

Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

**Table 3: Observed and Mapped Mean Annual Per capita Consumption (in 2012 International PPP Dollars) by Characteristics over Survey Pairs, Tunisia**

	Tunisia 2014	
	LMPS	EBCNV
Total	3958 (132)	3581 (404)
<b>Sex</b>		
Male	3986 (140)	3596 (401)
Female	3932 (135)	3566 (408)
<b>Region</b>		
North	4573 (223)	4167 (739)
Northwest	2769 (208)	2414 (445)
Center East	4526 (294)	4241 (861)
Center West	2808 (264)	2234 (375)
South East	3823 (261)	3392 (646)
South West	3438 (296)	2842 (400)
<b>Education Level</b>		
None	3444 (116)	2776 (264)
Primary	3810 (131)	3227 (314)
Secondary	4852 (239)	4434 (432)
Post-Secondary	5805 (463)	5746 (624)
University	6245 (446)	7146 (986)
<b>Age Group</b>		
0-5	3479 (178)	3120 (353)
6-11	3195 (155)	2948 (349)
12-14	3277 (177)	2984 (330)
15-19	3772 (203)	3209 (334)
20-29	4293 (177)	3700 (383)
30-39	4212 (178)	3606 (382)
40-49	3866 (158)	3559 (377)
50-59	4517 (214)	4212 (489)
60-64	4962 (307)	4620 (608)
Over 65	3863 (322)	4001 (547)
<b>Labor Market Status</b>		
Wage worker gov.	5127 (332)	5308 (507)
Wage worker pub.	4450 (420)	5786 (648)
Wage worker priv. non-ag.	4163 (175)	3486 (311)
Wage worker priv. ag.	2875 (228)	2040 (111)
Employer ag.	3603 (503)	3518 (264)

	<b>Tunisia 2014</b>	
	<b>LMPS</b>	<b>EBCNV</b>
Employer non-ag.	6248 (580)	6082 (766)
Self-emp. Ag.	2959 (182)	2418 (183)
Self-emp. Non-ag.	4147 (261)	3780 (276)
OLF, Unemp.	3885 (133)	3475 (403)
N	10157	50371

Notes: Bootstrapped standard errors (100 iterations (for the mapped values 500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses

Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

**Table 4: Observed and Mapped Distributions of Inequality and Poverty over Survey Pairs**

	1998		Egypt 2006		2012		Jordan 2010		Tunisia 2014	
	LMPS	HIECS	LMPS	HIECS	LMPS	HIECS	LMPS	HIECS	LMPS	EBCNV
<b>GE(-1)</b>	0.209 (0.024)	0.188 (0.037)	0.210 (0.021)	0.169 (0.029)	0.161 (0.009)	0.147 (0.020)	0.245 (0.020)	0.231 (0.041)	0.237 (0.018)	0.315 (0.034)
<b>GE(0)</b>	0.178 (0.011)	0.189 (0.034)	0.180 (0.010)	0.169 (0.028)	0.144 (0.009)	0.146 (0.019)	0.206 (0.014)	0.216 (0.038)	0.191 (0.013)	0.251 (0.022)
<b>GE(1)</b>	0.194 (0.016)	0.237 (0.045)	0.195 (0.014)	0.205 (0.034)	0.156 (0.013)	0.174 (0.024)	0.216 (0.016)	0.273 (0.063)	0.189 (0.014)	0.263 (0.024)
<b>GE(2)</b>	0.297 (0.197)	0.438 (0.096)	0.281 (0.040)	0.339 (0.060)	0.217 (0.051)	0.267 (0.045)	0.284 (0.029)	0.886 (0.371)	0.227 (0.022)	0.384 (0.044)
<b>P90/P10</b>	4.168 (0.194)	3.738 (0.437)	4.160 (0.171)	3.537 (0.369)	3.619 (0.112)	3.208 (0.230)	4.934 (0.269)	4.518 (0.514)	4.905 (0.310)	5.903 (0.509)
<b>P75/P25</b>	2.092 (0.065)	1.933 (0.121)	2.074 (0.050)	1.862 (0.091)	1.925 (0.034)	1.763 (0.061)	2.285 (0.070)	2.150 (0.156)	2.290 (0.090)	2.440 (0.103)
<b>Gini</b>	0.327 (0.010)	0.339 (0.033)	0.328 (0.009)	0.320 (0.028)	0.295 (0.008)	0.297 (0.020)	0.353 (0.012)	0.362 (0.034)	0.337 (0.011)	0.385 (0.017)
<b>Head count ratio</b>	0.241 (0.023)	0.182 (0.028)	0.229 (0.017)	0.198 (0.034)	0.268 (0.014)	0.282 (0.034)	0.150 (0.014)	0.150 (0.027)	0.076 (0.013)	0.142 (0.029)
<b>Average Poverty Gap</b>	0.059 (0.007)	0.033 (0.006)	0.058 (0.006)	0.037 (0.008)	0.064 (0.005)	0.058 (0.010)	0.036 (0.004)	0.029 (0.006)	0.017 (0.003)	0.036 (0.009)
<b>N (Observations)</b>	23849	111176	37131	102146	49167	32131	25967	15472	10157	50371

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses.

Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

**Table 5: Observed and Mapped Distributions of GE(0) by Characteristics and Survey Pairs, Egypt**

	1998		Egypt 2006		2012	
	LMPS	HIECS	LMPS	HIECS	LMPS	HIECS
Total	0.178 (0.011)	0.189 (0.034)	0.180 (0.010)	0.169 (0.028)	0.144 (0.009)	0.146 (0.019)
<b>Sex</b>						
Male	0.178 (0.011)	0.187 (0.034)	0.178 (0.011)	0.167 (0.028)	0.140 (0.008)	0.140 (0.018)
Female	0.178 (0.012)	0.190 (0.034)	0.182 (0.010)	0.170 (0.026)	0.149 (0.009)	0.152 (0.019)
<b>Region</b>						
Cairo	0.156 (0.018)	0.217 (0.033)	0.165 (0.016)	0.204 (0.022)	0.154 (0.020)	0.195 (0.012)
Suez	0.132 (0.018)	0.173 (0.050)	0.135 (0.017)	0.163 (0.046)	0.123 (0.015)	0.144 (0.033)
Urban-Lower	0.103 (0.009)	0.101 (0.008)	0.105 (0.008)	0.129 (0.013)	0.098 (0.008)	0.112 (0.013)
Urban-Upper	0.182 (0.032)	0.133 (0.011)	0.179 (0.021)	0.120 (0.013)	0.124 (0.009)	0.112 (0.011)
Rural-Lower	0.099 (0.010)	0.071 (0.005)	0.102 (0.008)	0.069 (0.006)	0.085 (0.005)	0.074 (0.006)
Rural-Upper	0.114 (0.019)	0.086 (0.006)	0.121 (0.009)	0.090 (0.004)	0.102 (0.006)	0.087 (0.008)
<b>Education Level</b>						
None	0.145 (0.009)	0.122 (0.014)	0.149 (0.008)	0.120 (0.013)	0.123 (0.006)	0.118 (0.010)
Primary	0.161 (0.010)	0.165 (0.027)	0.154 (0.010)	0.150 (0.023)	0.122 (0.007)	0.119 (0.014)
Secondary	0.157 (0.013)	0.182 (0.026)	0.153 (0.009)	0.150 (0.020)	0.127 (0.008)	0.141 (0.018)
Post-Secondary	0.152 (0.022)	0.160 (0.015)	0.145 (0.015)	0.157 (0.017)	0.129 (0.021)	0.136 (0.013)
University	0.182 (0.022)	0.276 (0.035)	0.201 (0.020)	0.243 (0.025)	0.161 (0.020)	0.202 (0.025)
<b>Age Group</b>						
0-5	0.143 (0.010)	0.138 (0.022)	0.149 (0.010)	0.119 (0.019)	0.114 (0.007)	0.093 (0.011)
6-11	0.162 (0.013)	0.154 (0.028)	0.147 (0.010)	0.140 (0.025)	0.112 (0.008)	0.115 (0.016)
12-14	0.164 (0.013)	0.163 (0.030)	0.162 (0.014)	0.155 (0.031)	0.125 (0.012)	0.132 (0.021)
15-19	0.171 (0.014)	0.177 (0.034)	0.156 (0.011)	0.158 (0.029)	0.135 (0.010)	0.132 (0.018)
20-29	0.166 (0.012)	0.175 (0.028)	0.184 (0.012)	0.157 (0.023)	0.141 (0.010)	0.144 (0.017)
30-39	0.167 (0.013)	0.180 (0.029)	0.165 (0.011)	0.156 (0.025)	0.138 (0.011)	0.120 (0.018)
40-49	0.184 (0.014)	0.221 (0.042)	0.171 (0.013)	0.182 (0.030)	0.130 (0.010)	0.145 (0.019)
50-59	0.202 (0.022)	0.232 (0.036)	0.198 (0.014)	0.207 (0.032)	0.156 (0.016)	0.158 (0.017)
60-64	0.192 (0.023)	0.255 (0.044)	0.205 (0.023)	0.197 (0.026)	0.179 (0.025)	0.169 (0.020)
Over 65	0.196 (0.027)	0.220 (0.038)	0.208 (0.024)	0.199 (0.025)	0.162 (0.017)	0.218 (0.030)
<b>Labor Market Status</b>						
Wage worker gov.	0.173 (0.015)	0.192 (0.028)	0.183 (0.015)	0.189 (0.029)	0.145 (0.013)	0.155 (0.020)
Wage worker pub.	0.176 (0.027)	0.188 (0.021)	0.156 (0.020)	0.177 (0.026)	0.152 (0.028)	0.151 (0.016)
Wage worker priv. non-ag.	0.172 (0.016)	0.194 (0.034)	0.179 (0.015)	0.183 (0.028)	0.137 (0.014)	0.137 (0.019)
Wage worker priv. ag.	0.114 (0.020)	0.070 (0.006)	0.124 (0.018)	0.076 (0.007)	0.101 (0.010)	0.065 (0.010)
Employer ag.	0.129 (0.026)	0.090 (0.008)	0.127 (0.011)	0.088 (0.007)	0.109 (0.009)	0.089 (0.007)
Employer non-ag.	0.184 (0.027)	0.346 (0.063)	0.194 (0.023)	0.251 (0.035)	0.151 (0.022)	0.204 (0.037)
Self-emp. Ag.	0.079 (0.019)	0.083 (0.006)	0.118 (0.017)	0.074 (0.005)	0.101 (0.013)	0.079 (0.005)
Self-emp. Non-ag.	0.174 (0.045)	0.159 (0.022)	0.158 (0.018)	0.161 (0.028)	0.122 (0.016)	0.111 (0.013)
OLF, Unemp.	0.176 (0.012)	0.186 (0.032)	0.178 (0.011)	0.168 (0.026)	0.145 (0.009)	0.147 (0.019)
N	23849	111176	37131	102146	49167	32131

