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## Abstract

We provide in this paper measures of inequality of opportunity of wages and consumption for Egypt at different points in time from 1988 to 2012. A standard way of measuring the degree of inequality of opportunity in a society is to choose a set of circumstances – characteristics of the individual's environment that affect his future income and are beyond his control – and to partition the population into types, where a type is the set of individuals with the same circumstances. Inequality in the outcomes of interest between types is attributable to inequality of opportunity, whereas inequality within types is attributable to effort or luck. Although measures of inequality of wage income are increasing over time in Egypt starting in 1998, the share attributable to circumstances appears to be declining steadily throughout the whole period. We attribute this decline to the fact that outcomes for the middle class are moving closer to the outcomes of the lower classes. The outcomes for the most privileged groups remain quite different. Another possible explanation is that unobserved circumstances are playing a growing role in inequality of opportunity in Egypt.

***JEL Classifications:*** D63, D31, E24, O15

***Keywords:*** Inequality of opportunity, Wages, Consumption, Egypt

## ملخص

نقدم في هذه الورقة تدابير لعدم تكافؤ الفرص في الأجور والاستهلاك لمصر في نقاط مختلفة في الوقت من عام 1988 إلى عام 2012. وهناك طريقة معيارية لقياس درجة من عدم تكافؤ الفرص في المجتمع وهي اختيار مجموعة من الظروف – مثل خصائص بيئة الفرد وتؤثر على دخله في المستقبل وتكون خارجة عن إرادته - وتقسيم السكان إلى أنواع، حيث أن النوع هو مجموعة من الأفراد مع نفس الظروف. عدم المساواة في النتائج في المصالح بين الأنواع تعزى إلى عدم تكافؤ الفرص، في حين أن عدم المساواة داخل أنواع تعزى إلى الجهد أو الحظ. وعلى الرغم من تدابير عدم المساواة في الدخل من الأجور تتزايد مع مرور الوقت في مصر بدءا من عام 1998، تعزى الحصة إلى أن الانخفاض المتواصل طوال تلك الفترة. ونحن نعزو هذا الانخفاض إلى حقيقة أن نتائجها للطبقة الوسطى تقترب إلى نتائج الطبقات الدنيا. لا تزال نتائج الفئات الأكثر تميزا مختلفة تماما. تفسير آخر محتمل هو أن الظروف غير الملحوظة يلعبون دورا متزايدا في عدم تكافؤ الفرص في مصر.

## 1. Introduction

The Egyptian public's perception of income inequality seems at odds with what the standard measures suggest. The central theme of the mass protests in Egypt in 2011 as reported in the media was economic and social injustice. Other sources confirm the wide perceptions of income inequality are at odds with standard measurements -- such as the Gini index -- which show only mild and declining levels of income inequality (Bibi & Nabli, 2009; El Enbaby & Galal, 2015; Hassine, 2011, 2015; Hlasny & Verme, 2014; Verme, Milanovic, Al-Shawarby, et al., 2014). The conflict between perceptions and evidence from available data has given rise to a "MENA inequality puzzle" (World Bank, 2015), which is particularly relevant to Egypt. In this paper we provide evidence of inequality of wages and consumption in Egypt over time that sheds light on this puzzle.

Attempts at reconciling perceptions of high inequality with low estimates of the Gini index from cross-sectional data in MENA countries include searching for missing top incomes (Hlasny & Verme, 2014), wealth inequality (World Bank, 2015) and inequality of opportunity, which may help resolve the puzzle. Hlasny and Verme (2014) explore the possibility that missing top incomes may yield a much higher inequality of income than we find in existing data in Egypt and conclude that this is not the case. World Bank (2015) provides evidence of high wealth inequality using data on financial assets held abroad by MENA individuals. While a perception of such wealth held abroad no doubt resonates with the public, it is distant from their own experiences since it does not incorporate wealth held by a broad section of the population.

By contrast, inequality of opportunity estimated from broad-based surveys can better capture the notion of unfairness and social injustice, which is at the root of popular perceptions. Fortunately, there is a growing literature on the Middle East that estimates the level of inequality of opportunity in MENA countries in health, education, wages, wealth, and access to basic services (Assaad, Salehi-Isfahani, & Hendy, 2014; El Enbaby & Galal, 2015; El-Kogali & Krafft, 2015; Ersado & Aran, 2014; Krafft & Assaad, 2016; Salehi-Isfahani, Hassine, & Assaad, 2012; Velez, Al-Shawarby, & El-Laithy, 2012). But so far this literature does not settle the inequality puzzle for Egypt. While the evidence clearly indicates that Egypt as a society fails to provide equal access to basic opportunities for all its children, except in specific aspects of education, this evidence does not distinguish Egypt as a country with an unusually high level of inequality of opportunity. The most glaring evidence of inequality of opportunity in education is in reaching university education, provided by Assaad (2013), who estimates the probability of a boy from a least advantaged family enrolling in university to be only 9% compared to 97% for a boy from a most advantaged family. Other estimates of inequality of opportunity vary, depending on the type of outcome being measured. Estimates of inequality of opportunity in educational achievement (TIMSS scores for eight graders) show considerable inequality in Egypt but place it below half a dozen MENA countries, such as Qatar, Turkey, Iran, and Jordan (Ersado & Aran, 2014; Salehi-Isfahani, Hassine, & Assaad, 2014). Inequality of opportunity in attainment is also an issue in Egypt, as measured by ever attending school and reaching secondary level if ever attending (Assaad, Salehi-Isfahani, & Hendy, 2014).

Assaad, Krafft, Belhaj-Hassine and Salehi-Isfahani (2012) show that Egyptian children born to disadvantaged families suffer from poorer health, as reflected in their anthropometric characteristics, height and weight, during early childhood. Access to basic services, as measured by the Human Opportunity Index, is unequal in Egypt but, significantly, had improved in the decade before the uprisings (Ersado & Aran, 2014; Salehi-Isfahani & Vahidmanesh, 2016).

There are relatively fewer studies of inequality of opportunity in wages and consumption. Belhaj-Hassine (2011) shows moderate and declining levels of inequality of opportunity in wages. However,

since wages are roughly only one-half of all incomes in Egypt and do not include subsidies and transfers, evidence from wages may not tell as complete a story as we can glean from consumption data. El Enbaby and Galal (2015) examine more recent data on wages, and found that while overall inequality fell from 2006 to 2012, the share of inequality of opportunity increased. Levels of inequality of opportunity in wages remain low, but inequality of opportunity in assets is higher. Assaad, Krafft, Roemer and Salehi-Isfahani (2016) examine inequality of opportunity in income and consumption for Egypt, Jordan and Tunisia for the period 2012-2014 and find moderate levels of inequality in all three countries. In this paper we examine the trend in inequality of opportunity in Egypt since 1988, and for the first time provide estimates of inequality of opportunity in both wages and consumption over time. Our findings generally confirm the evidence available so far of low and declining inequality in Egypt.

Section 2 presents our conceptual framework and the methodology for the estimation of inequality of opportunity. Section 3 describes the data sets we employ and the specification of our outcome variables and circumstances. Section 4 presents the results on inequality of opportunity measures in Egypt over time. Section 5 concludes.

## 2. Conceptual Framework

Our study follows the now standard framework proposed by Roemer (1998), which has been applied in a number of empirical studies of inequality of opportunity (Bourguignon, Ferreira, & Menendez, 2007; Ferreira & Gignoux, 2011; see also Roemer & Trannoy, 2014, for a survey, among others). In this framework, outcomes are the result of luck, individual effort, and circumstances beyond individual control. Of these, only circumstances are potentially observable. Survey and census data that links inequality in a particular outcome to a subset of these circumstances then allows a decomposition of total inequality into that part due to the observed circumstances (inequality of opportunity) and the rest due to effort and luck.

### *2.1 Decomposition of Inequality into Components due to Circumstances and Effort*

We define circumstances as those aspects of a person's environment that are generally believed to be beyond individual control: the socio-economic status of the family in which a person is raised and the birth region of the child. Family background is mainly defined on the basis of parental education and fathers' occupation, and the region of birth consists of metropolitan, provincial urban, and provincial rural areas. We then define a *type* as the set of persons with the same set of circumstances. Within each type, the inequality in the distribution of wages, income, or consumption, which we call *residual inequality,* can be attributed to factors other than the circumstances that define these types (that is, effort, unobserved circumstances, and luck).

We partition parental education into four categories, the lowest is one where both parents are illiterate, the highest is one where at least one parent has university education or both parents have upper secondary education. The two middle types have various other combinations of parents' education, as described below. This division hides important differences within each education category, including the fact that the *quality* of the parents' education varies. For example, it matters if the father attended an elite secondary school in Cairo or a public school in a poor area (both are coded the same way in our data). Among other unobserved circumstances are other aspects of the home environment, including parental time investment in the child.

To illustrate this approach, consider Figure 1, which plots the cumulative distribution functions of four types of workers in Egypt, where types are defined by levels of parental education. The distributions of the four types exhibit first-order stochastic dominance. The distribution of wages for

workers with the best educated parents (at least one parent with university education or both parents with upper secondary education) lies entirely to the right of the rest, and the distribution of workers with least educated parents (both parents illiterate) lies all the way to the left. The *horizontal distance* between these CDFs indicates inequality of opportunity. For instance, the median worker in the most advantaged type has a wage approximately triple that of the median worker of illiterate parents.

Another way to describe the inequality of opportunity depicted in this graph is to note that the distribution of wages within a type represents the wage opportunities accessible to members of that type, and the fact that these distributions differ comprises inequality of opportunity. Although we consider the graphic approach to inequality of opportunity compelling, much of our empirical work is done using statistical decompositions. Interestingly, the seemingly large amount of inequality of opportunity observed in Figure 1 turns out to be small when compared to inequality in other countries measured using common statistical techniques. Throughout this study we remind ourselves that the typology we use ignores many important circumstances, and that the inequality of opportunity we measure is only a lower bound on the true degree of opportunity inequality. Having said that, the comparison of inequalities over time is valid to the extent that the influence of the unobserved circumstance remains constant over time.

### *2.2 General entropy measures of inequality and their decomposition*

We measure inequality using the general entropy class of inequality measures, which are decomposable and are therefore the most commonly used for estimating inequality of opportunity (Ferreira & Gignoux, 2011). Our decomposition of inequality into circumstances and effort follows standard analysis and uses the standard notation. Let $F(y)$ be the distribution of an outcome $y$ (such as wages) with mean $\mu$. The inverse of the distribution function $F$ is the quantile function, $Q(p)$, which denotes the outcome level below which we find $p$ proportion of the population, for $p \in [0,1]$. Thus $F(Q(p)) = p$. We employ the general entropy index GE(0), also known as Theil's-L or the mean logarithmic deviation (MLD), which is the most suitable for the purpose at hand. This index is defined as (Duclos & Araar, 2006):

$$GE(0) = \int_0^1 ln\left(\frac{\mu}{Q(p)}\right) dp$$

This measure weights the lower end of the distribution more heavily in measuring inequality.

In order to decompose inequality into the part due to circumstances and that due to effort and luck, we assign individuals to types, $k$, where each type consists of those individuals with the same circumstances. We then decompose inequality into within- and between-type inequality (Duclos & Araar, 2006):

$$GE(\theta, F) = \sum_{k=1}^{K} \phi(k) \left(\frac{\mu_k}{\mu}\right)^{\theta} GE(\theta, k) + GE(\theta, \tilde{F}), \qquad (2.1)$$

Within Between

where $\phi(k)$ is the fraction of the population in type $k$, $\mu_k$ is the mean outcome of type $k$, and $GE(\theta, k)$ is the GE index of type $k$. $GE(\theta, k)$ is the measure of within group inequality. $GE(\theta, \tilde{F})$ is the GE index of a counterfactual distribution $\tilde{F}$ where each member of type $k$ is assigned $\mu_k$, their type's mean. In the hypothetical counterfactual there is no inequality within types, thus, $GE(\theta, \tilde{F})$ is a measure of

between group inequality (Duclos & Araar, 2006). The hypothetical distribution function $\tilde{F}$ is a step function, with one step for each type. One important feature of this decomposition into within-type inequality, which is attributed to effort, and between-type inequality, which is attributed to circumstances, is that only with $\theta = 0$ will the two kinds of inequality add to exactly $GE(\theta)$. That is, for $\theta = 0$, (2.1) reduces to:

$$GE(0,F) = \sum \phi(k) GE(0,k) + GE(0,\tilde{F}) \qquad (2.2)$$

All of the analyses incorporate bootstrapped standard errors around the estimated GE(0) statistics (and other statistics for inequality). Standard errors are clustered for all estimates, both bootstrapped inequality statistics and regressions.

### *2.3 Parametric estimation*

To assess the contribution of more than just a few circumstances using survey data, it is necessary to use parametric assumptions about how outcome *y* depends on the vector of circumstances *C*. The parametric approach relies on a linear estimate of this relationship:

$y = C\psi + \varepsilon$ .

With estimated coefficients, $\hat{\psi}$, the parametrically smoothed distribution is estimated by replacing $y_i$ with (Ferreira & Gignoux, 2011):

$\tilde{\hat{z}}_i = C_i\hat{\psi}$

Essentially, predicted values are used as estimates of type means. The inequality among these type means is a measure of between-type inequality. If the linear relationship holds and there are no missing interaction terms, the results would be the same as with a non-parametric estimate. This smoothed distribution allows for a direct, parametric estimate of inequality of opportunity as:

$$\theta_d = \frac{GE\left(0, \{\tilde{\hat{z}}_i\}\right)}{GE\left(0, \{y_i\}\right)}$$

Alternatively, with estimated residuals, $\hat{\varepsilon}_i$, the parametrically standardized distribution can be estimated as (Ferreira & Gignoux, 2011):

$\tilde{\hat{y}}_i = \bar{C}_i\hat{\psi} + \hat{\varepsilon}_i$,

where $\bar{C}$ is the vector of sample mean circumstances. Only within-type inequality remains, and thus we may calculate inequality of opportunity residually as:

$$\theta_r = 1 - \frac{GE\left(0, \{\tilde{\hat{y}}_i\}\right)}{GE\left(0, \{y_i\}\right)}$$

### *2.4 Partial effects in parametric estimation*

We are often interested in measuring the contribution of individual elements, or groups of elements, in *C* to total inequality. For example, we might ask if most of inequality of opportunity is driven by regional differences, which would have substantially different policy implications than if inequality of opportunity were driven by, say, parents' education. Estimating the "partial effects" of different circumstances in total inequality requires a counterfactual standardized distribution, removing the effects of some circumstances, and estimating partial effects residually. It is not possible to predict

outcomes (generate a smoothed distribution) for just some circumstances without making assumptions about the distributions of the others.