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses  
Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

**Table 6: Observed and Mapped Distributions of GE(0) by Characteristics and Survey Pairs, Jordan**

	<b>Jordan 2010</b>	
	<b>LMPS</b>	<b>HIECS</b>
Total	0.206 (0.014)	0.216 (0.038)
<b>Sex</b>		
Male	0.201 (0.014)	0.199 (0.033)
Female	0.212 (0.015)	0.231 (0.043)
<b>Region</b>		
Middle	0.215 (0.017)	0.246 (0.036)
North	0.170 (0.012)	0.128 (0.014)
South	0.168 (0.016)	0.132 (0.009)
<b>Education Level</b>		
None	0.186 (0.013)	0.215 (0.041)
Primary	0.175 (0.012)	0.168 (0.021)
Secondary	0.193 (0.017)	0.227 (0.044)
Post-Secondary	0.181 (0.017)	0.181 (0.019)
University	0.193 (0.018)	0.237 (0.046)
<b>Age Group</b>		
0-5	0.151 (0.012)	0.149 (0.026)
6-11	0.152 (0.012)	0.159 (0.024)
12-14	0.169 (0.015)	0.151 (0.030)
15-19	0.202 (0.018)	0.170 (0.034)
20-29	0.191 (0.016)	0.178 (0.019)
30-39	0.179 (0.013)	0.238 (0.052)
40-49	0.200 (0.018)	0.194 (0.036)
50-59	0.232 (0.022)	0.284 (0.047)
60-64	0.235 (0.027)	0.234 (0.029)
Over 65	0.246 (0.026)	0.303 (0.060)
<b>Labor Market Status</b>		
Wage worker gov.	0.172 (0.046)	0.132 (0.012)
Wage worker priv. non-ag.	0.210 (0.018)	0.256 (0.048)
Wage worker priv. ag.	0.214 (0.046)	0.070 (0.019)
Employer ag.	0.236 (0.088)	0.112 (0.062)
Employer non-ag.	0.216 (0.030)	0.427 (0.123)
Self-emp. Ag.	0.206 (0.065)	0.162 (0.073)
Self-emp. Non-ag.	0.195 (0.023)	0.138 (0.027)
OLF, Unemp.	0.214 (0.016)	0.206 (0.034)
N	25967	15472

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses  
Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

**Table 7: Observed and Mapped Distributions of GE(0) by Characteristics and Survey Pairs, Tunisia**

	Tunisia 2014	
	LMPS	EBCNV
Total	0.191 (0.013)	0.251 (0.022)
<b>Sex</b>		
Male	0.189 (0.013)	0.249 (0.021)
Female	0.193 (0.013)	0.252 (0.022)
<b>Region</b>		
North	0.151 (0.016)	0.220 (0.044)
Northwest	0.181 (0.023)	0.213 (0.022)
Center East	0.175 (0.021)	0.218 (0.016)
Center West	0.205 (0.030)	0.235 (0.011)
South East	0.167 (0.024)	0.220 (0.013)
South West	0.151 (0.026)	0.215 (0.028)
<b>Education Level</b>		
None	0.179 (0.012)	0.226 (0.015)
Primary	0.165 (0.013)	0.220 (0.017)
Secondary	0.169 (0.019)	0.217 (0.016)
Post-Secondary	0.182 (0.034)	0.228 (0.029)
University	0.154 (0.023)	0.207 (0.015)
<b>Age Group</b>		
0-5	0.189 (0.020)	0.245 (0.024)
6-11	0.181 (0.018)	0.257 (0.024)
12-14	0.182 (0.021)	0.230 (0.019)
15-19	0.183 (0.022)	0.237 (0.021)
20-29	0.182 (0.017)	0.231 (0.021)
30-39	0.188 (0.016)	0.234 (0.019)
40-49	0.179 (0.015)	0.236 (0.018)
50-59	0.186 (0.019)	0.254 (0.026)
60-64	0.171 (0.022)	0.258 (0.024)
Over 65	0.189 (0.034)	0.270 (0.025)
<b>Labor Market Status</b>		
Wage worker gov.	0.190 (0.026)	0.204 (0.013)
Wage worker pub.	0.168 (0.033)	0.230 (0.038)
Wage worker priv. non-ag.	0.174 (0.015)	0.201 (0.017)
Wage worker priv. ag.	0.147 (0.024)	0.142 (0.009)
Employer ag.	0.188 (0.061)	0.202 (0.025)
Employer non-ag.	0.142 (0.030)	0.247 (0.039)
Self-emp. Ag.	0.174 (0.027)	0.177 (0.015)
Self-emp. Non-ag.	0.167 (0.024)	0.206 (0.015)
OLF, Unemp.	0.189	0.255

	Tunisia 2014	
	LMPS	EBCNV
	(0.014)	(0.023)
N	10157	50371

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses  
Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)



**Table 8: Poverty Lines (in 2012 International PPP Dollars) by Country and Region**

	1999	<u>Egypt</u> 2004/5	2012/13	Jordan 2010	Tunisia 2010
<b>Egypt</b>					
Urban governorates	848	886	1230		
Urban Lower	777	872	1093		
Rural Lower	748	871	1098		
Urban Upper	789	864	1130		
Rural Upper	738	859	1071		
<b>Jordan</b>					
National				1436	
<b>Tunisia</b>					
Large Cities					1758
Other Cities					1594
Not Cities					1129

Source: Egypt 1998 from World Bank (2002), Egypt 2004/5 from World Bank (2007), Egypt 2012/13 from CAPMAS (2013) Jordan 2010 from Department of Statistics (Jordan) (2016), Tunisia 2010 from National Institute of Statistics (2012).

**Table 9: Observed and Mapped Poverty Rates (Percentages) over Survey Pairs, Egypt**

	1998		Egypt 2006		2012	
	LMPS	HIECS	LMPS	HIECS	LMPS	HIECS
Total	24.06 (2.33)	18.24 (2.80)	22.91 (1.66)	19.79 (3.39)	26.78 (1.38)	28.22 (3.37)
<b>Sex</b>						
Male	24.04 (2.39)	17.96 (2.82)	22.69 (1.67)	19.35 (3.34)	26.68 (1.41)	27.43 (3.33)
Female	24.07 (2.33)	18.52 (2.78)	23.13 (1.69)	20.25 (3.45)	26.88 (1.39)	29.01 (3.42)
<b>Region</b>						
Cairo	6.60 (1.68)	5.15 (1.03)	4.02 (1.15)	5.15 (1.20)	15.87 (2.65)	17.59 (1.75)
Suez	3.88 (1.48)	16.06 (3.29)	4.75 (1.53)	12.91 (3.44)	9.49 (2.21)	37.91 (8.06)
Urban-Lower	8.99 (1.82)	6.26 (1.04)	8.78 (1.68)	9.51 (3.08)	10.43 (1.91)	8.19 (1.12)
Urban-Upper	28.41 (3.64)	24.89 (4.64)	23.91 (3.27)	28.56 (5.29)	33.99 (3.31)	34.25 (3.41)
Rural-Lower	21.99 (3.25)	14.00 (2.74)	24.21 (2.48)	15.97 (4.21)	19.76 (1.83)	15.24 (2.01)
Rural-Upper	49.58 (4.10)	37.97 (5.54)	44.46 (3.31)	42.69 (5.89)	52.06 (2.42)	50.16 (5.22)
<b>Education Level</b>						
None	30.59 (2.66)	22.41 (2.85)	29.52 (1.97)	23.95 (3.42)	33.53 (1.63)	33.54 (3.79)
Primary	19.99 (2.34)	15.88 (2.49)	21.98 (1.80)	19.34 (3.22)	26.99 (1.61)	28.06 (3.29)
Secondary	12.63 (1.83)	9.39 (1.60)	15.27 (1.40)	11.58 (2.32)	19.60 (1.32)	19.23 (2.46)
Post-Secondary	6.87 (2.21)	5.69 (1.18)	6.84 (1.32)	7.03 (1.69)	11.61 (1.83)	12.11 (2.37)
University	3.13 (0.98)	2.30 (0.84)	4.33 (0.86)	3.35 (1.19)	6.43 (0.86)	8.00 (1.80)
<b>Age Group</b>						
0-5	32.83 (3.07)	24.76 (3.44)	30.30 (2.18)	25.95 (4.16)	34.28 (1.74)	38.28 (3.91)
6-11	31.44 (2.98)	24.60 (3.36)	30.86 (2.23)	27.60 (4.40)	36.19 (1.94)	36.86 (4.08)
12-14	29.31 (3.06)	22.41 (3.13)	28.70 (2.37)	26.73 (4.12)	35.31 (2.18)	34.22 (4.32)
15-19	24.81 (2.65)	18.53 (2.68)	23.85 (1.93)	21.17 (3.35)	26.91 (1.81)	29.01 (4.02)
20-29	19.84 (2.27)	14.35 (2.16)	20.59 (1.71)	15.52 (2.73)	22.71 (1.44)	23.62 (2.80)
30-39	21.52 (2.41)	16.37 (2.60)	21.38 (1.72)	18.38 (3.24)	26.97 (1.50)	29.76 (3.33)
40-49	19.76 (2.34)	14.80 (2.55)	18.13 (1.62)	16.84 (3.13)	23.24 (1.53)	24.64 (3.20)
50-59	15.63 (2.25)	11.80 (2.18)	15.81 (1.61)	12.25 (2.37)	15.59 (1.42)	16.60 (2.52)
60-64	13.26 (2.57)	11.01 (2.22)	13.79 (1.92)	10.74 (2.03)	15.16 (1.74)	13.74 (2.21)
Over 65	17.26 (2.56)	12.58 (2.37)	14.95 (1.66)	10.90 (2.10)	15.16 (1.50)	17.48 (2.55)
<b>Labor Market Status</b>						
Wage worker gov.	11.76 (1.82)	9.05 (1.66)	11.81 (1.31)	10.30 (2.18)	13.32 (1.33)	13.23 (2.21)
Wage worker pub.	9.71 (2.37)	6.42 (1.61)	6.50 (2.12)	7.43 (1.90)	10.34 (2.71)	13.37 (3.65)
Wage worker priv. non-ag.	20.65 (2.84)	14.81 (2.34)	18.59 (1.64)	15.38 (3.14)	23.04 (1.57)	25.88 (3.04)
Wage worker priv. ag.	46.17 (5.62)	37.96 (4.76)	42.12 (4.32)	40.26 (5.21)	43.95 (3.74)	41.19 (5.30)
Employer ag.	31.50 (4.89)	18.83 (3.10)	30.47 (2.99)	18.52 (2.82)	28.64 (2.75)	26.18 (3.29)
Employer non-ag.	8.27 (2.56)	6.88 (1.69)	10.57 (1.92)	9.00 (1.96)	11.13 (1.92)	12.50 (2.21)
Self-emp. Ag.	27.82 (7.95)	23.18 (3.20)	35.37 (4.64)	21.75 (3.32)	38.28 (4.65)	30.54 (4.24)
Self-emp. Non-ag.	18.54 (3.32)	15.36 (2.57)	18.13 (2.40)	18.43 (2.77)	22.29 (2.22)	22.49 (3.14)
OLF, Unemp.	24.22 (2.38)	19.38 (3.00)	23.27 (1.72)	21.41 (3.77)	27.24 (1.44)	30.71 (3.63)
N	23849	111176	37131	102146	49167	32131

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses

Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

**Table 10: Observed and Mapped Poverty Rates (Percentages) over Survey Pairs, Jordan**

	<b>Jordan 2010</b>	
	<b>LMPS</b>	<b>HIECS</b>
Total	14.95 (1.39)	15.01 (2.70)
<b>Sex</b>		
Male	14.72 (1.39)	14.64 (2.45)
Female	15.19 (1.44)	15.37 (2.96)
<b>Region</b>		
Middle	12.11 (1.52)	13.13 (3.85)
North	19.18 (2.69)	16.28 (2.93)
South	20.68 (3.31)	23.74 (5.63)
<b>Education Level</b>		
None	21.02 (1.88)	20.76 (3.12)
Primary	15.24 (1.53)	16.15 (2.58)
Secondary	7.76 (1.06)	5.97 (1.03)
Post-Secondary	6.54 (1.33)	6.29 (2.43)
University	2.29 (0.60)	3.55 (1.97)
<b>Age Group</b>		
0-5	16.45 (1.75)	17.20 (2.71)
6-11	21.77 (2.02)	22.79 (3.82)
12-14	23.14 (2.30)	23.41 (4.29)
15-19	18.15 (1.94)	15.98 (2.41)
20-29	9.10 (1.22)	9.62 (2.01)
30-39	13.12 (1.45)	13.11 (2.45)
40-49	14.76 (1.69)	15.49 (3.01)
50-59	8.22 (1.39)	8.59 (2.71)
60-64	5.78 (1.60)	5.94 (2.37)
Over 65	6.87 (1.52)	8.81 (2.95)
<b>Labor Market Status</b>		
Wage worker gov.	10.55 (1.44)	10.34 (1.49)
Wage worker priv. non-ag.	10.97 (5.26)	10.03 (2.30)
Wage worker priv. ag.	9.52 (1.41)	16.66 (10.42)
Employer ag.	35.50 (7.81)	12.52 (12.64)
Employer non-ag.	17.56 (9.81)	3.16 (2.93)
Self-emp. Ag.	3.89 (1.47)	7.51 (5.84)
Self-emp. Non-ag.	25.17 (8.32)	6.34 (2.23)
OLF, Unemp.	11.43 (2.20)	16.56 (2.90)
N	25967	15472

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses  
Source: Authors' calculations based on HIECS (observed) and LMPS (mapped)