The counterfactual standardized distribution involves neutralizing a circumstance, or set of circumstances, *J* (Ferreira & Gignoux, 2011):

$$\tilde{\hat{y}}_i^J = \bar{C}^J \hat{\psi}^J + C_i^{j \neq J} \hat{\psi}^{j \neq J} + \hat{\varepsilon}_i$$

Then the share of total inequality due to circumstance set *J* is (Ferreira & Gignoux, 2011):

$$\theta_r^J = 1 - \frac{GE\left(0, \{\tilde{\hat{y}}_i^J\}\right)}{GE\left(0, \{y_i\}\right)}$$

It must be kept in mind that the sums of the contributions of all the partial effects of circumstances *C* do not add up precisely to total inequality of opportunity. Neutralizing the effect of various sets of circumstances allows us to estimate the contribution of these particular circumstances to inequality of opportunity.

## 3. Data

### *3.1 The Egypt Labor Market Panel Surveys*

Our analyses are based on a series of labor market panel surveys from Egypt. The earliest is the 1988 special round of the Labor Force Sample Survey (LFSS). Additionally, we use the 1998, 2006, and 2012 rounds of the Egypt Labor Market Panel Survey (ELMPS). After the initial 1998 round, households and individuals were tracked over time, even if they split to form new households. In subsequent rounds, a refresher sample was added, and individuals in the refresher sample were also tracked thereafter.[1] The 1988 special round of the LFSS was carried out by Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS) and the ELMPS surveys were carried out by the Economic Research Forum (ERF) in collaboration with CAPMAS.

### *3.2 Outcomes*

The focus of this paper is analyzing the evolution of inequality in Egypt over time. Specifically, we examine two individual and household economic outcomes: individual wages and imputed per capita household consumption. All of the outcomes are in 2012 PPP international dollars, after converting into constant 2012 local currency units using the CPI and PPP international dollars from nominal local currency units.

Household consumption (expenditure) data are not collected in the LFSS/ELMPSs themselves. However, we use methods and software (POVMAP2) designed to map consumption from one data source onto another, recovering the original variance (the latter being crucial for inequality measurement purposes). Specifically, we model the predictors and variance of household consumption in contemporaneous household income expenditure and consumption surveys (HIECS) for the various countries and all the rounds except for Egypt in 1988.[2] These are used to predict consumption and recover the variance for consumption in the LMPSs based on the same set of covariates (for instance, durable assets).

[1] Reports on ELMPS data collection, sample design, tracking of households, and sample weighting are available (Assaad & Barsoum, 2000; Assaad & Krafft, 2013; Barsoum, 2009).

[2] No contemporaneous HIECS was available for 1988.

Individual wage data are collected directly in all the LFSS/ELMPSs for wage workers. All elements of wages (basic wages, supplemental wages, bonuses, incentives, overtime, and other wages from across all primary and secondary jobs) are aggregated into a monthly wage.

### *3.3 Sample*

The sample for our analyses of per capita consumption is all household heads with data on circumstances. Individual household heads are our unit of analysis for the consumption analyses.

The wage outcome is an individual outcome, and we use a sample of men ages 30-49, the age group that can be expected to be earning wages. Women are excluded from our analyses due to their low and selective labor force participation (Assaad & Krafft, 2015a; Hendy, 2015). Unemployment in Egypt is primarily a privileged, educated, new entrant phenomenon, and job-queuing behavior is common (Amer, 2015; Assaad & Krafft, 2014, 2015a; Assaad, 1997; Krafft & Assaad, 2014). The work by Assaad, Krafft, Roemer, and Salehi-Isfahani (2016) analyzes income, including non-wage income in the 2012 round, and discusses how selection into wage work might affect analyses of inequality.

### *3.4 Panel vs. cross-sectional data*

One additional analysis that is undertaken in this paper exploits the panel nature of the ELMPS. With the rounds in 1998 and 2012, we can observe individuals in their natal households in 1998 and assess the impact of circumstances that are not (or cannot) be reported once individuals have left their households. Specifically, we use a sample of males who were aged 26-36 in 2012 (and therefore approximately 12-22 in 1998) and who were observed in their natal households in 1998. This age range trades off selection due to household formation (fewer than 3% of individuals meeting the age restrictions were heads of their own household in 1998) and selection due to individuals being unemployed into their mid-20s. While circumstance information incorporates primarily 1998 data, outcomes are wages and earned income in 2012. Panel weights are used with this sample.

### *3.5 Circumstances*

This section discusses the different circumstance variables used in estimating inequality of opportunity under various specifications. The main variables included in our set of observed circumstances are parental characteristics, their education and fathers' occupation. We code educational attainment for each parent into five categories: (1) illiterate (2) reads and writes (3) basic (4) intermediate and above intermediate (upper secondary and two-year higher education programs) or (5) university (four-year higher education programs) and above. To reduce the number of types that five categories for each parent entail, we add these codes to create a single variable representing parental education ranging from two to ten. We then categorize this new variable into four "basic types:" parental education of (1) sum of 2, (2) sum of 3-5, (3) sum of 6-7, or (4) sum of 8-10.[3] These types are used in both parametric and non-parametric estimation. In some of our parametric estimates, where we can afford to have more categories, we allow for five different mother's education and father's education levels.

[3] Sum of 2 means both parents are illiterate. Sum of 3-5 means one of the following combinations: Illiterate and Read & Write, both Read & Write, Basic and Illiterate, Basic and Read & Write, Secondary and Illiterate. Sum of 6-7 means one of the following combinations: University and Illiterate, Secondary and Read & Write, Basic and Basic, University and Read & Write, Secondary and Basic. Sum of 8-10 means one of the following combinations: University and Basic, Secondary and Secondary, University and Secondary, or University and University.

In the non-parametric case, we also define the types based on the region of birth and father's occupation. Region of birth is defined as metropolitan, provincial urban, or provincial rural.[4] Father's occupation (when the respondent was 15 years old) is defined as white-collar, blue-collar, and agricultural worker. If fathers were not working or absent when the child was 15, we coded them as blue-collar. In the non-parametric analysis we thus have a partition of 36 types – the "full partition" – consisting of four parental education categories, three regions, and three father's occupations.

In the parametric models, we first stick with the same set of circumstances defined above as the "basic types." We call this specification 1. Specification 2 corresponds to the "full partition", and includes controls for the four parental education types, birth region, urban versus rural, and the three categories of father's occupation. We also control for work experience and its square, but do not treat work experience as a circumstance (allowing it to contribute to within-group but not between-group inequality). In specification 3 we depart from the non-parametric case by allowing for five categories of mother's and father's education, use six birth regions, and allow for eight categories of father's occupation: (1) white collar wage, (2) white collar non-wage, (3) blue collar regular wage, (4) blue collar irregular wage, (5) blue collar nonwage, (6) agricultural regular wage, (7) agricultural irregular wage, and (8) agricultural non-wage. Irregular work is much more precarious than regular work, and non-wage work varies across occupations. White-collar non-wage work (owning a company, for example) is very different than blue-collar or agricultural non-wage work (unpaid family work, for instance). Work experience is also included as in specification 2.

In panel estimates we add a number of additional characteristics that were observed in 1998, calling it specification 4. This adds to specification 3 a wealth quintile variable, which is an asset index of the natal household. We include also an interaction term indicating if the father was educated and in the top wealth quintile. Grandfather's characteristics, including his education, with the same categories as for father or mother, and three levels of occupation of the grandfather are also included. In some cases, for example, when the father was not alive to report it, grandfather's education is missing; these are identified by a control term for missing values. Ownership of an enterprise, and the capital of that enterprise, as well as an interaction between being a white-collar nonwage worker and having high capital for the natal household are included in the model as well.

## 4. Results

### *4.1 Descriptive statistics on sample characteristics*

#### *4.1.1 Distribution of types*

We first examine outcomes by type (combinations of parental education). Table 1 presents the distribution of types for each round, as well as for the different samples (outcomes) we examine. The distribution of types is quite important for understanding both how large and how select a type is within a country.

When focusing on household heads in the consumption sample, more than half of individuals were in the most disadvantaged type (57%-58% over 1998-2012). This was relatively constant over time. The share with low educated parents (sum of 3-5) declined from 37% in 1998 to 32% in 2012, primarily due to the increasing share of parents with a sum of 8-10, which rose from 2% in 1998 to 5% in 2012. Clearly, during 1988-2012, there has been little change in the distribution of types for male wage-workers aged 30-49. About one-half had illiterate parents throughout the period. There has been some

[4] In Jordan, data on region of birth was not distinguished by urban vs. rural. In the 1988 round of the LFSS for Egypt, only current region of residence was available and that was used as a proxy for region of birth.

shift towards having parents with more education, with the highest type representing only 2% of the sample in 1988 but 6% in 2012.

*4.1.2 Distribution of outcomes*

The levels of outcomes across time, as well as their inequality, are important measures of well-being. As we see in Table 2, there is substantial variation over time in the typical level of different outcomes. Both mean and median wages in Egypt fell from 1988 to 1998 and then rose again by 2006, with only small further improvements in 2012.

*4.2 Inequality of opportunity in Egypt over time*

In this section we examine the evolution of inequality of opportunity over time in Egypt. The first part of the analysis discusses the distribution of outcomes (monthly wages or consumption) by type by comparing CDFs across our four parental education types for different rounds of the survey. This analysis will also examine the change in mean outcomes by type, the distribution of outcomes by quintile for each type, and the ratio of the mean outcomes of the bottom type to that of the top type and that of all other types. All these indicators are compared across the four rounds of the survey to evaluate how inequality of opportunity has changed over time in Egypt. The second part of the analysis focuses on the decomposition of inequality in monthly wages and consumption into the share due to circumstances and that due to other factors including effort. We conduct the decomposition non-parametrically first using the four types as the only circumstances and then using a set of 36 types made up of four levels of parental education, three categories of birth region and three categories of father's occupation.

One thing to note as we make these comparisons is that, as education levels increase over time, the distribution of individuals in the four types will change. While the share of individuals in the bottom type did not change appreciably, going from 54% of male wage workers in 1988 to 51% in 2012, the share of the top type tripled from 2% in 1988 to 6% in 2012 (see Table 1). The top type is therefore less elite group in 2012 than in 1988.

A similar decomposition of monthly wage inequality in Egypt was carried out by Hassine (2011) using the same data sets, but only up to 2006, and El Enbaby and Galal (2015) up through 2012. Several differences exist between our analysis and theirs. First, we focus on prime age males aged 30-49 only, whereas the previous studies included all wage earners 15-65 of both sexes. While Hassine provides estimates from both non-parametric "types" and "tranches" methods, and El Enbaby and Galal apply only parametric methods, we use both parametric and non-parametric methods, but the only non-parametric estimates we provide are from the non-parametric "types" methodology. Probably most importantly, we eliminated a handful of outliers in the 2006 data that appear to be the results of data collection errors, a step El Enbaby and Galal undertook as well.[5] The outliers' inclusion dramatically and unrealistically increases inequality in 2006, a fact that explains the big jump in inequality in Hassine's results for 2006. Despite these differences, we compare the results of past work to our own whenever relevant.

*4.2.1 Distribution and evolution of outcomes according to the four parental education types*

Turning first to the distribution of per capita consumption in Figure 2, a noteworthy trend is the compression of the distribution over time, and also increasing distinctiveness by type. From 1998 to 2006 and then from 2006 to 2012, the distance between the types generally decreased, with the

[5] The errors were almost all people working in government, earning a typical monthly wage, who had that wage reported as daily in the survey data; government wages are not daily and we have corrected these back to monthly.

exception of the second best type moving away from the top type. While the entire distribution has shown slight improvements from 1998 to 2006 and to 2012 (Figure 4), it has not changed shape particularly dramatically, suggesting that other factors than parental education are increasingly driving inequality.

Figure 3 shows the evolution of the cumulative distributions of wages for prime-age male wage earners over time. A comparison of the four panels reveals that the CDFs of the bottom three types are becoming less spread out over time, suggesting that inequality across these three types is falling. At the same time, the gap between the third and fourth types becomes larger, reaching a maximum in 2006. This suggests that as education became more common among the parents' generation, it lost some of its salience as a driver of inequality in the wage space, as was the case with consumption. In fact, as shown in Figure 5, the overall CDFs in 1988, 2006 and 2012 are almost identical, suggesting that the overall wage distribution hardly changed. In 1998, overall real wages had declined and inequality was also lower.

Consumption growth appears to be primarily occurring at the bottom end of the distribution (Table 3). The bottom type had 1.8% growth from 1998-2006 and 2.4% growth from 2006-2012, and the second type 1.1% and then 1.6% over the same periods, while the higher types had less than 1% growth over 1998 to 2012. The decline in overall wages from 1988 to 1998 and the accompanying reduction in inequality is also quite apparent from Table 3, which shows the rate of growth of wages by type across each of the rounds. From 1988 to 1998, all four types experienced wage declines, but the decline was larger in relative terms for the third and fourth types, leading to overall wage compression. From 1998 to 2006, all four types experienced an increase in real wages, with the third type experiencing the lowest increase and the other types experiencing an increase of more or less the same magnitude. From 2006 to 2012, real wages were essentially stagnant, but now the second type experienced a slight decline, compared to a slight increase among the other three types.

An examination of the quintile distribution of wages by type and over time shown in Figure 6 reveals that the degree of wage mobility across types has increased slightly in Egypt over the period 1988 to 2012. In 1988, 28% of individuals in the lowest type were in the bottom quintile of wages and 51% in the bottom two quintiles, whereas by 2012, those percentages had declined to 25% and 46%, respectively. Similarly, the fraction of the top type that were in the top quintile of wages declined from 64% in 1988 to 52% in 2012, suggesting that members of lower types had slightly higher chances of appearing in the top quintile over time. The largest changes occur between 1988 and 2006. The period from 2006 to 2012 saw less wage mobility by type.

The general trend of falling inequality across the four parental education types in Egypt since 1988 is confirmed when we examine the evolution of the ratio of the mean monthly wage or consumption of the bottom type to that of the top type and all other types. A rising ratio reveals lower inequality across types. As shown in Figure 7, the ratio of the consumption of the bottom type to the top type was stable from 1998 to 2006 and then rose in 2012. The ratio of the wages of the bottom type to those of the top type increased substantially from 1988 to 2006 and then stabilized between 2006 and 2012. The ratio of the consumption of the bottom type to all the other types rose steadily in both 1998 to 2006 and 2006 to 2012. The ratio of the wages of the bottom type to those of all other types also increased substantially from 1988 to 1998, but stabilized from 1998 to 2006 and increased slightly from 2006 to 2012. These trends confirm the decline in between-type inequality in the period under consideration.

*4.2.1 The evolution of the share of circumstances in total wage inequality*

We now move to the second part of our analysis of the evolution of inequality of opportunity over time in Egypt, relying on GE(0) to quantify, first, total inequality, and then inequality of opportunity. The trends in total inequality provide important context for interpreting whether inequality of opportunity is changing in relative or absolute terms. In Figure 8 we examine the evolution of total inequality in consumption and wages over time. We find that, while wage inequality fell from 1988 to 1998, it has been rising since then. In contrast, total consumption inequality declined slightly from 1998 to 2006 and more substantially by 2012. Our results showing rising total inequality in wages in 2006 align with those of Hassine (2011) and El Enbaby and Galal (2015). Our finding of a continued rise in inequality in 2012 is, however, at odds with El Enbaby and Galal's finding of inequality dipping again in 2012. One possible explanation is that we focus on prime age males 30-49, whereas their inclusion of the full age range 15-65 includes the youth bulge group of new entrants. Wages early on in first jobs may not be as strongly differentiated as adult wages.