**Table 11: Observed and Mapped Poverty Rates (Percentages) over Survey Pairs, Tunisia**

	Tunisia 2014	
	LMPs	EBCNV
Total	7.64 (1.27)	14.23 (2.60)
<b>Sex</b>		
Male	7.37 (1.28)	13.90 (2.52)
Female	7.92 (1.40)	14.55 (2.68)
<b>Region</b>		
North	3.53 (1.59)	9.02 (0.94)
Northwest	15.72 (3.34)	24.06 (3.59)
Center East	3.75 (2.49)	6.97 (3.59)
Center West	16.43 (3.66)	29.91 (1.45)
South East	8.09 (3.07)	15.23 (4.86)
South West	9.30 (4.43)	20.03 (1.54)
<b>Education Level</b>		
None	9.48 (1.54)	20.43 (2.47)
Primary	7.02 (1.68)	15.54 (2.56)
Secondary	3.41 (1.24)	7.41 (1.57)
Post-Secondary	2.20 (1.51)	3.06 (1.00)
University	1.59 (1.54)	1.78 (0.88)
<b>Age Group</b>		
0-5	10.89 (2.25)	19.15 (4.06)
6-11	12.91 (2.80)	22.09 (3.95)
12-14	12.34 (2.73)	18.91 (3.37)
15-19	7.86 (2.36)	16.58 (2.96)
20-29	5.30 (1.46)	11.62 (1.94)
30-39	5.99 (1.25)	12.69 (2.37)
40-49	7.56 (1.47)	13.99 (2.42)
50-59	4.90 (1.37)	9.51 (1.83)
60-64	2.76 (1.36)	8.70 (2.12)
Over 65	6.65 (3.23)	11.54 (2.09)
<b>Labor Market Status</b>		
Wage worker gov.	4.43 (2.06)	4.79 (1.07)
Wage worker pub.	4.64 (3.27)	3.70 (1.08)
Wage worker priv. non-ag.	5.65 (1.35)	12.50 (2.20)
Wage worker priv. ag.	11.18 (3.98)	21.91 (2.72)
Employer ag.	9.05 (7.01)	7.76 (1.55)
Employer non-ag.	1.31 (1.31)	2.67 (1.14)
Self-emp. Ag.	10.35 (3.11)	17.37 (2.68)
Self-emp. Non-ag.	5.64 (2.73)	10.42 (1.84)
OLF, Unemp.	7.84 (1.42)	15.59 (2.90)
N	10157	50371

Notes: Bootstrapped standard errors (500 iterations for HIECS; 5 iterations each of 100 consumption distributions) in parentheses  
Source: Authors' calculations based on HIECS (observed) and LMPs (mapped)

## Appendix 1: Summary Statistics

**Table 12: Summary Statistics from ELMS 1998 and HIECS 1999/2000 (Egypt)**

	ELMS 1998	HIECS 1999/2000
Age	48.67	47.37
Age Squared	2552.86	2430.87
Total no. of Individuals in the Household	5.12	4.86
Persons per room	1.49	1.39
Rooms	3.82	3.79
Urban	0.48	0.46
Expenditure		2247.16
<b>Assets</b>		
Air conditioner	0.03	0.04
Cooker	0.70	0.84
Dishwasher	0.02	0.02
Fan	0.63	0.74
Iron	0.62	0.69
Motorcycle, bicycle	0.20	0.12
Refrigerator	0.66	0.71
Telephone	0.31	0.29
Television	0.87	0.92
Water heater	0.31	0.32
Washing machine	0.80	0.87
<b>Home ownership</b>		
Owned	0.71	0.70
Rented	0.23	0.22
Provided free	0.05	0.08
<b>Sewerage facility</b>		
Public sewerage network	0.57	0.38
Cess pool	0.42	0.61
No facility	0.01	0.01
<b>Head education</b>		
None	0.51	0.58
Basic	0.17	0.08
Intermediate	0.16	0.17
Above Int.	0.05	0.04
Univ. & above	0.12	0.13
<b>Head labor market status</b>		
Wage worker gov.	0.23	0.23
Wage worker public	0.06	0.06
Wage worker non-ag. Private	0.13	0.15
Wage worker ag. Private	0.05	0.03
Employer ag.	0.07	0.15
Employer non-ag.	0.07	0.08
Self-emp. Ag.	0.06	0.04
Self-emp. Non-ag.	0.07	0.08
OLF, unemp.	0.27	0.19
<b>Head gender</b>		
Male	0.84	0.85
Female	0.16	0.15
<b>Governorate</b>		
Cairo	0.14	0.13
Alexandria	0.06	0.06
Port Said	0.01	0.01
Suez	0.01	0.01
Damietta	0.02	0.02
Dakahlia	0.08	0.08
Sharkia	0.07	0.07
Kalyubia	0.06	0.06
Kafr El-Sheikh	0.03	0.04
Gharbia	0.07	0.06
Menoufia	0.05	0.04
Behera	0.06	0.06
Ismailia	0.01	0.01
Giza	0.09	0.09
Beni Suef	0.03	0.03
Fayoum	0.03	0.04
Menya	0.06	0.05
Assuit	0.04	0.04
Souhag	0.05	0.05
Qena	0.04	0.04
Aswan	0.01	0.02
Luxor	0.00	0.01
<b>Demographics</b>		
Share of adult females in hh	0.34	0.33

	<b>ELMS 1998</b>	<b>HIECS 1999/2000</b>
Share of adult males in hh	0.30	0.31
Share of children 14 years and under in hh	0.29	0.30
Share of children 6 years and under in hh	0.13	0.15
Share of adult female wage workers in public sector in hh	0.03	0.03
Share of adult females wage workers in private sector in hh	0.01	0.01
Share of adult non wage employed females in hh	0.09	0.08
Share of illiterate in hh	0.29	0.33
Share of adult males wage workers in public sector in hh	0.07	0.06
Share of adult male wage workers in private sector in hh	0.07	0.06
Share of adult non wage employed males in hh	0.06	0.09
Share of university grad and above in hh	0.07	0.08
N	4816	23576

Source: Authors' calculations based on ELMPS 1998 and Egypt HIECS 1999

**Table 13: Summary Statistics for ELMPS 2006 and HIECS 2004/2005 (Egypt)**

	ELMPS 2006	HIECS 2004/5
Age	48.30	46.79
Age Squared	2539.92	2383.12
Total no. of Individuals in the Household	4.57	4.39
Persons per room	1.31	1.32
Rooms	3.77	3.59
Urban	0.49	0.47
Expenditure		2995.09
<b>Assets</b>		
Air conditioner	0.05	0.05
Camera	0.07	0.05
Cooker	0.86	0.91
Dishwasher	0.02	0.02
Fan	0.78	0.83
Iron	0.69	0.71
Motorcycle, bicycle	0.16	0.10
Refrigerator	0.83	0.81
Telephone	0.57	0.46
Television	0.92	0.92
Water heater	0.40	0.37
Washing machine	0.91	0.90
<b>Home ownership</b>		
Owned	0.68	0.62
Rented	0.21	0.22
Provided free	0.11	0.16
<b>Sewerage facility</b>		
Public sewerage network	0.62	0.48
Cess pool	0.38	0.51
No facility	0.01	0.02
<b>Head education</b>		
None	0.45	0.55
Basic	0.16	0.08
Intermediate	0.22	0.21
Above Int.	0.04	0.04
Univ. & above	0.14	0.13
<b>Head labor market status</b>		
Wage worker gov.	0.20	0.21
Wage worker public	0.05	0.05
Wage worker non-ag. Private	0.16	0.18
Wage worker ag. Private	0.04	0.04
Employer ag.	0.10	0.15
Employer non-ag.	0.08	0.08
Self-emp. Ag.	0.05	0.04
Self-emp. Non-ag.	0.08	0.08
OLF, unemp.	0.25	0.19
<b>Head gender</b>		
Male	0.81	0.84
Female	0.19	0.16
<b>Governorate</b>		
Cairo	0.14	0.13
Alexandria	0.07	0.06
Port Said	0.01	0.01
Suez	0.01	0.01
Damietta	0.02	0.02
Dakahlia	0.08	0.08
Sharkia	0.07	0.08
Kalyubia	0.06	0.06
Kafr El-Sheikh	0.04	0.03
Gharbia	0.06	0.06
Menoufia	0.04	0.05
Behera	0.06	0.06
Ismailia	0.01	0.01
Giza	0.09	0.09
Beni Suef	0.03	0.03
Fayoum	0.03	0.03
Menya	0.05	0.06
Assuit	0.04	0.04
Souhag	0.04	0.05
Qena	0.03	0.04
Aswan	0.02	0.02
Luxor	0.01	0.01
<b>Demographics</b>		
Share of adult females in hh	0.36	0.35
Share of adult males in hh	0.32	0.32
Share of children 14 years and under in hh	0.26	0.27

	<b>ELMPS 2006</b>	<b>HIECS 2004/5</b>
Share of children 6 years and under in hh	0.14	0.14
Share of adult female wage workers in public sector in hh	0.03	0.03
Share of adult females wage workers in private sector in hh	0.01	0.01
Share of adult non wage employed females in hh	0.09	0.09
Share of illiterate in hh	0.27	0.33
Share of adult males wage workers in public sector in hh	0.07	0.05
Share of adult male wage workers in private sector in hh	0.09	0.08
Share of adult non wage employed males in hh	0.08	0.09
Share of university grad and above in hh	0.09	0.08
N	8,351	23,234