It is important to keep in mind total inequality trends as we begin our examination of the share of consumption and monthly wage inequality due to circumstances using GE(0). Here we present results from our non-parametric analysis; parametric decomposition results are included in the Appendix, Table 12. As mentioned above, we first present results based on the four parental education types and then compare them to results using the full partition.

We decompose overall inequality into between-type inequality, which we refer to as inequality due to circumstances, and within-type inequality, which we refer to as residual inequality, recalling that within-type inequality is due to both effort and unobserved circumstances, so that the share of inequality due to circumstances should be interpreted as a lower bound of the contribution of differences in opportunity to overall inequality.

We can immediately see in Figure 9, for consumption, and Figure 10, for wages, that the share of inequality due to circumstances, when circumstances are captured exclusively by the four types, is falling over time. Looking first at the four types for consumption, the share of inequality due to circumstances fell from 18% in 1998 to 13% in 2012. A similar pattern is observed for wages; the share of inequality due to circumstances falls from 20% in 1988 to 13% in 1998 to 10% in 2006 and 10% in 2012 using the 4 types. The decline in the share of circumstances from 1988 to 1998 is all the more remarkable because it occurred in the absence of an increase in total inequality. Thus the decline in the share between 1998 and 2012 was due to a more rapid increase in overall inequality than in inequality due to the measured circumstances. This suggests that an increasing role for unobserved circumstances, like social class, could explain the increase in overall inequality and the declining role of parental education.

We now move to the somewhat richer specification of circumstances that define our 36-type partition. For wages, this increase in the number of types raises the share of inequality due to circumstances from 20% to 34% in 1988 and from 10% to 13% in 2012. The conclusion that the share of inequality due to circumstances fell the most from 1988 to 1998 is robust with respect to the inclusion of the new circumstances. However, this specification shows that progress continued to be made through 2012, with the share due to circumstances falling from 23% in 1998 to 16% in 2006 to 13% in 2012. The declining share results from both a decline in the numerator (the inequality due to circumstances) and an increase in the denominator (overall inequality) from 1988 to 2012, although the increase in the denominator plays a more important role in the later part of the period. Using the richer 36 types for consumption shows a similar pattern. It raises the share of inequality due to circumstances from

18% to 33% in 1998 and from 13% to 20% in 2012, but maintains and even strengthens the pattern of falling inequality due to circumstances.

It appears that, for wages, inequality of opportunity as measured by the share of circumstances in overall inequality is declining in Egypt, with the largest decline occurring in the 1988-98 decade. The pace of decline appears to have slowed in recent years, especially between 2006 and 2012, and appears to be primarily due to an overall increase in inequality that is not matched by an increase in the inequality due to the measured circumstances. This result is in line with the finding above that the gap between the CDFs of the first three types has narrowed and that the degree of wage mobility across types has increased somewhat. It is also in line with the fact that the ratios of the mean wage of the bottom type to that of the top type and that of all other types has increased over time. The result also aligns with the results in Hassine (2011) and El Enbaby and Galal (2015) showing that inequality due to circumstances has been flat or falling. Hassine shows that the opportunity share of inequality (what we refer to as the share of inequality due to circumstances) estimated using the non-parametric types approach declined from 14% in 1988 to 11% in 2006 for men 15-64 in Egypt. El Enbaby and Galal find that inequality due to circumstances went from 11% in 1998 to 9% in 2006 and then rose very slightly to 9-10% in 2012. Although no other authors have looked at consumption as yet, our results of slight declines in total inequality and declining inequality due to circumstances are consistent with patterns of declining inequality due to circumstances in wages.

In order to understand which aspects of circumstances are driving the declines in the share of circumstances in inequality, in Figure 11 we present the partial effects from the parametric specification 3, including more disaggregated categories but similar variables to the 36 types non-parametric specification. For wages, and to a lesser extent consumption, the share of circumstances in inequality due to regional differences has been a key driver of declines. Parents' occupation has a small and fluctuating partial effect, while parents' education shows small declines in partial effects over time. Essentially, it appears that much of the decline in inequality in opportunity in Egypt has been due to declining regional inequality, perhaps representing more integrated labor markets and goods markets.

One reason that patterns of declining inequality due to circumstances are at odds with increasing concern with inequality in Egypt may be that wages miss many of the key aspects of jobs that individuals value. Egyptians express strong preferences for the security and benefits inherent to public sector employment. Formal jobs in the private sector are rarer, and not valued as highly as public sector jobs, but their benefits are still valued (Assaad & Krafft, 2015b; Barsoum, 2015). The benefits of formal jobs have substantial monetary value; it has been estimated that total compensation is essentially double wage compensation in the public sector in Egypt (Assaad, 1999). Yet the availability of public sector jobs has declined, private formal jobs have not increased at a rate so as to replace public sector jobs, and access to such jobs is highly unequal (Assaad & Krafft, 2014). We investigate the trends in what we refer as "formality adjusted wages" in Figure 12, where we double wages to represent compensation for any formal job. Once formality and thus total compensation has been taken into account, total inequality has risen steadily in Egypt from 1988 to 2012, almost doubling over that period, as measured by GE(0). The share of inequality due to circumstances, using the 36 types, declined from 1998 to 2006 substantially, and only a little further from 2006 to 2012, such that absolute inequality as measured by GE(0) actually rose from 2006 to 2012, returning to 1998 levels.

Even after accounting for job formality, levels of inequality and inequality due to circumstances remain modest. However, these results must still be interpreted with caution, for they could simply

mean that the circumstances we are capturing by our classification of types are becoming less relevant for capturing the most salient social cleavages in Egyptian society. As educational attainment increases, having more educated parents does not necessarily result in more favorable labor market outcomes, thus reducing the difference in outcomes across types. In fact, other research on Egypt has shown that rising educational attainment has not translated into commensurate improvement in occupational or labor market status (Assaad & Krafft, 2014; Binzel, 2011). The increasing levels of wage and especially formality adjusted wage inequality over time are hard to explain as increasing residual inequality is more likely due to the increasing importance of unobserved circumstances such as *quality* of education and parental wealth. We explore the influence of parental wealth in the next section using panel data that allows parental wealth to be observed when individuals were still living in their natal households.

### *4.3 Panel sample results*

A common challenge in estimating inequality of opportunity based on individuals' circumstances using cross-sectional data is that so many circumstances are not observed because individuals are observed only at one point in time. For instance, information on parents' education and occupation looking at wage earners 30-49 gives only a partial picture of children's early circumstances. However, because the ELMPS tracks individuals from 1998 through 2012, we can, for a subsample of the 2012 sample, examine inequality of opportunity in 2012 outcomes incorporating the characteristics of individuals' natal households in 1998. This "panel" sample, described earlier, is young male wage earners (26-36 in 2012). This section first illustrates the distributions of wages and income by birth household wealth and mobility by household wealth, and then performs parametric analyses of inequality of opportunity for a series of specifications incorporating an increasing number of circumstances.

#### *4.3.1 Distributions of wages and income by birth household wealth*

From Figure 13, which presents the cumulative distribution functions for wages by birth household wealth, it is clear that, while there is a slight gradient in the bottom four quintiles, it is primarily wage earners whose birth households were in the wealthiest 20% of the distribution in 1998 who have higher wages in 2012. The difference between the highest wealth quintile and the fourth wealth quintile tends to be several times larger than the difference between the bottom and fourth wealth quintiles. Essentially, individuals from the bottom 80% of households face similar wages with only a slight increment by wealth, while individuals from the top 20% of households earn substantially higher wages—around 50% higher than other groups over most of the distribution.

There is a slightly stronger gradient in the bottom 80% of the distribution when earned incomes are considered (Figure 14). Although earned incomes are very similar for the two poorest quintiles, the third and fourth quintiles show more of a difference. Individuals in these quintiles with wealthier families may have better opportunities for self-employment and other non-wage work because their families can help provide capital for their enterprises. Individuals from the richest 20% of households again have substantially higher earnings than other groups, but while the gap with the poorest is similar, the gap between the fourth and richest quintiles is somewhat smaller with earned income than wages. For individuals with access to capital, there appears to be less inequality of opportunity in earned income than in wages; circumstances may determine the rewards of wage work while effort may pay off more in non-wage work.

*4.3.2 Income mobility by natal household wealth*

The role of parental wealth in determining income translates into differential patterns of mobility by wealth. Examining the share in each wage quintile by birth household wealth quintile, if outcomes were independent of circumstances, we would expect to see 20% of each birth household wealth quintile in each wage quintile. This is not the case, particularly at the extremes of the distribution. Individuals whose birth households were in the poorest 40% have only a 5-10% chance of ending up in the top wage quintile. Those born into the third wealth quintile still have a disproportionately low share, 15%, while 38% of those from the wealthiest fifth of households end up in the top quintile of the wage distribution. Individuals in the top wealth quintile are unlikely to have downward economic mobility; only 8% end up in the bottom quintile of wages and 14% in the second quintile of wages, while more than 40% of the bottom three wealth quintiles end up at the bottom of the wage distribution. Those from the poorest wealth quintile are particularly likely to be at the bottom of the wage distribution, as 28% end up in the poorest wage quintile and 27% in the second quintile.

When examining mobility by earned income (Figure 16), a similar picture of limited upward mobility among individuals from poorer families and those from rich households disproportionately represented at the top of the income distribution emerges. Individuals from the poorest 60% of households are more likely to end up at the bottom of the income distribution than the bottom of the wage distribution, but there is also slightly more mobility into the top of the distribution.

*4.3.3 Inequality, inequality of opportunity, and partial effects from parametric estimation*

Analyzing inequality of opportunity in the panel sample serves two purposes. First, it allows us to assess the contributions of natal household circumstances that could not otherwise be observed, such as wealth. Secondly, it allows us to compare the full partition estimate to the basic partition to provide a sense of how much we may be under-estimating inequality of opportunity in Egypt and other countries when these additional circumstances are not observed.

Table 10 presents the estimates of wage inequality of opportunity for GE(0) using the panel sample. Recall that outcomes are in 2012, and it is notable that the amount of total inequality (0.25) is similar to that for the full sample (0.28, see Table 6).[6] The inequality share due to circumstances in specification 1 (four-category sum of parental education only) is 13%. This is fairly similar to that for Egypt in 2012 in the full sample (10%, Table 6). The share of inequality due to circumstances increases only very slightly with the addition of region of birth and family's employment in specification 2. Finer disaggregation of father's occupation, parents' education, and region in specification 3 increases the measured share of inequality of opportunity to 15%. In specification 4, variables available only in the panel are added, and at this point the share of inequality due to circumstances increases to 18%. Although the partial effects are insignificant, parent's education has a contribution of 12%, natal wealth has an 8% contribution to total inequality, and grandfather's characteristics a 3% contribution. A number of the individual regressors contributing to the other categories are statistically significant in the regressions (Table 13).

Comparing specification 4 to the preceding specifications (Figure 17) offers a number of insights into the estimations in the full sample. First, we are clearly not capturing the full scope of inequality of opportunity with the circumstances available in the full sample (and likely still missing aspects in the panel as well); the share of inequality due to circumstances increases from 15% to 18% (a 22% increase) from specification 3 to specification 4. Secondly, the partial effect of parental education

[6] The slightly lower level of total inequality is likely due to the additional age restriction; while the panel sample is 26-36 the standard sample is 30-49 and thus has a wider range of work experience contributing to total inequality.

decreases from 15% to 12% over the same span. This suggests that other characteristics (such as other aspects of the socio-economic background) that are correlated with parents' education are contributing to the partial effect. From a perspective of assessing inequality of opportunity overall, this is in fact a boon rather than a problem, but in terms of assessing partial effects and what drives inequality of opportunity, it is problematic.

Turning now to earned income (Table 11), we see that inequality of earned income of 0.33 is again similar but slightly smaller for the panel sample than that for the full sample (Assaad, Krafft, Roemer, & Salehi-Isfahani, 2016). The share of inequality due to circumstances in specification 1 is 10%, and this increases to 14% in specification 4. Parent's education is the only statistically significant partial effect, but natal wealth and grandfather's characteristics have moderate inequality shares and also some significant coefficients in the individual regressions (Table 13). Inequality of opportunity is smaller for earned income than for wages across all the specifications. This pattern also occurred for the full sample (Assaad, Krafft, Roemer, & Salehi-Isfahani, 2016) and is likely due, in part, to the greater volatility of earned income (due to volatility in crop harvests, for instance) than the relatively fixed income from a wage.

## 5. Discussion & Conclusions

Our results are fairly conclusive when it comes to comparing the trajectory of inequality of opportunity in Egypt across time. All the measures indicate that inequality in consumption and the share of inequality due to circumstances in consumption have both declined over time. Inequality of opportunity in wage earning based on the circumstances we measure has declined appreciably over time in Egypt, with much of the decline happening between 1988 and 1998, and becoming gradually slower since then. The ratio of the average wages of the bottom type to the top type has risen significantly from 1988 to 1998 but then stabilized between 2006 and 2012. The ratio of the wages of the bottom type to all other types also increased from 1988 to 1998, but then essentially stabilized since then. The share of inequality due to circumstances fell by about a third from 1988 to 1998, and continued falling since then albeit at a slower rate. The decline in the share due circumstances between 1988 and 1998 happened in a context of both falling real wages and falling total inequality. However, the subsequent decline in the share of circumstances since 1998 occurred in the context of rising or stagnant real wages, and, more importantly, rising total inequality. Further, when job formality is monetized, there is an even stronger trend in total inequality, such that the absolute level of inequality due to circumstances actually rose from 2006 to 2012.

Do we conclude from these results that Egypt was becoming a more opportunity egalitarian country during the period under consideration? The answer is probably no. We posit that other circumstances that we do not observe in the cross-time comparison are playing an increasingly important role in defining social cleavages in Egypt over that period. Although education has expanded considerably during the period, there is evidence to show that it has lost some of its value as a driver of social mobility (Assaad & Krafft, 2014; Binzel, 2011). Other factors such as family wealth, the quality of the education obtained, and favorable social ties are probably playing a growing role in determining outcomes.

Although we are unable to test these conjectures over time, we are able to assess whether supplementing our vector of circumstances with some of these previously unobserved circumstances substantially increases the share of inequality that is attributable to circumstances. We make use of a panel dataset that follows individuals from 1998 to 2012 to add additional circumstances that cannot be easily measured in cross-sectional data to estimate the same inequality of opportunity measures. The most important set of circumstances we were able to add in this way is natal household wealth,

although we also add grandfather's education and employment in addition to the father's. The addition of these variables increases the measured share of wage inequality due to circumstances from about 15% when the previous set of circumstances was used to 18% with the augmented set, a relative increase of 22%. For earned income, there as a similar magnitude increase.

Even the childhood circumstances we add in the panel estimates are likely to capture only a small part of children's early environment. Hufe, Peichel, Roemer and Ungerer (2015), examining the United States and United Kingdom, compare inequality due to a limited set of circumstances, similar to our non-panel estimates, to a richer set of estimates with information on childhood performance and health. As discussed previously, we believe such childhood attributes should be considered circumstances. With their limited set of circumstances, Hufe et al. find that 20% of income inequality is due to circumstances, while with the fuller set of circumstances, the share rises to 46% in the U.S. and 31% in the U.K. If in Egypt richer data on children's early experiences were available, we conjecture that the role of circumstances in inequality would likewise increase more than the 22% rise of the panel estimates and could even double. This suggests that unobserved circumstances play a substantial role in explaining inequality and that the estimates we provide can only be interpreted as a conservative lower bound.

## References


Amer, M. (2015). Patterns of Labor Market Insertion in Egypt, 1998-2012. In R. Assaad & C. Krafft (Eds.), *The Egyptian Labor Market in an Era of Revolution* (pp. 70–89). Oxford, UK: Oxford University Press.

Assaad, R. (1997). The Effects of Public Sector Hiring and Compensation Policies on the Egyptian Labor Market. *The World Bank Economic Review*, *11*(1), 85–118.

Assaad, R. (1999). Matching Severance Payments with Worker Losses in the Egyptian Public Sector. *The World Bank Economic Review*, *13*(1), 117–153.

Assaad, R. (2013). Equality for All? Egypt's Free Public Higher Education Policy Breeds Inequality of Opportunity. In A. Elbadawy (Ed.), *Is There Equality of Opportunity under Free Higher Education in Egypt? (Arabic)*. New York, NY: Population Council.

Assaad, R., & Barsoum, G. (2000). *Egypt Labor Market Survey, 1998: Report on the Data Collection and Preparation*. Cairo, Egypt.

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

Assaad, R., & Krafft, C. (2014). *Youth Transitions in Egypt: School, Work, and Family Formation in an Era of Changing Opportunities*. *Silatech Working Paper No. 14-1*. Doha, Qatar: Silatech.

Assaad, R., & Krafft, C. (2015a). The Evolution of Labor Supply and Unemployment in The Egyptian Economy: 1988-2012. In R. Assaad & C. Krafft (Eds.), *The Egyptian Labor Market in an Era of Revolution* (pp. 1–26). Oxford, UK: Oxford University Press.

Assaad, R., & Krafft, C. (2015b). The Structure and Evolution of Employment in Egypt: 1998-2012. In R. Assaad & C. Krafft (Eds.), *The Egyptian Labor Market in an Era of Revolution* (pp. 27–51). Oxford, UK: Oxford University Press.

Assaad, R., Krafft, C., Hassine, N. B., & Salehi-Isfahani, D. (2012). Inequality of Opportunity in Child Health in the Arab World and Turkey. *Middle East Development Journal*, *4*(2), 1–37.

Assaad, R., Krafft, C., Roemer, J., & Salehi-Isfahani, D. (2016). *Inequality of Opportunity in Income and Consumption: The Middle East and North Africa Region in Comparative Perspective*. *Economic Research Forum Working Paper Series*. Cairo, Egypt.

Assaad, R., Salehi-Isfahani, D., & Hendy, R. (2014). *Inequality of Opportunity in Educational Attainment in Middle East and North Africa: Evidence from Household Surveys*. *Economic Research Forum Working Paper Series No. 834*. Cairo, Egypt.

Barsoum, G. (2009). Methodological Appendix 1: The Egypt Labor Market Panel Survey 2006: Documentation of the Data Collection Process. In R. Assaad (Ed.), *The Egyptian Labor Market Revisited* (pp. 259–284). Cairo, Egypt: American University in Cairo Press.

Barsoum, G. (2015). Young People's Job Aspirations in Egypt and the Continued Preference for a Government Job. In R. Assaad & C. Krafft (Eds.), *The Egyptian Labor Market in an Era of Revolution* (pp. 108–126). Oxford, UK: Oxford University Press.

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

Binzel, C. (2011). *Decline in Social Mobility: Unfulfilled Aspirations among Egypt's Educated Youth*. *IZA Discussion Paper Series No. 6139*. Bonn, Germany.

Bourguignon, F., Ferreira, F. H. G., & Menendez, M. (2007). Inequality of Opportunity in Brazil. *Review of Income and Wealth*, *53*(4), 585–618.

Duclos, J.-Y., & Araar, A. (2006). *Poverty and Equity: Measurement, Policy and Estimation with DAD*. New York, NY: Springer International Development Research Centre.

El Enbaby, H., & Galal, R. (2015). *Inequality of Opportunity in Individuals' Wages and Households' Assets in Egypt*. *Economic Research Forum Working Paper Series No. 942*. Cairo, Egypt.

El-Kogali, S., & Krafft, C. (2015). *Expanding Opportunities for the Next Generation: Early Childhood Development in the Middle East and North Africa*. Washington, DC: World Bank.

Ersado, L., & Aran, M. (2014). *Inequality of Opportunity Among Egyptian Children*. *World Bank Policy Research Paper No. 7026*. Washington, DC: World Bank.

Ferreira, F. H. G., & Gignoux, J. (2011). The Measurement of Inequality of Opportunity: Theory and an Application to Latin America. *Review of Income and Wealth*, *57*(4), 622–657.

Hassine, N. B. (2011). Inequality of Opportunity in Egypt. *The World Bank Economic Review*, *26*(2), 265–295.

Hassine, N. B. (2015). Economic Inequality in the Arab Region. *World Development*, *66*, 532–556.

Hendy, R. (2015). Women's Participation in the Egyptian Labor Market. In R. Assaad & C. Krafft (Eds.), *The Egyptian Labor Market in an Era of Revolution* (pp. 147–161). Oxford, UK: Oxford University Press.

Hlasny, V., & Verme, P. (2014). *Top Incomes and the Measurement of Inequality in Egypt*. *Economic Research Forum Working Paper Series No. 874*. Cairo, Egypt.

Hufe, P., Peichel, A., Roemer, J., & Ungerer, M. (2015). *Inequality of Income Acquisition: The Role of Childhood Circumstances*. *ZEW Discussion Paper No. 15-084*.

Krafft, C., & Assaad, R. (2014). *Why the Unemployment Rate Is a Misleading Indicator of Labor Market Health in Egypt*. *Economic Research Forum Policy Perspective No. 14*. Cairo, Egypt.

Krafft, C., & Assaad, R. (2016). Inequality of Opportunity in the Labor Market for Higher Education Graduates in Egypt and Jordan. In I. Diwan & A. Galal (Eds.), *The Middle East Economies in Times of Transition*. New York, NY: Palgrave Macmillan.

Roemer, J. E. (1998). *Equality of Opportunity*. Cambridge, MA: Harvard University Press.

Roemer, J. E., & Trannoy, A. (2014). Equality of Opportunity. In A. B. Atkinson & F. Bourguignon (Eds.), *Handbook of Income Distribution* (Vol. 2). Elsevier B.V.

Salehi-Isfahani, D., Hassine, N. B., & Assaad, R. (2012). *Equality of Opportunity in Educational Achievement in the Middle East and North Africa*. *Economic Research Forum Working Paper Series No. 689*. Cairo, Egypt.

Salehi-Isfahani, D., Hassine, N. B., & Assaad, R. (2014). Equality of Opportunity in Educational Achievement in the Middle East and North Africa. *Journal of Economic Inequality*, *12*(4), 489–515.

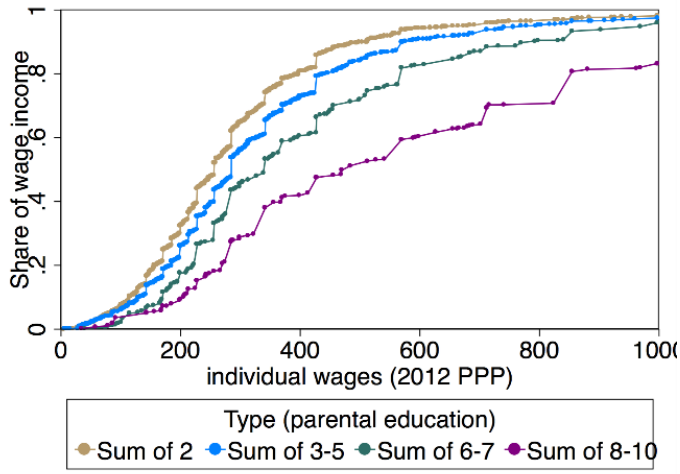
Salehi-Isfahani, D., & Vahidmanesh, A. (2016). *Equality of Human Opportunities in the Middle East and North Africa*. *Economic Research Forum Working Paper Series*.

Velez, C. E., Al-Shawarby, S., & El-Laithy, H. (2012). *Equality of Opportunity for Children in Egypt , 2000 – 2009 Achievements and Challenges*. *World Bank Policy Research Paper No. 6159*. Washington, DC.

Verme, P., Milanovic, B., Al-Shawarby, S., El Tawila, S., Gadallah, M., & El-Majeed, E. A. A. (2014). *Inside Inequality in the Arab Republic of Egypt: Facts and Perceptions across People, Time, and Space. World Bank Studies*. Washington, DC: World Bank.

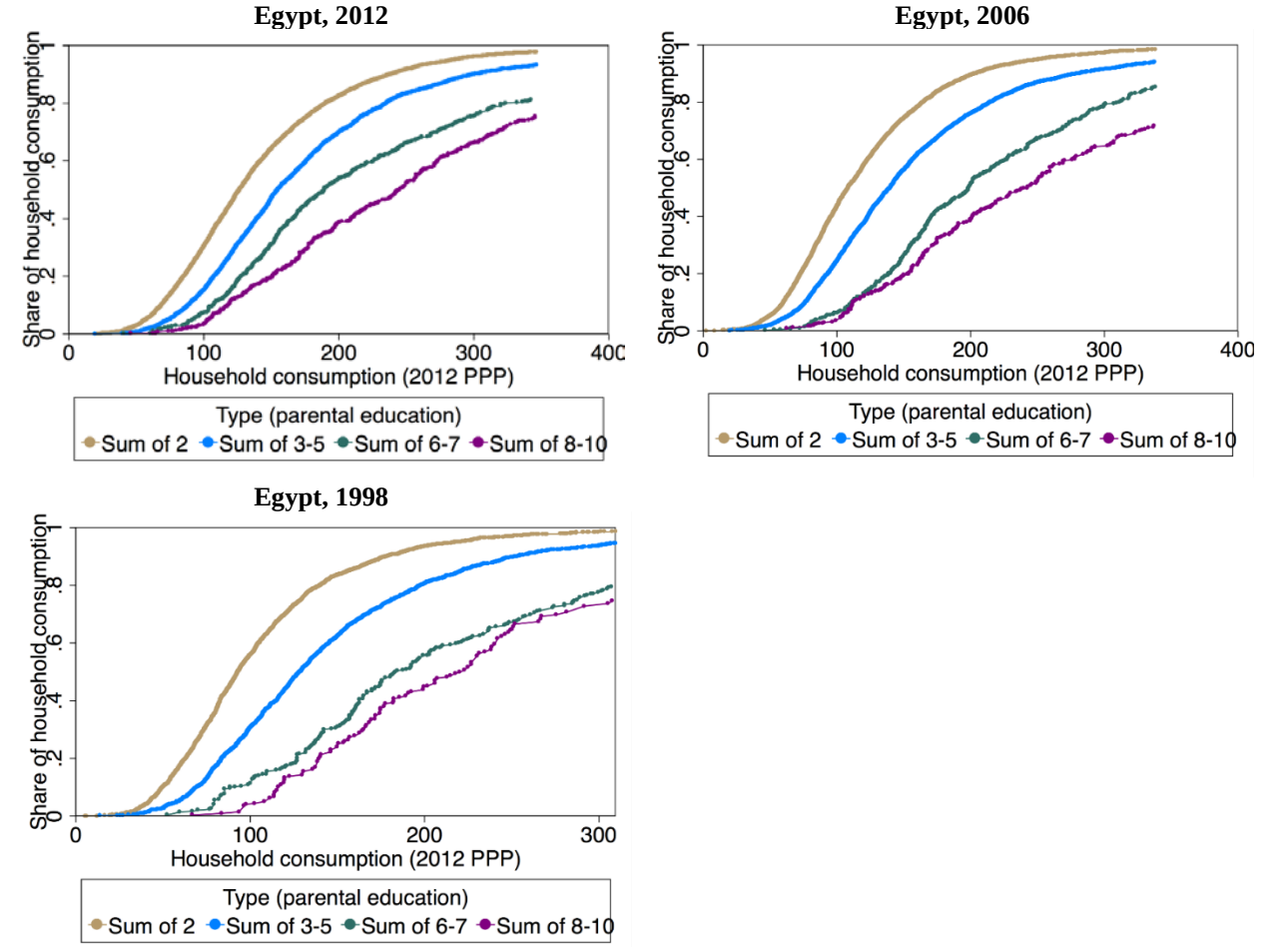
World Bank. (2015). *Inequality, Uprisings, and Conflict in the Arab World*. *MENA Economic Monitor*. Washington, DC: World Bank.