Source: Authors' calculations based on ELMPS 2006 and Egypt HIECS 2004/5



**Table 14: Summary Statistics for ELMPS 2012 and HIECS 2012/2013 (Egypt)**

	ELMPS 2012	HIECS 2012/3
Age	46.80	48.42
Age Squared	2417.65	2540.88
Total no. of Individuals in the Household	4.08	4.33
Persons per room	1.25	1.28
Rooms	3.51	3.62
Urban	0.46	0.44
Expenditure		7023.09
<b>Assets</b>		
Air conditioner	0.08	0.08
Camera	0.03	0.02
Cooker	0.98	0.99
Dishwasher	0.02	0.01
Fan	0.88	0.94
Internet	0.08	0.12
Iron	0.68	0.69
Motorcycle, bicycle	0.13	0.14
Refrigerator	0.93	0.93
Telephone	0.93	0.93
Television	0.94	0.95
Water heater	0.49	0.47
Washing machine	0.92	0.94
<b>Home ownership</b>		
Owned	0.60	0.68
Rented	0.20	0.17
Provided free	0.20	0.15
<b>Sewerage facility</b>		
Public sewerage network	0.68	0.53
Cess pool	0.32	0.47
No facility	0.00	0.00
<b>Head education</b>		
None	0.37	0.45
Basic	0.17	0.12
Intermediate	0.27	0.25
Above Int.	0.04	0.04
Univ. & above	0.16	0.14
<b>Head labor market status</b>		
Wage worker gov.	0.18	0.19
Wage worker public	0.03	0.03
Wage worker non-ag. Private	0.24	0.21
Wage worker ag. Private	0.05	0.04
Employer ag.	0.06	0.11
Employer non-ag.	0.06	0.07
Self-emp. Ag.	0.03	0.02
Self-emp. Non-ag.	0.08	0.08
OLF, unemp.	0.29	0.25
<b>Head gender</b>		
Male	0.81	0.82
Female	0.19	0.18
<b>Governorate</b>		
Cairo	0.16	0.12
Alexandria	0.05	0.06
Port Said	0.01	0.01
Suez	0.01	0.01
Damietta	0.03	0.02
Dakahlia	0.06	0.08
Sharkia	0.06	0.08
Kalyubia	0.06	0.06
Kafr El-Sheikh	0.05	0.04
Gharbia	0.06	0.06
Menoufia	0.03	0.05
Behera	0.06	0.06
Ismailia	0.04	0.01
Giza	0.06	0.09
Beni Suef	0.04	0.03
Fayoum	0.03	0.03
Menya	0.05	0.05
Assuit	0.04	0.04
Souhag	0.04	0.05
Qena	0.04	0.03
Aswan	0.03	0.02
Luxor	0.01	0.01
<b>Demographics</b>		
Share of adult females in hh	0.36	0.36
Share of adult males in hh	0.31	0.31

	<b>ELMPS 2012</b>	<b>HIECS 2012/3</b>
Share of children 14 years and under in hh	0.29	0.28
Share of children 6 years and under in hh	0.17	0.14
Share of adult female wage workers in public sector in hh	0.03	0.03
Share of adult females wage workers in private sector in hh	0.01	0.01
Share of adult non wage employed females in hh	0.05	0.04
Share of illiterate in hh	0.23	0.28
Share of adult males wage workers in public sector in hh	0.06	0.05
Share of adult male wage workers in private sector in hh	0.11	0.09
Share of adult non wage employed males in hh	0.06	0.08
Share of university grad and above in hh	0.11	0.09
N	12,060	7,404

Source: Authors' calculations based on ELMPS 2012 and Egypt HIECS 2012/13

**Table 15: Summary Statistics for JLMPS 2010 and HIECS 2010 (Jordan)**

	JLMPS 2010	HIECS 2010
Age	45.91	49.15
Age squared	2317.31	2627.68
Total no. of Individuals in the Household	4.85	5.38
Urban	0.84	0.84
Expenditure		2181.78
<b>Assets</b>		
Air conditioner	0.16	0.13
Car	0.46	0.46
Computer	0.45	0.45
Cooker/Stove	1.00	1.00
Dishwasher	0.01	0.02
Fan	0.81	0.88
Fax	0.01	0.01
Fridge/Freezer	0.97	0.98
Internet	0.16	0.15
Iron	0.84	0.84
Microwave	0.36	0.38
Satellite	0.96	0.97
Sewing machine	0.08	0.13
Telephone	0.98	0.98
Television	0.99	0.99
Vacuum	0.61	0.64
Washer	0.95	0.98
Water heater	0.61	0.68
<b>Home ownership</b>		
Owned	0.67	0.76
Rented	0.26	0.21
Provided free	0.07	0.04
<b>Sewerage facility</b>		
Public sewerage network	0.64	0.60
Cess pool	0.36	0.40
No facility	0.00	0.00
<b>Head gender</b>		
Male	0.86	0.86
Female	0.14	0.14
<b>Head education</b>		
None	0.27	0.20
Primary	0.29	0.44
Secondary	0.18	0.14
Post-sec.	0.10	0.08
University & above	0.16	0.13
<b>Head labor market status</b>		
Wage worker public sector	0.21	0.17
Wage worker non-ag. Private	0.26	0.24
Wage worker ag. Private	0.01	0.00
Employer ag.	0.01	0.00
Employer non-ag.	0.07	0.07
Self-emp. Ag.	0.01	0.01
Self-emp. Non-ag.	0.09	0.08
OLF, unemp.	0.35	0.43
<b>Governorate</b>		
Amman	0.43	0.41
Balqa	0.06	0.07
Zarqa	0.14	0.15
Madaba	0.02	0.03
Irbid	0.17	0.17
Mafrq	0.04	0.04
Jerash	0.03	0.03
Ajloun	0.02	0.02
Karak	0.04	0.04
Tafilah	0.01	0.01
Ma'an	0.02	0.02
Aqaba	0.02	0.02
<b>Demographics</b>		
Share of adult females in hh	0.32	0.34
Share of adult males in hh	0.32	0.29
Share of children 14 years and under in hh	0.17	0.16
Share of children 6 years and under in hh	0.31	0.30
Share of adult female wage workers in public sector in hh	0.15	0.12
Share of adult females wage workers in private sector in hh	0.10	0.08
Share of adult non wage employed females in hh	0.18	0.06
Share of illiterate in hh	0.11	0.15
Share of adult males wage workers in public sector in hh	0.04	0.04

	<b>JLMPS 2010</b>	<b>HIECS 2010</b>
Share of adult male wage workers in private sector in hh	0.04	0.01
Share of adult non wage employed males in hh	0.02	0.04
Share of university grad and above in hh	0.00	0.00
N	5102	2845