**Figure 1: Cumulative Distribution Functions of Individual Wages, Male Wage Earners 30-49, Egypt 2012**




Source: Authors' calculations based on ELMPS 2012

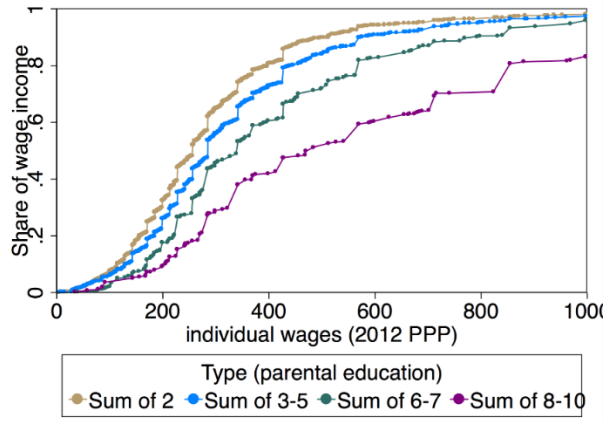
**Figure 2: Cumulative Distribution Functions of Individual Consumption by Round**



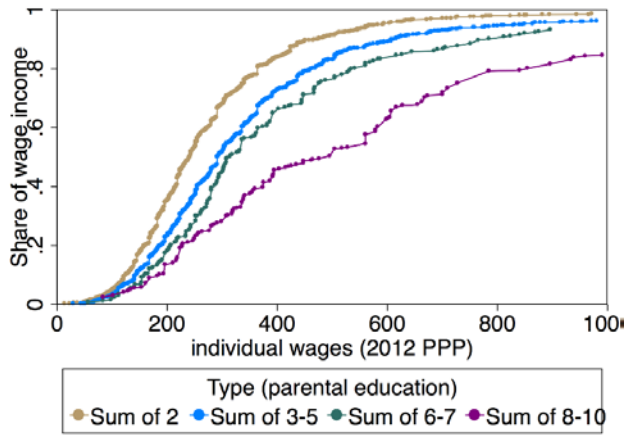

Notes: Sum of 2 means both parents are illiterate. Sum of 3-5 means one of the following combinations: Illiterate and Read & Write, both Read & Write, Basic and Illiterate, Basic and Read & Write, Secondary and Illiterate. Sum of 6-7 means one of the following combinations: University and Illiterate, Secondary and Read & Write, Basic and Basic, University and Read & Write, Secondary and Basic. Sum of 8-10 means one of the following combinations: University and Basic, Secondary and Secondary, University and Secondary, or University and University.
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 3: Cumulative Distribution Functions of Individual Wages, Male Wage Earners 30-49, by Round, Egypt**

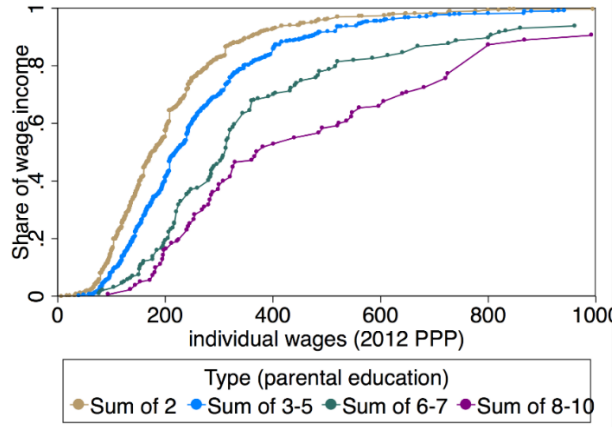
**Egypt, 2012**



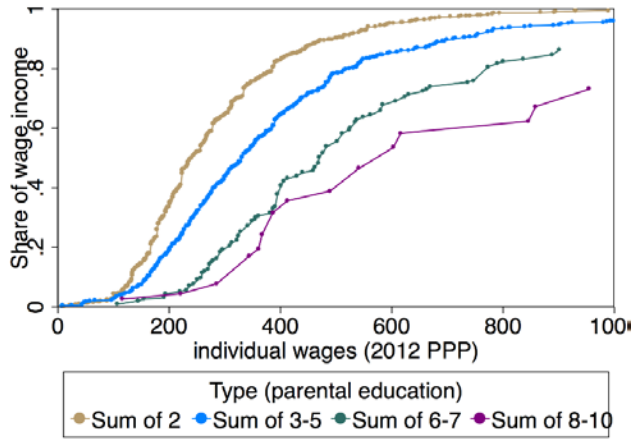

**Egypt, 2006**




**Egypt, 1998**

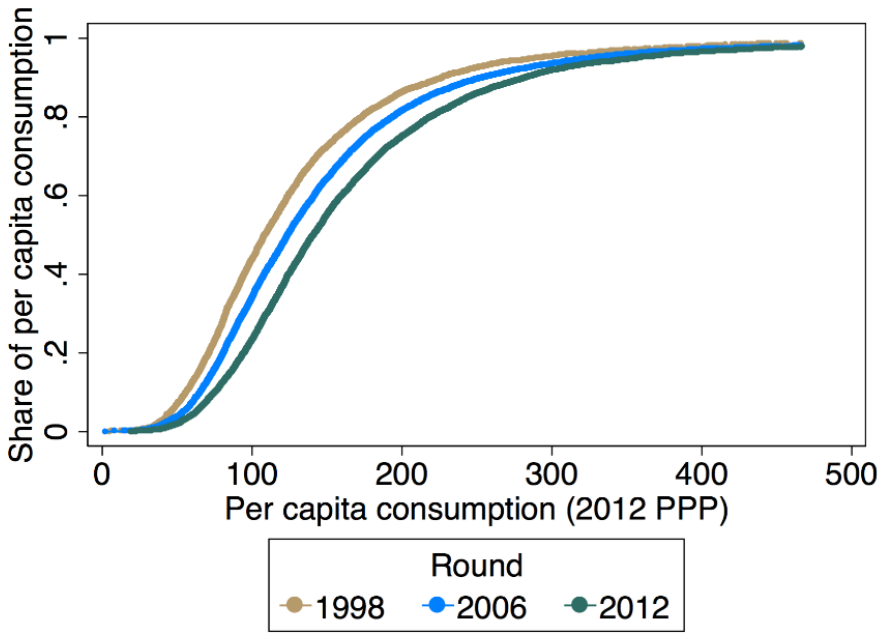



**Egypt, 1988**



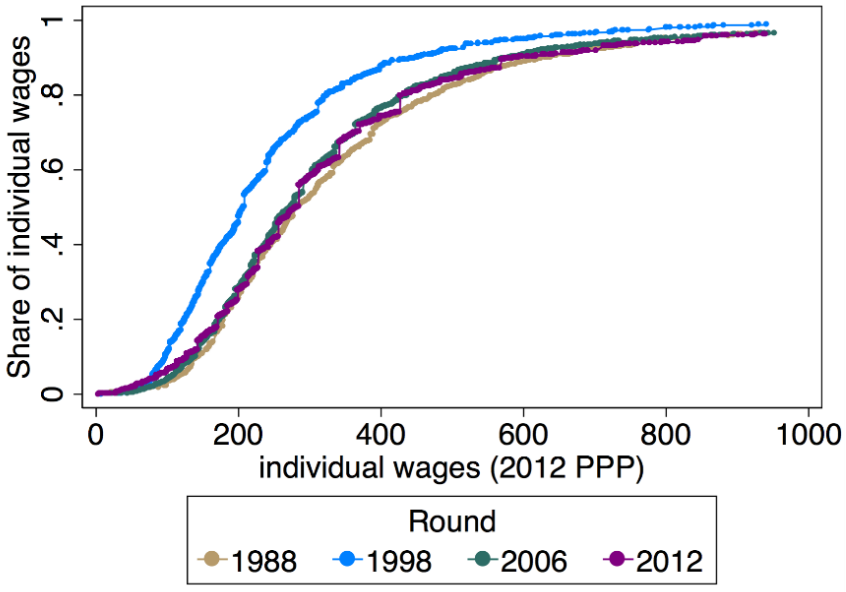

Notes: Sum of 2 means both parents are illiterate. Sum of 3-5 means one of the following combinations: Illiterate and Read & Write, both Read & Write, Basic and Illiterate, Basic and Read & Write, Secondary and Illiterate. Sum of 6-7 means one of the following combinations: University and Illiterate, Secondary and Read & Write, Basic and Basic, University and Read & Write, Secondary and Basic. Sum of 8-10 means one of the following combinations: University and Basic, Secondary and Secondary, University and Secondary, or University and University.
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 4: Cumulative Distribution Functions of Consumption by Round**



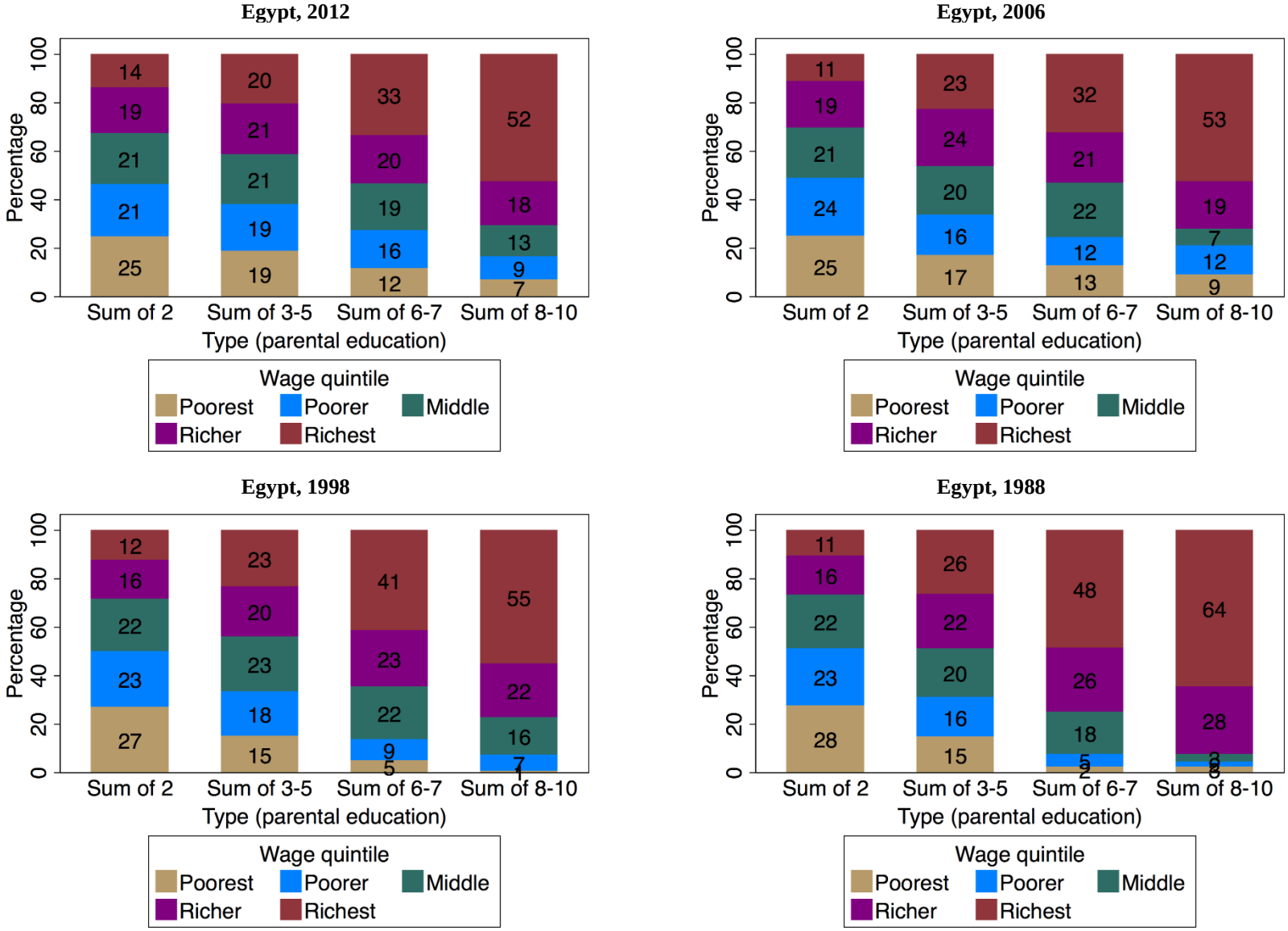

Notes: Based on first iteration of consumption
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 5: Cumulative Distribution Functions of Individual Monthly Wages, Male Wage Earners 30-49, by Round**



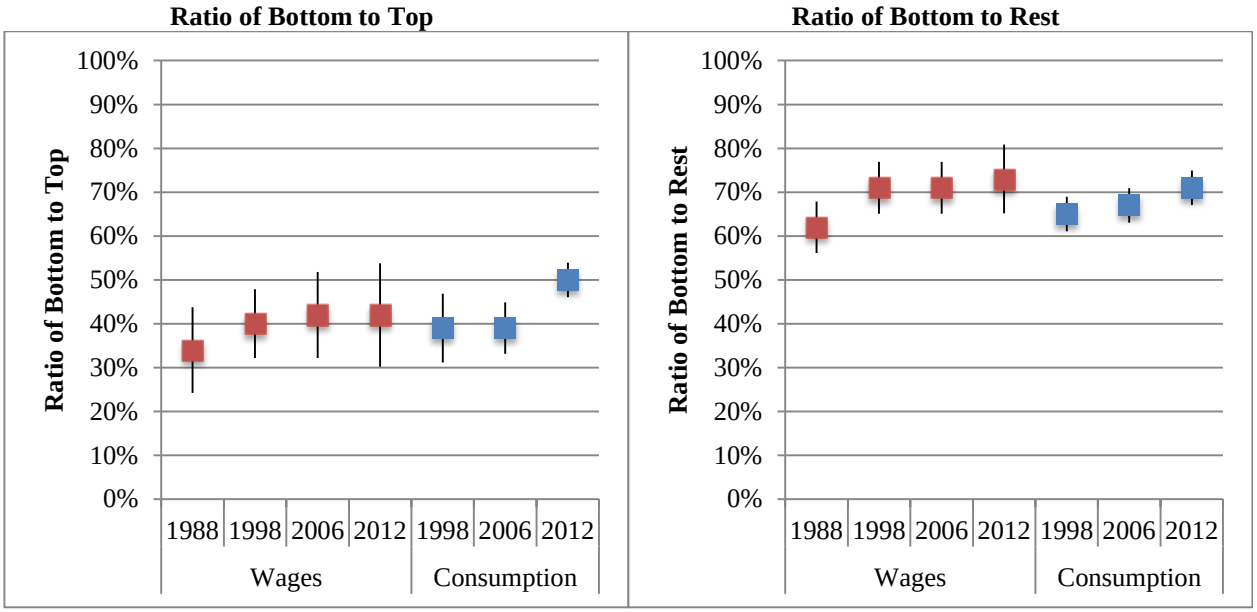

Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 6. Mobility by type: Share of each type by wage quintile (percentage), male wage earners 30-49, by country**



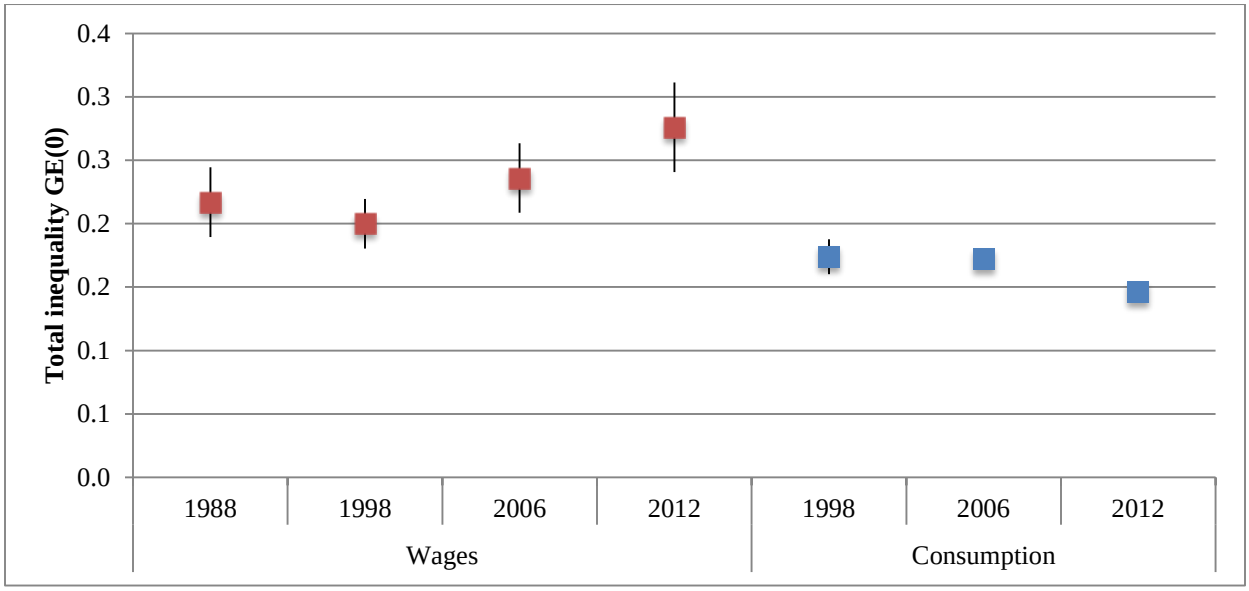

Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Figure 7: Individual Wage and Consumption Inequality by Round