Source: Authors' calculations based on JLMPS 2010 and Jordan HIECS 2010

**Table 16: Summary statistics for EBCNV 2010 and TLMPs 2014 (Tunisia)**

	TLMPs 2014	EBCNV 2010
Age	48.63	54.34
Age Squared	2484.14	3154.16
Total no. of Individuals in the Household	4.00	4.34
Persons per room	1.39	1.58
Rooms	3.78	3.13
Urban	0.69	0.68
Expenditure		2944.72
<b>Assets</b>		
Air conditioner	0.23	0.19
Bicycle	0.07	0.04
Camera	0.06	0.13
Car	0.19	0.15
Computer	0.26	0.21
Cooker	0.72	0.67
Dishwasher	0.01	0.03
DVD Player	0.15	0.25
Fan	0.19	0.33
Freezer	0.03	0.05
Internet	0.14	0.12
Microwave	0.15	0.21
Mobile Phone (head only)	0.90	0.77
Motorcycle	0.16	0.10
Refrigerator	0.97	0.94
Satellite TV	0.91	0.87
Sewing Machine	0.03	0.07
Telephone	0.13	0.26
Television	0.96	0.96
Washing machine	0.69	0.62
<b>Home ownership</b>		
Owned	0.83	0.87
Rented	0.12	0.09
Provided free	0.06	0.04
<b>Sewerage facility</b>		
Public sewerage network	0.57	0.59
Cess pool	0.39	0.38
Other	0.04	0.03
<b>Head education</b>		
None	0.25	0.31
Basic	0.54	0.45
Intermediate	0.13	0.17
Above Int.	0.03	0.03
Univ. & above	0.06	0.06
<b>Head labor market status</b>		
Wage worker gov.	0.14	0.12
Wage worker public	0.05	0.02
Wage worker non-ag. Private	0.25	0.25
Wage worker ag. Private	0.04	0.04
Employer ag.	0.01	0.02
Employer non-ag.	0.05	0.05
Self-emp. Ag.	0.08	0.06
Self-emp. Non-ag.	0.11	0.09
OLF, unemp.	0.27	0.35
<b>Head gender</b>		
Male	0.87	0.85
Female	0.13	0.15
<b>Region</b>		
Grand Tunis	0.23	0.25
North East	0.15	0.14
North West	0.13	0.12
Center East	0.22	0.23
Center West	0.13	0.13
South East	0.10	0.08
South West	0.06	0.05
<b>Demographics</b>		
Share of adult females in hh	0.37	0.40
Share of adult males in hh	0.34	0.35
Share of children 14 years and under in hh	0.24	0.20
Share of children 6 years and under in hh	0.12	0.10
Share of adult female wage workers in public sector in hh	0.02	0.02
Share of adult females wage workers in private sector in hh	0.02	0.04
Share of adult non wage employed females in hh	0.04	0.02
Share of illiterate in hh	0.18	0.21
Share of adult males wage workers in public sector in hh	0.06	0.04
Share of adult male wage workers in private sector in hh	0.10	0.10
Share of adult non wage employed males in hh	0.07	0.07
Share of university grad and above in hh	0.05	0.04
N	2,525	11,218

Source: Authors' calculations based on TLMPs 2014 and EBCNV 2010

## Appendix 2: Consumption and Household Effect Models

**Table 17: Egypt HIECS 1999 OLS consumption model**

Dependent variable: log consumption per capita in nominal local currency units

Total no. of Individuals in the Household	-0.073 (0.002)	***
Persons per room	-0.042 (0.006)	***
Rooms	0.028 (0.003)	***
Urban	0.018 (0.007)	**
Age	-0.001 (0.001)	
Age - Squared	0.000 (0.000)	
<b>Assets</b>		
Air conditioner	0.452 (0.013)	***
Cooker	0.048 (0.009)	***
Dishwasher	0.347 (0.016)	***
Fan	0.031 (0.007)	***
Heater	0.124 (0.010)	***
Iron	0.028 (0.007)	***
Motorcycle, bicycle	0.034 (0.008)	***
Refrigerator	0.037 (0.008)	***
Telephone	0.154 (0.007)	***
Television	0.029 (0.010)	**
Water heater	0.085 (0.007)	***
Washing machine	0.022 (0.009)	*
<b>Home ownership (Ref: Owned Home)</b>		
Rented	-0.070 (0.006)	***
Provided free	0.004 (0.009)	
<b>Sewerage facility (Ref: Public Sewerage Network)</b>		
Cess pool	-0.059 (0.007)	***
No facility	-0.079 (0.022)	***
<b>Head education (Ref: No Education)</b>		
Basic	0.042 (0.010)	***
Intermediate	0.079 (0.009)	***
Above Int.	0.108 (0.014)	***
Univ. & above	0.153 (0.013)	***
<b>Head labor market status (Ref: Wage worker gov.)</b>		
Wage worker public	0.075 (0.013)	
Wage worker non-ag. Private	0.063 (0.012)	***
Wage worker ag. Private	-0.061 (0.017)	***
Employer ag.	0.029 (0.013)	*
Employer non-ag.	0.144 (0.013)	***
Self-emp. Ag.	0.007 (0.017)	
Self-emp. Non-ag.	0.043	**

	(0.013)	
OLF, unemp.	0.002	
	(0.012)	
<b>Head gender (Ref: Male)</b>		
Female	0.068	***
	(0.009)	
<b>Governorate (Ref: Cairo)</b>		
Alexandria	0.071	***
	(0.009)	
Port Said	0.344	***
	(0.021)	
Suez	0.249	***
	(0.020)	
Damietta	0.049	**
	(0.019)	
Dakahlia	-0.318	***
	(0.011)	
Sharkia	-0.322	***
	(0.011)	
Kalyubia	-0.131	***
	(0.012)	
Kafr El-Sheikh	-0.071	***
	(0.015)	
Gharbia	-0.123	***
	(0.012)	
Menoufia	-0.279	***
	(0.014)	
Behera	-0.138	***
	(0.012)	
Ismailia	-0.012	
	(0.020)	
Giza	-0.169	***
	(0.009)	
Beni Suef	-0.349	***
	(0.015)	
Fayoum	-0.305	***
	(0.016)	
Menya	-0.166	***
	(0.013)	
Assuit	-0.432	***
	(0.014)	
Souhag	-0.408	***
	(0.014)	
Qena	-0.245	***
	(0.016)	
Aswan	-0.213	***
	(0.018)	
Luxor	-0.333	***
	(0.023)	
<b>Demographics</b>		
Share of adult females in hh	0.086	**
	(0.027)	
Share of adult males in hh	0.149	***
	(0.029)	
Share of children 14 years and under in hh	-0.120	***
	(0.026)	
Share of children 6 years and under in hh	-0.258	***
	(0.019)	
Share of adult female wage workers in public sector in hh	0.095	***
	(0.028)	
Share of adult females wage workers in private sector in hh	-0.052	
	(0.037)	
Share of adult non wage employed females in hh	0.042	*
	(0.021)	
Share of illiterate in hh	-0.014	
	(0.016)	
Share of adult males wage workers in public sector in hh	0.121	***
	(0.034)	
Share of adult male wage workers in private sector in hh	0.087	***
	(0.026)	
Share of adult non wage employed males in hh	0.207	***
	(0.028)	
Share of university grad and above in hh	0.219	***
	(0.021)	
<b>Intercept</b>	7.667	***
	(0.045)	
N (Observations)	23555	

R-squared	0.697
Adj. R-squared	0.696

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Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001  
Source: Authors' calculations based on Egypt HIECS 1999



**Table 18: Egypt HIECS 1999 Household Effect Model**

Predicted Value of Consumption - Squared	0.083 (0.004)	***
Household Size	0.733 (0.084)	***
Head Labor Market Status: Employer in Ag.	-0.167 (0.052)	**
Share Illiterate in hh	0.360 (0.062)	***
<b>Governorate</b>		
Fayoum	-0.395 (0.099)	***
Luxor	1.775 (0.151)	***
Damietta	-0.914 (0.126)	***
Sharkia	-5.332 (1.402)	***
Kafr El-Sheikh	-0.329 (0.090)	***
<b>Interactions with Predicted Value of Consumption</b>		
Household Size	-0.090 (0.012)	***
Governorate: Sharkia	0.682 (0.190)	***
<b>Interactions with Predicted Value of Consumption - Squared</b>		
Governorate: Behera	-0.004 (0.001)	***
Governorate: Giza	0.005 (0.001)	***
Female Head	0.004 (0.001)	***
Have Television	-0.005 (0.001)	***
<b>Intercept</b>	-10.177 (0.249)	***
N (Observations)	23555	
R-squared	0.039	
Adj. R-squared	0.038	

Notes: \*p&lt;0.05; \*\*p&lt;0.01; \*\*\*p&lt;0.001

Source: Authors' calculations based on Egypt HIECS 1999

**Table 19: Egypt HIECS 2004/2005 OLS Consumption Model (Log Consumption Per Capita In Nominal Local Currency Units)**

Total no. of Individuals in the Household	-0.104 (0.002)	***
Persons per room	-0.027 (0.006)	***
Rooms	0.049 (0.003)	***
Urban	0.061 (0.006)	***
Age	-0.002 (0.001)	
Age - Squared	0.000 (0.000)	*
<b>Assets</b>		
Air conditioner	0.303 (0.012)	***
Camera	0.226 (0.011)	***
Cooker	0.046 (0.008)	***
Dishwasher	0.250 (0.017)	***
Fan	0.062 (0.006)	***
Iron	0.028 (0.006)	***
Motorcycle, bicycle	0.013 (0.007)	
Refrigerator	0.018 (0.007)	*
Telephone	0.103 (0.006)	***
Television	0.017 (0.009)	
Water heater	0.096 (0.006)	***
Washing machine	0.007 (0.009)	
<b>Home ownership (Ref: Owned Home)</b>		
Rented	-0.079 (0.01)	***
Provided free	-0.013 (0.007)	*
<b>Sewerage facility (Ref: Public Sewerage Network)</b>		
Cess pool	-0.049 (0.006)	***
No facility	-0.016 (0.016)	
<b>Head education (Ref: No Education)</b>		
Basic	0.069 (0.010)	***
Intermediate	0.085 (0.008)	***
Above Int.	0.135 (0.013)	***
Univ. & above	0.170 (0.012)	***
<b>Head labor market status (Ref: Wage worker gov.)</b>		
Wage worker public	0.082 (0.013)	***
Wage worker non-ag. Private	0.026 (0.012)	*
Wage worker ag. Private	0.011 (0.015)	
Employer ag.	0.087 (0.012)	***
Employer non-ag.	0.142 (0.013)	***
Self-emp. Ag.	0.005 (0.016)	
Self-emp. Non-ag.	0.044 (0.013)	***
OLF, unemp.	0.006 (0.012)	