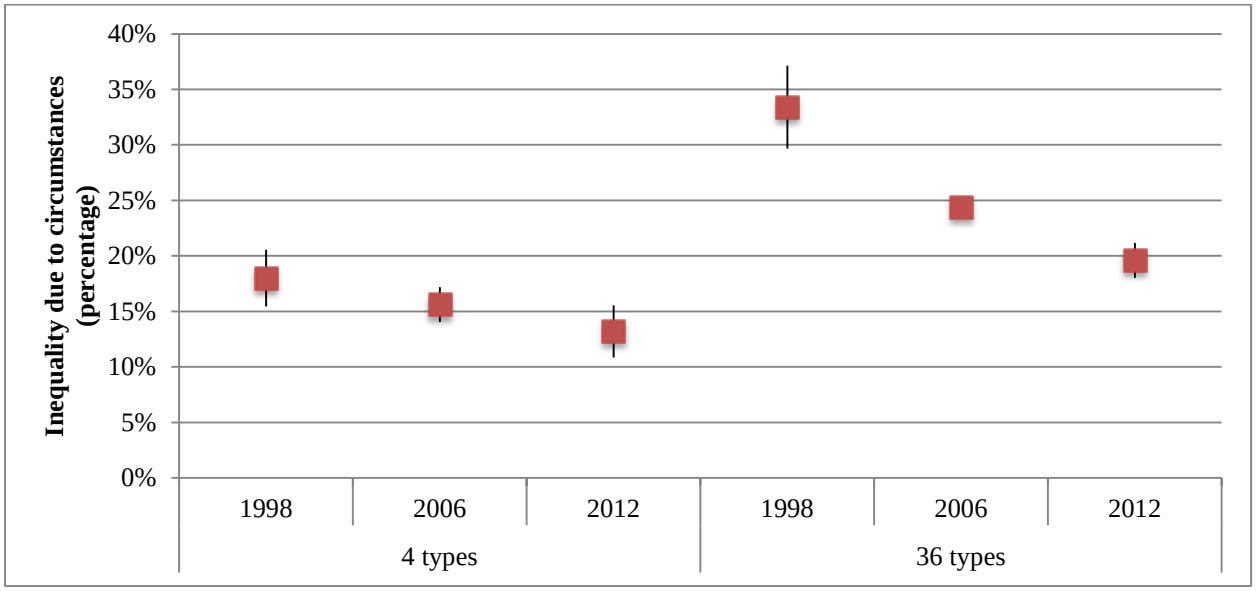

Note: See Table 4 for underlying values. Bars indicate 95% confidence intervals
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Figure 8: Total Inequality in Consumption and Wages Over Time



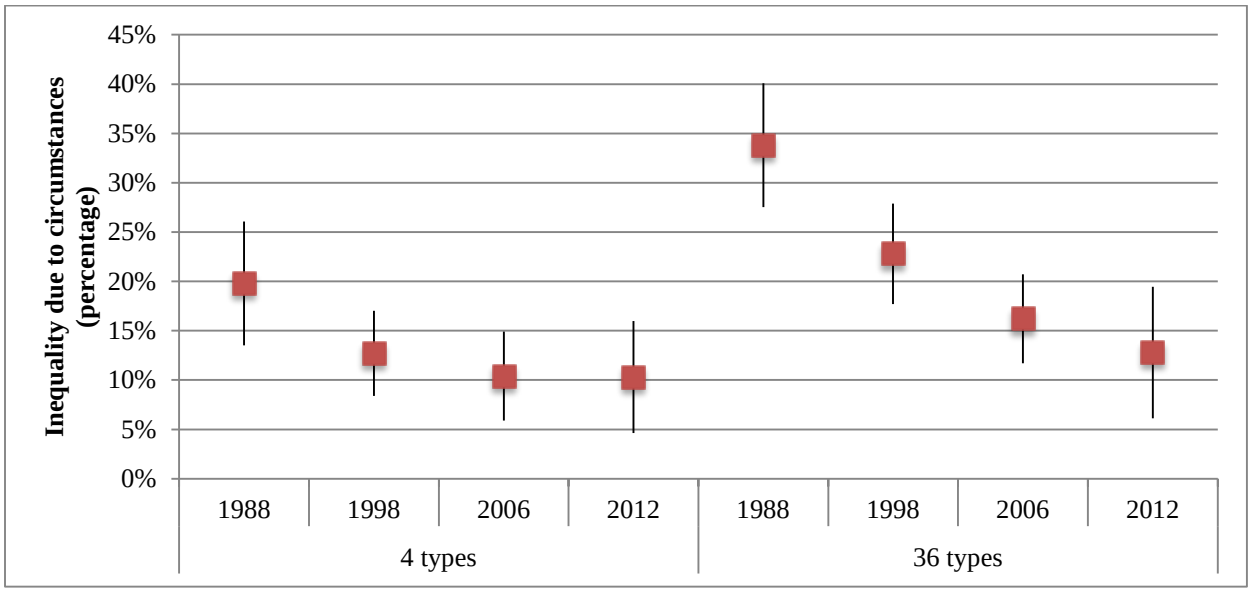

Note: See Table 5 and Table 6 for underlying values. Bars indicate 95% confidence intervals
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 9: Between Inequality in Consumption Over Time and by Specification**



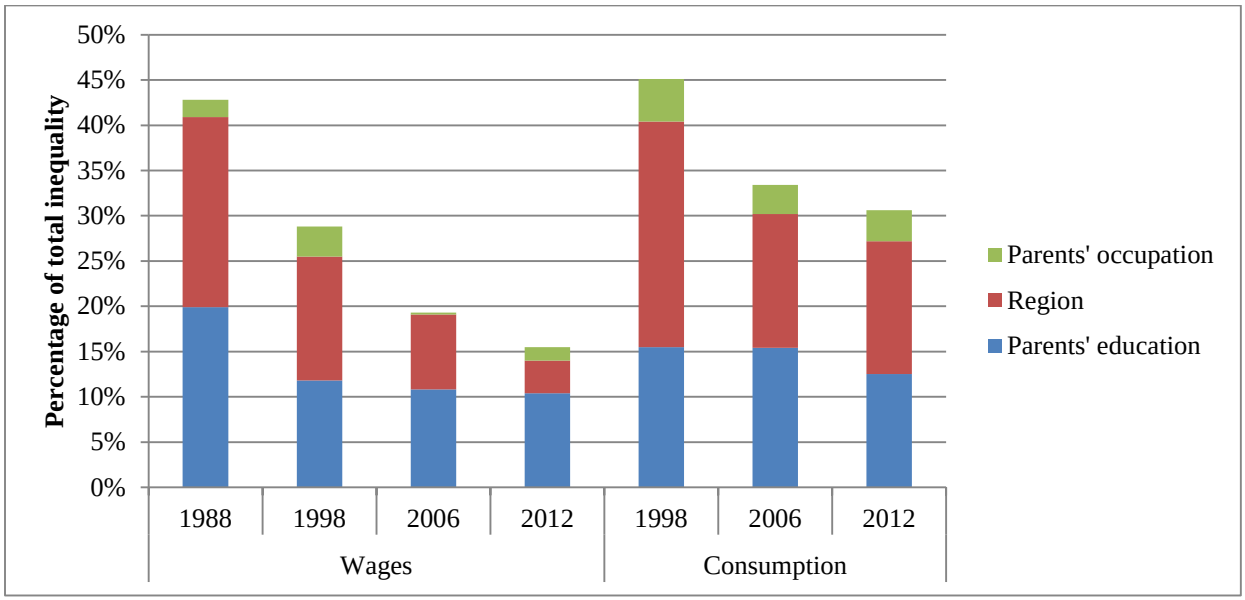

Note: See Table 5 and Table 7 for underlying values. Bars indicate 95% confidence intervals
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 10: Between Inequality in Wages Over Time and by Specification**



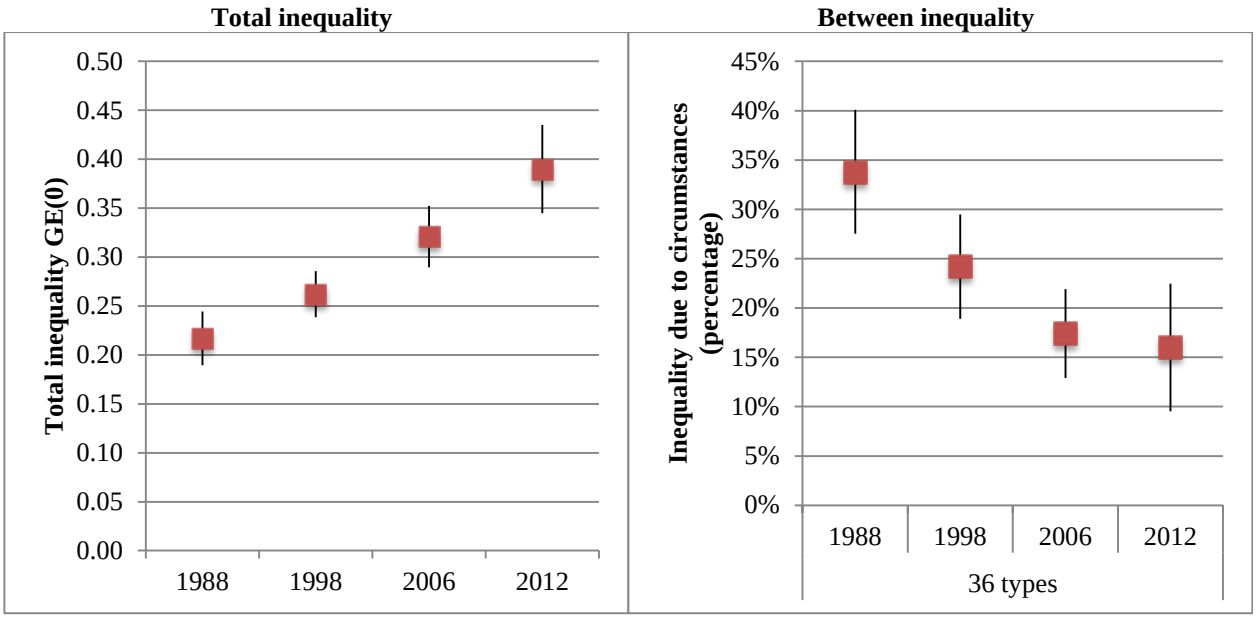

Note: See Table 6 and Table 8 for underlying values. Bars indicate 95% confidence intervals
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 11: Partial Effects, Percentage of Total Inequality in Wages and Consumption, Parametric Models Over Time**



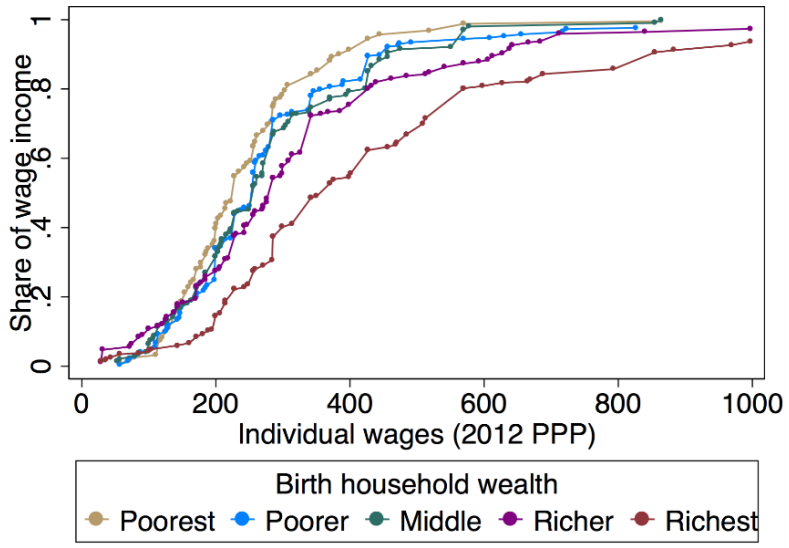

Note: See Table 12, specification 3 for underlying values
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 12: Total and between Inequality in Formality Adjusted Wages Over Time**



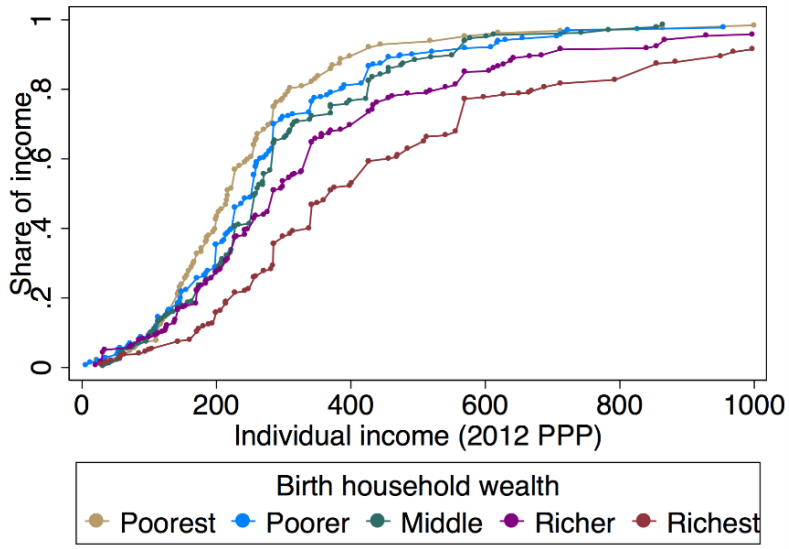

Note: See Table 9 for underlying values. Bars indicate 95% confidence intervals
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

**Figure 13: Cumulative Distribution Functions of Individual Wages, Male Wage Earners by Birth Household Wealth, Panel Sample, Egypt**



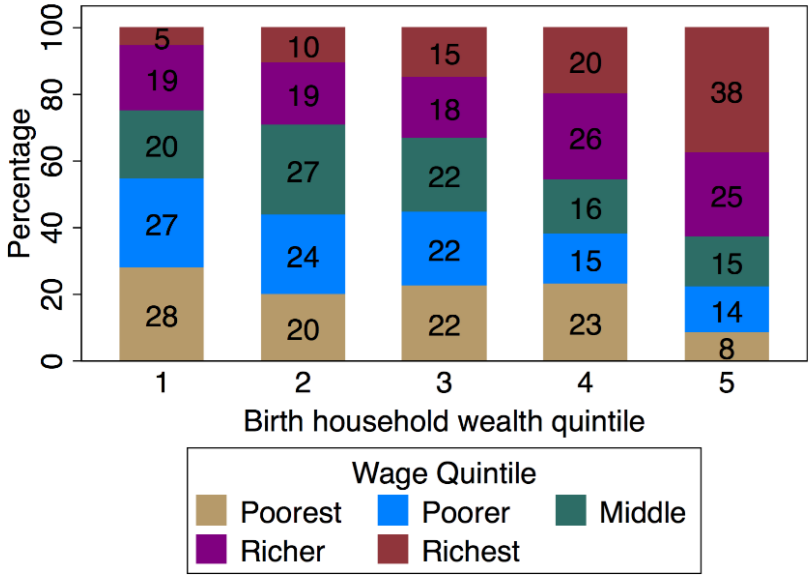

Source: Authors' calculations based on ELMPS 1998-2012

**Figure 14. Cumulative Distribution Functions of Individual Earned Incomes, Male Income Earners by Birth Household Wealth, Panel Sample, Egypt**



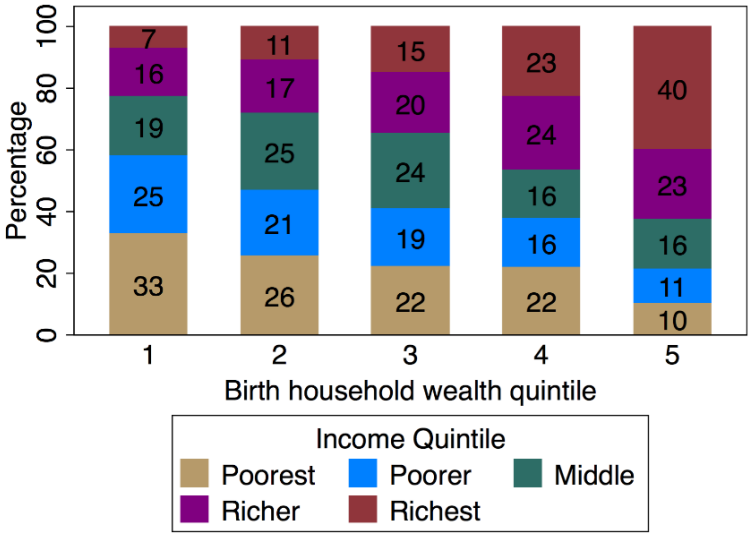

Source: Authors' calculations based on ELMPS 1998-2012

**Figure 15: Mobility by Natal Household Wealth: Share In Each Wage Quintile (Percentage), Male Wage Earners by Birth Household Wealth, Panel Sample, Egypt**



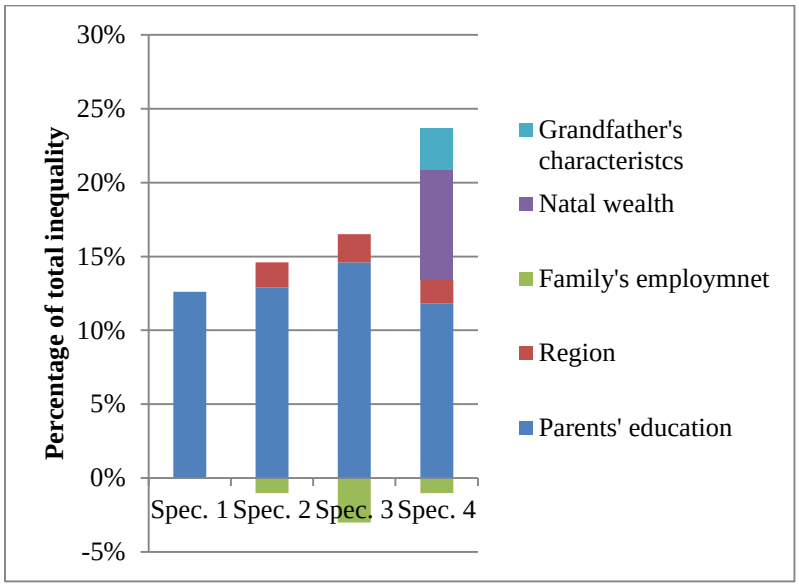

Source: Authors' calculations based on ELMPS 1998-2012

**Figure 16: Mobility by Natal Household Wealth: Share in Each Income Quintile (Percentage), Male Income Earners by Birth Household Wealth, Panel Sample, Egypt**




Source: Authors' calculations based on ELMPS 1998-2012

**Figure 17: Partial Effects, Percentage of Total Inequality in Wages, Parametric Models, Panel Sample**




Notes: See Table 11 for underlying estimates.
Source: Authors' calculations based on ELMPS 1998-2012

## Table 1: Distribution of Parental-Education Types by Round (Percentage)

| | 1988 | 1998 | 2006 | 2012 |
|---|---|---|---|---|
| **Type (heads of household)** | | | | |
| Sum of 2 | | 57 | 57 | 58 |
| Sum of 3-5 | | 37 | 35 | 32 |
| Sum of 6-7 | | 4 | 5 | 5 |
| Sum of 8-10 | | 2 | 3 | 5 |
| **Type (male wage workers 30-49)** | | | | |
| Sum of 2 | 54 | 49 | 49 | 51 |
| Sum of 3-5 | 38 | 43 | 40 | 37 |
| Sum of 6-7 | 6 | 5 | 6 | 6 |
| Sum of 8-10 | 2 | 3 | 5 | 6 |
| **Total** | 100 | 100 | 100 | 100 |
| N (heads of household) | | 4,779 | 8,340 | 12,053 |
| N (male wage workers 30-49) | 1,521 | 1,868 | 2,841 | 4,092 |

Notes: Sum of 2 means both parents are illiterate. Sum of 3-5 means one of the following combinations: Illiterate and Read & Write, both Read & Write, Basic and Illiterate, Basic and Read & Write, Secondary and Illiterate. Sum of 6-7 means one of the following combinations: University and Illiterate, Secondary and Read & Write, Basic and Basic, University and Read & Write, Secondary and Basic. Sum of 8-10 means one of the following combinations: University and Basic, Secondary and Secondary, University and Secondary, or University and University.
Source: Authors' calculations based on LFSS 1988 and ELMPS 1998-2012

## Table 2: Household Consumption and Individual Wages Summary Statistics by Country and Round (in 2012 PPP)

| | | 1988 | 1998 | 2006 | 2012 |
|---|---|---|---|---|---|
| **Household consumption** | Mean | | 133 | 151 | 169 |
| | Median | | 109 | 124 | 141 |
| | SD | | 99 | 120 | 116 |
| **Individual wages** | Mean | 365 | 254 | 353 | 364 |
| | Median | 283 | 207 | 273 | 282 |
| | SD | 314 | 200 | 384 | 441 |

Source: Authors' calculations based on LFSS 1988 and ELMPS 1998-2012

## Table 3: Annualized Mean Monthly Wage and Consumption Growth (%) by Type and Round, Egypt

| | Wages | | | Consumption | |
|---|---|---|---|---|---|
| **Type** | **1988-1998** | **1998-2006** | **2006-2012** | **1998-2006** | **2006-2012** |
| Sum of 2 | -3.1 | 4.1 | 1.0 | 1.8 | 2.4 |
| Sum of 3-5 | -4.0 | 4.2 | -0.6 | 1.1 | 1.6 |
| Sum of 6-7 | -5.7 | 0.8 | 1.2 | 0.7 | 0.3 |
| Sum of 8-10 | -4.8 | 3.5 | 0.9 | 1.6 | -1.6 |
| Total | -3.6 | 4.1 | 0.5 | 1.6 | 1.9 |

Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Appendix: Additional Tables

## Table 4: Individual Wage and Consumption Inequality by Round, Egypt

| | Wages | | | | Consumption | | |
|---|---|---|---|---|---|---|---|
| | **1988** | **1998** | **2006** | **2012** | **1998** | **2006** | **2012** |
| Outcome of bottom type (2012 PPP) | 286 | 211 | 292 | 309 | 108 | 124.67 | 144.14 |
| Ratio of bottom to top | 0.34 | 0.40 | 0.42 | 0.42 | 0.39 | 0.39 | 0.5 |
| *Bootstrapped SE* | (0.05) | (0.04) | (0.05) | (0.06) | (0.04) | (0.03) | (0.02) |
| Ratio of bottom to rest | 0.62 | 0.71 | 0.71 | 0.73 | 0.65 | 0.67 | 0.71 |
| *Bootstrapped SE* | (0.03) | (0.03) | (0.03) | (0.04) | (0.02) | (0.02) | (0.02) |

Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Table 5: Basic (Four Types) Non-Parametric Individual Consumption by Round

| | **1998** | **2006** | **2012** |
|---|---|---|---|
| Total inequality | 0.174*** | 0.172*** | 0.146*** |
| | (0.007) | (0.004) | (0.004) |
| Observed between inequality | 0.031*** | 0.027*** | 0.019*** |
| | (0.003) | (0.002) | (0.002) |
| Observed between/total | 0.180*** | 0.156*** | 0.132*** |
| | (0.013) | (0.008) | (0.012) |
| N | 4779 | 8340 | 12053 |

Notes: *p<0.05; **p<0.01; ***p<0.001
Source: Authors' calculations based on ELMPS 1998-2012

## Table 6: Basic (Four Types) Non-Parametric Individual Wage Inequality by Round, Males Age 30-49, Egypt

| | **1988** | **1998** | **2006** | **2012** |
|---|---|---|---|---|
| Total inequality | 0.217*** | 0.200*** | 0.236*** | 0.276*** |
| | (0.014) | (0.010) | (0.014) | (0.018) |
| Observed between inequality | 0.043*** | 0.025*** | 0.025*** | 0.029** |
| | (0.009) | (0.005) | (0.006) | (0.010) |
| Observed between/total | 0.198*** | 0.127*** | 0.104*** | 0.103*** |
| | (0.032) | (0.022) | (0.023) | (0.029) |
| N | 1521 | 1868 | 2841 | 4092 |

Notes: *p<0.05; **p<0.01; ***p<0.001
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Table 7: Full (36 types) Non-Parametric Individual Consumption Inequality by Round

| | **1998** | **2006** | **2012** |
|---|---|---|---|
| Total inequality | 0.174*** | 0.172*** | 0.144*** |
| | (0.006) | (0.004) | (0.003) |
| Observed between inequality | 0.058*** | 0.042*** | 0.028*** |
| | (0.003) | (0.002) | (0.002) |
| Observed between/total | 0.334*** | 0.244*** | 0.196*** |
| | (0.019) | (0.004) | (0.008) |
| N | 4765 | 8319 | 11947 |

Notes: *p<0.05; **p<0.01; ***p<0.001
Source: Authors' calculations based on ELMPS 1998-2012

## Table 8: Full (36 types) Non-Parametric Individual Wage Inequality by Round, Males Age 30-49

| | 1988 | 1998 | 2006 | 2012 |
|---|---|---|---|---|
| Total inequality | 0.217*** | 0.200*** | 0.236*** | 0.277*** |
| | (0.014) | (0.010) | (0.014) | (0.018) |
| Observed between inequality | 0.073*** | 0.045*** | 0.038*** | 0.035** |
| | (0.011) | (0.006) | (0.007) | (0.011) |
| Observed between/total | 0.338*** | 0.228*** | 0.162*** | 0.128*** |
| | (0.032) | (0.026) | (0.023) | (0.034) |
| N | 1516 | 1864 | 2833 | 4038 |

Notes: *p<0.05; **p<0.01; ***p<0.001
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Table 9: Full (36 Types) Non-Parametric Individual Adjusted Wage Inequality (Doubling Wages of Formal Jobs) by Round, Males Age 30-49

| | 1988 | 1998 | 2006 | 2012 |
|---|---|---|---|---|
| Total inequality | 0.217*** | 0.262*** | 0.321*** | 0.390*** |
| | (0.014) | (0.012) | (0.016) | (0.023) |
| Observed between inequality | 0.073*** | 0.063*** | 0.056*** | 0.062*** |
| | (0.011) | (0.009) | (0.009) | (0.016) |
| Observed between/total | 0.338*** | 0.242*** | 0.174*** | 0.160*** |
| | (0.032) | (0.027) | (0.023) | (0.033) |
| N | 1516 | 1864 | 2833 | 4038 |

Notes: *p<0.05; **p<0.01; ***p<0.001
Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Table 10: Wage Inequality of Opportunity (GE(0)), Panel Sample, Egypt, 2012

| | Spec. 1 | Spec. 2 | Spec. 3 | Spec. 4 |
|---|---|---|---|---|
| Total inequality | 0.253*** | 0.254*** | 0.254*** | 0.255*** |
| | (0.034) | (0.035) | (0.035) | (0.039) |
| Within inequality | 0.221*** | 0.221*** | 0.217*** | 0.210*** |
| | (0.025) | (0.027) | (0.025) | (0.022) |
| Observed between/total | 0.126* | 0.128* | 0.146** | 0.179** |
| | (0.055) | (0.050) | (0.055) | (0.058) |
| Parent's education | | 0.129* | 0.146* | 0.118 |
| | | (0.053) | (0.060) | (0.063) |
| Region of birth | | 0.017 | 0.019 | 0.016 |
| | | (0.021) | (0.024) | (0.022) |
| Family's employment | | -0.017 | -0.034 | -0.014 |
| | | (0.022) | (0.038) | (0.038) |
| Natal wealth | | | | 0.075 |
| | | | | (0.071) |
| Grandfather's characteristics | | | | 0.028 |
| | | | | (0.041) |
| N | 1070 | 1045 | 1045 | 1032 |

Notes: *p<0.05; **p<0.01; ***p<0.001
Source: Authors' calculations based on ELMPS 1998-2012

## Table 11: Earned Income Inequality of Opportunity (GE(0)), Panel Sample, Egypt, 2012

| | Spec. 1 | Spec. 2 | Spec. 3 | Spec. 4 |
|---|---|---|---|---|
| Total inequality | 0.328*** | 0.331*** | 0.331*** | 0.333*** |
| | (0.034) | (0.035) | (0.035) | (0.035) |
| Within inequality | 0.296*** | 0.298*** | 0.292*** | 0.285*** |
| | (0.028) | (0.028) | (0.026) | (0.024) |
| Observed between/total | 0.097** | 0.099** | 0.118** | 0.144** |
| | (0.035) | (0.034) | (0.038) | (0.045) |
| Parent's education | | 0.089* | 0.119** | 0.093* |
| | | (0.034) | (0.041) | (0.038) |
| Region of birth | | 0.017 | 0.008 | 0.002 |
| | | (0.018) | (0.017) | (0.017) |
| Family's employment | | 0.019 | -0.005 | 0.006 |
| | | (0.022) | (0.030) | (0.037) |
| Natal wealth | | | | 0.068 |
| | | | | (0.054) |
| Grandfather's characteristics | | | | 0.022 |
| | | | | (0.024) |
| N | 1346 | 1314 | 1314 | 1299 |