<b>Head gender (Ref: Male)</b>		
Female	0.094 (0.009)	***
<b>Governorate (Ref: Cairo)</b>		
Alexandria	-0.112 (0.010)	***
Port Said	0.024 (0.022)	
Suez	0.150 (0.025)	***
Damietta	-0.020 (0.018)	
Dakahlia	-0.231 (0.011)	***
Sharkia	-0.395 (0.011)	***
Kalyubia	-0.148 (0.011)	***
Kafr El-Sheikh	-0.161 (0.014)	***
Gharbia	-0.081 (0.011)	***
Menoufia	-0.237 (0.013)	***
Behera	-0.281 (0.012)	***
Ismailia	-0.102 (0.020)	***
Giza	-0.086 (0.010)	***
Beni Suef	-0.293 (0.015)	***
Fayoum	-0.098 (0.014)	***
Menya	-0.332 (0.012)	***
Assuit	-0.479 (0.013)	***
Souhag	-0.368 (0.012)	***
Qena	-0.270 (0.014)	***
Aswan	-0.349 (0.018)	***
Luxor	-0.166 (0.026)	***
<b>Demographics</b>		
Share of adult females in hh	0.059 (0.025)	*
Share of adult males in hh	0.099 (0.027)	***
Share of children 14 years and under in hh	-0.079 (0.024)	**
Share of children 6 years and under in hh	-0.277 (0.018)	***
Share of adult female wage workers in public sector in hh	0.132 (0.027)	***
Share of adult females wage workers in private sector in hh	0.019 (0.038)	
Share of adult non wage employed females in hh	0.105 (0.018)	***
Share of illiterate in hh	0.033 (0.014)	*
Share of adult males wage workers in public sector in hh	0.136 (0.033)	***
Share of adult male wage workers in private sector in hh	0.121 (0.024)	***
Share of adult non wage employed males in hh	0.109 (0.02)	***
Share of university grad and above in hh	0.219 (0.020)	***
<b>Intercept</b>	7.947 (0.041)	***
R-Squared	0.687	
Adjusted R-Squared	0.686	
N	23229	

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$   
Source: Authors' calculations based on Egypt HIECS 2004/5

**Table 20: Egypt HIECS 2004/2005 Household Effect Model**

Air Conditioner	8.511 (1.393)	***
Dishwasher	0.518 (0.132)	***
Home Ownership: Rented	0.203 (0.042)	***
Governorate: Dakahlia	-0.326 (0.058)	***
Person per room	11.068 (1.851)	***
Head Gender: Female	0.355 (0.052)	***
Share of adult females in hh	0.520 (0.094)	***
<b>Interaction with Predicted Value of Consumption</b>		
Air Conditioner	-0.948 (0.162)	***
Person per room	11.068 (1.851)	***
<b>Interactions with Predicted Value of Consumption - Squared</b>		
Person per room	0.181 (0.03)	***
Total number of room	0.002 (0.000)	***
Sewerage: Cess pool	-0.003 (0.001)	***
Share of adult females in hh	0.011 (0.001)	***
Urban	0.004 (0.001)	***
<b>Intercept</b>	-6.582 (0.113)	***
<hr/>		
R-Squared	0.036	
Adjusted R-Squared	0.036	
N	23229	

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Source: Authors' calculations based on Egypt HIECS 2004/5

**Table 21: Egypt HIECS 2012/2013 OLS Consumption Model (Log Consumption Per Capita In Nominal Local Currency Units)**

Total no. of Individuals in the Household	-0.102 (0.005)	***
Persons per room	-0.045 (0.013)	***
Rooms	0.045 (0.006)	***
Urban	0.056 (0.011)	***
Age	-0.004 (0.002)	
Age - Squared	0.000 (0.000)	*
<b>Assets</b>		
Air conditioner	0.279 (0.018)	***
Camera	0.233 (0.029)	***
Cooker	0.036 (0.045)	
Dishwasher	0.278 (0.053)	***
Fan	0.034 (0.017)	*
Internet	0.111 (0.014)	***
Iron	0.052 (0.010)	***
Motorcycle, bicycle	0.035 (0.012)	**
Refrigerator	0.023 (0.018)	
Telephone	0.060 (0.018)	***
Television	0.019 (0.021)	
Water heater	0.085 (0.011)	***
Washing machine	-0.004 (0.019)	
<b>Home ownership (Ref: Owned Home)</b>		
Rented	-0.153 (0.012)	***
Provided free	-0.022 (0.012)	
<b>Sewerage facility (Ref: Public Sewerage Network)</b>		
Cess pool	-0.064 (0.011)	***
No facility	-0.163 (0.086)	
<b>Head education (Ref: No Education)</b>		
Basic	0.067 (0.016)	***
Intermediate	0.095 (0.015)	***
Above Int.	0.124 (0.024)	***
Univ. & above	0.223 (0.022)	***
<b>Head labor market status (Ref: Wage worker gov.)</b>		
Wage worker public	0.078 (0.027)	**
Wage worker non-ag. Private	0.011 (0.021)	
Wage worker ag. Private	-0.048 (0.028)	
Employer ag.	0.030 (0.024)	
Employer non-ag.	0.110 (0.024)	***
Self-emp. Ag.	-0.072 (0.033)	*
Self-emp. Non-ag.	0.008 (0.024)	

OLF, unemp.	-0.015 (0.022)	
<b>Head gender (Ref: Male)</b>		
Female	0.080 (0.016)	***
<b>Governorate (Ref: Cairo)</b>		
Alexandria	0.057 (0.020)	**
Port Said	0.034 (0.042)	
Suez	0.344 (0.047)	***
Damietta	-0.127 (0.032)	***
Dakahlia	-0.125 (0.020)	***
Sharkia	-0.080 (0.020)	***
Kalyubia	-0.177 (0.020)	***
Kafr El-Sheikh	0.007 (0.025)	
Gharbia	-0.010 (0.021)	
Menoufia	-0.015 (0.023)	
Behera	-0.153 (0.021)	***
Ismailia	0.058 (0.035)	
Giza	-0.125 (0.018)	***
Beni Suef	-0.123 (0.027)	***
Fayoum	-0.158 (0.026)	***
Menya	-0.110 (0.022)	***
Assuit	-0.317 (0.023)	***
Souhag	-0.295 (0.023)	***
Qena	-0.375 (0.026)	***
Aswan	-0.430 (0.033)	***
Luxor	-0.297 (0.037)	***
<b>Demographics</b>		
Share of adult females in hh	0.151 (0.047)	**
Share of adult males in hh	0.151 (0.050)	**
Share of children 14 years and under in hh	-0.160 (0.046)	***
Share of children 6 years and under in hh	-0.256 (0.033)	***
Share of adult female wage workers in public sector in hh	0.172 (0.047)	***
Share of adult females wage workers in private sector in hh	-0.042 (60.000)	
Share of adult non wage employed females in hh	0.066 (0.038)	
Share of illiterate in hh	0.024 (0.026)	
Share of adult males wage workers in public sector in hh	0.109 (0.065)	
Share of adult male wage workers in private sector in hh	0.019 (0.042)	
Share of adult non wage employed males in hh	0.078 (0.048)	
Share of university grad and above in hh	0.058 (0.036)	
<b>Intercept</b>	8.795 (0.090)	***
R-Squared	0.656	
Adjusted R-Squared	0.653	

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Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

Source: Authors' calculations based on Egypt HIECS 2012/13



**Table 22: Egypt HIECS 2012/2013 Household Effect Model**

Predicted Value of Consumption	27.146 (7.213)	***
Predicted Value of Consumption - Squared	0.505 (0.095)	***
OLF, unemp.	0.261 (0.065)	***
Governorate: Giza	0.370 (0.097)	***
Governorate: Qena	0.497 (0.158)	**
Intercept	27.146 (7.213)	***
R-Squared	0.028	
Adjusted R-Squared	0.027	
N	7403	

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Source: Authors' calculations based on Egypt HIECS 2012/13

**Table 23: Jordan 2010 OLS Consumption Model (Log Consumption Per Capita in Nominal Local Currency Units)**

Total no. of Individuals in the Household	-0.098 (0.006)	***
Urban	-0.041 (0.162)	
Age	-0.010 (0.005)	*
Age - Squared	0.000 (0.000)	*
<b>Assets</b>		
Air conditioner	0.198 (0.030)	***
Car	0.218 (0.021)	***
Computer	0.036 (0.024)	
Cooker	0.554 (0.185)	**
Dishwasher	0.221 (0.077)	**
Fan	-0.027 (0.027)	
Fax	0.427 (0.110)	***
Internet	0.208 (0.031)	***
Iron	0.036 (0.029)	
Microwave	0.084 (0.023)	***
Refrigerator	0.037 (0.072)	
Satellite	-0.047 (0.064)	
Sewing Machine	-0.009 (0.028)	
Telephone	0.015 (0.081)	
Television	0.116 (0.131)	
Water heater	0.036 (0.023)	
Washing machine	0.278 (0.074)	***
<b>Home ownership (Ref: Owned Home)</b>		
Rented	-0.101 (0.024)	***
Provided free	-0.057 (0.048)	
<b>Sewerage facility (Ref: Public Sewerage Network)</b>		
Cess pool	-0.012 (0.025)	
No facility	-0.043 (0.216)	
<b>Head education (Ref: No Education)</b>		
Primary	0.111 (0.038)	**
Secondary	0.175 (0.045)	***
Post-sec.	0.235 (0.048)	***
University & above	0.275 (0.054)	***
<b>Head labor market status (Ref: Wage worker gov.)</b>		
Wage worker public	0.057 (0.041)	
Wage worker non-ag. Private	-0.041 (0.162)	
Wage worker ag. Private	-0.020 (0.153)	
Employer ag.	0.178 (0.061)	**
Employer non-ag.	0.056 (0.134)	

Self-emp. Ag.	-0.024 (0.058)	
Self-emp. Non-ag.	-0.010 (0.042)	
OLF, unemp.	-0.046 (0.081)	
<b>Head gender (Ref: Male)</b>		
Female	0.138 (0.037)	***
<b>Governorate (Ref: Amman)</b>		
Balqa	-0.189 (0.049)	***
Zarqa	0.010 (0.033)	
Madaba	0.074 (0.070)	
Irbid	-0.097 (0.027)	***
Mafrq	-0.063 (0.043)	
Jerash	0.148 (0.134)	
Ajloun	-0.159 (0.066)	*
Karak	-0.058 (0.053)	
Tafilah	-0.046 (0.081)	
Ma'an	-0.329 (0.057)	***
Aqaba	-0.309 (0.098)	**
<b>Demographics</b>		
Share of adult females in hh	0.461 (0.112)	***
Share of adult males in hh	0.335 (0.129)	**
Share of children 14 years and under in hh	-0.248 (0.114)	*
Share of children 6 years and under in hh	0.021 (0.081)	
Share of adult female wage workers in public sector in hh	-0.331 (0.208)	
Share of adult females wage workers in private sector in hh	0.208 (0.126)	
Share of adult non wage employed females in hh	0.287 (0.300)	
Share of illiterate in hh	0.007 (0.074)	
Share of adult males wage workers in public sector in hh	0.317 (0.142)	*
Share of adult male wage workers in private sector in hh	-0.139 (0.123)	
Share of adult non wage employed males in hh	0.259 (0.193)	
Share of university grad and above in hh	0.123 (0.080)	
<b>Intercept</b>	6.588 (0.283)	***
R-Squared	0.669	
Adjusted R-Squared	0.662	
N	2842	

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Source: Authors' calculations based on Jordan HIECS 2010

**Table 24: Jordan 2010 Household Effect Model**

Governorate: Jerash	-0.831 (0.488)	
Share Illiterate	1.159 (0.243)	***
Intercept	-5.722 (0.062)	***
R-Squared	0.017	
Adjusted R-Squared	0.016	
N	2842	

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Source: Authors' calculations based on Jordan HIECS 2010

**Table 25: Tunisia 2010 OLS Consumption Model (Log Consumption Per Capita In Nominal Local Currency Units)**

Total no. of Individuals in the Household	-0.102 (0.004)	***
Urban	0.018 (0.014)	
Age	0.002 (0.003)	
Age - Squared	0.000 (0.000)	
<b>Assets</b>		
Air conditioner	0.191 (0.015)	***
Bicycle	0.028 (0.021)	
Camera	0.091 (0.017)	***
Car	0.223 (0.016)	***
Computer	0.0845 (0.018)	***
Cooker	0.094 (0.011)	***
Dishwasher	0.198 (0.031)	***
DVD	0.073 (0.012)	***
Fan	0.084 (0.010)	***
Freezer	0.094 (0.023)	***
Internet	0.018 (0.022)	
Microwave	0.104 (0.014)	***
Mobile	0.123 (0.012)	***
Motorcycle	0.120 (0.015)	***
Radio	0.050 (0.010)	***
Refrigerator	0.125 (0.020)	***
Satellite	0.066 (0.015)	***
Sewing Machine	0.064 (0.019)	***
Telephone	0.048 (0.013)	***
Television	0.084 (0.024)	***
Washing machine	0.149 (0.012)	***
<b>Home ownership (Ref: Owned Home)</b>		
Rented	0.013 (0.017)	
Provided free	0.015 (0.023)	
<b>Sewerage facility (Ref: Public Sewerage Network)</b>		
Cess pool	-0.044 (0.013)	***
No facility	-0.137 (0.027)	***
<b>Head education (Ref: No Education)</b>		
Primary	0.008 (0.016)	
Secondary	0.077 (0.02)	***
Post-sec.	0.150 (0.036)	***
University & above	0.166 (0.035)	***
<b>Head labor market status (Ref: Wage worker gov.)</b>		
Wage worker public	-0.003 (0.040)	

Wage worker non-ag. Private	-0.089 (0.026)	***
Wage worker ag. Private	-0.066 (0.032)	*
Employer ag.	0.018 (0.040)	
Employer non-ag.	0.014 (0.033)	
Self-emp. Ag.	-0.024 (0.031)	
Self-emp. Non-ag.	-0.095 (0.029)	**
OLF, unemp.	0.019 (0.026)	
<b>Head gender (Ref: Male)</b>		
Female	0.047 (0.017)	**
<b>Region</b>		
Grand Tunis	-0.086 (0.016)	***
North East	-0.238 (0.016)	***
North West	0.036 (0.014)	*
Center East	-0.182 (0.016)	***
Center West	-0.081 (0.018)	***
South East	-0.241 (0.019)	***
South West	0.013 (0.003)	***
<b>Demographics</b>		
Share of adult females in hh	0.170 (0.051)	***
Share of adult males in hh	0.184 (0.055)	***
Share of children 14 years and under in hh	-0.286 (0.054)	***
Share of children 6 years and under in hh	-0.016 (0.041)	
Share of adult female wage workers in public sector in hh	0.297 (0.066)	***
Share of adult females wage workers in private sector in hh	0.182 (0.045)	***
Share of adult non wage employed females in hh	0.076 (0.051)	
Share of illiterate in hh	-0.083 (0.028)	**
Share of adult males wage workers in public sector in hh	-0.006 (0.083)	
Share of adult male wage workers in private sector in hh	0.215 (0.047)	***
Share of adult non wage employed males in hh	0.236 (0.055)	***
Share of university grad and above in hh	0.093 (0.057)	
<b>Intercept</b>	7.365 (0.097)	***
R-Squared	0.680	
Adjusted R-Squared	0.678	
N	11055	

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Source: Authors' calculations based on Tunisia EBCNV 2010

**Table 26: Tunisia 2010 Household Effect Model**

Bicycle & consumption interaction	-0.050 (0.015)	**
Region: Greater Tunis	-0.368 (0.067)	***
Region: North East & consumption squared interaction	-0.010 (0.001)	***
Sewerage facility: Cess pool	-0.203 (0.052)	***
Demographics: Share of children 14 years and under in hh	-0.058 (0.014)	***
Intercept	-5.157 (0.043)	***
R-Squared	0.016	
Adjusted R-Squared	0.016	
N	11055	

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Source: Authors' calculations based on Tunisia EBCNV 2010