Notes: *p<0.05; **p<0.01; ***p<0.001
Source: Authors' calculations based on ELMPS 1998-2012

## Table 12: Parametric Inequality Estimates

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Specification 1** | | | | | | | |
| | **Consumption** | | | **Wages** | | | |
| | **Egypt 1998** | **Egypt 2006** | **Egypt 2012** | **Egypt 1988** | **Egypt 1998** | **Egypt 2006** | **Egypt 2012** |
| Total inequality | 0.174*** | 0.172*** | 0.146*** | 0.217*** | 0.200*** | 0.236*** | 0.276*** |
| | (0.007) | (0.009) | (0.007) | (0.018) | (0.012) | (0.015) | (0.019) |
| Within inequality | 0.143*** | 0.145*** | 0.127*** | 0.175*** | 0.174*** | 0.213*** | 0.248*** |
| | (0.005) | (0.008) | (0.004) | (0.010) | (0.009) | (0.013) | (0.014) |
| Observed between/total | 0.180*** | 0.156*** | 0.132*** | 0.193*** | 0.127*** | 0.100*** | 0.101*** |
| | (0.030) | (0.010) | (0.017) | (0.036) | (0.025) | (0.025) | (0.026) |
| N | 4779 | 8340 | 12053 | 1521 | 1868 | 2841 | 4092 |
| **Specification 2** | | | | | | | |
| | **Consumption** | | | **Wages** | | | |
| | **Egypt 1998** | **Egypt 2006** | **Egypt 2012** | **Egypt 1988** | **Egypt 1998** | **Egypt 2006** | **Egypt 2012** |
| Total inequality | 0.174*** | 0.172*** | 0.144*** | 0.217*** | 0.200*** | 0.236*** | 0.277*** |
| | (0.008) | (0.009) | (0.004) | (0.018) | (0.012) | (0.015) | (0.017) |
| Within inequality | 0.115*** | 0.131*** | 0.112*** | 0.152*** | 0.157*** | 0.202*** | 0.245*** |
| | (0.004) | (0.006) | (0.002) | (0.008) | (0.008) | (0.012) | (0.013) |
| Observed between/total | 0.342*** | 0.240*** | 0.222*** | 0.302*** | 0.211*** | 0.145*** | 0.115*** |
| | (0.015) | (0.013) | (0.010) | (0.037) | (0.030) | (0.028) | (0.028) |
| Parent's education | 0.144*** | 0.136*** | 0.114*** | 0.141*** | 0.116*** | 0.090*** | 0.093*** |
| | (0.027) | (0.008) | (0.009) | (0.034) | (0.024) | (0.024) | (0.026) |
| Region | 0.250*** | 0.150*** | 0.150*** | 0.189*** | 0.137*** | 0.084*** | 0.038*** |
| | (0.004) | (0.006) | (0.013) | (0.008) | (0.008) | (0.012) | (0.011) |
| Occupation | 0.049** | 0.038*** | 0.035*** | 0.062** | 0.022 | 0.006 | 0.007 |
| | (0.018) | (0.007) | (0.010) | (0.020) | (0.014) | (0.011) | (0.008) |
| N | 4761 | 8319 | 11945 | 1515 | 1861 | 2833 | 4035 |
| **Specification 3** | | | | | | | |
| | **Consumption** | | | **Wages** | | | |
| | **Egypt 1998** | **Egypt 2006** | **Egypt 2012** | **Egypt 1988** | **Egypt 1998** | **Egypt 2006** | **Egypt 2012** |
| Total inequality | 0.174*** | 0.172*** | 0.144*** | 0.229*** | 0.200*** | 0.236*** | 0.277*** |
| | (0.008) | (0.009) | (0.004) | (0.021) | (0.012) | (0.015) | (0.017) |
| Within inequality | 0.113*** | 0.128*** | 0.111*** | 0.152*** | 0.157*** | 0.197*** | 0.240*** |
| | (0.004) | (0.005) | (0.002) | (0.009) | (0.007) | (0.012) | (0.011) |
| Observed between/total | 0.350*** | 0.254*** | 0.230*** | 0.338*** | 0.216*** | 0.165*** | 0.134*** |
| | (0.015) | (0.015) | (0.011) | (0.039) | (0.031) | (0.029) | (0.030) |
| Parent's education | 0.155*** | 0.154*** | 0.125*** | 0.199*** | 0.118*** | 0.108*** | 0.104*** |
| | (0.027) | (0.008) | (0.009) | (0.037) | (0.027) | (0.027) | (0.029) |
| Region | 0.249*** | 0.148*** | 0.147*** | 0.210*** | 0.137*** | 0.083*** | 0.036*** |
| | (0.016) | (0.005) | (0.014) | (0.009) | (0.007) | (0.012) | (0.011) |
| Occupation | 0.047** | 0.032*** | 0.034*** | 0.019 | 0.033* | 0.002 | 0.015 |
| | (0.017) | (0.008) | (0.009) | (0.022) | (0.016) | (0.013) | (0.012) |
| N | 4758 | 8319 | 11945 | 1092 | 1856 | 2833 | 4035 |

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

Source: Authors' calculations based on LFSS 1988, ELMPS 1998-2012

## Table 13: Regressions Underlying Inequality Decomposition for Wages and Earned Income, Panel Sample, Egypt, 2012

| | Log Wages | | | | Log Full Income | | | |
|---|---|---|---|---|---|---|---|---|
| | **Spec. 1** | **Spec. 2** | **Spec. 3** | **Spec. 4** | **Spec. 1** | **Spec. 2** | **Spec. 3** | **Spec. 4** |
| **Sum of parent's education (both illit. (2) omit)** | | | | | | | | |
| Sum of 3-5 | 0.025 | 0.027 | | | 0.144* | 0.098 | | |
| | (0.068) | (0.072) | | | (0.060) | (0.064) | | |
| Sum of 6-7 | 0.165* | 0.142 | | | 0.354*** | 0.251* | | |
| | (0.078) | (0.100) | | | (0.083) | (0.103) | | |
| Sum of 8-10 | 0.571*** | 0.593*** | | | 0.631*** | 0.540*** | | |
| | (0.108) | (0.140) | | | (0.102) | (0.139) | | |
| **Region (3) (Metro. omit)** | | | | | | | | |
| Lower Egypt | | -0.172* | | | | -0.122 | | |
| | | (0.073) | | | | (0.086) | | |
| Upper Egypt | | -0.128 | | | | -0.034 | | |
| | | (0.076) | | | | (0.082) | | |
| **Birth area rural** | | -0.009 | | | | -0.074 | | |
| | | (0.058) | | | | (0.072) | | |
| **Father's occupation (white collar omit)** | | | | | | | | |
| Blue collar | | 0.056 | | | | -0.031 | | |
| | | (0.073) | | | | (0.076) | | |
| Agricultural | | 0.051 | | | | -0.110 | | |
| | | (0.104) | | | | (0.096) | | |
| **Work experience from life history** | | 0.017 | 0.014 | 0.019 | | 0.016 | 0.015 | 0.018 |
| | | (0.020) | (0.019) | (0.016) | | (0.019) | (0.019) | (0.018) |
| **Work Exp. Sq/100** | | -0.048 | -0.038 | -0.050 | | -0.050 | -0.047 | -0.055 |
| | | (0.073) | (0.071) | (0.061) | | (0.067) | (0.067) | (0.063) |
| **Mother's education (none omit.)** | | | | | | | | |
| Reads and Writes | | | -0.073 | -0.041 | | | 0.028 | 0.059 |
| | | | (0.127) | (0.130) | | | (0.136) | (0.137) |
| Basic | | | 0.061 | 0.074 | | | -0.027 | -0.002 |
| | | | (0.077) | (0.077) | | | (0.097) | (0.094) |
| Intermediate and Above Int. | | | 0.280* | 0.227 | | | 0.195 | 0.136 |
| | | | (0.130) | (0.126) | | | (0.129) | (0.127) |
| University and Above | | | 0.395 | 0.130 | | | 0.262 | 0.055 |
| | | | (0.216) | (0.264) | | | (0.178) | (0.223) |
| **Father's education (none omit.)** | | | | | | | | |
| Reads and Writes | | | 0.051 | 0.040 | | | 0.145* | 0.133* |
| | | | (0.065) | (0.066) | | | (0.063) | (0.063) |
| Basic | | | 0.071 | 0.080 | | | 0.193 | 0.148 |
| | | | (0.131) | (0.112) | | | (0.131) | (0.120) |
| Intermediate and Above Int. | | | 0.081 | 0.074 | | | 0.131 | 0.118 |
| | | | (0.145) | (0.139) | | | (0.148) | (0.152) |
| University and Above | | | 0.424** | 0.293 | | | 0.550*** | 0.360* |
| | | | (0.154) | (0.178) | | | (0.159) | (0.170) |
| **Region (6) (Greater Cairo omit.)** | | | | | | | | |
| Alex & Suez Canal | | | 0.122 | 0.143 | | | 0.065 | 0.084 |
| | | | (0.091) | (0.092) | | | (0.090) | (0.093) |
| Urban Lower Egypt | | | -0.087 | -0.082 | | | -0.106 | -0.079 |
| | | | (0.097) | (0.105) | | | (0.096) | (0.102) |
| Urban Upper Egypt | | | -0.117 | -0.072 | | | -0.091 | -0.028 |
| | | | (0.091) | (0.089) | | | (0.091) | (0.094) |
| Rural Lower Egypt | | | -0.151 | -0.068 | | | -0.184* | -0.077 |
| | | | (0.080) | (0.081) | | | (0.087) | (0.091) |
| Rural Upper Egypt | | | -0.102 | -0.034 | | | -0.083 | -0.003 |
| | | | (0.104) | (0.100) | | | (0.095) | (0.103) |
| **Father's occupation (white collar regular omit)** | | | | | | | | |
| White collar nonwage | | | 0.085 | 0.075 | | | 0.195 | 0.187 |
| | | | (0.115) | (0.107) | | | (0.118) | (0.114) |
| Blue collar regular wage | | | 0.057 | 0.057 | | | -0.013 | 0.037 |
| | | | (0.109) | (0.102) | | | (0.115) | (0.110) |
| Blue collar irregular wage | | | 0.216 | 0.224* | | | 0.235* | 0.269* |
| | | | (0.115) | (0.101) | | | (0.119) | (0.109) |
| Blue collar nonwage | | | 0.094 | 0.107 | | | 0.075 | 0.112 |
| | | | (0.112) | (0.102) | | | (0.111) | (0.109) |
| Agricultural regular wage | | | 0.084 | 0.067 | | | 0.029 | 0.050 |
| | | | (0.164) | (0.160) | | | (0.143) | (0.133) |
| Agricultural irregular wage | | | 0.086 | 0.065 | | | 0.074 | 0.110 |
| | | | (0.124) | (0.109) | | | (0.120) | (0.112) |
| Agricultural nonwage | | | 0.124 | 0.152 | | | -0.062 | -0.010 |
| | | | (0.157) | (0.127) | | | (0.137) | (0.129) |

| | Log Wages | | | | Log Full Income | | | |
|---|---|---|---|---|---|---|---|---|
| | **Spec. 1** | **Spec. 2** | **Spec. 3** | **Spec. 4** | **Spec. 1** | **Spec. 2** | **Spec. 3** | **Spec. 4** |
| **Natal HH wealth quintile (poorest omit)** | | | | | | | | |
| Poorer | | | | 0.036 | | | | -0.000 |
| | | | | (0.072) | | | | (0.077) |
| Middle | | | | 0.100 | | | | 0.087 |
| | | | | (0.079) | | | | (0.088) |
| Richer | | | | 0.062 | | | | 0.117 |
| | | | | (0.077) | | | | (0.091) |
| Richest | | | | 0.007 | | | | -0.031 |
| | | | | (0.129) | | | | (0.127) |
| **Father university educated and richest quintile** | | | | 0.330 | | | | 0.406 |
| | | | | (0.276) | | | | (0.245) |
| **Grandfather information missing** | | | | 0.003 | | | | 0.087 |
| | | | | (0.075) | | | | (0.081) |
| **Grandfather education (illit. omit)** | | | | | | | | |
| Reads and Writes | | | | -0.121* | | | | -0.008 |
| | | | | (0.051) | | | | (0.060) |
| Basic | | | | 0.025 | | | | 0.153 |
| | | | | (0.122) | | | | (0.139) |
| Intermediate and Above Int. | | | | 0.428 | | | | 0.418 |
| | | | | (0.276) | | | | (0.273) |
| University and Above | | | | 0.287 | | | | 0.337 |
| | | | | (0.236) | | | | (0.230) |
| **Grandfather occupation (white collar omit.)** | | | | | | | | |
| Blue collar | | | | 0.000 | | | | 0.011 |
| | | | | (0.076) | | | | (0.084) |
| Agricultural | | | | -0.021 | | | | -0.007 |
| | | | | (0.077) | | | | (0.082) |
| **Family has enterprise** | | | | -0.276 | | | | -0.272 |
| | | | | (0.170) | | | | (0.151) |
| **Enterprise capital (none/DK omit.)** | | | | | | | | |
| <LE500 | | | | 0.417* | | | | 0.365 |
| | | | | (0.204) | | | | (0.188) |
| LE500-999 | | | | 0.346 | | | | 0.330 |
| | | | | (0.211) | | | | (0.198) |
| LE1000-4999 | | | | 0.131 | | | | 0.209 |
| | | | | (0.188) | | | | (0.169) |
| LE5000-9999 | | | | 0.076 | | | | 0.449* |
| | | | | (0.224) | | | | (0.187) |
| LE 10000+ | | | | 0.257 | | | | 0.201 |
| | | | | (0.194) | | | | (0.186) |
| **White collar and high capital (LE 5000+) enterprise** | | | | 0.184 | | | | 0.176 |
| | | | | (0.128) | | | | (0.142) |
| **Constant** | 5.450*** | 5.421*** | 5.342*** | 5.251*** | 5.397*** | 5.475*** | 5.367*** | 5.202*** |
| | (0.042) | (0.155) | (0.167) | (0.170) | (0.038) | (0.166) | (0.185) | (0.193) |
| **P-value (model)** | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **N(Observations)** | 1070 | 1045 | 1045 | 1032 | 1346 | 1314 | 1314 | 1299 |
| **Log likelihood** | -1031.288 | -998.3126 | -991.1566 | -958.0247 | -1495.573 | -1453.817 | -1440.676 | -1408.491 |
| **R-squared** | 0.075 | 0.090 | 0.102 | 0.143 | 0.065 | 0.079 | 0.097 | 0.124 |
| **Adj. R-squared** | 0.072 | 0.081 | 0.083 | 0.108 | 0.062 | 0.072 | 0.081 | 0.095 |

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

Source: Authors' calculations based on ELMPS 1998-2012